Public Concern about Chemicals in the Environment: Regional Differences Based on Threat Potential

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Synopsis

While the hazards of chronic environmental pollution remain unclear, people are making decisions about their exposure to pollution and its possible effects on their health. To compare people's concerns about environmental problems, a systematic, stratified sample was surveyed. The sample was made up of residents, ages 25 through 74 years, of three areas of New York State. The three areas were western New York, with a high density of toxic dump sites; Long Island, with a major shallow ground water aquifer; and the remainder of the State, excluding New York City, as a comparison area. The sampling list was obtained from records of licensed drivers of the New York State Department of Motor Vehicles. A 66 percent response rate was obtained to the mailed survey.

As expected, most concerns were greater for western New York and Long Island, the two areas with highest threat potential for exposure or contamination, than for the comparison area. The single exception was that no regional differences were noted for concerns about environmental pollution and contamination. All concerns were associated with perceived distance between one's residence and a source of potential exposure. Regardless of region, women were more concerned than men about exposures, pollution, and related health effects. No sex differences, however, were noted for economic concerns.

DESPITE THE AMBIGUITY of the hazards of chronic environmental pollution by chemicals, people are making decisions every day about their exposure to chemicals, and the possible subsequent effects of toxic substances on their health. Their decisions often are based on fragmentary evidence that, at best, is scientifically questionable. With the same information, some people conclude that a given situation is harmful, while others do not.

One of the purposes of this research was to determine whether public concerns about chemical contamination of the environment and the population's exposure to the contamination varied within and among three New York State regions, each region differentiated by its sources of potential contamination. Two of the regions have unique environmental situations: western New York has a high density of toxic waste disposal sites (*1*), and Long Island has a large and shallow ground water aquifer (*2*).

The two environmental situations pose a substantial potential threat for contamination because of the size of the population that could be affected on Long Island, and the sheer number and volume of the point sources with potential for contamination in western New York. The third survey area, the remainder of New York State except for New York City, was surveyed for comparison purposes.

Methods

Sample selection. A list for sampling was obtained in 1985 from the New York State Department of Motor Vehicles. The list included both men and women residents of New York State, excluding New York City, ages 25 to 74, who had obtained a new license or who had renewed their driver's license within the previous year. The list included the residents' names, addresses, and birth dates.

A systematic, stratified sample, starting at random, of 7,533 residents was selected from the records of licensed drivers. Among New York State residents, excluding New York City, 84.8 percent of those ages 25 and older had a license to drive in 1982. The sample strata, each with about one-third of the sample, were western New York, consisting of Erie and Niagara Counties; Long Island's Nassau and Suffolk Counties, and the central and eastern area, the remainder of the State, except for New York City. A questionnaire was mailed to each person with a cover letter and a self-addressed, permit return envelope. The followup proce-

dures included a postcard reminder, a second mailing of the questionnaire, and a final mailing of the questionnaire by certified mail. Data from the 1980 census were used to assess whether sample respondents were representative of the population of the area.

Measurement. The dependent variables measured four types of concerns associated with chronic chemical contamination of the environment. The concerns involved personal or familial exposure to toxic substances in the environment, pollution and environmental contamination, specific health effects associated with exposure to toxics in the environment, and their economic consequences, as shown in the accompanying box.

The measure was developed by White and coworkers and was previously used in a hazardous waste site study in Memphis (*3*). The indices included a five-point scale that ranged from being very concerned to not concerned at all about personal exposure, children's exposure, chemical body burden, specific symptoms or diseases, damage to specific physiological functions, various displays of environmental contamination, potential sources of contamination, and economic consequences of chemical pollution.

For each measure, the values (five being the highest) were summed. The scores were computed by adding the total value of the responses and dividing the sum by the number of questions answered. The scores ranged from 1.0 to 5.0, with a higher score indicating greater concern.

If less than half of the questions for any index were answered, a missing score was assigned. Missing scores did not differ by region. The proportion was highest for the exposure index (about 9 percent), followed by the health effects concerns index (4 percent), economic concerns index (3 percent), and the environmental concerns index (1 percent). Older persons and older persons who were widowed or never married were the two most likely groups to be scored as missing.

Analysis. An analysis of variance was completed to evaluate differences in the scores of the four indices among each of the three regions. Within each region, differences in the mean scores were tested for a variety of sociodemographic subgroups, including age, sex, and education, and for their perceived proximity to sources of potential exposure. Statistical significance was set at the 0.05 level.

Results

Survey response. Twenty-seven persons who had died and 612 persons who had moved were removed from the sample. Of the 6,988 persons in the adjusted sam-

Questions Asked to Determine Respondent Levels of Concern on Four Environmental Concerns Indices

Here is a list of concerns some people have regarding toxic materials in our environment. On a 5-point scale:

1. How would you describe the level of your concern regarding:

Your past exposure
Your present exposure
Your future exposure
Your spouse's past exposure
Your spouse's present exposure
Your spouse's future exposure
Your children's past exposure
Your children's present exposure
Your children's future exposure
Your uncertainty of exposure
Build-up of poison in your body
Health problems in your pets
Uncertainty of health effects

2. How concerned or unconcerned are you about the effects on the environment of:

Air pollution
Drinking water pollution
Food contamination
Plant life and tree damage
Fish contamination
Municipal landfills
Toxic disposal sites
Nuclear plant emissions

3. How concerned or unconcerned are you about the following health concerns related to toxic material in the environment, such as:

Getting cancer
Birth defects in my children
Genetic disease in my children
A spontaneous abortion
Damage to my reproductive system
Damage to my nervous system
Damage to my urinary system
Dental problems in family members
Headaches in family members
Rashes in family members
Fatigue in family members
Weakness in family members
Family stress

4. How about economic concerns?

Industry leaving your town
Loss of jobs in the town or city
Inability to attract industry to your area
Decline of your property value
Harm to your community's economy

Table 1. Description of respondents by region, New York State, 1986

Category	Western New York		Long Island		Central and eastern New York	
	Number	Percent	Number	Percent	Number	Percent
Total	1,626	100.0	1,395	100.0	1,149	100.0
Sex:						
Male	760	46.7	600	43.0	647	44.7
Female	840	51.7	745	53.4	765	52.8
Missing	26	1.6	50	3.6	37	2.6
Age (years):						
25–34	365	22.4	299	21.4	320	22.1
35–44	351	21.6	324	23.2	365	25.2
45–54	245	15.1	262	18.8	250	17.3
55–64	342	21.0	274	19.6	259	17.9
65–74	303	18.6	219	15.7	228	15.7
Missing	20	1.2	17	1.2	27	1.9
Education (years):						
<9	86	5.3	45	3.2	70	4.8
9–11	165	10.1	91	6.5	114	7.9
12	594	36.5	411	29.5	458	31.6
13 or more	756	46.5	820	58.8	787	54.3
Missing	20	1.5	28	2.0	20	1.4
Race:						
White	1,520	93.5	1,291	92.5	1,376	95.0
Black	60	3.7	40	2.9	29	2.0
Other	23	1.4	29	2.1	19	1.3
Missing	23	1.4	35	2.5	25	1.7
Urbanization of residential area:						
Urban	409	25.2	47	3.4	252	17.4
Suburban	918	56.5	1,229	88.1	694	47.9
Rural	249	15.3	86	6.2	473	32.6
Missing	50	3.1	33	2.4	30	2.1
Home ownership:						
Own	1,223	75.2	1,143	81.9	1,116	77.0
Rent	372	22.9	231	16.6	308	21.3
Missing	31	1.9	21	1.5	25	1.7

ple, 4,601 (65.8 percent) completed questionnaires and returned them, some after three followup attempts.

The distributions of all respondents by age, sex, and region of residence were compared with the sampling frame, the 1980 U.S. Census, and data on the group of nonrespondents and known refusers. Within several percentage points, the distributions were similar among the response categories.

Table 1 describes the respondents by age, sex, and other sociodemographic variables for each of the three survey areas. More women than men in each region responded to the survey, as would be expected, based on the composition of the same age group (25–74 years) from the 1980 population of New York State (excluding New York City), 47.6 percent male and 52.4 percent female. The age distribution differed slightly among the three survey areas, with respondents from western New York more likely to be in the oldest age categories, from 55 to 74 years, than those from the other two areas.

Regional differences were noted in the variables of education, home ownership, and urbanization of the residential area. Long Island residents were most likely to have 13 or more years of education (58.8 percent), compared to western New York (46.5 percent), and central and eastern New York (54.3 percent).

Home ownership was highest among Long Island residents (81.9 percent), and lowest among western New York residents (75.2 percent). The modal number of years at the current residence was 1 year for both western New York and central and eastern New York respondents and 2 years for Long Island respondents. The median number of years at the current residence was 12 years for western New York, 12.5 years for Long Island, and 9.5 years for central and eastern New York.

The urbanization of the residential area differed considerably among the three areas. Most Long Island residents said they lived in a suburban area (88.1 percent, compared with 56.5 percent for western New York residents and 47.9 percent for central and eastern New York residents). Western New Yorkers were most likely to live in an urban area (25.2 percent) than respondents from the other two regions. Residents from

central and eastern New York were most likely to live in a rural area (32 6 percent, compared to 15 3 percent in western New York and 6.2 percent in Long Island).

Exposure concerns index. The mean scores and standard errors of the exposure concerns index are reported in table 2 for each region and for specific sociodemographic characteristics and perceived proximity to potential exposure sources. Regional differences in mean scores of exposure concerns were significant at $P < 0.001$. Long Island residents had the highest exposure concern score, followed by western New York residents.

In all three regions, concern about exposure was significantly higher for women ($P < 0.01$ for one region). Exposure concerns were highest among persons with 9 to 11 years of education and were lowest among those with 13 or more years of education. The differences by education were statistically significant for residents of western New York ($P < 0.0005$) and Long Island ($P < 0.001$).

Exposure concerns were highest among respondents who believed that they lived either close or very close to a toxic dump site or to an area of high pesticide use (commercial or residential). Next to those respondents who perceived that they lived close, respondents who did not know how close they lived to one of the sources of potential exposure to toxic substances had the next highest mean concern score, followed by those who believed they lived far or very far from the sources.

This pattern was seen for all three regions, with the levels of concern being highest among Long Island residents, followed by western New York residents, and lowest among central and eastern New York residents. Within each region, the differences were highly significant at $P < 0.0001$.

If the respondent believed that the health of his or her children was in danger because of pollution in the community, the concern about exposure was significantly higher ($P < 0.0001$) than if one did not have this belief. This pattern was true for all three regions. If the respondent believed that his or her child played in areas that were seriously polluted, the concern about exposure was higher in western New York ($P < 0.0005$), and in the other two regions ($P < 0.05$).

Environmental concerns index. The mean scores and standard errors of the environmental concerns index are reported in table 3. No regional differences were found. Concern about environmental issues was higher for women in all three regions, although in western New York the difference did not reach statistical significance. In western New York ($P < 0.001$) and Long Island ($P < 0.01$), environmental concerns were highest among persons with some high school education and lowest for those with more than a high school education.

Environmental concerns were higher among unemployed respondents from central and eastern New York, while employment status did not affect the environmental concerns index score in the other two regions. Environmental concerns were highest among respondents who believed that they lived either close or very close to a toxic dump site or to an area of high commercial or residential pesticide use. Next to those respondents who perceived they lived close, respondents who did not know how close they lived to the use or to the disposal site of toxic substances, had the next highest mean concern score, followed by those who believed they lived far or very far away from such sources. This pattern was seen for all three regions, with the levels of concern being highest among Long Island residents. Within each region, the differences were highly significant at $P < 0.0005$.

If the respondent believed that the health of his or her children was in danger because of pollution in the community, the concern about environmental issues was significantly higher ($P < 0.0001$) than if one did not have this belief. This pattern was true for all three regions. If a western New York or Long Island respondent believed that his or her child played in areas that were seriously polluted, the concern about environmental issues was higher ($P < 0.05$ for each of the two regions).

Health effects concerns index. The mean scores and standard errors of the health effects concerns index for the variables discussed subsequently are reported in table 4. The mean scores for the three regions were significantly different at $P < 0.0005$. Residents of Long Island had the highest score, followed by those of western New York. The lowest mean score was for residents of central and eastern New York.

Concern about health effects was higher for women residing on Long Island and in central and eastern New York ($P < 0.01$), while no sex differences were found for respondents from western New York. The mean concern score increased as both age and education decreased for all three regions. Persons with 13 or more years of education had the lowest concern about health effects ($P < 0.0001$, western New York; $P < 0.0005$, Long Island; $P < 0.01$, central and eastern New York). Blacks and other nonwhite respondents had higher scores on the health effects concerns index ($P < 0.01$ in all three regions).

Higher concern scores were associated significantly with having children younger than 18 years for respondents from Long Island and western New York

Table 2. Mean scores for exposure concern index, by selected variables and region, New York State, 1986

Category	Western New York		Long Island		Central and eastern New York	
	Mean score	Standard error	Mean score	Standard error	Mean score	Standard error
Total	[1]3.61	0.03	[1]3.65	0.03	[1]3.50	0.03
Sex						
Male	[2]3.55	0.04	[1]3.54	0.05	[2]3.44	0.05
Female	3.67	0.04	3.75	0.04	3.56	0.04
Age (years)						
25–34	[2]3.64	0.05	[2]3.74	0.06	3.54	0.06
35–44	3.70	0.05	3.77	0.05	3.57	0.06
45–54	3.76	0.07	3.65	0.07	3.58	0.07
55–64	3.49	0.07	3.49	0.08	3.36	0.08
65–74	3.49	0.08	3.53	0.09	3.35	0.10
Education (years)						
<9	[4]3.72	0.16	[1]3.88	0.17	3.17	0.16
9–11	3.86	0.09	3.68	0.13	3.50	0.13
12	3.68	0.05	3.81	0.06	3.49	0.06
13 or more	3.49	0.04	3.55	0.04	3.52	0.04
Employment						
Employed	3.63	0.03	3.67	0.03	3.49	0.03
Unemployed	3.54	0.10	3.56	0.13	3.54	0.10
Child living at home						
Yes	3.66	0.04	3.74	0.04	[2]3.56	0.04
No	3.59	0.04	3.59	0.04	3.45	0.04
Race						
White	[2]3.60	0.03	3.64	0.03	[2]3.48	0.03
Black	3.98	0.16	3.93	0.15	4.02	0.17
Other	3.79	0.28	3.70	0.23	3.35	0.30
Marital status						
Married	3.59	0.03	3.62	0.03	3.51	0.03
Divorced	3.73	0.09	3.63	0.16	3.48	0.13
Separated	3.60	0.26	3.63	0.23	3.45	0.02
Widowed	3.59	0.15	3.93	0.16	3.34	0.18
Never	3.72	0.10	3.78	0.10	3.49	0.15
Urbanization of residential area						
Urban	3.66	0.06	3.65	0.17	3.54	0.07
Suburban	3.62	0.04	3.65	0.03	3.45	0.04
Rural	3.51	0.07	3.60	0.13	3.54	0.06
Home ownership						
Own	3.61	0.03	3.63	0.03	3.49	0.03
Rent	3.61	0.06	3.74	0.08	3.52	0.07
Proximity to toxic dumpsite						
Very close	[3]3.93	0.06	[4]4.07	0.08	[3]3.91	0.13
Close	3.69	0.04	3.83	0.06	3.81	0.06
Far	3.33	0.07	3.43	0.07	3.22	0.07
Very far	3.20	0.16	3.06	0.16	3.18	0.11
Do not know	3.63	0.06	3.63	0.05	3.48	0.05
Proximity to commercial pesticide use						
Very close	[3]3.80	0.07	[4]4.13	0.09	[3]3.77	0.09
Close	3.63	0.05	3.74	0.06	3.61	0.05
Far	3.44	0.06	3.45	0.08	3.28	0.08
Very far	3.12	0.14	3.20	0.12	3.21	0.12
Do not know	3.77	0.06	3.71	0.05	3.46	0.05
Proximity to residential pesticide use						
Very close	[3]3.77	0.05	[3]3.88	0.07	[3]3.64	0.10
Close	3.66	0.05	3.68	0.06	3.64	0.05
Far	3.29	0.08	3.48	0.08	3.24	0.08
Very far	2.86	0.18	3.10	0.17	3.06	0.14
Do not know	3.70	0.06	3.66	0.05	3.53	0.05
Believe child's health in danger due to pollution						
Yes	[4]4.22	0.07	[4]4.26	0.08	[4]4.26	0.09
No	3.53	0.04	3.62	0.04	3.43	0.04
Child plays in polluted area						
Yes	[4]4.37	0.12	[2]4.22	0.18	[2]4.08	0.21
No	3.64	0.04	3.68	0.04	3.52	0.04

[1] $P < 0.001$ [2] $P < 0.05$ [3] $P < 0.01$ [4] $P < 0.0005$ [5] $P < 0.0001$

Table 3. Mean scores for environmental exposure concern index, by selected variables and region, New York State, 1986

Category	Western New York		Long Island		Central and eastern New York	
	Mean score	Standard error	Mean score	Standard error	Mean score	Standard error
Total	4.25	0.02	4.27	0.02	4.22	0.02
Sex						
Male	4.20	0.03	[1]4.17	0.04	[2]4.17	0.03
Female	4.29	0.03	4.34	0.03	4.27	0.03
Age (years):						
25–34	4.17	0.04	4.26	0.04	4.15	0.04
35–44	4.25	0.04	4.30	0.04	4.20	0.04
45–54	4.28	0.06	4.30	0.06	4.24	0.06
55–64	4.26	0.06	4.16	0.06	4.19	0.06
65–74	3.30	0.06	4.33	0.07	4.33	0.06
Education (years)						
<9	[1]4.39	0.12	[1]4.31	0.17	4.36	0.11
9–11	4.47	0.07	4.42	0.10	4.33	0.06
12	4.26	0.04	4.36	0.04	4.23	0.04
13 or more	4.17	0.03	4.20	0.03	4.18	0.03
Employment:						
Employed	4.26	0.02	4.27	0.03	[3]4.20	0.02
Unemployed	4.29	0.08	4.32	0.09	4.39	0.07
Child lives at home						
Yes	4.24	0.03	4.30	0.04	4.21	0.03
No	4.25	0.03	4.25	0.03	4.22	0.03
Race						
White	4.24	0.02	4.26	0.02	4.21	0.02
Black	4.36	0.12	4.46	0.11	4.57	0.14
Other	4.31	0.19	4.10	0.23	4.11	0.26
Marital status:						
Married	4.25	0.03	4.26	0.03	4.20	0.03
Divorced	4.27	0.09	4.24	0.13	4.28	0.10
Separated	3.89	0.28	4.03	0.19	4.02	0.18
Widowed	4.23	0.11	4.38	0.10	4.30	0.10
Never	4.26	0.06	4.30	0.07	4.30	0.07
Urbanization of residential area:						
Urban	4.27	0.05	4.22	0.15	4.28	0.05
Suburban	4.25	0.03	4.27	0.03	4.18	0.03
Rural	4.17	0.06	4.27	0.10	4.23	0.04
Home ownership						
Own	4.25	0.03	4.26	0.03	4.22	0.03
Rent	4.24	0.05	4.31	0.06	4.22	0.05
Proximity to toxic dumpsite						
Very close	[4]4.45	0.05	[4]4.46	0.07	[4]4.50	0.10
Close	4.30	0.03	4.39	0.04	4.41	0.04
Far	4.07	0.05	4.12	0.05	4.00	0.05
Very far	4.03	0.13	3.90	0.12	4.01	0.10
Do not know	4.23	0.05	4.27	0.04	4.22	0.04
Proximity to commercial pesticide use:						
Very close	[5]4.39	0.05	[4]4.65	0.05	[4]4.34	0.06
Close	4.28	0.04	4.36	0.04	4.34	0.04
Far	4.14	0.05	4.12	0.05	4.10	0.06
Very far	3.98	0.11	3.93	0.10	3.92	0.10
Do not know	4.29	0.05	4.29	0.04	4.19	0.04
Proximity to residential pesticide use						
Very close	[4]4.36	0.04	[4]4.43	0.06	[4]4.28	0.07
Close	4.27	0.04	4.31	0.04	4.32	0.04
Far	4.01	0.06	4.09	0.06	4.08	0.05
Very far	3.99	0.15	3.90	0.15	3.89	0.11
Do not know	4.25	0.05	4.28	0.04	4.24	0.04
Believe child's health in danger due to pollution:						
Yes	[4]4.56	0.05	[4]4.66	0.05	[4]4.67	0.06
No	4.17	0.04	4.21	0.04	4.14	0.03
Child plays in polluted area:						
Yes	[2]4.57	0.11	[2]4.72	0.11	4.40	0.16
No	4.24	0.03	4.26	0.03	4.19	0.03

[1]$P < 0.001$ [2]$P < 0.05$ [3]$P < 0.01$ [4]$P < 0.0001$, [5]$P < 0.0005$

Table 4 Mean scores for environmental health effects concern index, by selected variables and region, New York State, 1986

Category	Western New York		Long Island		Central and eastern New York	
	Mean score	Standard error	Mean score	Standard error	Mean score	Standard error
Total	[1]3.76	0.03	[1]3.79	0.03	[1]3.63	0.03
Sex						
Male	3.72	0.04	[2]3.70	0.05	[2]3.55	0.05
Female	3.79	0.04	3.87	0.04	3.71	0.04
Age (years)						
25–34	[3]3.94	0.05	[1]3.99	0.06	[3]3.83	0.06
35–44	3.82	0.06	3.89	0.06	3.69	0.06
45–54	3.77	0.08	3.74	0.08	3.56	0.08
55–64	3.68	0.07	3.58	0.08	3.50	0.08
65–74	3.56	0.08	3.66	0.09	3.38	0.10
Education (years)						
<9	[4]3.98	0.14	[4]4.13	0.19	[2]3.60	0.14
9–11	4.04	0.09	3.98	0.12	3.90	0.12
12	3.84	[5]0.05	3.93	0.06	3.74	0.06
13 or more	3.62	[5]0.04	3.68	0.04	3.53	0.04
Employment						
Employed	3.78	0.03	3.80	0.03	3.62	0.03
Unemployed	3.64	0.10	3.77	0.14	3.71	0.11
Child living at home						
Yes	3.82	0.05	[2]3.92	0.05	[2]3.72	0.05
No	3.72	0.04	3.72	0.04	3.55	0.04
Race						
White	[2]3.74	0.03	[2]3.76	0.03	[2]3.61	0.03
Black	4.29	0.11	4.36	0.15	4.24	0.16
Other	3.97	0.25	3.91	0.25	4.02	0.25
Marital status						
Married	3.73	0.03	3.76	0.04	3.62	0.04
Divorced	3.83	0.09	3.73	0.17	3.68	0.13
Separated	3.60	0.28	4.02	0.14	3.49	0.22
Widowed	3.76	0.13	3.96	0.15	3.64	0.16
Never	3.93	0.09	3.93	0.09	3.58	0.11
Urbanization of residential area:						
Urban	3.83	0.06	3.97	0.17	[5]3.74	0.07
Suburban	3.74	0.04	3.79	0.03	3.53	0.05
Rural	3.71	0.08	3.71	0.14	3.70	0.06
Home ownership						
Own	[5]3.73	0.03	[5]3.76	0.04	[5]3.59	0.04
Rent	3.87	0.06	3.94	0.08	3.78	0.07
Proximity to toxic dumpsite						
Very close	[3]3.92	0.07	[4]4.04	0.09	[4]3.91	0.13
Close	3.76	0.05	3.85	0.07	3.77	0.06
Far	3.55	0.07	3.69	0.07	3.36	0.07
Very far	3.56	0.16	3.74	0.15	3.57	0.12
Do not know	3.87	0.06	3.84	0.05	3.66	0.05
Proximity to commercial pesticide use						
Very close	[4]3.81	0.08	[4]4.08	0.11	[3]3.74	0.09
Close	3.76	0.05	3.80	0.07	3.66	0.06
Far	3.60	0.06	3.58	0.07	3.41	0.08
Very far	3.43	0.14	3.41	0.13	3.39	0.12
Do not know	3.96	0.06	3.93	0.05	3.71	0.05
Proximity to residential pesticide use						
Very close	[4]3.76	0.06	[3]3.79	0.09	[1]3.60	0.10
Close	3.79	0.05	3.77	0.06	3.68	0.06
Far	3.46	0.09	3.63	0.08	3.38	0.08
Very far	3.30	0.19	3.32	0.18	3.34	0.14
Do not know	3.95	0.06	3.92	0.05	3.75	0.05
Believe child's health in danger due to pollution						
Yes	[4]4.23	0.07	[4]4.30	0.08	[1]4.14	0.11
No	3.73	0.05	3.79	0.05	3.66	0.04
Child plays in polluted area						
Yes	4.16	0.14	4.22	0.19	3.82	0.26
No	3.82	0.04	3.85	0.04	3.71	0.04

[1] $P < 0.0005$ [2] $P < 0.01$ [3] $P < 0.001$ [4] $P < 0.0001$ [5] $P < 0.05$

Table 5. Mean scores for economic concern index, by selected variables and region, New York State, 1986

Category	Western New York		Long Island		Central and eastern New York	
	Mean score	Standard error	Mean score	Standard error	Mean score	Standard error
Total	[1]4.20	0.02	[1]3.32	0.03	[1]3.62	0.03
Sex:						
Male	4.18	0.04	3.28	0.05	3.59	0.05
Female	4.23	0.03	3.34	0.05	3.64	0.05
Age (years):						
25–34	[1]3.91	0.05	3.37	0.07	3.57	0.06
35–44	4.14	0.05	3.37	0.07	3.53	0.06
45–54	4.43	0.05	3.32	0.08	3.63	0.08
55–64	4.32	0.05	3.25	0.08	3.80	0.08
65–74	4.33	0.06	3.23	0.10	3.62	0.10
Education (years):						
<9	[1]4.28	0.14	[1]3.49	0.22	[1]3.90	0.16
9–11	4.50	0.07	3.78	0.14	4.08	0.11
12	4.32	0.04	3.60	0.06	3.81	0.06
13 or more	4.03	0.03	3.12	0.04	3.41	0.04
Employment:						
Employed	[2]4.19	0.03	3.30	0.04	[2]3.59	0.04
Unemployed	4.41	0.07	3.41	0.14	3.92	0.10
Child living at home:						
Yes	[2]4.12	0.04	[4]3.42	0.05	[2]3.50	0.05
No	4.25	0.03	3.25	0.05	3.70	0.04
Race:						
White	4.21	0.02	[2]3.29	0.04	3.61	0.03
Black	4.32	0.13	4.03	0.18	3.77	0.23
Other	3.93	0.27	3.34	0.27	3.44	0.31
Marital status:						
Married	4.21	0.03	3.29	0.04	3.60	0.04
Divorced	4.20	0.09	3.08	0.18	3.75	0.13
Separated	3.61	0.29	3.78	0.25	3.42	0.24
Widowed	4.33	0.09	3.61	0.17	3.84	0.14
Never	4.15	0.08	3.36	0.11	3.53	0.12
Urbanization of residential area:						
Urban	[3]4.32	0.05	3.44	0.20	[3]3.85	0.08
Suburban	4.20	0.03	3.31	0.04	3.48	0.05
Rural	4.04	0.07	3.24	0.14	3.68	0.06
Home ownership:						
Own	4.24	0.03	3.32	0.04	3.64	0.04
Rent	4.13	0.05	3.31	0.09	3.54	0.07
Proximity to toxic dumpsite:						
Very close	[3]4.37	0.06	[3]3.26	0.12	[3]3.93	0.14
Close	4.17	0.04	3.29	0.07	3.73	0.07
Far	4.07	0.05	3.23	0.07	3.36	0.07
Very far	4.04	0.13	2.85	0.16	3.60	0.14
Do not know	4.28	0.05	3.44	0.05	3.65	0.05
Proximity to commercial pesticide use:						
Very close	[3]4.20	0.07	[1]3.30	0.13	3.77	0.09
Close	4.16	0.04	3.32	0.07	3.63	0.06
Far	4.11	0.05	3.08	0.07	3.55	0.08
Very far	4.04	0.11	3.04	0.12	3.41	0.14
Do not know	4.36	0.04	3.51	0.06	3.63	0.06
Proximity to residential pesticide use:						
Very close	[5]4.22	0.05	[3]3.11	0.09	3.51	0.11
Close	4.14	0.04	3.33	0.06	3.64	0.06
Far	4.03	0.07	3.18	0.09	3.49	0.08
Very far	4.23	0.13	3.00	0.18	3.75	0.15
Do not know	4.36	0.05	3.47	0.06	3.66	0.05
Believe child's health in danger due to pollution:						
Yes	[2]4.31	0.07	[4]3.61	0.12	[2]3.93	0.12
No	4.10	0.04	3.35	0.05	3.51	0.05
Child plays in polluted area:						
Yes	4.37	0.17	3.48	0.26	3.73	0.26
No	4.13	0.03	3.38	0.05	3.55	0.04

[1] $P < 0.0001$; [2] $P < 0.01$; [3] $P < 0.001$; [4] $P < 0.05$; [5] $P < 0.0005$.

'Concern about exposure was significantly higher for women residing in all three regions. Exposure concerns were highest among persons with 9 to 11 years of education and were lowest among those with 13 or more years of education.'

($P < 0.01$ for each). Concerns about health effects in all three regions were higher if a respondent was a renter, as compared to a home owner ($P < 0.05$).

Health effects concerns were highest among respondents who believed that they lived either close or very close to a toxic dump site or to an area of high pesticide use (commercial or residential). For some of these variables, if respondents did not know how close they lived to one of these sources of potential exposure to toxic substances, their mean concern score was higher than those who knew that they lived close.

Proximity to toxic dump sites yielded the highest mean concern score when a person believed that he or she lived close or very close. If the respondent did not know how close or how far a dump site was from the residence, the concern level ranked next to those living close ($P < 0.001$ for each of the three regions). Concern about proximity to commercial pesticide use was strongly associated with concerns about health effects, with respondents from Long Island and central and eastern New York having the highest concern level when they believed the use was very close or when they did not know how close it was ($P < 0.005$). In western New York, concern was highest when the respondents did not know the proximity, followed by those who believed it was very close ($P < 0.0001$). The proximity to residential pesticide use yielded the highest concern about health effects in all three regions when the respondent did not know how close this use was to their residence ($P < 0.001$ for each region).

If the respondent believed that the health of his or her children was in danger because of pollution in the community, the concern about health effects was significantly higher ($P < 0.0001$) for each of the regions than if one did not have this belief.

Economic concerns index. Significant regional differences in mean scores on the economic index were found ($P < 0.0001$). The greatest concern was indicated by western New York residents, followed by residents of central and eastern New York. Long Island residents had the lowest economic concern scores.

The level of economic concern was only associated with age in western New York, where it increased as age increased ($P < 0.0001$), as indicated in table 5. Economic concerns increased as education decreased in all three regions, with persons with 13 or more years of education having the lowest mean economic concern score ($P < 0.0001$).

Economic concerns were higher among unemployed respondents from western and central and eastern New York ($P < 0.005$ for each), while employment status in Long Island was not a factor related to economic concerns. If respondents from Long Island had children younger than 18 years, the economic concerns were higher ($P < 0.05$); however, for western New York and central and eastern New York the inverse was true. Respondents who did not have children younger than 18 years had higher concerns ($P < 0.005$ for each region.)

Home ownership was not related to economic concerns in any of the regions. The urbanization of the residential area was related to economic concerns in western New York ($P < 0.001$) and central and eastern New York ($P < 0.0001$). Urban residents had the highest concern scores in both regions.

Economic concerns were highest among respondents in all three regions who believed that they lived either close, very close, or of unknown proximity to a toxic dump site ($P < 0.005$). The mean concern score was highest among western New York respondents, compared to the other two regions.

Proximity to areas of residential or commercial pesticide use was related to economic concern levels in western New York and Long Island. Respondents who did not know how close they lived to one of the sources of exposure had the highest mean concern score in both western New York and Long Island ($P < 0.001$ for each region). Again, the mean concern score was highest among western New York respondents compared to the other regions. If the respondent believed that the health of his or her children was in danger because of pollution in the community, the concern about economic issues was significantly higher than if one did not have this belief. This pattern was true for all three regions at various levels of statistical significance ($P < 0.01$, western New York; $P < 0.05$, Long Island; $P < 0.005$, central and eastern New York).

Discussion

Regional differences were noted for concerns about exposures, health outcomes, and economic effects as they related to toxic materials in the environment. In the first two instances, Long Island residents were most concerned while western New York residents scored slightly lower. Residents of central and eastern New York had the lowest level of concern about exposures and health effects. However, with regard to economic

concerns, western New York residents had the greatest concern, followed by residents of central and eastern New York. No regional differences were noted for concerns about environmental contamination.

Regardless of region, women were more concerned than were men about exposures, environmental pollution, and health effects as they related to toxic materials in the environment. However, no sex differences were found regarding concerns about property value and other local economic issues. The same four concerns were similar for home owners and renters and among urban, suburban and rural residents, with only small differences noted in one or two of the regions.

Some age differences were observed. Older persons in western New York had greater economic concerns, while younger persons in all three regions had greater concern about health effects and were more concerned about exposure to toxic substances in the environment. Having children younger than 18 years increased concerns about exposures and health effects among Long Island and central and eastern New York residents, but it was not associated with these concerns in western New York.

As the perceived distance between one's residence and a toxic disposal site, or an area of commercial or residential pesticide use, declined, concerns about exposure, pollution, health, and economic effects increased. Respondents who did not know how close they were to a source of chemical exposure rated their concerns more similarly to those who stated they were in close proximity than those who believed they were not.

The concerns were generally greatest for Long Island, a region with a large and shallow ground water aquifer. Concerns were only slightly lower for respondents from western New York, an area with a known high density of toxic waste disposal sites. Both areas have a high potential for environmental contamination and human exposure to chemicals in the environment, and this situation is associated with higher concern levels. Media attention on environmental issues in both areas probably reinforces interest and concern (*4*).

Concerns were lower in central and eastern New York, but regional differences were not large. While the potential for environmental contamination may not be as focused as it is for western New York and Long Island residents, the data would suggest that people from central and eastern New York were very concerned about the issues.

Research by other investigators has shown that persons with the greatest concern about environmental contamination are women, particularly those with children younger than 18 years, and residents who are long term, older, well educated, or affluent (*5–7*). Using multivariate analyses, Hamilton (*6*) found that concern about toxic wastes was highest among young respondents and women, particularly women with children younger than 18 years. The studies differ from this study in that concern was measured after a disaster had occurred. In the cross-sectional study reported here, sex and education were consistent predictors of concern, with women and persons with less than 12 years of education having the highest levels of all concerns.

The importance of these studies is the consistent message to all agencies working with communities facing environmental problems. While the threat of environmental hazards may be small in a given situation, the public's concern may be great (*8*). Effective risk management includes not only testimony that the hazard risk is small, but must include responses to the concerns perceived and voiced by the community (*9*). The concern is real and is based on more than just the hazard, as shown in this study and others. Concern also is shaped by personal attributes. If risk management does not include an effective response to the concerns of a community, whether real or perceived, public outrage may continue (*8*), or hysteria may ensue (*10*).

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