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Ethanol-Blended Fuel in Anchorage, 1994-1995

Residents May Smell The Difference But Have No Health Complaints

Widespread symptoms were associated with the introduction of oxygenated fuel containing methyl tertiary butyl ether (MTBE) in Alaska gasoline during the winter of 1992-1993<sup>1,2</sup>. Although there have been no reports of ill effects associated with ethanol-blended fuel in other states, we conducted a weekly survey to assess potential changes in the health status of the population after introduction of ethanol-blended fuel in Anchorage during the 1994-1995 winter season.

A weekly random digit dialed survey of 100 Anchorage adults, age 18 years or older, was conducted for 16 consecutive weeks between December 7, 1994 and March 22, 1995. All Anchorage households accessible by telephone had an equal chance of selection each week, including previous survey respondents (i.e., selection with replacement). For any given week, the margin of error was  $\pm 10\%$ . Ethanol was phased in to gasoline in Anchorage over a number of weeks, starting in late December 1994. By mid-January all gasoline stations were dispensing fuel with the ethanol additive. For ease of reporting and statistical analyses, respondents were categorized into three time periods based on the extent to which Anchorage service stations had phased in use of ethanol. Interviews regarding past week symptoms conducted between Dec. 7th and 28th, were categorized into the "none" ethanol phase, those conducted between Jan 7th and 11th, and on March 22nd, were categorized into the "partial" ethanol phase, and those conducted between Jan. 18th and March 15th were categorized into the "total" ethanol phase. By grouping the data into the three time periods, the ability to statistically detect small differences in proportions or means was improved. Survey responses were weighted by gender and marital status. Weighted and unweighted results were similar. Only weighted prevalence rates are presented. Chi-square statistical tests for differences in proportions and tests for trend, and analysis of variance were conducted on all weighted demographic and symptom variables.

A total of 1,603 individuals responded to the symptom survey, of whom 415 (25.9%) reported past week illness (fever, sweats or chills, or cold or flu). Because past week illness was positively associated with all other past week symptoms ( $\chi^2$ ,  $p \leq .05$ ) and increased during the course of the winter, we excluded all individuals reporting past week illness from the analyses. Demographic characteristics, number of past week gasoline tank fill-ups, and the average amount of time spent in a motor vehicle in the past week were remarkably consistent among survey respondents over the study period. However, respondents' smoking status did differ by phase of ethanol use. The prevalence of past week symptoms (irritated eyes, burning nose or throat, headache, nausea or vomiting, dizziness, or cough) did not differ by ethanol use phase. A significant positive trend, however, was noted for unusual odors while pumping gasoline. The survey identified a low background prevalence of symptoms among non-ill survey respondents and found no change in symptom reporting with the introduction of ethanol-blended fuel. In contrast, in December 1992 after the introduction of MTBE, a high prevalence of symptoms was observed after excluding respondents reporting illness (diarrhea, fever, sweats or chills, or muscle aches).<sup>1</sup> Because of differences in the surveys we cannot make direct comparisons. However, in December 1992, 34% of 101 non-ill Anchorage health care workers reported having more headaches than usual, 22% reported having irritated eyes, 19% reported having a burning sensation in nose or throat, and 18% reported having cough more than usual.

TABLE 1

Selected Past Week Characteristics and Symptoms of Non-ill Anchorage-Area Respondents By Phase of Ethanol Use

December 1994 - March, 1995

Characteristic	Phase of Ethanol Use		
	None n = 316	Partial n = 218	Total n = 654
Mean age (in years)	43.5	43.4	44.3
% Cigarette smokers	24.7	19.7	17.4*
Mean minutes/day in vehicle	89.0	89.3	85.4
Mean number tank fill-ups	1.0	1.1	1.1
<b>Past Week Symptom</b>			
% Irritated eyes			
while driving	4.9	5.3	5.1
within hour of pumping gas	1.2	1.7	1.9
% Burning nose/throat			
while driving	3.8	2.6	2.4
within hour of pumping gas	1.6	1.0	1.0
% Headache			
while driving	6.5	9.8	8.3
within hour of pumping gas	2.5	3.4	2.9
% Dizziness			
while driving	0.3	1.3	0.0
within hour of pumping gas	0.0	0.5	0.3
% Cough			
while driving	3.1	2.8	2.9
within hour of pumping gas	1.2	1.0	1.4
% Noticed unusual odors			
while pumping gas	6.9	11.0	12.9*
while driving	18.7	12.3	20.7
* $p \leq .05$ , $\chi^2$ test for trend			

1. Bulletin No. 1, January 6, 1993, Section of Epidemiology, Division of Public Health, Department of Health and Social Services.

2. Bulletin No. 26, December 22, 1992, Section of Epidemiology, Division of Public Health, Department of Health and Social Services.

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