ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC
SAFETY ADMINISTRATION
WASHINGTON, D.C. 20590

VOLUME 3

ALCOHOL SAFETY ACTION PROJECTS EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC
SAFETY ADMINISTRATION
WASHINGTON, D.C. 20590

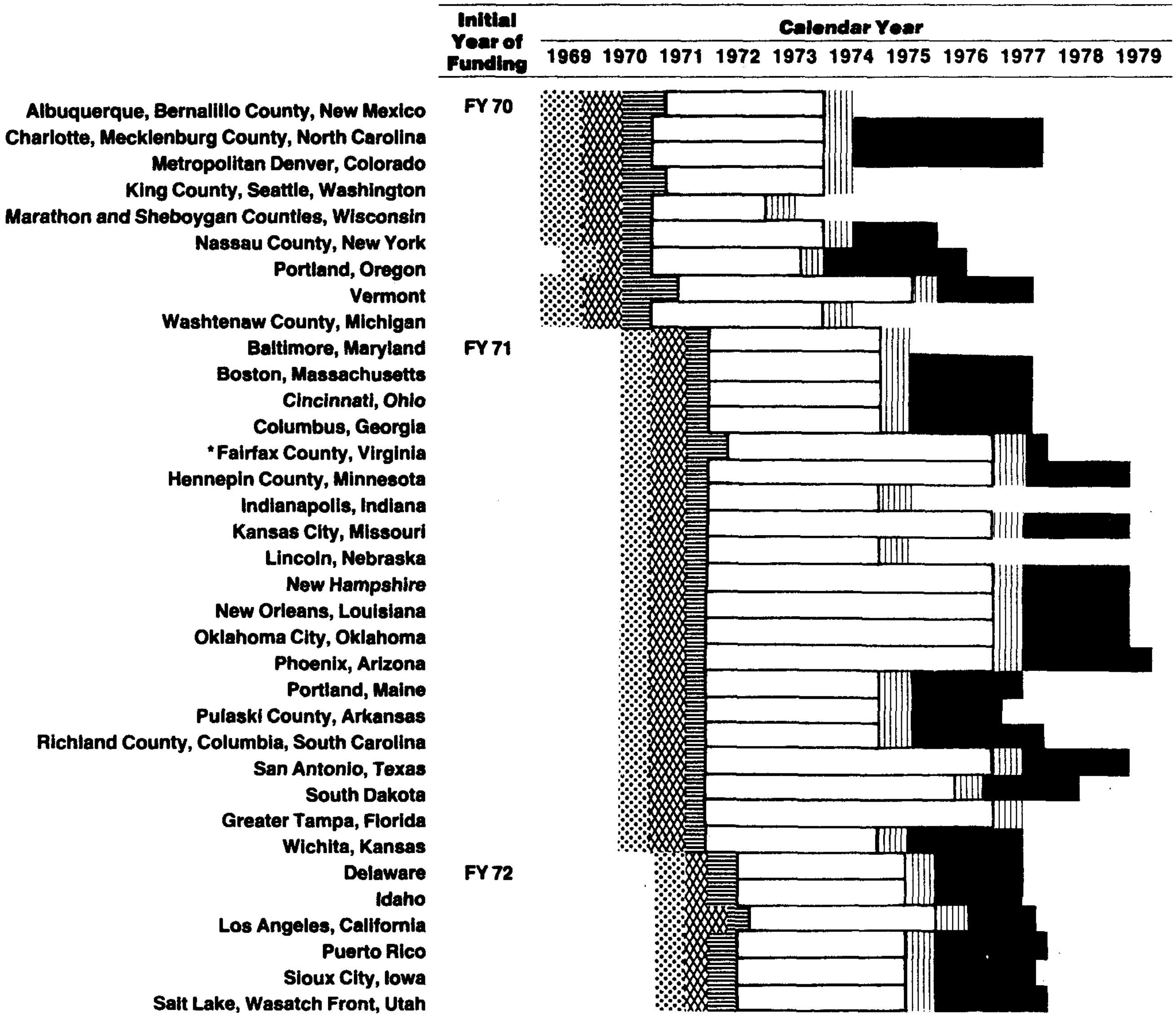
CONTENTS

I. INTRODUCTION

Following the establishment of the Department of Transportation in 1967, the Federal Government's alcohol safety effort was launched with a special study provided for in the Highway Safety Act of 1967. This study, the Secretary's 1968 Report to the Congress on *Alcohol and Highway Safety* (34), illuminated the extent of the losses due to drunk driving and focused on the role of the problem drinker in these accidents. As a result of this analysis of the problem, an action program was developed to test the capability of the traditional community institutions to control the drinking driving problem (35,36). This program involved the establishment, between January 1971 and July 1972, of thirty-five Alcohol Safety Action Projects (ASAPs) in communities throughout the Nation (24,37). As shown in Figure 1-1, each of the projects was operational from two to five years, and the overall effort involved an expenditure of 88 million dollars of Federal funds between 1970 and 1977.

While the traditional community agencies which have always dealt with the alcohol safety problem (the courts, the police, the schools and other educational facilities) were

FIGURE 1-1
ASAP SCHEDULES



Note: In most projects the Post ASAP Evaluation Phase overlapped the Final Reporting Phase

SITE SELECTION AND APPLICATION
PROPOSAL DEVELOPMENT PHASE
PROJECT INITIATION PHASE
OPERATIONAL PHASE
FINAL REPORTING PHASE
POST ASAP EVALUATION PHASE (IF APPLICABLE)

*Post ASAP Eval Data Collection will continue through CY 78 at no cost to NHTSA utilized in this program, two novel features were applied. First, a special management office was established which was to produce an integrated, "systems" approach to the drunk driving hazard (36). Both the police departments and the courts were provided with the resources to handle a greatly increased number of DWI (Driving While Intoxicated) offenders, and a public information effort was mounted to support this activity. In this way it was intended to increase the level of deterrence to drunk driving among *social drinkers*.

A second novel portion of the ASAP effort was directed at developing systems for identifying problem drinkers among the DWI offenders and referring them to treatment agencies. Through this effort it was hoped that the *problem drinkers*, who could not be deterred from drunk driving, might be treated for their alcohol problem and ultimately removed from the drinking driver population. An overall description of the concept, development and management of the ASAP program is contained in Volume II Chapter 1 of the 1972 ASAP Evaluation Report (38). Specific instructions for managing ASAPs are provided in a Manual for Project Directors (24).

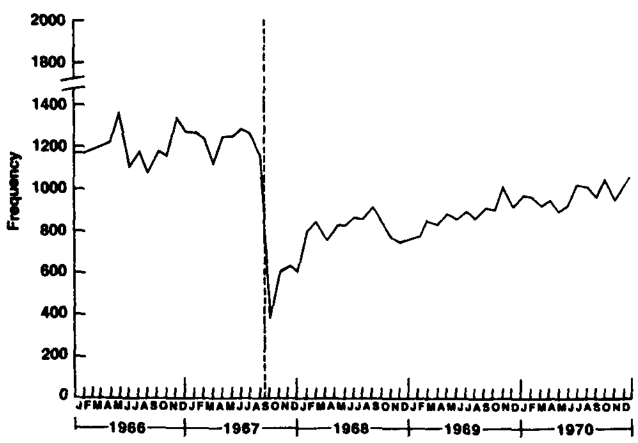
This paper reports on an analysis of the effectiveness of the ASAP effort in reducing alcohol-related crashes. In addition, the ASAP had several other objectives: "to evaluate individual countermeasures within the limits permitted by the simultaneous application of a number of different countermeasures at the same site" and "to catalyze each State into action to improve its safety program in the area of alcohol safety" (39). Information on the application of individual countermeasures can be found in a series of reports covering the major areas of effort in the ASAPs (38,39): Enforcement, Court Procedures, Treatment Programs and Public Information. An assessment of the catalytic effect of the ASAPs in promoting alcohol safety programs at the State and community level is in press (41).

II. PREVIOUS RESEARCH

Traditionally, over-simplistic before vs. after analyses of crash data have been used to claim impact for safety efforts. When such claims are examined with more adequate research techniques they are usually found to be misleading. Few if any adequate experiments have been planned ahead of time to test the impact of alcohol safety programs. Most of the scientific studies reported in the literature were conducted on an after-the-fact basis taking advantage of a historical event which permitted analysis of the effect of applying a new law or program. The best known example of a scientifically validated program, the British Road Safety Act of 1967, was studied in this after-the-fact manner by Ross (31). The British Road Safety Act became effective on October 9th of that year to deter excessive drinking while driving a motor vehicle on a road or other public place. Excessive drinking was defined as exceeding .08% BAC. Varying penalties were provided under the Act but the most feared penalty was automatic loss of license for one year on the first offense. During the five month period prior to the effective date of the law, a massive publicity campaign was conducted to inform the public of its obligations under the new law. Through public opinion surveys, it was determined that a large proportion of the population both before and after the law had knowledge of the penalties and breath test requirements.

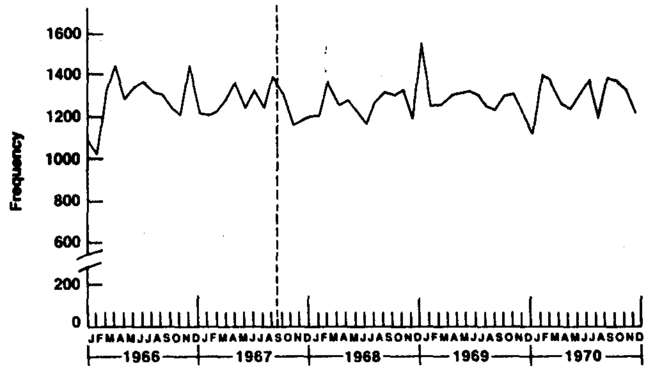
The impact evaluation was accomplished by the use of Interrupted Time Series Analysis. This technique, developed by Glass, Wilson and Gottman (11), tests for a change in crash level at a specific intervention point taking into account the behavior of the series over time. The study contains comparative analyses of the impact measure time series with other series assumed not to have been affected. Since a large portion of the drinking and driving is done on weekend nights, the fatalities and serious injuries occurring during this time frame were analyzed and compared to the fatalities and serious injuries for weekday commuting hours (See Figures 2-1 and 2-2).

Figure 2-1



Fatalities and serious injuries combined for Friday nights, 10 P.M. to midnight; Saturday mornings, midnight to 4 A.M.; Saturday nights, 10 P.M. to midnight; and Sunday mornings, midnight to 4 A.M.; corrected for weekend days per month, seasonal variations removed.

Figure 2-2



Fatalities and serious injuries combined for Mondays through Fridays, 7 A.M. to 10 A.M. and 4 P.M. to 5 P.M., corrected for weekdays per month, seasonal variations removed.

Unfortunately this technique supplies no quantitative measure of impact. The interrupted time series approach does have some limitations which are discussed in Section III on evaluation design. More recently, Ross (33) has published another study on the effect of this law and its enforcement which, in support of earlier analysis, concludes that there was at least a short term impact on crashes. Noordzij (28) reported that the initiation of a new, more stringent drinking driving law in the Netherlands resulted in a significant reduction in fatalities. The introduction of new legislation in Canada, similar to the British Road Safety Act of 1967, had a much smaller, if any, effect (5,7). In contrast to these rather limited examples of scientifically validated programs, there have been a number of evaluations which have failed to find evidence of effect. Robertson et al. (30) evaluated a program involving imposing jail sentences on convicted drunk drivers in Chicago and found that despite the claims of its sponsor, jail sentences were applied in less than 10% of the cases and there was no evidence of impact on crashes.

More recently, a significant controversy has arisen over the effectiveness of Scandinavian drunk driving programs, which are reputed to be "tough" because they have low limits on permissible Blood Alcohol Content (.05%) and because individuals convicted of drunk driving are almost invariably jailed. Ross (32) characterized these claims as a "myth" because of his failure to find an association between the passage of the legislation and highway accidents. His results have been disputed by other studies (19,42). There is now considerable evidence from roadside breath test surveys (1,19,23) that there are fewer drivers with low to moderate BAC levels on the Scandinavian roads than in the United States or Canada. A review in January 1978 of alcohol safety programs by Jones and Joscelyn (16), summarizes the research on five types of efforts: (Legal, Health, Public Information and Education, Technological, and Systems) and concludes that of "the large scale alcohol safety programs which have been evaluated, only the British Road Safety Act of 1967, has clearly shown to have reduced crash losses involving drinking drivers and the effects of that program were transitory." Robertson (29) in his critique of Community Programs also comes to the conclusion that they are ineffective.

Three preliminary reports on the overall impact of the ASAPs have been published (37), (38, Vol. II—Chapter 2), and (39, Vol. II—Chapter 1). All three of these reports found evidence for a small but significant crash reduction effect, but since these studies were conducted on incomplete data, their results were preliminary. The first NHTSA ASAP impact evaluation covered the three year baseline period for 29 ASAPs in comparison with the two year operational period for the first eight ASAPs and the one year of operations for the remaining 21 ASAPs. Quarterly data of both nighttime as well as daytime fatal accidents were used to measure impact. For each of the two groups of ASAPs fatal crash data (nighttime vs. daytime) was aggregated and linear trend projections were developed for the operational years. Actual operational years' fatal crashes were then compared to projections under the assumption that if no intervention had occurred due to ASAP, a linear projection would be a reasonable expectation of fatal crash activity. If nighttime fatal crashes dropped significantly while daytime fatal crashes remained at the same levels compared to expectation, one could reasonably conclude that the reduction was due to ASAP, given that all other influences were held at the same level. In the case of the first eight ASAPs having two years of operations, a reduction of 94 nighttime fatal crashes was experienced while daytime crashes showed an increase of 32. Figure 2-3 shows the change in fatal crashes by category of crash.

FIGURE 2-3

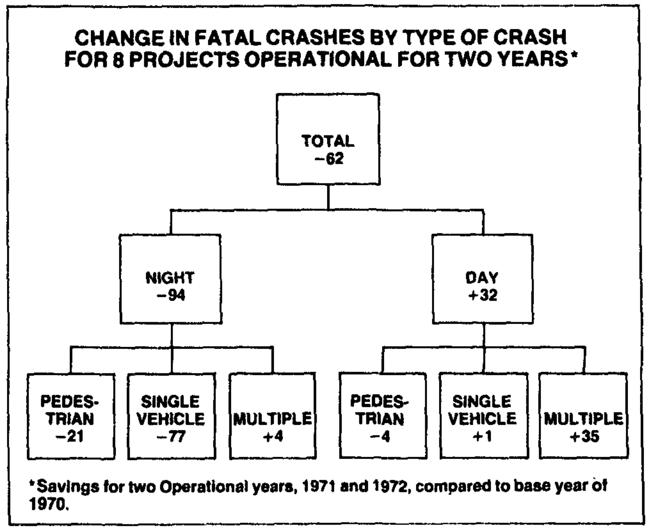
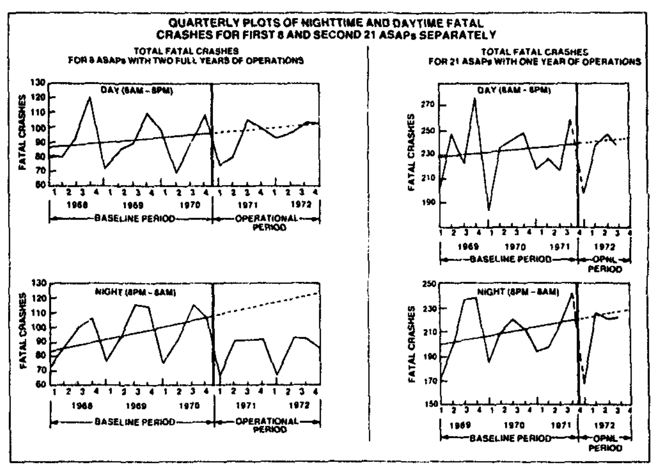


Figure 2-4, contains a graphic portrayal of the trends of nighttime and daytime fatal crashes for each of the two ASAP groups. Although, the first 8 ASAPs as a group show a reduction in nighttime fatal crashes as compared to the daytime fatal crashes, the ASAP group consisting of 21 projects with one year of operation showed no significant changes.

FIGURE 2-4



After completion of two years of operations for the 21 ASAP project group, a second interim evaluation was conducted to determine if any impact had been realized.

TABLE 2-1
NIGHT FATAL CRASHES OF 21 ASAPs

ASAP	BASE YEARS			OPERATIONAL YEARS		AVERAGE		PERCENT CHANGE
	1969	1970	1971	1972	1973	1969-71	1972-73	
BALTIMORE	84	66	59	78	59	69.7	68.5	
BOSTON	61	45	41	44	31	49.0	37.5	—23
CINCINNATI	35	42	40	36	38	39.0	37.0	—5
COLUMBUS, GA.	10	10	6	8	11	8.7	9.5	9
FAIRFAX COUNTY	31	33	47	37	30	37.0	33.5	—9
HENNEPIN COUNTY	43	51	44	38	59	46.0	48.5	5
INDIANAPOLIS	30	31	24	31	19	28.3	25.0	—12
KANSAS CITY	52	45	40	49	35	45.7	42.0	—8
LINCOLN	6	6	6	5	2	6.0	3.5	—42
NEW HAMPSHIRE	78	66	79	72	61	74.3	66.5	—10
NEW ORLEANS	44	48	49	33	34	47.0	33.5	—29
OKLAHOMA CITY	28	30	37	40	41	31.7	40.5	28
PHOENIX	43	47	40	48	45	43.3	46.5	7
PORTLAND, ME.	34	36	28	24	17	32.7	20.5	—37
PULASKI COUNTY	21	19	16	19	18	18.7	18.5	—1
RICHLAND COUNTY	21	21	28	16	18	23.3	17.0	—27
SAN ANTONIO	59	53	46	47	69	52.7	58.0	10
SOUTH DAKOTA	101	83	89	110	100	91.0	105.0	15
TAMPA	52	52	71	64	89	58.3	76.5	31
VERMONT	18	8	82	16	21	16.0	18.5	14
WICHITA	21	21	25	27	25	22.3	26.0	17
TOTAL	872	813	837	842	822	841.0	832.0	1

TABLE 2-2
DAY FATAL CRASHES OF 21 ASAPs

ASAP	BASE YEARS			OPERATIONAL YEARS		AVERAGE		PERCENT CHANGE
	1969	1970	1971	1972	1973	1969-71	1972-73	
BALTIMORE	75	73	74	63	75	74.0	69.0	− 7
BOSTON	45	28	33	36	35	35.3	35.5	1
CINCINNATI	33	36	40	38	32	36.3	35.0	− 4
COLUMBUS, GA.	8	8	9	9	9	8.3	9.0	8
FAIRFAX COUNTY	32	25	46	39	40	34.3	39.5	15
HENNEPIN COUNTY	77	77	54	48	65	69.3	56.6	−18
INDIANAPOLIS	35	33	27	23	24	31.7	23.5	−26
KANSAS CITY	39	39	36	44	49	38.0	46.5	22
LINCOLN	6	6	6	4	7	6.0	5.5	− 8
NEW HAMPSHIRE	85	90	92	84	63	89.0	73.5	−17
NEW ORLEANS	55	50	45	42	48	50.0	45.0	−10
OKLAHOMA CITY	49	37	36	44	35	40.7	39.5	− 3
PHOENIX	51	46	42	50	66	46.3	58.0	25
PORTLAND, ME.	34	41	37	38	32	37.3	36.0	− 6
PULASKI COUNTY	26	31	29	37	35	28.7	36.0	25
RICHLAND COUNTY	31	31	28	26	28	30.0	27.0	−10
SAN ANTONIO	59	40	30	38	52	43.0	45.0	5
SOUTH DAKOTA	117	103	116	120	126	112.0	123.0	10
TAMPA	68	68	78	76	86	71.3	81.0	14
VERMONT	19	17	19	23	27	18.3	25.0	37
WICHITA	27	23	20	31	25	23.3	28.0	20
TOTAL	971	802	897	913	959	923.1	936.1	1

Fatal crash data reported by 21 of the ASAPs, broken down by nighttime and daytime, appears in Tables 2-1 and 2-2. For the average of the baseline period, it appears that daytime fatal crashes were up about 1 percent, whereas nighttime fatal crashes were down about 2 percent. Similarly, nighttime and daytime fatal crash data in Table 2-3 and 2-4 for the first eight ASAPs show an increase of 6 percent in daytime fatal crashes compared with a decrease of 10 percent in nighttime fatal crashes. Corresponding data for 21 sites indicate increases of 2 percent and 5 percent in nighttime and daytime fatal crashes, respectively.

The results of the analysis indicated that after two years of operation there were some trend reversals at project sites after introducing the national trend in nighttime fatal crashes and the daytime fatal crash series at each site. From the structure of the analysis the evaluation design can be characterized as one which approaches a multiple time series with both comparison series and areas. At this point in time, the statistical techniques utilized were conventional and did not consider the effects, if any, of dependent data.

In 1975, P. Zador published a report (46) which attempted to show that there was no evidence that reduction in fatalities had occurred at ASAP sites and concluded that large scale programs such as ASAP are ineffective. If one reviews the design structure and the conclusion reached, it is difficult to link methodology with results in a logical manner.

Zador employed a design which evaluated ASAP effectiveness by comparing year-to-year variation in fatality statistics between groups of areas with ASAPs and comparison

TABLE 2-3
NIGHT FATAL CRASHES FOR THE FIRST EIGHT ASAPs

ASAP	BASE YEARS			OPERATIONAL YEARS		AVERAGE		PERCENT CHANGE
	1968	1969	1970	1971	1972	1968-70	1971-72	
ALBUQUERQUE	28	33	37	39	54	32.7	46.5	42
CHARLOTTE	34	34	43	35	29	37.0	32.0	−14
DENVER	55	66	57	54	56	59.3	55.0	− 7
NASSAU COUNTY	65	94	79	78	68	79.3	73.0	− 8
PORTLAND-EUGENE	32	28	34	22	36	31.3	29.0	− 7
SEATTLE	102	94	87	72	59	94.3	65.5	−31
WASHTENAW COUNTY	24	31	38	29	24	31.0	26.5	−15
WISCONSIN	24	21	20	20	18	21.7	19.0	−12
TOTAL	364	401	395	349	344	386.6	346.5	−10
NATIONAL TREND	9,267	9,557	9,345	9,489	9,679	9,369.7	9,589.0	2

TABLE 2-4
DAY FATAL CRASHES FOR THE FIRST EIGHT ASAPs

ASAP	BASE YEARS			OPERATIONAL YEARS		AVERAGE		PERCENT CHANGE
	1968	1969	1970	1971	1972	1968-70	1971-72	
ALBUQUERQUE	34	29	30	35	37	31.0	36.0	16
CHARLOTTE	37	41	32	52	47	36.7	49.5	35
DENVER	61	49	52	45	54	54.0	49.5	− 8
NASSAU COUNTY	71	70	79	82	75	73.3	79.0	7
PORTLAND-EUGENE	27	29	43	19	43	33.0	31.0	− 6
SEATTLE	88	91	87	83	86	88.7	84.5	− 5
WASHTENAW COUNTY	33	20	26	29	35	26.3	32.0	22
WISCONSIN	24	24	19	19	29	22.3	24.0	7
TOTAL	375	353	368	364	406	365.3	385.5	6
NATIONAL TREND	9,867	10,035	10,021	10,194	10,755	9,974.3	10,474.5	5

groups of areas without ASAPs. Twenty-eight ASAP areas were consolidated into 13 groups—5 groups were formed from 8 ASAPs that began in 1971 and 8 groups were formed from the 20 ASAPs that began in 1972. The comparison groups were selected solely on the basis of population and population growth.

An analysis of variance model was utilized to determine if ASAP groups showed any impact from the baseline to the operational period. The measure of effectiveness used was defined as the proportion of total fatalities occurring in the ASAP group compared to the combined total of fatalities occurring in both ASAP and the comparison groups for each year. This was done for each of the 5 groups for 3 years of baseline and 2 years of operations. For each of the 8 ASAPs this was done for 3 years of baseline and 1 year of operation. Based upon the two analysis of variance matrices (5×5) and (8×4), Zador concluded that ASAPs were ineffective.

Johnson et al. (15) in a critique of Zador's paper attempted to refute the claim that the ASAPs as large scale social programs had been ineffective. The authors took issue with the structure of the comparison groups, statistical design and methods, and the use of total fatality data on an annual basis. It appeared that since the ASAP program primarily addressed the reduction of alcohol-related crashes, which for the most part occur in the evening and late night hours, that total fatality measures were inappropriate. The Johnson et al. paper provoked a rejoinder by Zador (47). The Zador paper did show some improvements in statistical design in that comparison groups were selected as a basis for validation of conclusions. However, the selection was based on total population and population growth rather than characteristics matched to the ASAP sites. Furthermore, subgroups were formed by combining ASAPs rather than permitting each ASAP to be evaluated based upon its own baseline and experimental period separately and compared to comparison sites separately. The totality of the analysis consisted of inferences made using 57 data points, thus significantly reducing the power of the test. A further weakness of the evaluation stems from the omission of validation of time series characteristics with the assumption that conventional techniques were in all cases applicable.

In addition to the overall program impact studies done by NHTSA, each individual ASAP was required to produce an assessment of project impact on an annual basis.[1]

Heimstra and his coworkers at the Human Factors laboratory at the University of South Dakota, were retained by the NHTSA to critically assess the evaluation methodology of the analytic reports submitted by the individual ASAPs and to summarize the results across projects. Their reports, (20) and (21), provided a good condensation of the evaluation findings in early stages of the ASAPs and aided in identifying the evaluation progress made in 1973 and 1974.

[1] Because of the large number of these reports, they have not been printed for wide distribution. Individual reports are available at the NHTSA Technical Reference Branch, Washington, D.C. 20590.

Interim Assessments of Total Project Impact: 1974

The 1974 volume deals with the 1973 data from Analytic Studies submitted by the ASAPs. It contains discussions on project impact evaluation, Interim Assessments of effect, and brief critiques for each site's reports. The section on project impact evaluation is a good reference which develops the terminology and concepts fundamental to project evaluation. In addition, data analysis methods are explained which are important for understanding the techniques in the analytic studies, and examples from the analytic studies are presented and explained.

The most important section of the report presents the interim assessment of effect. At the beginning of the projects, four basic evaluation questions were listed for consideration in measuring ASAP effectiveness. Briefly, they were:

1. Was there a change in the level of distribution of ultimate performance measures?
2. If changes are observed, are they a result of ASAP or other identifiable factors in the community?
3. If there is a reduction, what is the cost effectiveness?
4. Are the ASAPs apprehending drivers with profiles similar to those of fatally injured DUI drivers?

Table 2-5 summarized the ASAP effects on ultimate performance measures as reported in 1973. Each analytic study was classified as having a "descriptive only," "weak" or "strong" analysis, based on the type and power of the statistic used in the analysis. While only six locations performed "strong" analyses, 13 sites had some indication of positive effects on fatal, injury or property damage crashes during the first year (shown by +). The remainder of sites, at this point in the program, showed no change or an increase in crashes (shown by ‡).

Additional effort was made to review results of proxy measures such as alcohol-related crashes, nighttime crashes, weekend crashes and single vehicle crashes, to establish a possible causal relationship between ASAP and crash reductions. These subsets of the total accident category have been shown to be more highly associated with drinking driver accidents than other types. Table 2-6 reflects the strength of the analysis for each of six categories of proxy measure studies. Study of these measures was often difficult, especially in gathering data for alcohol-related crashes, but the Phoenix project was able to acquire the needed data, and performed strong analysis indicating positive ASAP effect.

TABLE 2-5
REPORTED EFFECTS ON ULTIMATE PERFORMANCE MEASURES

REGION	ASAP PROJECT	FATAL CRASHES: DESCRIPTIVE ONLY	FATAL CRASHES: WEAK ANALYSIS	FATAL CRASHES: STRONG ANALYSIS	INJURY CRASHES: DESCRIPTIVE ONLY	INJURY CRASHES: WEAK ANALYSIS	INJURY CRASHES: STRONG ANALYSIS	PROPERTY DAMAGE CRASHES: DESCRIPTIVE ONLY	PROPERTY DAMAGE CRASHES: WEAK ANALYSIS	PROPERTY DAMAGE CRASHES: STRONG ANALYSIS
I	CUMBERLAND/YORK, ME		‡			‡			‡	
	BOSTON, MA		+		‡			‡		
	NEW HAMPSHIRE	+			+					
	VERMONT	‡			‡			‡		
II	PUERTO RICO									
III	DELAWARE	+			+					
	BALTIMORE, MD	+			‡					
	FAIRFAX CO., VA			‡			+			‡
IV	TAMPA, FL		‡			‡			‡	
	COLUMBUS, GA	‡								
	CHARLOTTE/MECKLENBURG, NC	‡			‡					
	RICHLAND CO., SC	+/?			+/?			‡		
V	INDIANAPOLIS, IN	+			?					
	HENNEPIN CO., MN			‡						
	CINCINNATI, OH	+								
VI	PULASKI CO., AR		+/?	(FATAL & INJURY COMBINED)						
	NEW ORLEANS, LA			+			‡			
	ALBUQUERQUE, NM	‡			‡					
	OKLAHOMA CITY, OK	‡			‡					
	SAN ANTONIO, TX	‡			‡					
VII	SIOUX CITY/WOODBURY CO., IA	+/?			‡					
	WICHITA, KS	‡			‡					
	KANSAS CITY, MO	‡			‡					
	LINCOLN, NB	+/?								
VIII	DENVER, CO		+		‡					
	SOUTH DAKOTA			‡			+			‡
	UTAH			‡			‡			
IX	PHOENIX, AZ			‡			‡			
	LOS ANGELES CO., CA									
X	IDAHO	‡				‡				

Analysis was also conducted by some ASAPs on trends in BACs of arrested drivers, cost effectiveness and driver profiles. Of special interest were several cost effectiveness studies reviewed.

The New Orleans and Oklahoma City projects prepared noteworthy studies which carefully linked cost considerations to statistical estimates of crash reduction, and provided confidence limits for the cost estimates.

This points up the importance of careful impact evaluation of crashes as a basis for other measures of effectiveness, and careful use of statistical techniques.

The 1974 volume concludes with brief critiques of the individual ASAP reports. This section is informative and points up a real limitation to the use of the Analytic Studies—the varying levels of statistical analysis that were used from site to site. The previous two tables indicate that a large number of projects depended upon descriptive statistics as a basis for their reports. It becomes difficult to draw uniform conclusions on ASAP effectiveness when few projects were able to accomplish appropriate statistical evaluation. The comment section in each critique reflects many of the inadequacies in this area. It must be remembered that many of these reports reflected the first year's collection of data, which of itself was not a substantial basis for drawing firm conclusions of the impact of the ASAP program. However, these reports provided a chronicle to the progress made during the first months of ASAP operation.

1975 Interim Assessment of Total Project Impact

The second volume (21), "1975 Interim Assessment of Total Project Impact," reviews the data submitted by the ASAP projects in the Analytic Studies #1 for 1974. Section I and II of this volume review basic concepts of evaluation presented in the 1974 volume. Section III, Methods and Results, provides the most valuable data in the volume.

Prior to the writing of the 1974 studies reviewed in this volume, an effort was made to acquaint all ASAP evaluators with time series techniques which would more adequately analyze the dependent series they were using in their analyses. Time constraints, lack of computer programs or lack of statistical expertise prevented all but six studies from using the more powerful measures for analysis. The following five problems prevented this volume from accomplishing impact assessment for the overall ASAP program:

1. Difficulties in consistent reporting of crash series, including problems of time interval reporting;
2. Great variations in the methodologies of statistical analysis;
3. Lack of proper testing for statistical significance at many sites;
4. Little consideration for competing hypotheses in the analysis;
5. Conflict in changes in ultimate performance measures within a site.

As a result of these five problems, the Methods and Results chapter is relatively brief, and provides examples of sites which did have some good analytic sections as well as some bad techniques which jeopardized the integrity of some report results. Of the 21 reports reviewed, 7 sites (33%) showed total fatal crash decline concurrent with ASAP activity (see Figure 2-5). Of nine studies considered to have "strong analysis" only two sites supported significant pro-ASAP changes, and one of these appeared due to the energy crisis rather than ASAP. Figure 2-5 shows the results of the fatal and injury crash analysis, based on descriptive, weak or strong analysis. Discussion is also made of proxy measures for alcohol-related crashes, various measures of BAC trends, profile comparisons, and cost effectiveness. Figure 2-6, for example, shows that of twelve sites found to have useable analysis, five showed positive ASAP effect based on the BACs of fatally injured drivers which were measured.

The report makes it clear that while individual analytic studies were able to document the individual ASAP project and its operations, the variation in data collection efforts and analysis sophistication made it impossible to draw overall program conclusions based on individual ASAP site results. This assessment indicated that overall program impact would have to be evaluated by NHTSA. The results of this program level analysis are described in Chapter VII of this paper. These interim assessment reports were useful in determining the quality of the ASAP Analytic Studies #1 and provide a good summary and evaluation of the conclusions drawn in the individual studies.

FIGURE 2-5

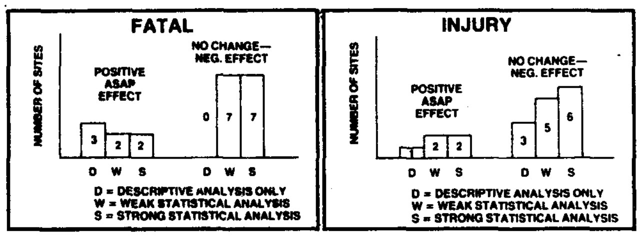
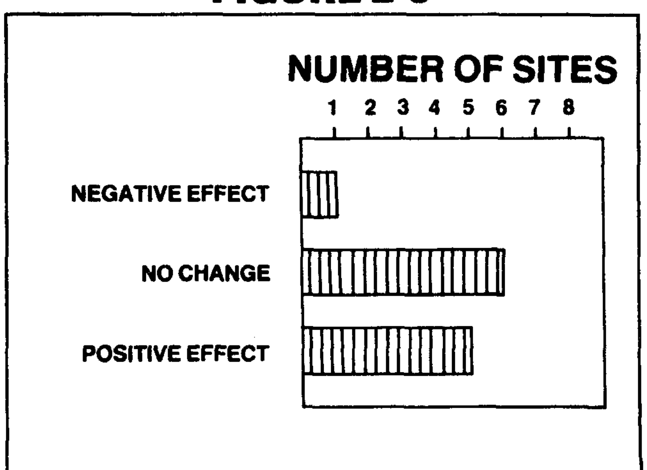


FIGURE 2-6



ESTIMATION OF ASAP EFFECT BASED ON FATALLY INJURED DRIVER BAC

TABLE 2-6
REPORTED EFFECTS ON PROXY MEASURES (CRASH SUBSETS)

REGION	ASAP PROJECT	A/R FATAL CRASHES			A/R INJURY CRASHES		
		DESCRIPTIVE ONLY	WEAK ANALYSIS	STRONG ANALYSIS	DESCRIPTIVE ONLY	WEAK ANALYSIS	STRONG ANALYSIS
I	CUMBERLAND/YORK, ME		‡			‡	
I	BOSTON, MA		+				
I	NEW HAMPSHIRE		‡				
I	VERMONT	‡			‡		
II	PUERTO RICO						
III	DELAWARE	+			‡		
III	BALTIMORE, MD	‡					
III	FAIRFAX CO., VA	‡					
IV	TAMPA, FL		‡			‡	
IV	COLUMBUS, GA		+	(FATAL, INJURY & PROP. COMBINED)			
IV	CHARLOTTE/MECKLENBURG, NC	+			+		
IV	RICHLAND COUNTY, SC	+/?			‡		
V	INDIANAPOLIS, IN	+					
V	HENNEPIN CO., MN			‡			
V	CINCINNATI, OH		‡				
VI	PULASKI CO., AR						
VI	NEW ORLEANS, LA						
VI	ALBUQUERQUE, NM	‡			‡		
VI	OKLAHOMA CITY, OK		+				
VI	SAN ANTONIO, TX	‡			‡		
VII	SIOUX CITY/WOODBURY CO., IA		+			+/?	
VII	WICHITA, KS	‡			‡		
VII	KANSAS CITY, MO		‡			‡	
VII	LINCOLN, NB	‡					
VIII	DENVER, CO	‡			‡		
VIII	SOUTH DAKOTA			‡			‡
VIII	UTAH			‡			
IX	PHOENIX, AZ			+			+
IX	LOS ANGELES CO., CA						
X	IDAHO	‡/?			‡/?		

NIGHTTIME CRASHES							WEEKEND CRASHES						SINGLE VEHICLE CRASHES					
	FATAL			INJURY			FATAL			INJURY			FATAL			INJURY		
DESCRIPTIVE ONLY	WEAK ANALYSIS	STRONG ANALYSIS	DESCRIPTIVE ONLY	WEAK ANALYSIS	STRONG ANALYSIS	DESCRIPTIVE ONLY	WEAK ANALYSIS	STRONG ANALYSIS	DESCRIPTIVE ONLY	WEAK ANALYSIS	STRONG ANALYSIS	DESCRIPTIVE ONLY	WEAK ANALYSIS	STRONG ANALYSIS	DESCRIPTIVE ONLY	WEAK ANALYSIS	STRONG ANALYSIS	
	‡			‡			‡			‡								
	+																	
	‡						‡						‡					
	+/?		‡			‡			‡			‡			‡			
‡			‡			‡			‡									
‡			‡			‡			‡			‡			‡			
	+						‡			‡								
	+	(A/R NIGHTTIME CRASHES— FATAL & INJURY & P.D.)											+/‡	(A/R SINGLE VEHICLE— FATAL & INJURY & P.D.)				
‡						+			+									
+			‡															
‡			‡															
		‡						‡						‡				
	‡			+/?			‡			+/?		‡			‡			
	+/?	(FATAL & INJURY COMB.)																
		+			+			+			‡			‡			+	
‡			‡			‡			‡									
						‡			‡									
	‡			‡														
	+/?			+/?														
‡			‡			‡			‡			‡			‡			
‡						‡												
‡						‡												
+			‡									+			‡			
		‡			‡			‡			‡			‡			‡	
		‡			‡													
‡			‡															
‡/?			‡/?			‡			‡									

III. EVALUATION DESIGN

The purpose of this study was to determine whether the ASAP program as a whole had a statistically significant impact on the number of alcohol-related crashes. Two basic approaches were possible: (1) the crashes for all 35 communities could be summed and analyzed as a unit, or (2) each community could be treated as a separate experiment. In the Interim Reports (37,38,39) a summing technique had been used together with some individual site analyses. As the number of projects grew, it became clear that the basic ASAP concept was being applied in different ways at different sites. Even where applications were very similar, site variations (population, geography, urbanization, etc.) made the integration of data questionable. As a result, an approach was adopted for this final evaluation which treated each site individually but by a common methodology. Since the sites varied in the quality of their data, and to a certain extent in the types of data they collected, the most sensitive test of effectiveness might have been provided by using a different analytical technique on different data sets at each site. However, this procedure would have run the considerable danger of allowing the project evaluators to shift their impact measures to take advantage of chance reductions occurring in some of the data sets. It was determined therefore, that a single research design, using a single analytical technique on the same data from each of the 35 projects, would be employed.

A. Measures

Criterion Data: The selection of an appropriate criterion measure was a major evaluation problem. It is clear that the best (most persuasive) criterion measure would be the number of crashes involving at/fault drivers who have a high BAC at the time of the crash. Unfortunately, this measure was not available, since measurements of BAC are made on only a portion of drivers involved in fatal accidents, and almost never on drivers involved in either injury or property-damage-only accidents. While some communities provide for regular blood tests by coroners on fatally injured drivers, surviving drivers are tested only if the investigating officer has sufficient evidence to warrant an arrest for drunk driving. Aside from the fact that a relatively small proportion of drivers in accidents are charged with drunk driving, this measure would be biased by the judgment of the police. This bias threatens the validity of any study of police enforcement, since the training provided the police officers and the increased motivation to make drunk driving arrests would be likely to affect the number of drivers in crashes who are measured for blood alcohol. Zylman (48) has argued that even among the fatally injured drivers, measurements are biased by a tendency to oversample fatally injured drivers who are suspected of drinking or who die at night when drunk driving is most likely.

The problems associated with identifying alcohol-related accidents through the use of BAC data or police investigator judgments have been more fully discussed in the interim ASAP evaluations (38, Vol. II—Chapter I pp. 13–25). From the beginning it was clear that an overall program analysis using BAC data would not be possible. It was necessary therefore, to make use of a surrogate measure for the desired criterion, alcohol-related crashes. The measure chosen was nighttime (8pm to 8am) fatal crashes. This surrogate takes advantage of the well documented relationship between time of day, drinking and alcohol-related crashes in this culture (16 p. 47). This measure is similar to the criterion used by Ross (31) in his convincing study of the British Road Safety Act of 1967, except that the British nationwide pub closing laws made the timing of alcohol-related crashes more precise than is the case in the United States.

Consideration was given to using a more limited time period (say 10pm to 4am). However, since the data sets were limited to fatal crashes, the number of cases was already small. A shorter time period would have yielded a set of data on which it might have been impossible to demonstrate any change. The use of an objective time criterion rather than police investigator's judgments, and the limiting of the data to fatal crashes, which are generally well recorded, assured that there would be a minimum opportunity for what Campbell and Stanley (4) have termed the "instrumentation" threat to validity (the possibility that the measuring instrument changes over time).

Intermediate Measure: To augment the crash data and provide a measure of project effect with face validity, voluntary roadside surveys of the breath/alcohol levels in a random sample of drivers using the roads were recommended as one of the evaluation techniques to be used by the ASAPs. Such surveys could only be conducted where the cooperation of the police and the permission of the city or county attorney could be obtained. For various reasons only 27 of the 35 ASAP sites were able to carry out such surveys. It was hoped that such surveys would provide an indication that the frequency of drinking and driving was reduced, and provide a link between the project activity measures such as drunk driving arrests, convictions, etc. and a reduction in nighttime fatal crashes.

Guidelines for conducting surveys (40) were issued to each project in an effort to standardize procedures. The guidelines recommended that the surveys be conducted yearly with the first sample obtained during project development (first six months) and every twelve months thereafter during the remainder of the project. A minimum sample size of 640 interviews with a BAC test was specified. Equal samples were to be obtained on Friday and Saturday. If funding permitted, other days of the week could be included. The evening hours of 7pm to 3am were to be covered in the survey with a minimum of 32 locations sampled on the basis of crash data for the 7pm to 3am period. Straight sections of medium speed roadway with sufficient traffic volume, parking area, and driver visibility were required for safety.

The results obtained in these surveys were reasonably consistent (39, Vol. II—Chapter I). An overall estimate of driver BAC levels for the Continental U.S. was obtained through a national probability sample for the same hours and days of week (43). The results of this survey were similar to the individual project results (44). This survey technique was apparently useful in describing the level of alcohol use among drivers not involved in crashes. However, because of cost considerations, the number surveyed and the number of surveys were limited.

The ASAP evaluation methodology utilized to measure project impact has been evolving throughout the period of demonstration. Previous evaluations did not consider some of the shortcomings and requirements of the quasi-experimental design, i.e., where the elements or demonstrations being studied are not selected through a random process for treatment and control. However, it is felt that the current methodology (multiple time series) utilized to evaluate the ASAP program makes use of the most powerful state-of-the-art techniques available to evaluators today.

The objectives of ASAP impact evaluation are to determine: (1) if a reduction in alcohol-related crashes occurred during the demonstration period, and (2) whether the observed reduction in alcohol-related crashes resulted from the implementation of countermeasures employed by the ASAP project. Impediments to the attainment of these evaluation objectives exist and must be considered when reviewing analytic results and conclusions reached.

B. Research Design

In a conventional experimental design, the subjects under study are both selected and assigned randomly to either an experimental or a control group. Treatment is then applied to the experimental group and the difference, if any, in the ultimate measure relevant to the experimental and control groups is determined to be statistically significant or not. If statistically significant, then it is concluded that the difference is due to exposure to treatment.

In the quasi-experimental design, the multiple time series approach provides the capability to control for all of the sources of internal invalidity and perhaps is the best of all feasible designs to employ in an experiment such as ASAP (4, pp. 55–57). Controlling for internal validity assures that changes in the experimental areas are in fact due to treatment rather than some confounding factors. A time series defined as a sequence of data elements recorded over equally spaced time periods (e.g. months) provides a longitudinal approach of observation and analysis. In the multiple time series approach, a two way comparison is made between two or more time series. One time series represents crash data from the demonstration site prior to and during the demonstration period. The second time series represents crash data from a comparison site for the same periods used in the demonstration site. The two way comparison consists of: (1) determination of the change in level of accidents before vs. after the demonstration period within each series, and (2) comparison of the change in level between the demonstration and comparison sites. In other words, two or more time series are evaluated and compared; one time series has been subjected to the treatment and the other series, not subjected to treatment, is utilized for comparison.

C. Statistical Analysis

"Before and After" studies of the effect of a new safety program may be invalidated by the failure to detect and eliminate autocorrelation in the crash data. Examination of data over a period of time (time series analysis) often reveals within-series relationships (autocorrelation) existing between the data points. Frequently, this results from annual cycles or seasonality in crash frequencies. Autocorrelation may also result from longer term trends such as when population growth or decline or changes in vehicle miles traveled produce a change in crash levels.

The methodology used to evaluate before and after comparisons in each ASAP nighttime fatal crash, daytime fatal crash and comparison series is known as Intervention Analysis (3). The foundation for this technique is the application of the Box-Jenkins (2) time series analysis where univariate series are decomposed into time series factors (seasonality, trend, etc.). This technique is used to determine the existence and degree of within time series relationships. This is accomplished by examining the dependence of a time series on itself after a number of successive time period lags have been introduced. For each time period lag, a quantifiable measure known as the autocorrelation is calculated which measures the strength of dependence. The autocorrelation at each time period lag suggests the pattern of the relationship and indicates the necessary adjustments required to reduce the original time series to a random or "white noise" series. The decomposition is terminated and a model is specified when it is felt that there is an appropriate balance between the number and types of time series parameters *and* the residual unexplained variation. The residual unexplained variation is successively reduced to uncorrelated random error terms representing the differences between the actual data and the estimates derived from the statistical model.

Using the concepts of univariate decomposition, Box and Jenkins further developed a methodology analogous to Regression Analysis, which derives a mathematical relationship between two or more time series variables. This mathematical relationship is known as the transfer function and can be expressed as follows:

$Y_t = v(B)X_{t-b} + N_t$, where:

Y_t = value of dependent variable at time t

X_{t-b} = value of independent variable at time t−b

b = lag (or delay) time

$v(B)$ = transfer function analogous to regression coefficient

N_t = term representing time series characteristics

If each of the time series variables (X,Y) are uncorrelated, the transfer function reduces to a regression equation of the form $Y_t = b_0 + b_1 X_{t-b} + e_t$. If a significant reduction in crash level occurs at or shortly after the point of intervention, one can conclude that project impact has been achieved provided all other competing hypotheses have been eliminated. Two methods are available for this determination when dealing with time series variables. Glass, Wilson and Gottman (11) developed a univariate approach in which, after adjustments for time series characteristics are performed, a test for a change in level between the two periods is conducted.

This approach has limitations in that the experimental period time series model is assumed to be identical to the baseline period model, there is no provision for independent variable input, and the technique does not take into consideration the delay time between project input and effect on output which is a possibility when dealing with dynamic systems. With the more complex intervention models, the technique does not generate quantifiable estimates of the magnitude of the effect.

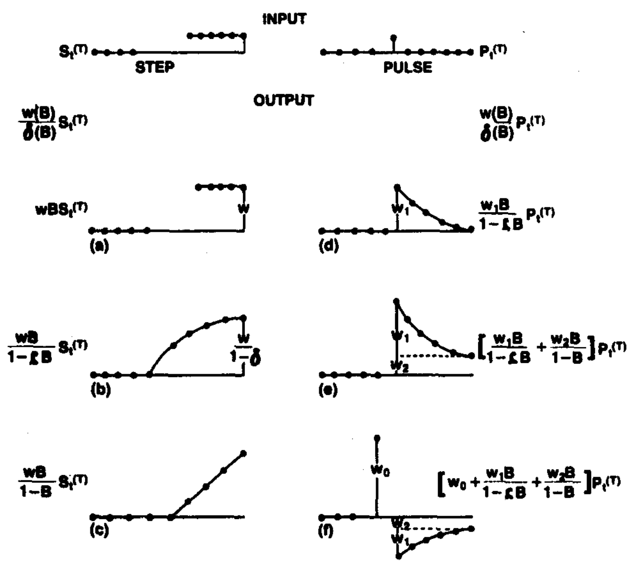
The Box-Jenkins transfer function/intervention analysis quantifies the relationship between inputs and outputs. Unfortunately, in the case of multifaceted traffic safety programs, it is most difficult to account for the effect of individual countermeasures on nighttime fatal crashes. It is incorrect to utilize only one input variable to represent the total project presence, for example DUI arrests, as a representative measure of the project's output. Fortunately, Intervention Analysis has the capability of measuring the total composite intervention effect when a new policy or condition is introduced. If one then views the total ASAP project in a community as an intervention, its total effect can be measured on the ultimate impact measures through the transfer function. The input time series variable representing total ASAP project effect is characterized as a step function composed of "zeros" and "ones." It is assigned the value "zero" when the ASAP project was absent and assigned the value "one" when the ASAP project was present (demonstration). For a typical ASAP project having a three year baseline and three year demonstration period, the monthly time series data elements characterized by 36 "zeros" followed by 36 "ones" is used to depict the absence and presence of an ASAP project. The time series steps from a value of "zero" to "one" at time period 37. In contrast to the step function which is sustained for 36 time periods, there is also the pulse function which is a one time input to the system. A graphic portrayal of step and pulse input functions and examples of some possible output responses taken from (3) is shown in Figure 3-1.

The ASAP projects were evaluated utilizing a step rather than a pulse function input since the countermeasures were implemented over a sustained period of time. The 35 projects were scheduled for full operations in three groups beginning with January 1, 1971, January 1, 1972 and July 1, 1972. At each project site monthly baseline data for the three years prior to implementation was collected. This enabled NHTSA to evaluate project impact based on at least six years of crash data.

Corresponding crash data from comparison sites as well as estimates of national trend crash data were utilized to support conclusions concerning the ASAP results. The first of these comparison series, daytime fatal crashes, provides a method of controlling for factors other than the ASAP project which might impact both nighttime and daytime fatal crashes. Examples of such factors might be safety improvements in vehicles and roadways, economic and weather conditions. It was the contrast between the changes in nighttime as compared to daytime crashes in Britain which Ross relied on in his demonstration of the effectiveness of their Road Safety Program.

FIGURE 3-1

RESPONSES TO A STEP AND A PULSE INPUT*



*(a), (b), (c) show the response to a step input for various simple transfer function models; (d), (e), (f) show the response to a pulse for some models of interest.

The use of a daytime accident comparison does not control for effects which might logically be expected to differentially affect nighttime crashes, such as an overall increase in alcohol consumption. To provide a meaningful comparison to control for such possibilities, a nighttime fatal crash series is required from another community which differs from the ASAP site only in the absence of a special alcohol safety program (see Chapter IV).

For each of the three time series (ASAP nighttime, daytime and comparison site nighttime fatal crashes) monthly data were available for three years prior to the initiation of the project and for two to five years of project operations. The operational period for each ASAP project is given in Figure 1-1. The treatment initiation point was the official project starting date in all but three cases (Boston, Nassau County and Charlotte) where the starting date was delayed one year because enforcement activities were not begun until the second year.

The design permitted the testing of the hypothesis that the experimental treatment (ASAP) reduced the number of nighttime fatal crashes at the ASAP site while the two comparison time series (ASAP daytime fatal crashes and comparison site nighttime fatal crashes) showed no reduction. If a downward trend in the experimental ASAP nighttime series is accompanied by a downward trend in one of the comparison series, an ambiguous result is produced since this suggests the possibility that an outside factor rather than the ASAP is responsible for the result.

Coincident with the ASAP demonstration period, two major confounding factors were present and had to be accounted for. The first was the fuel crisis which was hypothesized to be present from October 1973 through March 1974 and the second was the imposition of the 55 MPH National Maximum Speed Limit Law which became effective between November 1973 and March 1974 depending on the State in question. The impact of these events has been demonstrated by independent studies (6,14,17,18) and was also verified by analysis of the National (14 State sample—see Chapter V) daytime fatal crash series. The dramatic reduction in highway fatalities attributable to both of these events was coincident with almost all of the ASAP demonstration time periods. Consequently, the effect of these two events had to be accounted for and separated from any ASAP effectiveness measures. These two confounding factors were also introduced into the analysis as dummy variables consisting of zeros and ones. Therefore, if any ASAP project showed impact, it was exclusive of the effect of either of these two confounding factors. In summary, the approach used in evaluating ASAP impact consisted of applying time series techniques to nighttime fatal crashes as well as to a matched comparison site depicted by the following matrix, Figure 3-2.

FIGURE 3-2
ASAP PROJECT/PROGRAM EVALUATION

NIGHT FATAL CRASHES

	Three Year Baseline Period	**Multi-year Demonstration Period**
	For each ASAP separately	
ASAP	**1. Eliminate long term time series trend, seasonal and confounding effects due to energy crisis and 55 MPH NMSL (if applicable).** **2. Determine the statistical significance in night fatal crash levels between the baseline and demonstration period using intervention analysis.** **3. Quantify the significant reduction in night fatal crashes due to the presence of the ASAP system.**	
	For each comparison site matched to an ASAP separately	
Comparison Site	**1. Eliminate long term time series trend, seasonal and confounding effects due to energy crisis and 55 MPH NMSL (if applicable).** **2. Apply identical statistical tests to the baseline and demonstration night fatal crash data to substantiate further the conclusion that any reduction in night fatal crashes at the ASAP site did not occur by chance.** **3. Quantify any change in night fatal crashes (if any) that may have been observed during the comparable baseline/demonstration period.**	
	For all 35 ASAPs projects and 25 comparison sites applications	
ASAP Program	**1. Determine frequency of reduction in night fatal crashes for each of the two sets of sites (ASAP and comparison).** **2. Test difference in frequency of occurrences for each set of sites.** **3. Conduct similar tests on increases in night fatal crashes within each set of sites.**	

Since one nighttime fatal crash series, one daytime fatal crash series, and one or more comparison nighttime fatal crash series (depending on the number of comparison sites available) were analyzed for each of the 35 ASAPs, a total of 114 time series analyses were carried out. The output from Intervention Analysis gives parameters (representing project effect) and their standard errors. Significance is measured using a t test. In this study as in the preliminary ASAP evaluations, a one-tailed test at the alpha = .05 level has been used throughout, unless otherwise specified. The one-tailed test was selected because the hypothesis being tested is that the ASAP program will cause a reduction in alcohol-related crashes.

IV. COMPARISON SITES

The multiple time series approach requires the use of comparison sites in order to establish the required internal validity for the experiments in question. In the field of traffic safety, it is very difficult, if not impossible, to select a site sufficiently similar in character to that of the experimental area. Evaluators at the ASAP projects were for the most part unable to find acceptable comparison sites for their particular project, owing to a lack of good data to measure similarity, or due to contamination. The implementation of alcohol countermeasures, considered to be a confounding factor in any comparison area during the ASAP demonstration period, eliminated many sites from consideration. It was decided that it would be useful to seek a number of such comparison areas from the national level. A contract was then initiated (25) to find localities that could be suitable for comparison to ASAP areas.

As with the National trend data (Chapter V), few eligible sites were identified, thus reducing the desired additional replications of comparison sites. Fifty-two candidate communities which were initially selected on the basis of population size and lack of ASAP activity were presented with the following questions:

- Does the community have an alcohol safety program?
- Does the community have data available for the eight years 1968–1975?
- Could the site be a legitimate comparison for one or more ASAP communities?

Thirty-one communities were eliminated because of unavailable data or operational alcohol programs, leaving twenty-one sites with sufficient data requirements to be candidates for comparison site analyses.

A substantial amount of time was invested in selecting characteristic variables i.e., variables which were highly correlated with the surrogate measures most closely associated with alcohol-related crashes: ratio nighttime fatal accidents to total accidents; nighttime fatal accidents per capita; nighttime fatal accidents per licensed driver.

Initially a list of 27 such variables was developed consisting of factors thought to be correlated with alcohol-related crashes (Table 4-1). Items 1–8 could not always be collected at the city or county level in ASAPs or their comparison sites, and were eliminated immediately.

Items 9–27 were then subjected to two different statistical analyses. First, a simple correlation was done between variables themselves. Items that had very high correlations with other characteristics in the list (e.g., population density and percentage urban) were identified so that the number to be matched could be kept to a minimum. If one characteristic was matched, other highly correlated characteristics would also have a high probability of matching. The selection of which variables to keep was somewhat subjective but was guided by the correlation of variables with the surrogate measures. As a result, Items 9–16 were eliminated.

Items 17–27 were then subjected to a stepwise linear regression analysis—all surrogate measures were estimated by linear combinations of the characteristic variables. Items 17–22 consistently contributed little to the estimation of any of the surrogate measures and were therefore eliminated. As a result, five variables (23–27) were chosen as having significant relationships with the surrogates.

- Percentage Urban—The more rural the area, the higher percentage of alcohol-related crashes (high negative correlation).
- Gas Dollars per Capita—An indicator of the amount of driving in an area (local mileage is usually not available).
- Dollars Spent in Eating and Drinking Establishments—A variable which reflects the economy and the potential for drinking and driving home from drinking establishments.
- Drinking Age—The lower the drinking age the higher the number of alcohol-related crashes. Inclusion of this variable indicates youth involvement in alcohol-related crashes and changes in drinking age in the communities.
- Population change for one year.

Data for these five variables were collected from the

TABLE 4-1
COMMUNITY CHARACTERISTICS FOR ANALYSIS OF CORRELATION WITH ALCOHOL-RELATED CRASHES

1. **Road miles**
2. **Vehicle miles**
3. **Road density**
4. **Registered vehicles**
5. **Licensed drivers**
6. **Number of DWIs**
7. **Number of DWIs per capita**
8. **Registered vehicles per driver**
9. **Population over 18 years of age**
10. **Population density**
11. **Manufacturing dollars per capita**
12. **Labor in manufacturing per capita**
13. **Total gas dollars**
14. **Dollars per labor in manufacturing**
15. **Income per capita**
16. **Percentage nonwhite**
17. **Legal driving age**
18. **Minor driving age**
19. **Average low temperature**
20. **Average high temperature**
21. **Percentage of drivers under 25 years of age**
22. **Population**
23. **Percentage urban**
24. **Dollars spent in eating and drinking establishments**
25. **Drinking age**
26. **Gas dollars per capita**
27. **Population change**

ASAP project and comparison sites for input to the clustering program used to match ASAPs with comparison areas.

The clustering technique, developed by Stanford Research Institute, required each ASAP comparison site to be described by a unique, multi-dimensional vector determined by values of the five characteristic variables, and required an initial selection of the numbers of clusters desired, since this too, was variable. Given this data, all sites were aggregated into one cluster to start, and the multivariate mean for each site was computed.

The second cluster was formed by selecting the site whose multivariate mean was the greatest distance from the cluster mean and designating it as a new cluster. All other sites' means were compared to each cluster mean, and assigned to a cluster so as to minimize distances within the cluster, and maximize the distance between cluster means. In this manner, additional clusters were formed up to the number originally specified. It was necessary to run the clustering program for each specified number of clusters so that the most logical and practical clustering arrangement could be selected from the cluster configurations produced.

The final optimal cluster scheme resulted in eleven clusters of the 34 ASAPs and 21 comparison sites. It was hoped that data was available for all 21 sites, but a number of them were unable to provide all data requested and one site was eliminated when it was found to have an alcohol enforcement program during ASAP operation. As a result, the ASAP analysis presented in Chapter VI is based on the clustering scheme in Table 4-2.

The final clustering plan consisted of three groups with two comparison sites, five groups with one comparison, and one group, New Orleans and Puerto Rico, with no suitable comparison group at this time.

Table 4-3, shows the ASAPs with their corresponding comparison sites divided into Groups I, II and III. When a comparison site was used for separate ASAPs in different

TABLE 4-2
CLUSTERING OF ASAP AND COMPARISON SITES

CLUSTER	ASAP SITES	COMPARISON SITES
1.	PHOENIX, ARIZONA	
	WACHTENAW, MICHIGAN	PIMA COUNTY, ARIZONA
	TAMPA, FLORIDA	DADE COUNTY, FLORIDA
	COLUMBUS, GEORGIA	
	MECKLENBURG COUNTY, N.C.	
2.	PORTLAND, OREGON	
	LOS ANGELES, CALIFORNIA	
	KANSAS CITY, MISSOURI	
	CINCINNATI, OHIO	LOUISVILLE, KENTUCKY
	OKLAHOMA CITY, OKLAHOMA	BIRMINGHAM, ALABAMA
	INDIANAPOLIS, INDIANA	
	WICHITA, KANSAS	
	KING COUNTY, WASHINGTON	
3.	NEW ORLEANS, LOUISIANA	
4.	NEW HAMPSHIRE	
	CUMBERLAND, MAINE	WEST VIRGINIA
	VERMONT	
	MARATHON COUNTY, WISCONSIN	
5.	IDAHO	WYOMING
	SOUTH DAKOTA	
6.	DELAWARE	
	SALT LAKE CITY, UTAH	
	SAN ANTONIO, TEXAS	
	BALTIMORE, MARYLAND	SAN DIEGO, CALIFORNIA
	PULASKI COUNTY, ARKANSAS	
	ALBUQUERQUE, NEW MEXICO	
	DENVER, COLORADO	
	RICHLAND COUNTY, S.C.	
7.	LINCOLN, NEBRASKA	
	SIOUX CITY, IOWA	MIAMI, FLORIDA
	HENNEPIN, MINNESOTA	OMAHA, NEBRASKA
	NASSAU COUNTY, NEW YORK	
8.	....	
9.	....	
10.	BOSTON, MASSACHUSETTS	PITTSBURGH, PENNSYLVANIA
11.	FAIRFAX, VIRGINIA	HENRICO COUNTY, VIRGINIA

TABLE 4-3
ASAP COMPARISON SITES BY GROUPS

ASAPS		COMPARISON SITES
	GROUP I	
ALBUQUERQUE		BIRMINGHAM, ALABAMA
CHARLOTTE		DADE COUNTY, FLORIDA
DENVER		LOUISVILLE, KENTUCKY
NASSAU COUNTY		MIAMI, FLORIDA
PORTLAND-EUGENE		OMAHA, NEBRASKA
SEATTLE		PIMA COUNTY, ARIZONA
WASHTENAW COUNTY		SAN DIEGO, CALIFORNIA
WISCONSIN		WEST VIRGINIA
	GROUP II	
BALTIMORE		BIRMINGHAM, ALABAMA
BOSTON		DADE COUNTY, FLORIDA
CINCINNATI		HENRICO COUNTY, VIRGINIA
COLUMBUS, GEORGIA		LOUISVILLE, KENTUCKY
FAIRFAX COUNTY, VIRGINIA		MIAMI, FLORIDA
HENNEPIN COUNTY, MINNESOTA		(NEWARK, NEW JERSEY)*
INDIANAPOLIS		OMAHA, NEBRASKA
KANSAS CITY, MISSOURI		PIMA COUNTY, ARIZONA
LINCOLN, NEBRASKA		PITTSBURGH, PENNSYLVANIA
NEW HAMPSHIRE		SAN DIEGO, CALIFORNIA
NEW ORLEANS		WEST VIRGINIA
OKLAHOMA CITY		WYOMING
PHOENIX		
PORTLAND		
PULASKI COUNTY, ARKANSAS		
RICHLAND COUNTY, S.C.		
SAN ANTONIO		
SOUTH DAKOTA		
TAMPA		
VERMONT		
WICHITA		
	GROUP III	
DELAWARE		BIRMINGHAM, ALABAMA
IDAHO		LOUISVILLE, KENTUCKY
L.A. COUNTY		MIAMI, FLORIDA
PUERTO RICO*		OMAHA, NEBRASKA
SALT LAKE CITY		SAN DIEGO, CALIFORNIA
SIOUX CITY, IOWA		WYOMING

*Data not available.

groups, the same intervention point used for the ASAP was also used for the comparison site. Thus, Pima County, Arizona was analyzed twice—once for use as a comparison for Washtenaw County, (Group I) and a second time in comparison with Tampa, Phoenix, Columbus and Mecklenburg County. In this way the comparison sites were used for all ASAPs in their cluster, with differences in project starting dates accommodated.

The presentation of these comparison sites is done here with caution. Many of them have small frequencies of nighttime fatal crashes, which means that changes of only one or two crashes in either direction can be found significant. Also, this effort to collect the data was made with the hope that a much larger selection of sites would be available for clustering. Because of the small number of sites that provided useable data, the matching done in the cluster program was not as specific as had been expected. Had more sites been available, (1) it is unlikely that eight ASAPs would have been matched to any one comparison, as occurred in the sixth group and (2) more clusters, containing fewer sites in each would have been obtained, providing a more solid and reliable comparison design.

The development of comparison sites for the ASAP analysis supported an observation that had been made initially—that there were few locales which can provide both the demographic compatability and the data to become eligible comparison sites for an on-going traffic safety program. The development of the few sites which were available does, however, provide an indication of the frequency of nighttime fatal crashes on a local basis, and enables one to see whether there was generally a significant change in the frequency of crashes in these local areas. Such analysis might indicate changes in the ASAP areas while the projects were on-going, which would lead to more intensive investigation of program effectiveness. The results of the analysis of these comparison sites is taken up in the section on Overall Project Impact as well as Individual Project Results.

V. THE NATIONAL TREND

In order to establish that nighttime fatal accident reductions observed in ASAP sites were indeed attributable to ASAP project effectiveness, a measurement of the national trend from 1965–1975 for various categories of accidents was developed. If ASAP projects showed significant reductions in nighttime fatal crashes coincident with a downward turn in the national trend of nighttime fatal crashes, it would influence the scope and direction of the analysis and necessitate an assessment of how much of the accident reduction was due to ASAP and how much might be attributable to other causes. If ASAP projects showed decreasing nighttime fatal crashes while the national trend rose, or remained unchanged, the hypothesis of ASAP project effectiveness would be further supported.

In order to determine the nature of the national trend in nighttime fatal crashes, it was necessary to select a nationally representative sample of States (25). Initially, to establish the character of the national trend, information for each of the 48 contiguous States was collected on 28 variables (Table 5-1) thought to influence the drinking and driving environment of a State. National data on these variables were compared to data of various State subgroups, in order to select the subsample most representative of the entire Nation. One requirement which definitely restricted the selection of States for the National sample was the availability of the following data for the years 1965–1975:

- Number of fatal and total accidents by time of day and day of week.
- Number of fatal and total accidents by type of accident (multivehicle, single vehicle or pedestrian).
- Number of fatal and total accidents by age of driver.
- Number of fatal and total accidents by rural and urban classification of place of accident.

In light of this restriction only sixteen States were initially eligible for the national sample; fourteen of these presented sufficiently complete data to be chosen. They were:

1. Colorado
2. Delaware
3. Illinois
4. Indiana
5. Mississippi
6. Nebraska
7. New Mexico
8. New York
9. North Carolina
10. North Dakota
11. Oklahoma
12. Oregon
13. Tennessee
14. Washington

As a measure for verifying the representativeness of this sample as a national surrogate, statistics were generated from the data gathered on the 28 variables mentioned previously. A national mean value based on observations from all 48 States was established for each variable. Also, means for the 14 State subgroup for each variable were also compared. To statistically test for differences between the mean value of the subgroup and mean values of the Nation for the variables selected, a Z test was applied, the results of which are shown in Figure 5-1. All of the Z statistics fell within a 95% confidence band of $\pm$ 1.96, supporting the hypothesis that the 14 State subgroup would be a reasonable and representative sample to reflect national trends in various accident categories.

The national trend database contains the following five variables from all 14 States for 1965–1975:

- Number of total, fatal and injury accidents.
- Number of total and fatal single vehicle accidents.
- Number of total, fatal rural and urban accidents.
- Number of total and fatal run off the roadway accidents.
- Number of total and fatal accidents by age of driver.

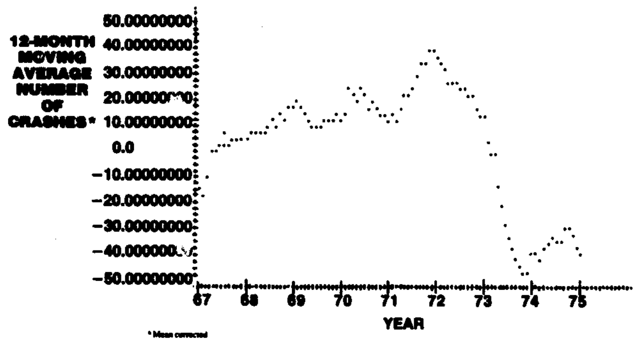
TABLE 5-1
COMPARISON OF NATIONAL AND 14-STATE SAMPLE AVERAGES

	NATIONAL AVERAGE*		14-STATE SAMPLE AVERAGE		
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	Z VALUE FOR DIFFERENCE IN MEAN
RURAL ROAD MILES	65.42	38.65	72.64	26.66	0.42
URBAN ROAD MILES	13.54	12.31	14.43	12.88	0.16
TOTAL ROAD MILES	78.94	50.85	87.07	29.10	0.04
RURAL VEHICLE MILES	12.19	9.48	11.79	7.24	−0.09
URBAN VEHICLE MILES	14.50	16.96	13.21	13.71	−0.17
TOTAL VEHICLE MILES	26.69	25.52	25.00	19.95	−0.15
ROAD DENSITY	385.83	303.24	308.36	195.24	−0.57
REGISTERED VEHICLES	2,610.54	2,557.41	2,459.00	2,056.90	−0.13
MILES PER VEHICLE	10,528.65	1,022.34	10,365.29	1,177.29	−0.36
POPULATION	4,364.81	4,486.52	4,388.21	4,930.85	0.02
LICENSED DRIVERS	2,552.58	2,540.34	2,381.36	2,327.30	−0.06
% OF POPULATION THAT DRIVES	60.50	6.13	61.43	7.64	0.34
TRAVEL PER LICENSED DRIVER	11,118.52	1,567.04	10,892.64	1,731.09	−0.32
TRAFFIC FATALITIES PER YEAR	1,135.52	999.46	1,110.00	857.43	−0.06
LIQUOR CONSUMPTION (GALLONS)	8,252.48	9,858.55	8,394.86	11,747.28	0.03
POPULATION OVER 18 YEARS OF AGE	2,821.00	2,966.97	2,876.43	3,325.45	0.04
% OF POPULATION DRY	5.92	13.69	5.71	12.43	−0.03
DRIVER'S AGE (YEARS)	18.33	1.53	18.29	1.65	−0.06
DRINKING AGE (YEARS)	19.62	1.44	20.14	1.29	0.81
LOW TEMPERATURE (DEGREES)	23.29	12.44	22.29	10.35	−0.18
HIGH TEMPERATURE (DEGREES)	87.46	4.91	87.86	4.02	0.18
PER CAPITA INCOME (DOLLARS)	4,642.37	636.16	4,690.86	713.58	0.17
% OF POPULATION URBAN	65.85	14.41	65.57	13.57	−0.04
% OF DRIVERS UNDER 25 YEARS OF AGE	23.19	2.50	23.86	2.82	0.06
402 FUNDING (DOLLARS)	1,874.44	2,004.38	1,973.06	2,071.38	0.11
ALCOHOL FUNDS UNDER 402 (DOLLARS)	159.17	258.06	178.92	229.48	0.17
% OF POPULATION UNDER ASAP	20.79	29.37	21.86	28.98	0.08
POPULATION GROWTH RATE	12.08	11.98	10.79	7.03	−0.24

*Excluding Alaska and Hawaii

From this database the nighttime fatal crash (8:00 p.m.–8:00 a.m.) series was selected for study during ASAP baseline and demonstration periods to determine the national trend during this time. Figure 5-1 shows a moving average of this nighttime fatal crashes series.

FIGURE 5-1
NATIONAL TREND
NIGHT FATAL CRASHES
12-MONTH MOVING AVERAGE



The sharp decline, which appears about October 1973 is apparently due to the combined effect of the energy crisis (starting October 1973) and the 55 MPH speed limit imposed in January 1974. The graph also supports the accepted belief that accidents remained at a lower level throughout 1975, since the moving average remains fairly flat, not returning to the 1973 level.

The Box-Tiao Time Series Analysis methodology was applied to this 14 State nighttime fatal crash series, and the results are summarized in Table 5-2. Three separate analyses were run to coincide with the three hypothesized ASAP demonstration periods (Group I, January 1971–December 1973; Group II, January 1972–December 1974; Group III, July 1972–June 1975), to see if a reduction in the level of the mean (average value) occurred during this time.

TABLE 5-2
NATIONAL TREND—
NIGHT FATAL CRASHES—
PARAMETER ESTIMATES

GROUP I	FUEL	SPEED	ASAP
PARAMETER EST.	−71.6	−18.0	−11.2
STANDARD DEV.	20.7	14.7	12.6
T-VALUE	− 3.46*	− 1.22	− 0.98
DELAY TIME	2 MONTHS	0 MONTHS	0 MONTHS
GROUP II			
PARAMETER EST.	−68.9	− 8.0	−11.5
STANDARD DEV.	21.4	13.4	11.6
T-VALUE	− 3.22*	− 0.60	− 0.89
DELAY TIME	2 MONTHS	0 MONTHS	0 MONTHS
GROUP III			
PARAMETER EST.	−66.3	− 4.3	−18.5
STANDARD DEV.	20.8	13.3	11.9
T-VALUE	− 3.19*	− 0.32	− 1.55
DELAY TIME	2 MONTHS	0 MONTHS	0 MONTHS

* Significant at .95 level, one tailed t test.

The analysis for the timing of the Group I ASAPs showed a highly significant decrease in nighttime fatal crashes associated with the energy crisis, beginning about December 1973. No significant effect was found associated with implementation of the 55 mph speed limit. The dummy variable included to measure the change in the mean number of nighttime fatal crashes before and after ASAP also showed no significant change. The results for Group II and Group III programs were similar and showed no significant effects other than that of the fuel crisis.

The National Trend Database was developed to provide a measure of the direction and magnitude of various accident categories in the United States. The nighttime fatal crash series for 1967–1975 was used to investigate the existence of any factors present nationally, which might have caused a decrease in nighttime fatal crashes coincident with the ongoing ASAP program. The results show a significant decrease in nighttime fatal crashes in late 1973 attributable to the energy crisis variable included in the analysis, with no other apparent effects present; no significant change in the national mean number of nighttime fatal crashes based upon the fourteen State sample indicates there are no factors present which may have caused a significant decrease in nighttime fatal crashes coincident at individual project sites. Although a downward trend appears to have taken place, it does not coincide with the peak activity of ASAP operations in 1972–1973.

VI. OVERALL ASAP PROGRAM IMPACT

In an ideal sense, ASAP program impact can be viewed as the combined effect of an ASAP project replicated in a pre-post experimental design thirty-five times. Or one can also view the experiment as the selection of a thirty-five site sample from a homogeneous population whose combined change in impact levels from a baseline to a demonstration period reflects the success or failure of the program. However, the selection process was not conducted using purely random/experimental design criteria. In any event, regardless of the purity of the design, total program impact was not to be determined by summarizing crash data across projects and testing pre-post demonstration levels. Projects demonstrating crash reductions would be identified but not combined with projects which did not experience reductions. Rather, if one views program impact as the number of significant reductions in the impact measure occurring in the thirty-five site sample compared with their corresponding comparison sites, then the rate of reduction of the impact measure in each set of sites can be used to reflect total program success in a much more objective way.

Successful project impact is defined as the occurrence of a significant reduction in nighttime fatal crashes during the experimental period as compared with the baseline period. The significant reduction has been determined by the Box-Tiao technique of Intervention Analysis accompanied by and accounting for interventions due to the Fuel Crisis and imposition of the 55 mph National Maximum Speed Limit Law if they happened to coincide with the demonstration period of the ASAP. The intervention point between baseline and demonstration was established to be the scheduled operational date of the ASAP in all but three projects, where a noticeable lag occurred in countermeasure implementation. In the case of Charlotte, Nassau County and Boston, the intervention points for testing ASAP effect were moved ahead one year due to delays in the implementation of the enforcement countermeasure. The null hypothesis tested in each case is "There is no significant reduction in alcohol-related crashes between baseline and operational periods" in each project site.

Nighttime fatal crashes occurring between 8pm and 8am were used as the impact measure instead of alcohol-related crashes. See Chapter II for a detailed discussion and rationale for the use of nighttime fatal crashes. For reasons of inaccuracy in the data and inconsistency in definition and reporting it was decided to use that set of crashes containing a major portion of the alcohol-related crashes. If impact can be shown on the larger set containing alcohol-related crashes, it is reasonable to assume that alcohol-related crashes were also impacted, provided that the ratio of alcohol-related to non-alcohol-related crashes remains stable. For each ASAP project, an intervention analysis was performed using nighttime fatal crashes as the dependent or output variable. Three "dummy" variables composed of "zeros" and "ones" were used as independent or input variables to portray the presence or absence of the ASAP, the fuel crisis and the effect of the 55 mph National Maximum Speed Limit Law where applicable.

Similarly for each comparison site (see section on Comparison Sites), an intervention analysis was performed using the same input and output variables. However, the test for the ASAP type intervention at the appropriate intervention point should be interpreted as a test for a simultaneous reduction in the nighttime fatal crash series at the comparison site, due to factors other than ASAP. If such a condition is found, its cause must be determined and its existence verified at the ASAP site. However, the analysis revealed no significant reductions in nighttime fatal crashes at comparison sites during their corresponding ASAP demonstration period. Table 6-1 contains those projects whose effect due to ASAP presence resulted in a statistically significant reduction in nighttime fatal crashes. The level of statistical significance can be measured by the t score (13) indicated in the Table along with the magnitude of the average monthly reduction measured over the total effective demonstration period. In addition, results of the comparison site analysis are indicated for both comparison sites where applicable. (See Table 4-2 for the paired ASAP comparison sites.)

A. Fatal Crash Results

Based upon the individual project analyses, twelve ASAPs showed a statistically significant reduction in nighttime fatal crashes during their demonstration period. Moreover, none of the comparison sites showed any significant decreases for the corresponding ASAP between baseline and demonstration periods. The Albuquerque and Tampa projects showed increases in nighttime fatal crashes. Additionally, three comparison sites showed increases as well.

TABLE 6-1

PROJECT	T SCORES OF ASAPS WHOSE NIGHT FATAL CRASHES SHOW STAT. SIGNIFICANT REDUCTION	PROB. LEVEL	NIGHT FATAL CRASHES REDUCED PER MONTH OF DEMONSTRATION	T SCORE OF NIGHT FATAL CRASHES AT COMPARISON SITES	
				1	2
CHARLOTTE**	−1.75	< .05	− .77	N.S.	N.S.
DENVER	−2.62	< .005	−1.24	N.S.	− −
SEATTLE	−3.97	< .001	−2.38	N.S.	N.S.
BOSTON**	−2.11	< .025	−1.34	N.S.	− −
KANSAS CITY*	−2.17	< .025	− .74	N.S.	N.S.
NEW HAMPSHIRE*	−2.36	< .01	−1.65	N.S.	− −
NEW ORLEANS*	−2.09	< .025	−1.12	N/A	− −
PORTLAND, MA.	−2.39	< .01	− .76	N.S.	− −
RICHLAND, S.C.	−2.18	< .025	− .69	N.S.	− −
SOUTH DAKOTA*	−1.67	< .05	−1.15	N.S.	− −
SALT LAKE CITY	−1.78	< .05	−1.14	N.S.	− −
SIOUX CITY, IOWA	−1.70	< .05	− .42	N.S.	N.S.

* 2 year operational extension ** Intervention moved one year ahead N.S. non=significant reduction N/A data not available

When monthly reductions in nighttime fatal crashes are extended for each project's demonstration period, the total estimated reduction can be seen in Table 6-2.

The total estimated reduction in nighttime fatal crashes is 494 as a result of the ASAP demonstration period. This is arrived at by extending the monthly steady state gain (reduction) for each project by the number of months the project was at full operation after consideration of time lags. Some projects incurred no delay time in attaining full momentum but others experienced lags in reaching the implementation of a fully operational set of countermeasures.

ASAP impact is further corroborated by examining the proportion of ASAPs with significant reductions during their demonstration period compared with the proportion of comparison sites showing a similar significant reduction. Twelve of the thirty-five ASAPs showed a significant reduction as compared to zero comparison sites out of a total of eleven. Therefore the expected value of a successful project (impacting nighttime fatal crashes) is the ratio of 12/35 or approximately one in three projects. If the expected rate of reduction among the projects occurred approximately one out of three times then to conclude that ASAP had no effect, it should be expected that of the eleven comparison sites approximately four would also show a significant decrease in nighttime fatal crashes.

A test for the difference between the proportion of nighttime fatal crash reductions occurring at ASAP sites (p=.3429) and the comparison sites (p=0) indicates a t score of 2.26. This is significant at the p=.02 level. The conclusion reached based upon the t score is that the pro-

TABLE 6-2

ASAPS WITH SIGNIFICANT REDUCTION IN NIGHT FATAL CRASHES	MONTHLY REDUCTION IN NIGHT FATAL CRASHES	DELAY TIME (MONTHS)	NUMBER OF MONTHS FOR WHICH REDUCTION IS IN EFFECT	TOTAL REDUCTION OVER EFFECTIVE OPERATIONAL TIME PERIOD
CHARLOTTE	− .77	0	24	18.48
DENVER	−1.24	4	32	39.68
SEATTLE	−2.38	0	24	57.12
BOSTON	−1.34	0	24	32.16
KANSAS CITY	− .74	9	51	37.74
NEW HAMPSHIRE	−1.65	3	57	94.05
NEW ORLEANS	−1.12	0	60	67.20
PORTLAND, MAINE	− .76	5	31	23.56
RICHLAND COUNTY	− .69	0	36	24.84
SOUTH DAKOTA	−1.15	2	49	56.35
SALT LAKE CITY	−1.14	3	27	30.78
SIOUX CITY	− .42	1	29	12.18
				494.14

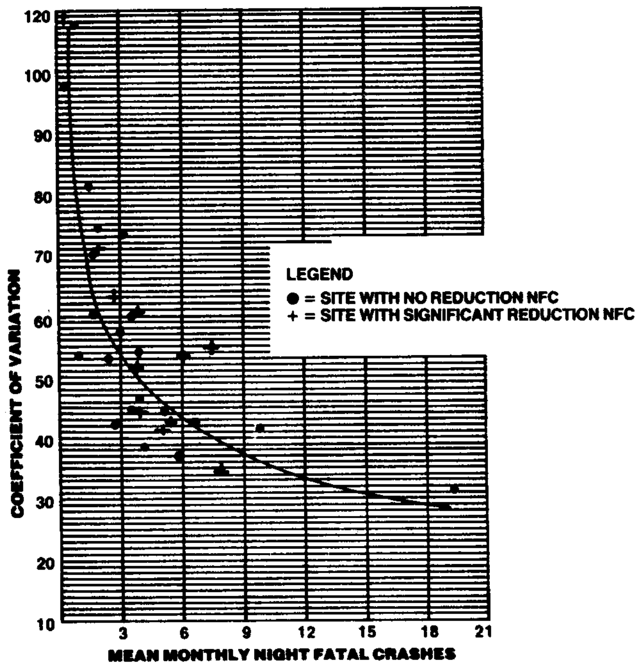
portion of ASAP sites whose nighttime fatal crashes were reduced during the demonstration period is significantly greater than the proportion of comparison site applications. A difference as large as this can only be attributed to chance two times in a hundred.

If these two sets of sites (ASAP and comparison) are markedly different in terms of their nighttime fatal crash reduction occurrence, further comparison of other crash trends between the two sets will give credibility to the conclusion of ASAP effectiveness and impact. Among the ASAP sites, two projects (P_a=.0571) showed increases in their nighttime fatal crashes during the demonstrated period as compared to one comparison site (Louisville) (P_c= .0909). This indicates a non-significant difference in the proportion of sites in each group showing increases. Daytime fatal crashes (8:00 am–8:00 pm) occurring at the twelve impacted ASAP sites in Table 6-1 showed one significant reduction (New Hampshire) and no increases during the demonstration period. At least two interpretations of this reduction are possible. First, it is possible that the overall fatal accident trend in New Hampshire dropped during the ASAP operational period as compared to the baseline period because of some factor not related to ASAP. However, if there were a general downward trend in New Hampshire it might be expected to have shown up in neighboring States. Instead, daytime crashes in Vermont actually increased significantly. The other possibility is that the ASAP project had an impact on both nighttime and daytime crashes. This latter possibility is strengthened by the fact that the New Hampshire project (22,27) found that a considerable number of drinking driving accidents occurred between 4 pm and 8 pm, and set up special DWI patrols during these hours (defined as daytime for this analysis). For the nonimpacted sites as a whole, daytime fatal crashes increased in two sites (p_d=.0571) and decreased significantly in no sites. This eliminates the competing hypothesis which asserts that a condition other than ASAP existed during the demonstration period which simultaneously affected both nighttime and daytime fatal crashes.

The sensitivity of the criterion used for impact detection appears to be dependent on the level of crashes in each of the ASAP sites. When the average monthly crash level during the baseline period is close to zero, it is likely to be accompanied by proportionately large fluctuations in monthly crashes, therefore, the variability of the time series data (standard deviation) is large relative to the mean. Therefore, some of the projects with near zero crash levels could not have demonstrated crash impact due to this instability in the data.

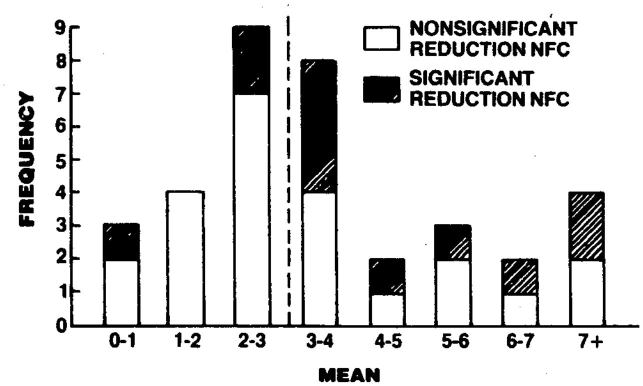
For each ASAP, the coefficient of variation (a relative dispersion measure) was calculated (8). This is defined as the standard deviation of a series divided by its mean. The coefficient of variation for each ASAP is plotted in Figure 6-3 as a function of the mean monthly nighttime fatal crashes for the baseline period. The relative dispersion is highest when the mean crash level is lowest, i.e., the standard deviation is larger per unit of the mean at the lower crash levels than at the higher crash levels. In addition, the coefficient of variation curve has the steepest slope when the mean crash level lies at or below three. Above three crashes per month the slope begins to change markedly and becomes flatter as the mean crash level increases.

FIGURE 6-3
SCATTER DIAGRAM OF THE MEAN MONTHLY NIGHT FATAL CRASHES AND THE COEFFICIENT OF VARIATION



As can be seen in Figure 6-4, it appears that there is a relationship between the existence of a significant t value and the level of mean monthly nighttime fatal crashes.

FIGURE 6-4
HISTOGRAM OF MEAN MONTHLY NIGHT FATAL CRASHES FOR 35 ASAPS



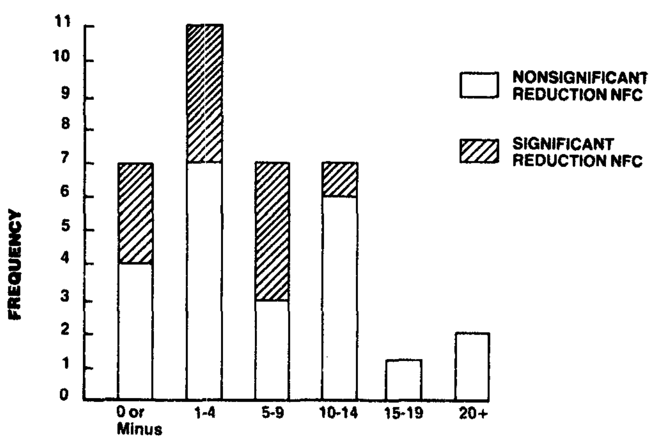
For the projects whose mean monthly nighttime fatal crash level was less than three, only 3 of 16 (p_1=.188) showed a significant reduction, in contrast to 9 of 19 (p_2=.474) projects whose mean monthly nighttime fatal crashes were greater than three. A t test of the difference between the proportions p_1 and p_2 is significant at the P=.05 level (one tailed t=1.697, df=30). Thus, it appears that there was greater potential for detecting significant reductions among those projects having higher baseline mean monthly crashes when compared to projects having lower crash levels.

In conclusion, it appears that the statistical techniques used to evaluate ASAP projects had greater potential for detecting significant reductions among those projects having larger mean monthly nighttime fatal crashes compared to projects having lower crash levels. For sites with a mean less than 3 nighttime fatal crashes per month, the estimated proportion of significant reductions was .188, in contrast to projects with a mean greater than 3, the estimated proportion was .474. Had there been a minimum crash level requirement for site selection, it is conceivable that a much greater impact in the reduction of nighttime fatal crashes would have been experienced.

A second characteristic which appeared to affect the possibility of detecting impact was the growth in population of the site during the baseline and operational periods. Figure 6-5 depicts the relationship of the reduction in nighttime fatal crashes and the percent population change from 1970 to 1974. As can be seen from this figure, there is a tendency for the sites with large increases in population not to demonstrate a reduction in crashes. For projects whose population growth rate from 1970 to 1974 was less than 10%, 11 out of 25 (p_1=.440) showed a significant reduction in nighttime fatal crashes, as compared to 1 out of 10 (p_2=.100) for projects whose population increased more than 10%. Of the 22 ASAPs which had either less than 3 nighttime fatal crashes during their baseline period or had a population growth rate of greater than 10%, only 4 (p_1=.182) produced significant results, while of the remaining 13 sites which had 3 or more fatal crashes per month or a growth rate of less than 10%, 8 (p_2=.615) demonstrated reductions.

FIGURE 6-5

HISTOGRAM OF % POPULATION GROWTH



There was no significant correlation between the enforcement level and the reduction in nighttime fatal crashes for all 35 sites. However, Table 6-7 reveals a strong relationship in the group of ASAPs having a mean nighttime fatal crash rate greater than 3 and population growth rate less than 10%. Enforcement level was measured by the number of arrests per thousand licensed drivers in the ASAP community. Nine of these thirteen sites achieved a level of 9 or more arrests per thousand drivers during their first year of operations. Of these, seven produced significant reductions in nighttime fatal crashes. Only one of the four projects with enforcement levels below 9 arrests per thousand demonstrated a statistically significant reduction in nighttime fatal crashes.

TABLE 6-7

RELATIONSHIP OF MEAN MONTHLY NIGHTTIME FATAL CRASHES, POPULATION GROWTH AND THE DETECTION OF A SIGNIFICANT REDUCTION IN NIGHTTIME FATAL CRASHES

		POPULATION GROWTH	
MEAN LEVEL NIGHTTIME FATAL CRASH		≤10%	≥10%
	≤3	3/12	0/4
	≥3	8/13	1/6

* First figure is number of sites with significant nighttime fatal reductions. Second figure is total number of sites.

B. Roadside Survey Results:

Twenty-seven ASAP sites conducted roadside breath test surveys. Eight projects were not able to conduct their first surveys until after the start of operations, therefore no baseline data was available for the present analysis. The remaining 19 sites conducted baseline surveys prior to the initiation of operations and from one to five annual operational surveys. The proportion of drivers with BACs at or above .10% (intermediate measure) is provided in Table 6-8 for the 27 projects. This proportion is averaged for all operational surveys at each site. The eight projects which did not conduct a baseline survey are shown separately. For those projects the first operational survey was used as the "baseline" comparison.

TABLE 6-8

ASAP ROADSIDE BREATH TESTING RESULTS

GROUP 1—ASAPS WITH STATISTICALLY SIGNIFICANT REDUCTIONS IN NIGHTTIME FATAL CRASHES

ASAPS	PROPORTION ≥.10 DURING BASELINE	BASELINE SAMPLE SIZE	PROPORTION ≥.10 DURING OPERATIONS	OPERATION SAMPLE SIZE
CHARLOTTE	.042	766	.031	2130
KANSAS CITY	.052	985	.042	4064
NEW ORLEANS	.034	795	.029	3714
PORTLAND	.031	487	.026	1499
RICHLAND COUNTY	.048	766	.039	2561
SOUTH DAKOTA	.074	810	.055	16792
SALT LAKE CITY	.029	832	.024	2379
SIOUX CITY	.026	771	.035	2125
TOTALS 8/19	.056*	6212	.044	35264
W/O S. DAKOTA	.039*	5402	.033	18472
SEATTLE	.038	500	.017	1048
TOTALS 9/27	.055*	6712	.043	36312
W/O S. DAKOTA	.039*	5902	.032	19520

GROUP 2—ASAPS WITH NO STATISTICALLY SIGNIFICANT REDUCTIONS IN NIGHTTIME FATAL CRASHES

ASAPS	PROPORTION ≥.10 DURING BASELINE	BASELINE SAMPLE SIZE	PROPORTION ≥.10 DURING OPERATIONS	OPERATION SAMPLE SIZE
COLUMBUS	.008	637	.033	1409
FAIRFAX COUNTY	.044	1576	.044	9306
INDIANAPOLIS	.072	608	.068	1822
LINCOLN	.028	772	.021	2289
OKLAHOMA CITY	.030	1575	.025	6636
PULASKI COUNTY	.039	1211	,057	2279
SAN ANTONIO	.129	634	.117	2701
TAMPA	.064	865	.067	2913
VERMONT	.045	334	.063	496
WICHITA	.033	844	.040	2159
IDAHO	.055	1433	.040	5062
TOTALS 11/19	.049*	10489	.047	37072
PUERTO RICO	.055	1236	.086	1298
LOS ANGELES	.049	1294	.065	1030
HENNEPIN COUNTY	.059	847	.054	3365
ALBUQUERQUE	.076	845	.067	1854
CINCINNATI	.033	644	.047	2254
WASHTENAW COUNTY	.040	746	.036	1867
PORTLAND, ORE.	.073	519	.022	1109
TOTALS 18/27	.050*	16620	.049	49849
GRAND TOTALS				
TOTALS 19	.052*	16701	.046	72,336
TOTALS 27	.052*	23332	.046	86,161

* Weighted on basis of N for Operational Surveys

The 19 sites which conducted baseline surveys had a mean level of 52 drivers per thousand with a BAC$\geq$.10% prior to the start of operations in contrast to 45 drivers per thousand during operations. This difference is statistically significant (X^2=11.08, df=1, p$\leq$.01) as shown in Table 6-9. When the 8 sites which did not conduct baseline surveys are added, a similar result is obtained. These 27 sites as a group showed a decline from 53 to 46 per thousand with BACs $\geq$.10% from the baseline to operational surveys (X^2=13.81, df=1, p$\leq$.01).

TABLE 6-9

RESULTS OF X^2 TESTS FOR DIFFERENCE IN PROPORTION OF DRIVERS AT OR ABOVE BAC OF .10% BASELINE AND OPERATIONAL SURVEYS AT ASAP SITES*

	19 SITES	P VALUE
TOTAL	X^2 = 10.81	P$\leq$.01
GROUP 1:8 SITES	X^2 = 17.43	P$\leq$.01
GROUP 2:11 SITES	X^2 = .73	NS
GROUP 1:7 SITES WITHOUT SOUTH DAKOTA	X^2 = 4.59	P$\leq$.05
	27 SITES**	**P VALUE**
TOTAL	X^2 = 14.64	P$\leq$.01
GROUP 1:9 SITES	X^2 = 19.00	P$\leq$ 01
GROUP 2:18 SITES	X^2 = .26	NS
GROUP 1:8 SITES WITHOUT SOUTH DAKOTA	X^2 = 6.74	P$\leq$.01

GROUP 1:8 SITES WITH SIGNIFICANT REDUCTION IN NIGHTTIME FATAL CRASHES

GROUP 2:11 SITES WITH NO CHANGE IN NIGHTTIME FATAL CRASHES

*The following ASAP sites did not conduct Roadside Surveys: Boston, New Hampshire, Denver, Nassau Co., Wisconsin, Baltimore, Phoenix, and Delaware. Source: National Archives of ASAP Roadside Survey data—Highway Safety Research Institute—University of Michigan, Ann Arbor, Michigan.

**Includes 8 sites whose "baseline" survey occurred in the first year of operations.

Of the 19 sites which conducted baseline and operational roadside surveys, 8 were among the 12 sites which demonstrated a significant reduction in nighttime fatal crashes while 11 were among the 23 sites which showed no change in nighttime fatal crashes. The 8 sites in Group 1 with nighttime fatal crash reductions demonstrated a significant reduction in high BAC drivers (X^2=20.86, df=1, P$\leq$.01). In contrast, the group of 11 sites in Group 2 (no significant reductions in nighttime fatal crashes) did not demonstrate a significant reduction in the proportion of high BAC drivers (X^2=.46, df=1). Likewise, when 27 projects were considered, the 9 sites in Group 1 which demonstrated a significant nighttime fatal crash reduction, also demonstrated a statistically significant reduction in the number of drivers with BAC$\geq$.10% (X^2=20.97, df=1, P$\leq$.01). The 18 sites which did not show a reduction in nighttime fatal crashes, did not show a reduction in high BAC drivers (X^2=.98, df=1).

Over 16,000 interviews were conducted in South Dakota during the operational period. It was felt that the Group 1 results may have been strongly influenced by this large sample size. To check for this possibility, South Dakota's BAC results were deleted from the group of sites with significant reductions in nighttime fatal crashes. As shown in Table 6-8, the reduction in the number of drivers with high BACs in roadside surveys was still statistically significant.

This correspondence between the results of the analysis of the intermediate measure (roadside surveys) and the criterion measure (nighttime fatal crashes) provides further evidence for the impact of the ASAP program.

For the reader's information, the sampling guidelines for conducting voluntary roadside survey are included.

The sampling guidelines which follow seek to represent a portion of the drinking driving practices in the ASAP by the random selection of urban and rural sites during high probability drinking and driving times near high risk road locations.

Sampling Frequency. Recommended frequency for this survey is yearly with the first sample obtained during project development (first six months) and every twelve months thereafter during the remainder of the project.

Sample Size. A minimum sample size of 640 interviews with associated BAC data is specified. A goal of a minimum of 20 at any one site location should be used.

Day of Week. Equal samples should be obtained on Friday and Saturday. If dollars and time permit, other days of the week should be included.

Hour of Day. The evening hours of 7pm to 3am should be represented in the random selection of general site locations in the ASAP area. A minimum of 32 general sites should be selected. The balance of urban and rural sites should be in proportion to their weight in the ASAP area.

The major criteria for selecting the exact road location in a general site area should be high risk crash locations that are likely to involve alcohol impaired drivers. Select fatal and, where necessary, serious injury crashes which occurred in the past three years, on Friday and Saturday, 7pm to 3am as the data that is most likely to represent the high risk location. Also, make sure to take into account the direction in which the traffic was flowing at the time of the crash. Do not select sites outside of bars and taverns as locations for sampling.

Straight sections of medium speed roadway with sufficient traffic volume, parking area, and driver visibility, are a starting point in selecting the final site location.

Test Instrument. The test instruments to be used in this survey should be of the type used to obtain breath samples for court evidence.

C. ASAP Cost Benefit Analysis

The total Federal cost under Section 403 of the Highway Safety Act of the ASAPs is shown in Table 11. An important issue in any evaluation of government programs is the benefit derived for the amount expended. A major problem in cost benefit analysis is the determination of what benefits to attribute to the project effort. In the present instance, only those fatality savings were included which occurred at sites where the impact was sufficient to produce a statistically significant reduction.

Fatal accidents were converted to fatalities by multiplying by 1.14 fatalities per fatal crash (based upon analysis of the FARS file for 1976) and arrived at 563 fatalities forestalled.

The cost per fatality forestalled is the total 403 ASAP project cost of $88 million divided by 563, or $156,306. In order to put this figure in perspective, it can be compared to the estimated cost per fatality forestalled for other countermeasures. *The National Highway Safety Needs* Report (26, Figure 6.6 page VI-II) ranks 37 countermeasures with cost per fatality forestalled ranging from $505 for mandatory safety belt usage, and $26,200 for nationwide 55 MPH speed limit, to $12,100,000 for roadway alignment and gradient. The ASAP cost would rank between number 14—motorcycle lights-on practice and number 15—impact absorbing and roadway safety devices. In addition to the deaths forestalled there are benefits due to reductions in night injury crashes, injury severity, and property damage crashes, plus forestalling economic and social losses to the community.

TABLE 11

ALCOHOL SAFETY ACTION PROJECTS COST BREAKDOWN BY COUNTERMEASURE AREAS

COST IN $1,000

	MGMT.	EVAL.	ENFORCEM'T	JUDICIAL	REHAB.	PI&E	LICENS'G	TOTAL
FY 69 STARTS (NINE PROJECTS)	2,787	4,085	3,948	1,741	2,242	1,339	229	16,371
FY 70 STARTS (TWENTY PROJECTS)	9,916	10,120	17,451	9,494	3,908	3,734	99	54,722
FY 71 STARTS (SIX PROJECTS)	2,397	3,526	5,846	2,785	1,616	1,118	7	17,295
TOTAL COST	15,100	17,731	27,245	14,020	7,766	6,191	335	88,388
% OF TOTAL COST	17.08	20.06	30.83	15.86	8.79	7.00	0.38	100.00

These costs represent only Federal 403 funds. In addition, local and Federal 402 funds in increasing amounts went into each of the programs as they progressed, particularly in the ten that were operationally extended for two years.

Management and evaluation categories include costs for the development of two to three years of baseline data, 6 to 9 months of a planning phase, final report writing, the development of an extensive data collection management information system and approximately two million dollars for post-ASAP data collection for twenty-seven of the thirty-five ASAP projects.

TABLE 12

COST BENEFIT CALCULATION FOR ASAPS WITH STATISTICALLY SIGNIFICANT REDUCTION IN NIGHT FATAL CRASHES

ASAP WITH SIGNIFICANT REDUCTION IN NIGHTTIME FATAL CRASHES	MONTHLY REDUCTION IN NIGHTTIME FATAL CRASHES	DELAY TIME (MONTHS)	NUMBER OF MONTHS FOR WHICH REDUCTION IS IN EFFECT	TOTAL REDUCTION OVER EFFECTIVE OPERATIONAL TIME PERIOD
CHARLOTTE	.77	0	24	18.48
DENVER	1.24	4	32	39.68
SEATTLE	2.38	0	24	57.12
BOSTON	1.34	0	24	32.16
KANSAS CITY	.74	9	51	37.74
NEW HAMPSHIRE	1.65	3	57	94.05
NEW ORLEANS	1.12	0	60	67.20
PORTLAND, MAINE	.76	5	31	23.56
RICHLAND COUNTY	.69	0	36	24.84
SOUTH DAKOTA	1.15	2	49	56.35
SALT LAKE CITY	1.14	3	27	30.78
SIOUX CITY	.42	1	29	12.18
			Savings	494.14

The data presented indicate that the ASAP program had a statistically significant impact on nighttime fatal crashes, forestalling a fatality at an approximate cost of $156,000. The most interesting cost data, however, were compiled by Hawkins, et al. (12). His study indicated that ASAPs could be designed which would raise as much revenue from the drivers arrested as it would cost to implement the program. This opens the possibility of promoting alcohol safety at the community level without a major burden on local tax revenues. Taken together with the present evidence that programs featuring increased enforcement can produce benefits, the traditional community program does have potential as a solution to the drinking/driving problem.

VII. DISCUSSION

Since the research leading up to the establishment of the ASAPs indicated that alcohol plays a large role in fatal crashes, and that the community institutions established to deal with this problem were not operating with full effectiveness, it appeared reasonable to expect reduction in crashes. On the other hand, demonstrating the effectiveness of community safety programs through scientific research techniques has proven to be very difficult. Programs can fail to demonstrate an impact for at least 4 reasons: (1) they are faulty in conception and have no value, (2) they are not effectively implemented, (3) outside events overwhelm the effects of the program or (4) the evaluation design and methodology are faulty. This latter factor, faulty methodology cuts both ways. It can lead to claims for the effectiveness of inadequate programs (Type I error) or the failure to detect the impact of effective programs (Type II error).

The primary concern in the present instance is to determine whether, in the light of the results reported, the basic ASAP *program* concept has value. This concept relies on organizing the traditional community enforcement, judicial, public information and treatment agencies to deal with the drinking driver in a systematic fashion. This control "system" is to impact the drinking driving problem in two ways, (1) by raising the enforcement level and public awareness of that enforcement effort in order to deter the social drinker and (2) by rehabilitating more of the problem drinkers through increased apprehension and referral to treatment.

This second source of impact, the rehabilitation of problem drinkers, could contribute little to the reduction produced by the ASAP on a community's total nighttime fatal crashes within the relatively short operational period (3 years) of these projects. A period up to several months could have intervened between arrest and conviction. The treatment program typically ran from 3 to 12 months. By the time enforcement efforts had produced a significant increase in arrests, and these additional cases had been processed through the courts, referred to treatment agencies and the rehabilitation programs completed, the project was at least halfway through its operational phase. Under these conditions it was unlikely that sufficient numbers of problem drinkers could have been processed by the system to significantly affect the overall alcohol-related crash rate.

A more sensitive test of the effectiveness of the ASAP treatment programs for problem drinkers was provided by studies which followed the driving records of treated and non-treated problem drinkers. Considerable difficulty was experienced in obtaining the cooperation of the courts and the treatment agencies in conducting carefully controlled studies of the effectiveness of the ASAP rehabilitation programs. This cooperation was achieved by a subgroup of the thirty-five ASAP sites which were extended for two additional years. Data from this research on "Short-Term Rehabilitation Programs" is just becoming available (10).

The interim results suggest that:

(1) There were indications from earlier studies that the use of chemotherapy (disulfiram) can add to the effectiveness of such programs in terms of reducing rearrests. However, in few cases were reductions in crash involvement observed (9).

(2) Overall, it appears that no existing short term psychotherapy is effective in reducing drunk driving by problem drinkers. It may be that longer term therapy can be more effective but that has yet to be demonstrated.

In any case, there are at least two reasons for believing that the rehabilitation of problem drinkers contributed little to the crash reduction results reported in this study. First, it appears that most of the treatment programs employed in the ASAPs were not effective in changing the subsequent *driving records* of problem drinkers. Second, even had there been evidence for their effectiveness, too few of the total number of problem drinking drivers were arrested and processed through the treatment system to have made a statistical contribution to the overall impact on nighttime fatal crashes.

The reduction observed in both the criterion measure (nighttime fatal crashes) and the intermediate measure (high BAC drivers on the road) is most probably a result of the increased general deterrence to drunk driving. This increased deterrence probably affected those whose drinking and driving behavior was most subject to modification through the increased enforcement threat—the social drinkers. While the criterion, nighttime fatal crashes, was not a sensitive measure for project sites which had few fatal crashes, it had the advantage of being an objective, recorded variable which was not likely to be invalidated by the presence of the special ASAP program. The positive results with this criterion are supported by the corresponding reductions in roadside survey results. Finally, the relationship between arrest level and the occurrence of a statistically significant reduction in nighttime fatal crashes (Figure 7-1) strengthens the conclusion that it was the ASAP effort which produced these results.

Figure 7-1

Relationship of Enforcement to the Occurrence of a Significant Reduction in Nighttime Fatal Crashes Among the 13 Projects at Sites With 3 or More Night Fatal Crashes Per Month and With a Population Growth Rate Less Than 10%

	Low Enforcement less than 9 arrests per 1000 Drivers	High Enforcement 9 + arrests per 1000 Drivers
Reduction in Nighttime Fatal Crashes	Boston	Charlotte Seattle Kansas City New Hampshire New Orleans South Dakota Salt Lake City
No Change in Nighttime Fatal Crashes	Nassau Co. Baltimore Delaware	Hennepin Los Angeles

VIII. INDIVIDUAL PROJECT ANALYSES

The analysis of each ASAP project is accompanied by a parameter table and a cumulative sum graph (45). The cumulative sum is a graphic technique which dramatizes changes in the subject series in order to better view the actual changes which occurred. Due to the low frequency and large variance of monthly night fatal crashes, small but significant reductions are difficult to visualize from the raw data graphs. A cumulative sum is constructed by selecting a reference value (the mean of the baseline night fatal crashes) and subtracting this from each observation in the total series. This gives a new series of deviations from the baseline mean. These differences are accumulated over time to derive the cumulative sum. If the mean number of crashes in the demonstration period is lower than the baseline mean, the deviations from the baseline mean will be negative and the cumulative sum will get increasingly negative as each month's contribution is added. A reduction in the mean between baseline and demonstration periods will cause a downward trend in the cumulative sum. The important point of the cumulative sum occurs after the end of the baseline period where it reverts to zero. It is the relative behavior after this point that is indicative of ASAP impact. In order to normalize these graphs, all cumulative sums were divided by the standard deviation of the respective series. The cumulative sums are then in standard deviation units rather than raw data. The purpose of this normalization is to reduce the raw data to standard graphic units for greater comparability between sites.

As an alternative to cumulative sum graphs, moving averages (8) were used to depict the general trend of data that exhibited seasonal fluctuations. The moving average technique was used to "smooth out" these seasonal periods of twelve months.

As the name implies, the moving average is constructed by computing the averages of twelve month periods sequentially. An example follows:

Given a set with 84 monthly data points (X_1, X_2, X_3,.., X_{84}), the first term in the moving average will be:
$M_1 = 1/12\,(X_1 + X_2 + \ldots + X_{11} + X_{12})$
The second term will be:
$M_2 = 1/12\,(X_2 + X_3 + \ldots + X_{12} + X_{13})$, etc.
The last term will be:
$M_{73} = 1/12\,(X_{73} + X_{74} + \ldots + X_{83} + X_{84})$.

As can be seen, each consecutive term in the moving average reflects the change between two data points twelve months apart. In addition, there are eleven fewer data points in the moving average than in the raw data (one less than the period of the moving average). The moving average term at time period K represents the change between data points K and K-12.

The parameter tables in each section summarize the results of the analysis of ASAP night and day fatal crashes, comparison site night fatal crashes and ASAP night injury crashes where the data was available. All analyses were conducted using Box-Jenkins time series/intervention analysis techniques.

The *"parameter estimate"* indicates the mean change in monthly crashes during the period in question due to fuel crisis, 55 mph NMSL or ASAP presence. The *standard deviation* is a measure of dispersion of the parameter estimate. The *value of the t test* is derived by dividing the parameter estimate by its *standard deviation*. The *delay time* represents the number of months before the initial effect was "felt" in the crash series. If no delay time appears (as was the case with all comparison series), a delay of zero months was the result.

Since each intervention variable (fuel crisis, reduced speed limit and ASAP) is expected to cause a reduction in night fatal crashes, a one-sided test is applied to the parameter estimates. If the resulting t value is less than -1.658 (95% confidence) the reduction is considered statistically significant at the $P = .05$ level.

Injury crash data have been included where available to further corroborate the effectiveness of the ASAP program. Alcohol-related arrest data have been included (when available) to justify the delay time where a statistically significant result has been found for the ASAP project.

The narrative section for each site discusses the results of the analysis, defines the time frames for baseline and demonstration periods, and addresses the subject of missing or unavailable data.

Some ASAPs had two comparison sites, others had one comparison site and two (New Orleans and Puerto Rico) had no comparison site. For a detailed explanation see the section on Comparison Site Development.

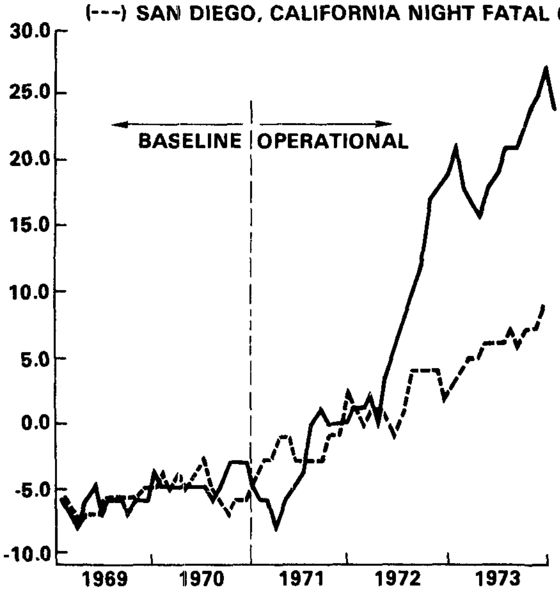
The effects of the fuel crisis and speed limit were discussed only in conjunction with impact at the ASAP site. Discussion of these effects has been intentionally avoided for day fatal crashes and comparison sites. The reason for this is the inclusion of a dummy variable representing ASAP was used to check for a coincident reduction during the operational period. This "extra" variable could alter the results for fuel crisis and speed limit parameters. If the purpose of the analysis had been to investigate the effects of the fuel crisis and speed limit, no dummy variable would have been included for ASAP in the day fatal and comparison site crash analyses.

ALBUQUERQUE, NEW MEXICO ASAP

The Albuquerque, New Mexico ASAP began operations in January 1971 and remained in effect until December 1973. Since the State of New Mexico enacted its 55 mph NMSL law in March 1974, this did not represent a confounding factor in the analysis and was not included. However, a dummy variable was included to determine the possible effect of the fuel shortage (October-December 1973). Monthly night fatal crash data was not available for the Albuquerque site. Monthly estimates were derived by distributing quarterly night fatal crashes according to the distribution of monthly fatality data which was available.

CUMULATIVE SUM

(—) ALBUQUERQUE NIGHT FATAL CRASHES
(---) SAN DIEGO, CALIFORNIA NIGHT FATAL CRASHES



Analysis of this data showed that the ASAP was not effective in reducing night fatal crashes. Although the parameter estimate for the fuel crisis is statistically significant (negative) the delay time of 2 months revealed that this reduction relates only to the month of December 1973. Since the estimate is based on only one observation, caution should be exercised in the interpretation of this result.

ASAP SITE: ALBUQUERQUE, NEW MEXICO

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-3.78	N/A	1.00
STANDARD DEVIATION	1.48		.49
VALUE OF t TEST	-2.55		2.05
DELAY TIME	2 MOS.		2 MOS.

COMPARISON SITE: ALBUQUERQUE DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	NOT	NOT	1.33
STANDARD DEVIATION	PRESENT	PRESENT	1.52
VALUE OF t TEST			.88

Analysis of quarterly day fatal crashes in Albuquerque showed no change between the baseline (1968-1970) and operational (1971-1973) periods. San Diego, California was the comparison site for Albuquerque. During the ASAP period (1971-1973) San Diego experienced no change in night fatal crashes.

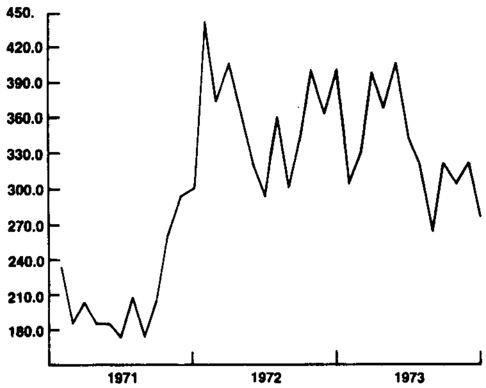
COMPARISON SITE: SAN DIEGO, CALIFORNIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.48		.26
STANDARD DEVIATION	.64		.48
VALUE OF t TEST	-.75		.55

CHARLOTTE, NORTH CAROLINA ASAP

The Charlotte ASAP was funded to begin operations in January 1971. The experimental design provided for one year (1971) of a public information and education media countermeasure, followed by the introduction of special enforcement in January 1972.

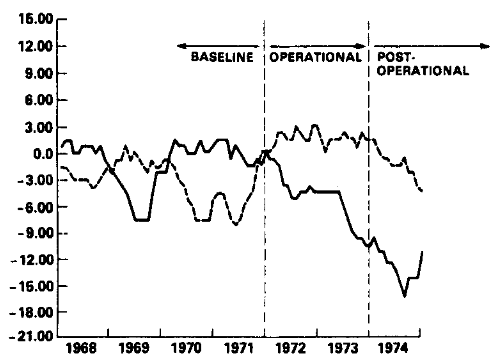
CHARLOTTE ASAP ALCOHOL RELATED CRASHES OPERATIONALLY FUNDED YEARS



It was felt that the media campaign alone was not effective in deterring the drinking driver. Hence, for the purpose of evaluating the impact of the total ASAP program, January 1972 was selected as the point of intervention. This brings about a four year baseline period (1968-1971) and a two year operational period (1972-1973). In addition, the Charlotte ASAP was awarded a post ASAP evaluation extension which consisted of the collection and reporting of specified impact variables. The year 1974 represents this post operational period during which there was no ASAP activity in Charlotte.

CUMULATIVE SUM

(—) CHARLOTTE NIGHT FATAL CRASHES
(----) CHARLOTTE DAY FATAL CRASHES



ASAP SITE: CHARLOTTE, NORTH CAROLINA

OUTPUT SERIES: NIGHT FATAL CRASHES

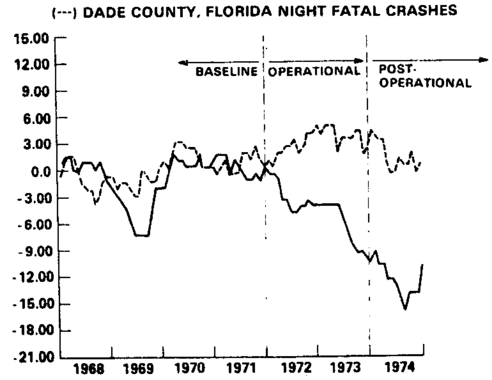
	FUEL CRISIS	55 MPH NMSL	*ASAP DUMVAR
PARAMETER ESTIMATE	CCF = 0	−.29	−.77
STANDARD DEVIATION		.59	.44
VALUE OF t TEST		−.49	−1.75
DELAY TIME		2 MOS.	0 MOS.

DATE OF 55 MPH NMSL: DECEMBER 1973
***NOTE: ASAP INTERVENTION MOVED TO JANUARY 1972**

Analysis of night fatal crashes revealed a statistically significant reduction of .77 fatal crashes per month (9.24 per year or 18.48 during the life of the project) due to the presence of ASAP. Neither the fuel crisis nor the 55 mph NMSL had any effect on night fatal crashes in Charlotte.

CUMULATIVE SUM

(—) CHARLOTTE NIGHT FATAL CRASHES
(---) DADE COUNTY, FLORIDA NIGHT FATAL CRASHES



Analysis of day fatal crashes showed no change between baseline (1968-1971), operational (1972-1973) and post operational (1974) periods. The Charlotte ASAP had two comparison sites: Pima County, Arizona and Dade County, Florida. Neither of these sites experienced a change in the mean level of monthly night fatal crashes coincident with the ASAP operational period.

COMPARISON SITE: CHARLOTTE DAY FATAL CRASHES

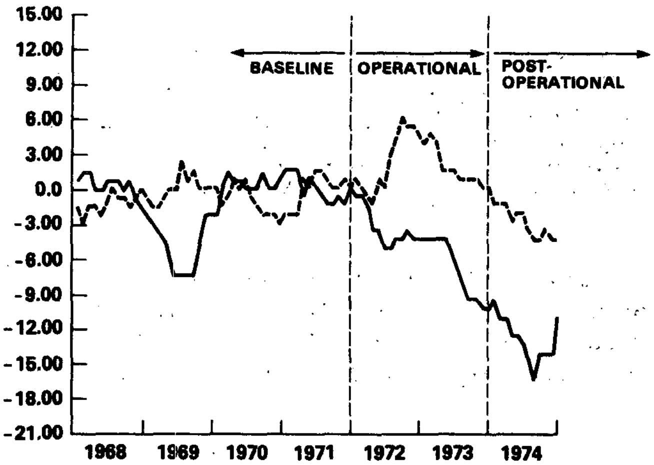
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	CCF=O	-1.06	.63
STANDARD DEVIATION		.58	.58
VALUE OF t TEST		-1.83	1.09
DELAY TIME		1 MOS.	0 MOS.

COMPARISON SITE: DADE COUNTY, FLORIDA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	–.25	–.68	.27
STANDARD DEVIATION	1.45	1.13	.80
VALUE OF t TEST	–.17	–.60	.34

CUMULATIVE SUM

(—) CHARLOTTE NIGHT FATAL CRASHES
(---) PIMA COUNTY, ARIZONA NIGHT FATAL CRASHES

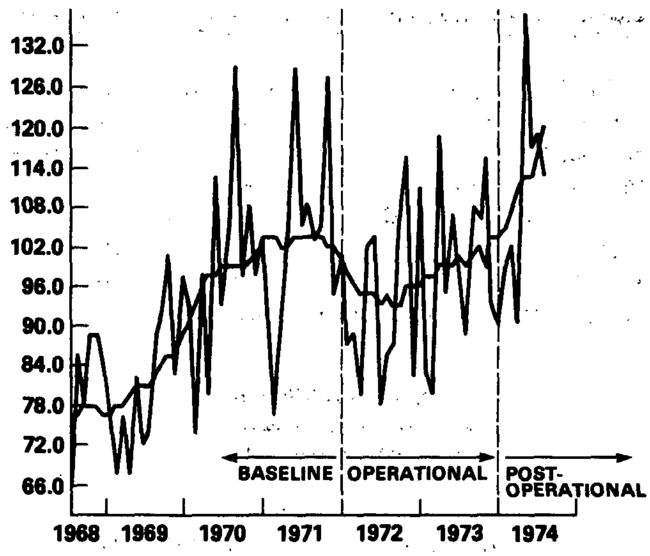


COMPARISON SITE: PIMA COUNTY, ARIZONA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	–.46	–.86	.08
STANDARD DEVIATION	.96	.76	.54
VALUE OF t TEST	–.48	–1.13	.15

In addition to night fatal crashes, night injury crashes were analyzed to determine the impact of ASAP. The raw data is plotted with a 12-month moving average superimposed. Inspection shows the change in trend coincident with the start of the special patrols enforcement countermeasure (January 1972).

CHARLOTTE NIGHT INJURY CRASHES WITH 12 MONTH MOVING AVERAGE



The series exhibits a 12 month annual cycle and trend which were removed during the analysis. The results show a statistically significant reduction of 11.19 injury crashes per month (134.28 per year) during the ASAP operational period. There was no effect noted due to either the fuel crisis or 55 mph NMSL. This is additional evidence of the effect of the ASAP program. Note the upward movement of the series during the post operational phase.

ASAP SITE: CHARLOTTE, NORTH CAROLINA

OUTPUT SERIES: NIGHT INJURY CRASHES

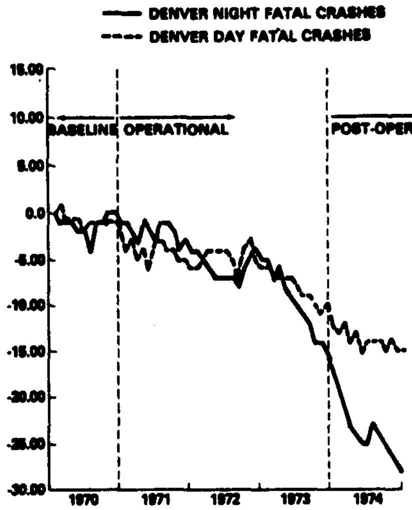
	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-7.93	17.69	-11.19
STANDARD DEVIATION	8.40	5.87	4.57
VALUE OF t TEST	-.94	3.01	-2.45
DELAY TIME	1 MOS.	0 MOS.	2 MOS.

DATE OF 55 MPH NMSL: NOVEMBER 1973

DENVER, COLORADO ASAP

The Denver, Colorado ASAP began operations January 1971 for a three year experimental period (1971-1973). At the end of the project an evaluation extension was awarded during which time post operational data was to be collected and reported. The analysis of ASAP impact covers three mutually exclusive time frames: baseline (1968-1970), operational (1971-1973) and post operational (1974). ASAP was present only during the operational phase.

CUMULATIVE SUM



The results of the analysis show a statistically significant reduction of 1.24 fatal crashes per month due to the presence of the ASAP program. This amounts to a reduction of 39.68 fatal crashes during the ASAP operational period. The four month delay signifies that although operations began January 1971, the effect was not "felt" in the system until May 1971, and continued throughout the life of the project (December 1973).

ASAP SITE: DENVER, COLORADO

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-2.15	-1.19	-1.24
STANDARD DEVIATION	.87	.87	.47
VALUE OF t TEST	-2.48	-1.36	-2.62
DELAY TIME	3 MOS.	5 MOS.	4 MOS.

DATE OF 55 MPH NMSL: FEBRUARY 1977

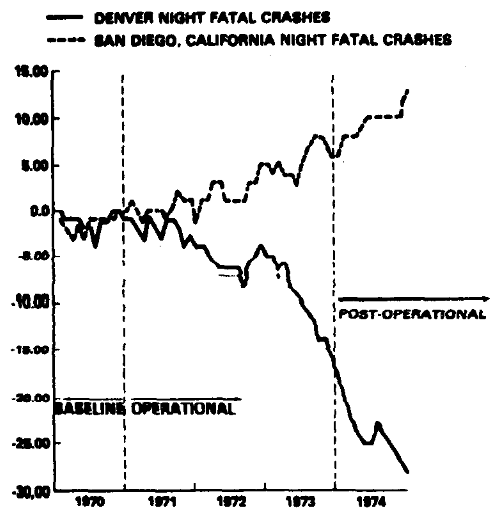
Due to the presence of the fuel crisis and 55 mph NMSL during the post operational phase (1974) dummy variables were included in the analysis to measure the effects of these confounding factors. Analysis reveals a statistically significant reduction of 2.15 fatal crashes per month for the presence of the fuel crisis (hypothesized to be October 1973-March 1974; note the three month delay). The speed limit had no effect on night fatal crashes.

COMPARISON SITE: DENVER DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	- .90	.16	- .08
STANDARD DEVIATION	.59	.44	.26
VALUE OF t TEST	-1.53	.36	- .31
DELAY TIME	2 MOS.	1 MOS.	4 MOS.

Analysis of Denver day fatal crashes showed no change in mean level for the years 1968-1974. San Diego, California was the comparison site for Denver. Analysis showed no change in night fatal crashes for the years 1968-1974.

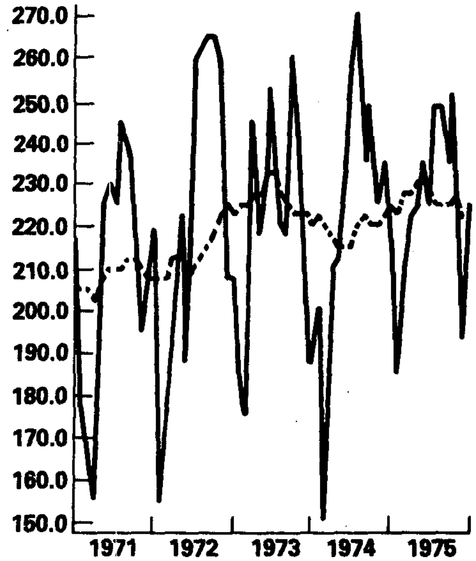
CUMULATIVE SUM



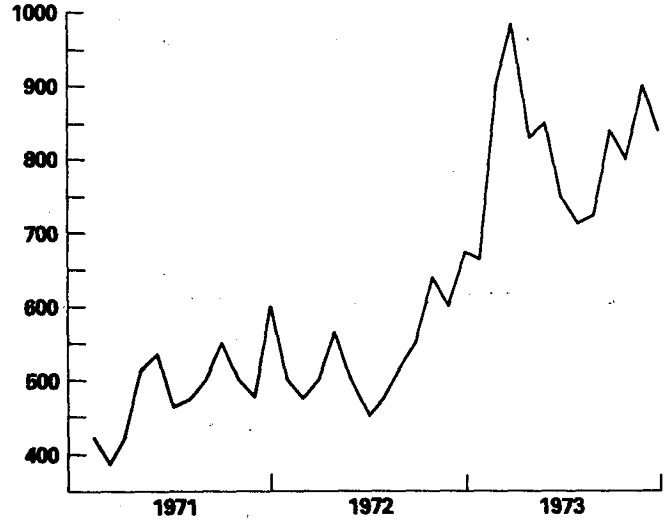
COMPARISON SITE: SAN DIEGO, CALIFORNIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.48	.87	.26
STANDARD DEVIATION	.64	.61	.48
VALUE OF t TEST	-.75	1.44	.55

DENVER ASAP NIGHT INJURY CRASHES 12-MONTH AVERAGE



DENVER ASAP ALCOHOL RELATED ARREST OPERATIONAL YEARS



Night injury crash data was also analyzed to determine ASAP impact. There was no change in night injury crashes during the ASAP operational period.

ASAP SITE: DENVER, COLORADO

OUTPUT SERIES: NIGHT INJURY CRASHES

METHODOLOGY:

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF=0	9.01	12.43
STANDARD DEVIATION		12.46	14.04
VALUE OF t TEST		.72	.89
DELAY TIME		2 MOS.	2 MOS.

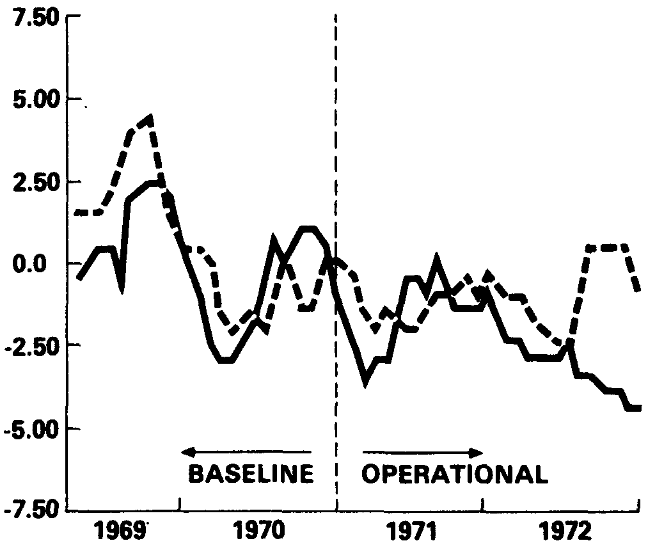
DATE OF 55 MPH NMSL: FEBRUARY 1974

MARATHON-SHEBOYGAN, WISCONSIN ASAP

The Wisconsin ASAP began operations January 1971. The project life was two years with operations terminating December 1972. Monthly fatal crash data was not supplied by the site; therefore monthly night and day fatal crash data were generated from the quarterly data according to monthly distribution of fatalities which was available. The analysis compared monthly night fatal crashes in the baseline (1968–1970) and operational (1971–1972) periods.

CUMULATIVE SUM

(—) WISCONSIN NIGHT FATAL CRASHES
(-–) WEST VIRGINIA NIGHT FATAL CRASHES



The analysis of night fatal crashes showed no change in the mean level between baseline and operational periods. Since the project terminated in December 1972, neither the fuel crisis nor the 55 mph NMSL effect was included in the analysis.

ASAP SITE: MARATHON–SHEBOYGAN, WISCONSIN

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	N/P	N/P	- .12
STANDARD DEVIATION			.34
VALUE OF t TEST			- .35
DELAY TIME			4 MOS.

DATE OF 55 MPH NMSL: N/P

In addition, there was no change in the mean level of day fatal crashes between the baseline (1968–1970) and project (1971–1972) periods. West Virginia was the comparison site for the Wisconsin ASAP. Again, no change was noted in the night fatal crash series coincident with ASAP operations.

COMPARISON SITE: MARATHON-SHEBOGAN, WISCONSIN DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	NOT	NOT	.42
STANDARD DEVIATION	PRESENT	PRESENT	1.23
VALUE OF t TEST			.34

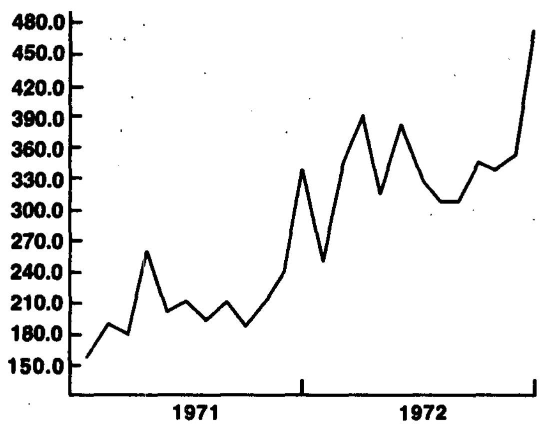
COMPARISON SITE: WEST VIRGINIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	N/P	N/P	- .28
STANDARD DEVIATION			1.80
VALUE OF t TEST			- .16

NASSAU COUNTY, NEW YORK ASAP

In January 1971 the Nassau County ASAP began the first year of a two year operational phase. The experimental design called for one year (1971) of a public information and education countermeasure with enforcement entering in 1972.

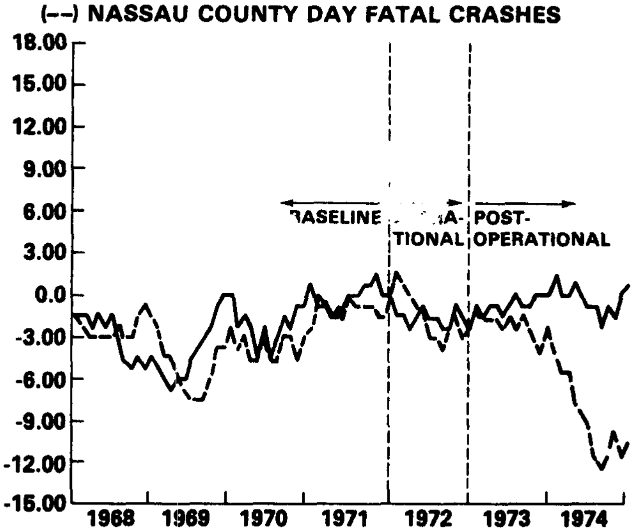
NASSAU COUNTY ASAP ALCOHOL RELATED ARRESTS OPERATIONALLY FUNDED YEARS



As in the Charlotte ASAP, PI&E alone was felt to be ineffective as a deterrent to the drinking driver. Therefore, for the purpose of analysis, 1971 was considered a baseline year and 1972, the operational year. At the end of December 1972 the project terminated and began a two year post operational evaluation extension for data collection and reporting purposes. The analysis considers three periods covering seven years: baseline (1968–1971), operational (1972) and post operational (1973–1974).

CUMULATIVE SUM

(—) NASSAU COUNTY NIGHT FATAL CRASHES
(--) NASSAU COUNTY DAY FATAL CRASHES



The analysis of monthly night fatal crashes shows no reduction during the period of ASAP presence. Neither the fuel crisis nor the 55 mph NMSL had any impact on night fatal crashes in Nassau County.

ASAP SITE: NASSAU COUNTY, NEW YORK

OUTPUT SERIES:NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF = 0	-.49	-.61
STANDARD DEVIATION		.74	.72
VALUE OF t TEST		-.66	-.85
DELAY TIME	MOS.	3 MOS	0 MOS.

DATE OF 55 MPH NMSL: NOVEMBER 1973

Analysis of day fatal crashes showed that there was no change during ASAP operations compared to the baseline and post operational periods.

COMPARISON SITE: NASSAU COUNTY DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.09	-1.20	.12
STANDARD DEVIATION	1.32	.94	.68
VALUE OF t TEST	-.07	-1.28	.18

The comparison sites for Nassau County, New York were Miami, Florida and Omaha, Nebraska. No change was found in night fatal crashes in Miami or Omaha coincident with ASAP operations in Nassau County.

COMPARISON SITE: MIAMI, FLORIDA

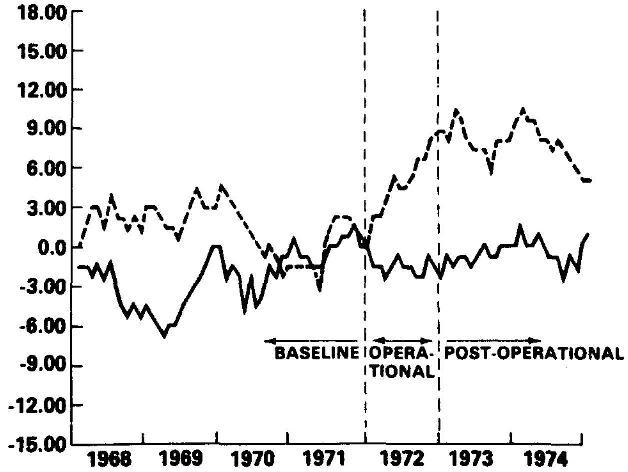
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	.67	.42	.64
STANDARD DEVIATION	.62	.45	.34
VALUE OF t TEST	1.08	.93	1.73

COMPARISON SITE: OMAHA, NEBRASKA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	.15	.72	-.15
STANDARD DEVIATION	.74	.63	.47
VALUE OF t TEST	.20	1.14	-.32

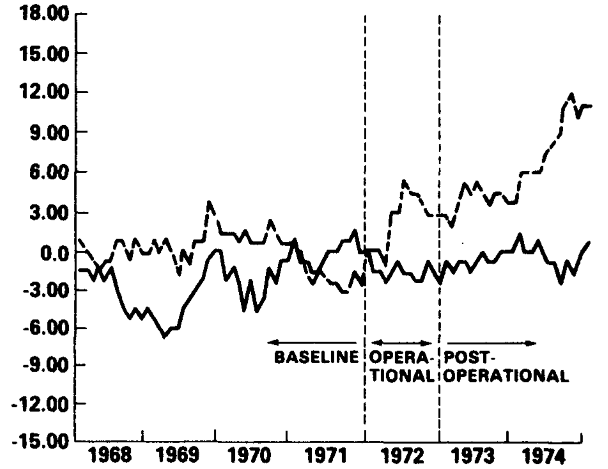
CUMULATIVE SUM

(—) NASSAU COUNTY NIGHT FATAL CRASHES
(--) MIAMI, FLORIDA NIGHT FATAL CRASHES



CUMULATIVE SUM

(—) NASSAU COUNTY NIGHT FATAL CRASHES
(--) OMAHA, NEBRASKA NIGHT FATAL CRASHES



In addition to the night fatal crash data, monthly night injury data for 1968–1974, submitted by the site, is depicted below.

The analysis of Nassau County night injury crashes used the same time frames for the fuel crisis, speed limit and ASAP effect as in the night fatal crash analysis. The results show no change in the night injury crash series during ASAP operations. There was, however, a statistically significant reduction of 65.22 injury crashes per month attributed to the fuel crisis. No effect was found for the speed limit.

ASAP SITE: NASSAU COUNTY, NEW YORK

OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-65.22	.36	27.52
STANDARD DEVIATION	27.02	24.21	17.03
VALUE OF t TEST	-2.41	.01	1.62
DELAY TIME	2 MOS.	1 MOS.	3 MOS.

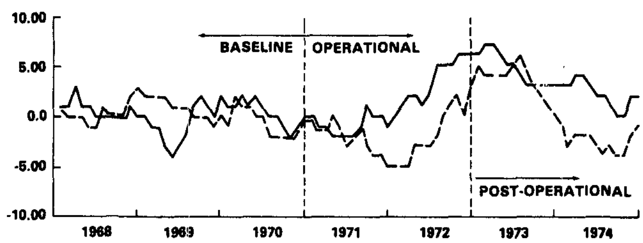
DATE OF 55 MPH NMSL: NOVEMBER 1973

PORTLAND-EUGENE, OREGON ASAP

Operations began in the Portland-Eugene ASAP in January 1971. The three year baseline period (1968–1970) was followed by a two year operational period (1971–1972). ASAP operations terminated in December 1972. An evaluation extension was awarded for a two year post operational period (1973–1974) for data collection and reporting.

CUMULATIVE SUM

(——) PORTLAND-EUGENE NIGHT FATAL CRASHES
(– – –) PORTLAND-EUGENE DAY FATAL CRASHES



Analysis of night fatal crashes in the Oregon ASAP showed that neither the fuel crisis nor the speed limit affected crashes in the post operational period. In addition, no change in the mean level of night fatal crashes was detected during ASAP operations.

ASAP SITE: PORTLAND-EUGENE, OREGON

OUTPUT SERIES: NIGHT FATAL CRASHES
METHODOLOGY:

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-1.11	CCF=0	-.08
STANDARD DEVIATION	.70		.41
VALUE OF t TEST	-1.58		-.18
DELAY TIME	7 MOS.		9 MOS.

DATE OF 55 MPH NMSL: NOVEMBER 1973

There was no change in day fatal crashes during the ASAP operational phase.

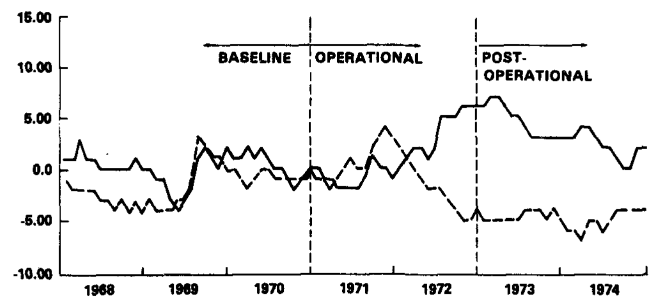
COMPARISON SITE: PORTLAND-EUGENE DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-1.77	.18	.22
STANDARD DEVIATION	.92	.65	.48
VALUE OF t TEST	-1.92	.28	.45

Birmingham, Alabama and Louisville, Kentucky were the comparison sites for Portland-Eugene, Oregon. No change in the mean level of night fatal crashes was detected at either site coincident with ASAP operations in Oregon.

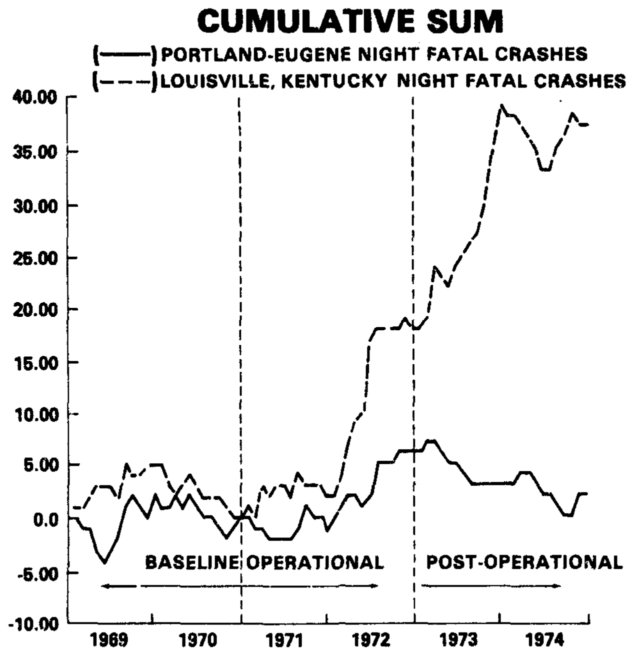
CUMULATIVE SUM

(——) PORTLAND-EUGENE NIGHT FATAL CRASHES
(– – –) BIRMINGHAM, ALABAMA NIGHT FATAL CRASHES



COMPARISON SITE: BIRMINGHAM, ALABAMA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.53	.23	-.60
STANDARD DEVIATION	.63	.51	.37
VALUE OF t TEST	-.84	.45	-1.62

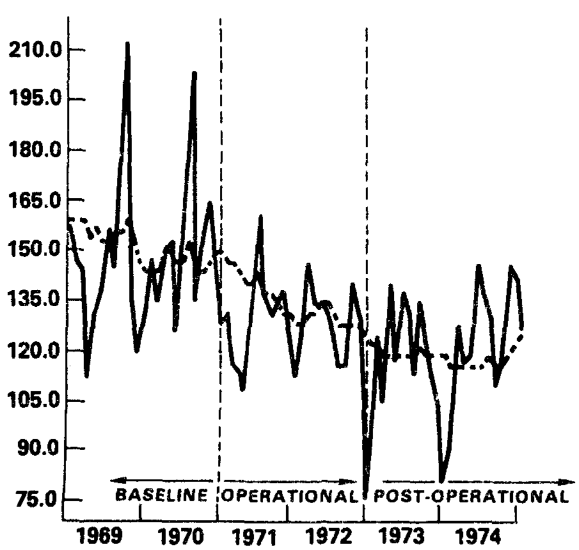


COMPARISON SITE: LOUISVILLE, KENTUCKY

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	2.28	-1.20	.512
STANDARD DEVIATION	1.06	.84	.645
VALUE OF t TEST	2.15	-1.43	.793

In addition to monthly fatal crash data, the Portland-Eugene ASAP submitted monthly night injury crash data graphed below.

PORTLAND-EUGENE ASAP NIGHT INJURY CRASHES 12-MONTH MOVING AVERAGE



The analysis of Portland-Eugene night injury crashes revealed a statistically significant reduction of 19.31 injury crashes per month for the period January 1971–December 1974 (459 crashes down for the ASAP operational period). In addition, a statistically significant reduction of 27.45 crashes per month was attributed to the fuel crisis (165 crashes for the period October 1973–March 1974). No effect was found for the reduced speed limit.

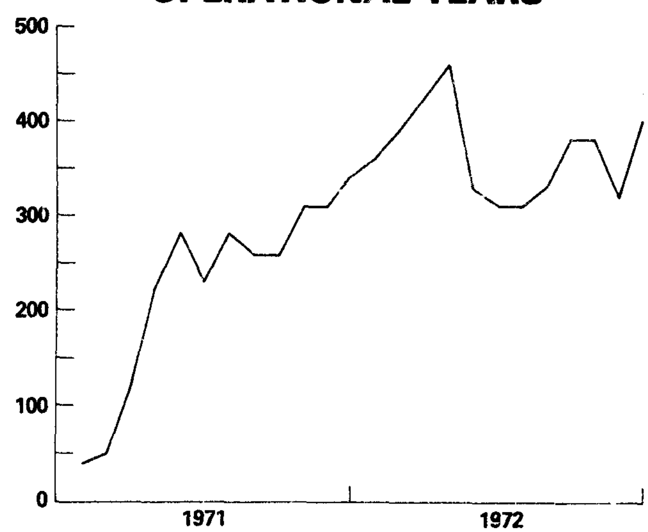
ASAP SITE: PORTLAND-EUGENE, OREGON

OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−27.45	−14.11	−19.13
STANDARD DEVIATION	12.02	8.67	6.40
VALUE OF t TEST	−2.28	−1.63	−2.99
DELAY TIME	0 MOS.	0 MOS.	0 MOS.

DATE OF 55 MPH NMSL: NOVEMBER 1973

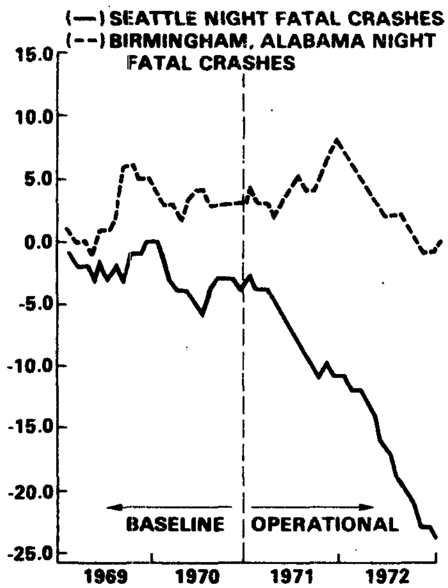
PORTLAND-EUGENE ASAP ALCOHOL RELATED ARRESTS OPERATIONAL YEARS



SEATTLE, WASHINGTON ASAP

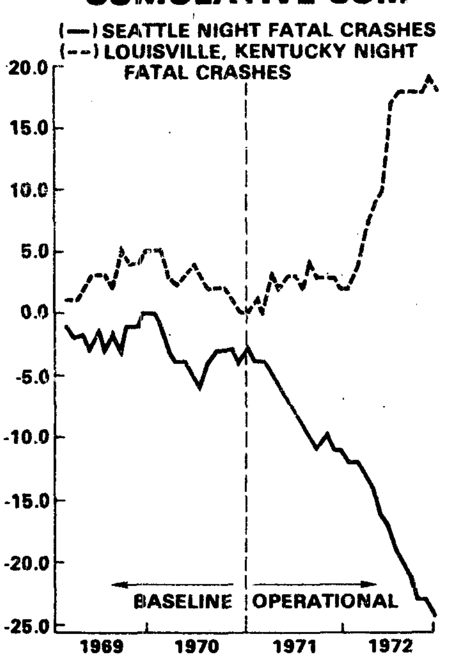
Janaury 1971 was the start of the Seattle, Washington ASAP. Two years of operations (1971–1972) were preceded by a three year baseline period (1968–1970). The analysis investigated the effect of ASAP without the fuel crisis and speed limit effects present.

CUMULATIVE SUM



Monthly crash data was never collected in Seattle. The quarterly night fatal crash data was used to generate monthly estimates according to the distribution of available monthly fatality data.

CUMULATIVE SUM



The resulting analysis identified a statistically significant reduction of 2.38 fatal crashes per month for the period January 1971–December 1972 attributed to the presence of the ASAP program in Seattle. This amounts to a reduction of 57.12 crashes during the project life.

ASAP SITE: SEATTLE, WASHINGTON

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	N/A	N/A	– 2.38
STANDARD DEVIATION			.60
VALUE OF t TEST			–3.97
DELAY TIME			0 MOS.

DATE OF 55 MPH NMSL: NOVEMBER 1973

The analysis of day fatal crashes showed no change between baseline and operational periods.

COMPARISON SITE: SEATTLE DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	NOT	NOT	-1.04
STANDARD DEVIATION	PRESENT	PRESENT	2.17
VALUE OF t TEST			-.48

Birmingham, Alabama and Louisville, Kentucky were the comparison sites for Seattle, Washington. No changes in night fatal crashes were detected during the years of ASAP operations in Seattle (1971–1972).

COMPARISON SITE: BIRMINGHAM, ALABAMA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.53	.23	-.60
STANDARD DEVIATION	.63	.51	.37
VALUE OF t TEST	-.84	.46	-1.62

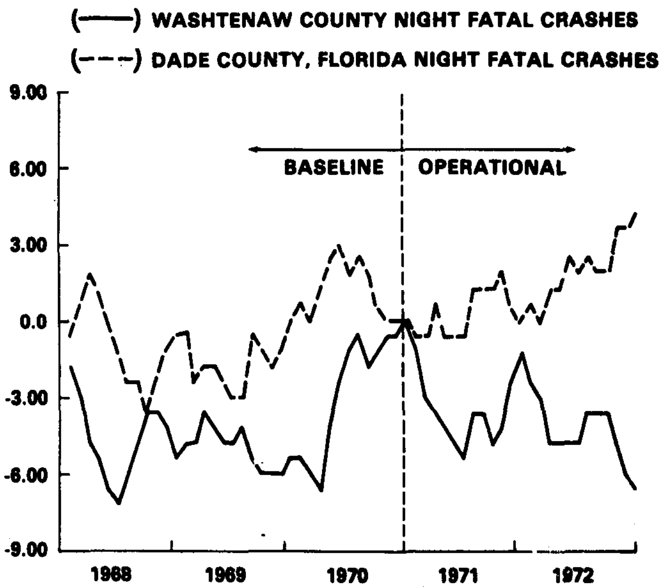
COMPARISON SITE: LOUISVILLE, KENTUCKY

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	2.28	– 1.20	.51
STANDARD DEVIATION	1.06	.84	.65
VALUE OF t TEST	2.15	– 1.43	.79

WASHTENAW COUNTY, MICHIGAN ASAP

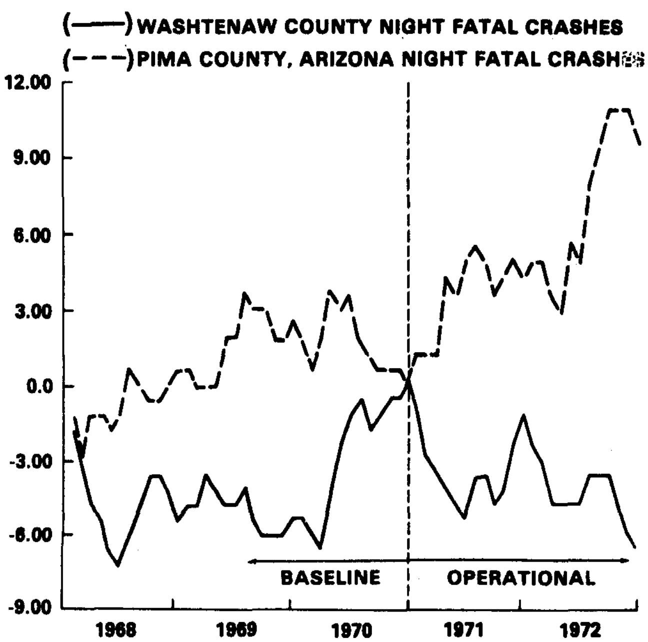
The Washtenaw County ASAP began operations in January 1971. The project was funded for two years until December 1972 when it was terminated. Monthly crash data was not collected in Washtenaw County.

CUMULATIVE SUM



Monthly estimates were derived from quarterly crash data using the monthly fatality data. The analysis compares night fatal crashes in the baseline (1968–1970) and operational (1971–1972) periods. Neither the fuel crisis nor 55 mph NMSL were considered in the analysis since they were not yet present in 1972.

CUMULATIVE SUM



The resulting analysis showed no change in night fatal crashes in Washtenaw County during the ASAP operational period.

ASAP SITE: WASHTENAW COUNTY, MICHIGAN

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	NOT	NOT	-.49
STANDARD DEVIATION	PRESENT	PRESENT	.44
VALUE OF t TEST			-1.11
DELAY TIME			0 MOS.

DATE OF 55 MPH NMSL: NOT APPLICABLE

The analysis of day fatal crashes also showed no change in mean level during the period of ASAP operations.

COMPARISON SITE: WASHTENAW COUNTY DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	NOT	NOT	1.42
STANDARD DEVIATION	PRESENT	PRESENT	1.31
VALUE OF t TEST			1.08

Dade County, Florida and Pima County, Arizona were the comparison sites for Washtenaw County, Michigan. No change in night fatal crashes was found at either site during the period of ASAP operations in Washtenaw County.

COMPARISON SITE: DADE COUNTY, FLORIDA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.08	-.32	.66
STANDARD DEVIATION	1.43	1.04	.78
VALUE OF t TEST	-.06	-.31	.85

COMPARISON SITE: PIMA COUNTY, ARIZONA

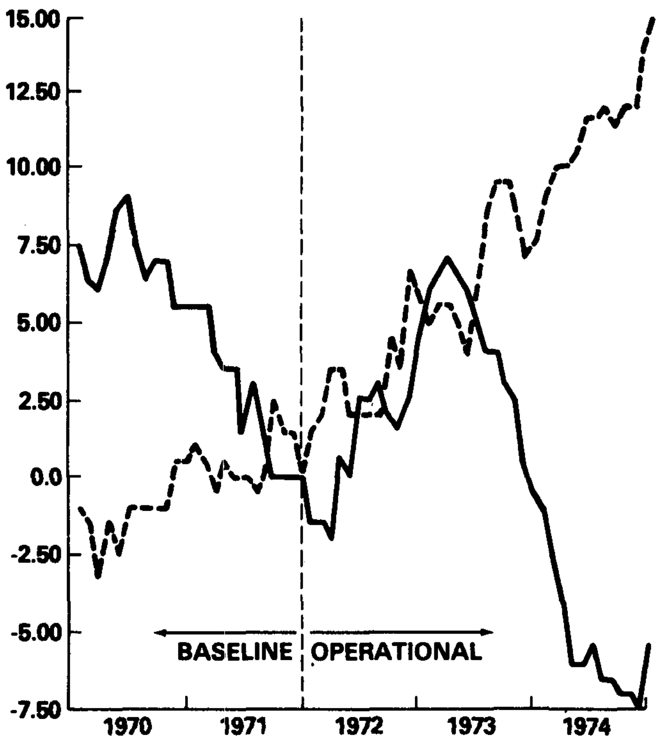
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.25	-.54	.94
STANDARD DEVIATION	.92	.69	.52
VALUE OF t TEST	-.27	-.78	1.81

BALTIMORE, MARYLAND ASAP

ASAP operations began in Baltimore, Maryland in January 1972. The project ran for three years ending in December 1974. The analysis compares night fatal crashes between the baseline (1969–1971) and operational (1972–1974) periods. Monthly night fatal crash data was not collected for the Baltimore site. Monthly estimates were derived using quarterly crash data and the distribution of monthly fatality data which was reported.

CUMULATIVE SUM

(——) BALTIMORE NIGHT FATAL CRASHES
(----) SAN DIEGO, CALIFORNIA NIGHT FATAL CRASHES



The analysis of night fatal crashes in Baltimore showed a statistically significant reduction of 3.59 fatal crashes per month for the period November 1973–April 1974 attributed to the fuel crisis. The speed limit had no effect on crashes. No change in night fatal crashes was found during the ASAP operational period.

ASAP SITE: BALTIMORE, MARYLAND

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-3.59	-.35	.73
STANDARD DEVIATION	.99	.88	.60
VALUE OF t TEST	-3.63	-.40	1.22
DELAY TIME	1 MOS.	5 MOS.	3 MOS.

DATE OF 55 MPH NMSL: DECEMBER 1973

COMPARISON SITE: BALTIMORE DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-3.54	-3.31	-.81
STANDARD DEVIATION	2.82	2.23	1.68
VALUE OF t TEST	-1.25	-1.48	-.48

The analysis of day fatal crashes showed no change during the period of ASAP operations when compared to the baseline period. San Diego, California was the comparison site for Baltimore, Maryland. No change was found in night fatal crashes coincident with ASAP operations in Baltimore.

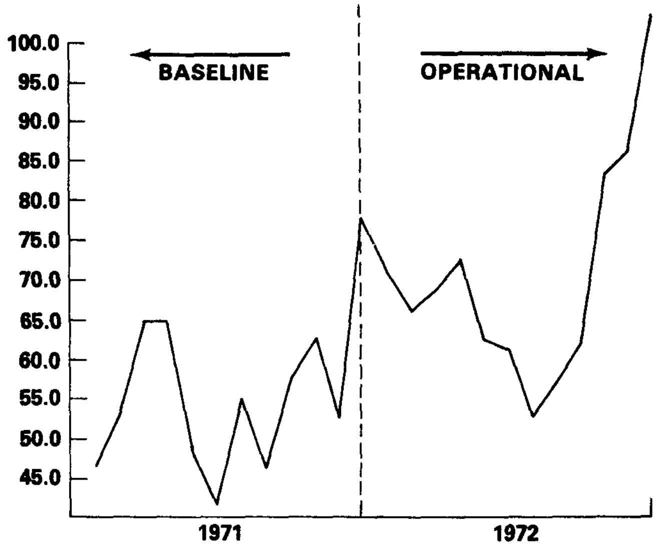
COMPARISON SITE: SAN DIEGO, CALIFORNIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.59	.45	.49
STANDARD DEVIATION	.64	.51	.42
VALUE OF t TEST	.92	.88	1.17

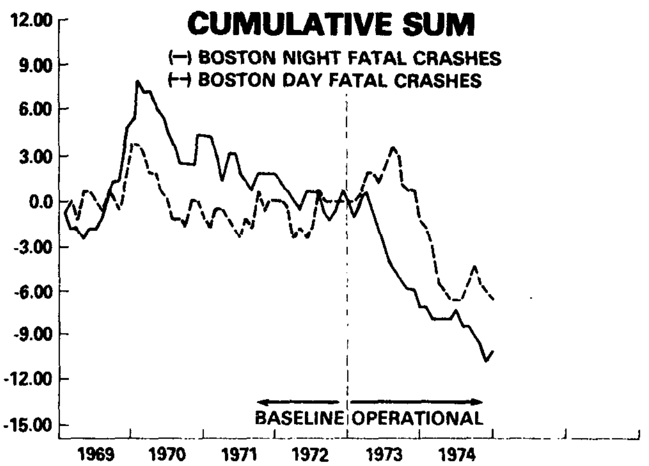
BOSTON, MASSACHUSETTS ASAP

The Boston ASAP began operations in January 1972. The experimental design provided for one year (1972) of Public Information and Education (PI&E) countermeasure activity with enforcement entering in January 1973.

BOSTON ASAP ALCOHOL RELATED ARRESTS



It was felt that the PI&E countermeasure alone was not effective in reducing the number of alcohol related fatal crashes. For the purpose of analysis, only the years 1973–1974 were considered in the operational period.



ASAP SITE: BOSTON, MASSACHUSETTS

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF = Ø	CCF = Ø	-1.34
STANDARD DEVIATION			.57
VALUE OF t TEST			-2.35
DELAY TIME			3 MOS.

DATE OF 55 MPH NMSL: NOVEMBER 1973

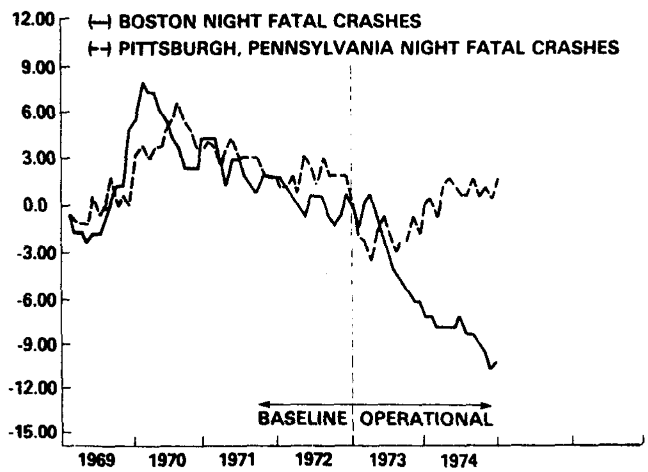
Monthly night fatal crashes were analyzed to determine the impact of ASAP in Boston beginning January 1973. The resulting analysis showed a statistically significant reduction of 1.34 fatal crashes per month attributable to the ASAP program. For the two year operational period (1973–1974) this is a savings of 32.16 fatal crashes. Neither the fuel crisis nor the 55 mph NMSL affected night fatal crashes in Boston.

COMPARISON SITE: BOSTON DAY FATAL CRASHES

	FUEL CRISIS	55MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-1.97	.27	-.34
STANDARD DEVIATION	.88	.82	.60
VALUE OF t TEST	-2.40	.33	-.57
DELAY TIME	2 MOS.	1 MOS.	3 MOS.

The analysis of day fatal crashes in the Boston site showed no change in mean level between the baseline and operational periods. Pittsburgh, Pennsylvania was the comparison site for Boston, Massachusetts. No change in the mean number of night fatal crashes was noted coincident with ASAP presence in Boston.

CUMULATIVE SUM



COMPARISON SITE: PITTSBURGH, PENNSYLVANIA

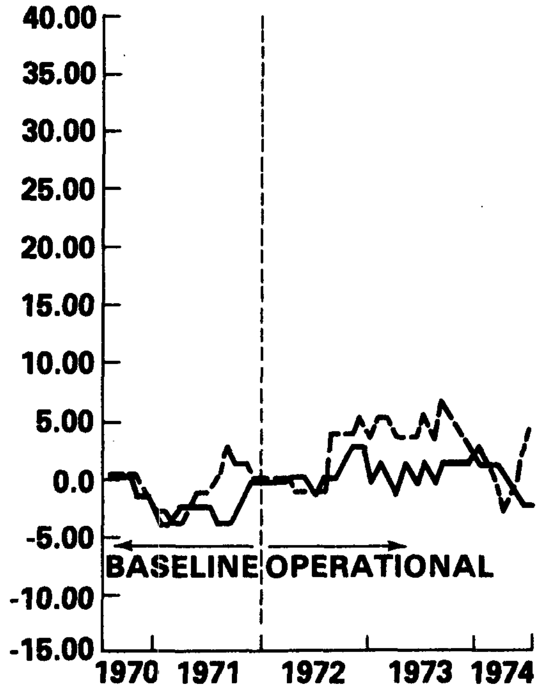
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	CCF = Ø	CCF = Ø	.38
STANDARD DEVIATION			.34
VALUE OF t TEST			1.12

CINCINNATI, OHIO ASAP

The Cincinnati, Ohio ASAP began operations in January 1972. The project was funded to run three years, terminating in December 1974. Baseline monthly crash data for the period January 1969–June 1970 was not submitted by the site. In addition, data was not reported for July–December 1974. The analysis covers a four year time frame comparing night fatal crashes in the baseline (July 1970–December 1971) and operational (January 1972–June 1974) periods.

CUMULATIVE SUM

(—) CINCINNATI NIGHT FATAL CRASHES
(---) CINCINNATI DAY FATAL CRASHES



The results of the analysis showed no effect for either the fuel crisis or the reduced speed limit. There was no change in night fatal crashes during the ASAP operational period.

ASAP SITE: CINCINNATI, OHIO

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF = 0	CCF = 0	-.11
STANDARD DEVIATION			.49
VALUE OF t TEST			-.22
DELAY TIME	MOS.	MOS.	0 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

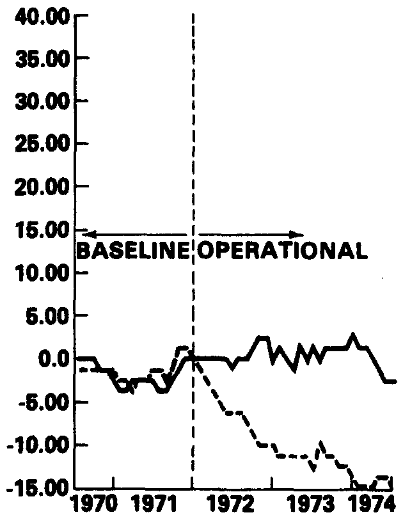
COMPARISON SITE: CINCINNATI DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	CCF = 0	2.69	-.07
STANDARD DEVIATION		.94	.48
VALUE OF t TEST		2.86	-.15
DELAY TIME		1 MOS.	0 MOS.

The analysis of Cincinnati day fatal crashes showed no change in the mean level of day fatal crashes during the period of ASAP activity. Birmingham, Alabama and Louisville, Kentucky were the comparison sites for Cincinnati, Ohio. Neither site experienced a change in night fatal crashes coincident with ASAP operations in Cincinnati.

CUMULATIVE SUM

(—) CINCINNATI NIGHT FATAL CRASHES
(---) BIRMINGHAM, ALABAMA NIGHT FATAL CRASHES

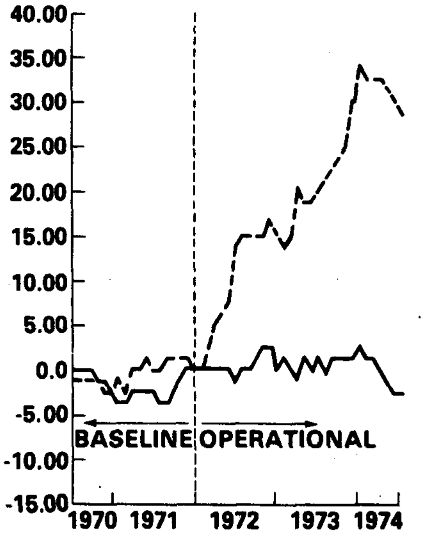


COMPARISON SITE: BIRMINGHAM, ALABAMA

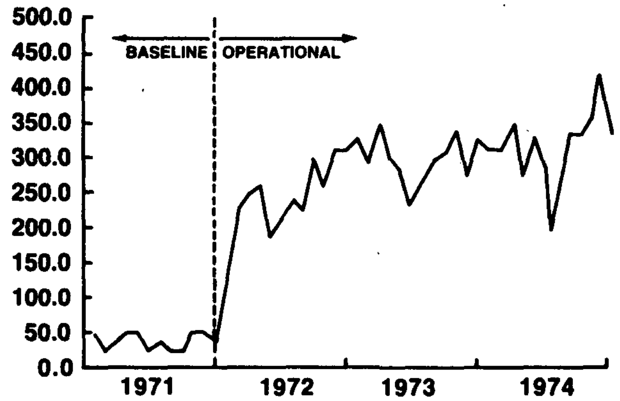
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.33	.81	-.60
STANDARD DEVIATION	.66	.55	.38
VALUE OF t TEST	-.50	1.47	-1.58

CUMULATIVE SUM

(—) CINCINNATI NIGHT FATAL CRASHES
(--) LOUISVILLE, KENTUCKY NIGHT FATAL CRASHES



CINCINNATI ASAP ALCOHOL-RELATED ARRESTS



***COMPARISON SITE:* LOUISVILLE, KENTUCKY**

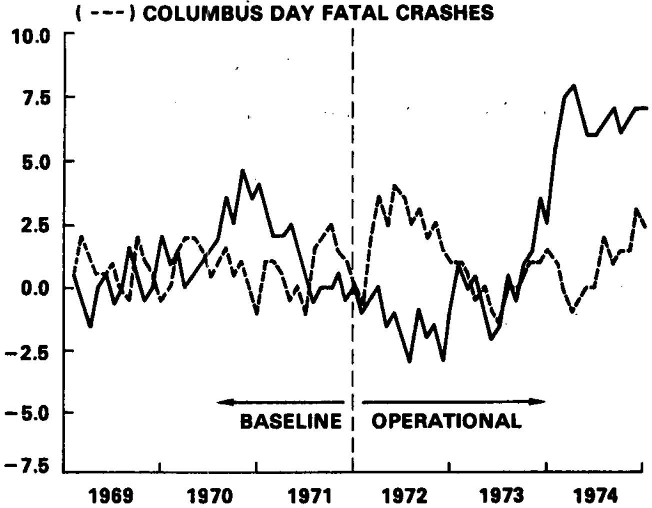
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	1.31	-2.39	1.87
STANDARD DEVIATION	1.02	.83	.62
VALUE OF t TEST	1.28	-2.88	3.02

COLUMBUS, GEORGIA ASAP

The ASAP in Columbus, Georgia began operations in January 1972. The analysis considers a three year baseline period (1969–1971) and a three year operational period (1972–1974) taking into account the fuel crisis and 55 mph NMSL.

CUMULATIVE SUM

(——) COLUMBUS NIGHT FATAL CRASHES
(- - -) COLUMBUS DAY FATAL CRASHES



Results showed that neither the fuel crisis nor the speed limit had any effect on night fatal crashes. No reduction in the mean number of night fatal crashes was attributable to the ASAP program in Columbus.

ASAP SITE: COLUMBUS, GEORGIA

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	.52	CCF=0	.19
STANDARD DEVIATION	.26		.14
VALUE OF t TEST	2.00		1.36
DELAY TIME	1 MOS.		7 MOS.

DATE OF 55 MPH NMSL: FEBRUARY 1974

The analysis of day fatal crashes showed no change in the mean level coincident with the period of ASAP presence.

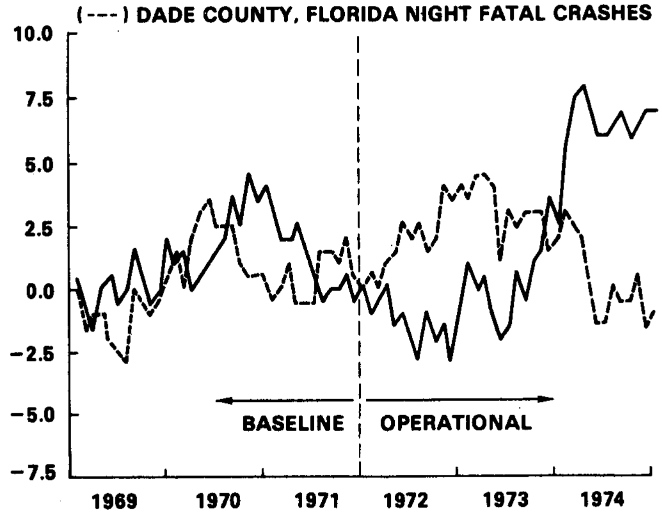
COMPARISON SITE: COLUMBUS DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	CCF=0	.07	.07
STANDARD DEVIATION		.39	.21
VALUE OF t TEST		.18	.33

Dade County, Florida and Pima County, Arizona were the comparison sites for Columbus, Georgia. No change in night fatal crashes was found at either site coincident with ASAP operations in Columbus, Georgia.

CUMULATIVE SUM

(——) COLUMBUS NIGHT FATAL CRASHES
(- - -) DADE COUNTY, FLORIDA NIGHT FATAL CRASHES

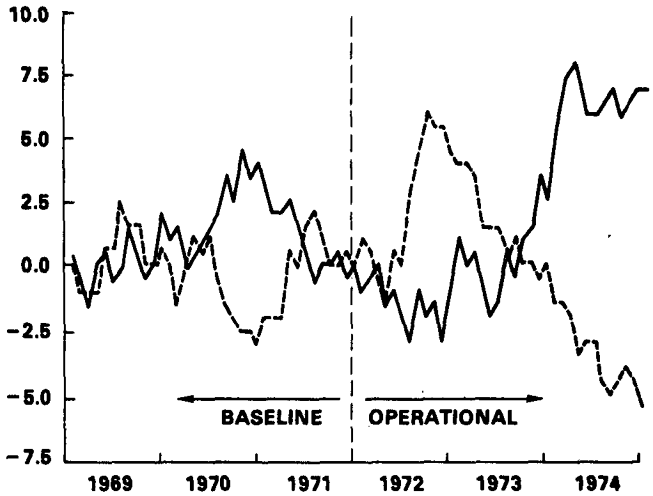


COMPARISON SITE: DADE COUNTY, FLORIDA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.25	-.68	.27
STANDARD DEVIATION	1.45	1.13	.80
VALUE OF t TEST	-.17	-.60	.34

CUMULATIVE SUM

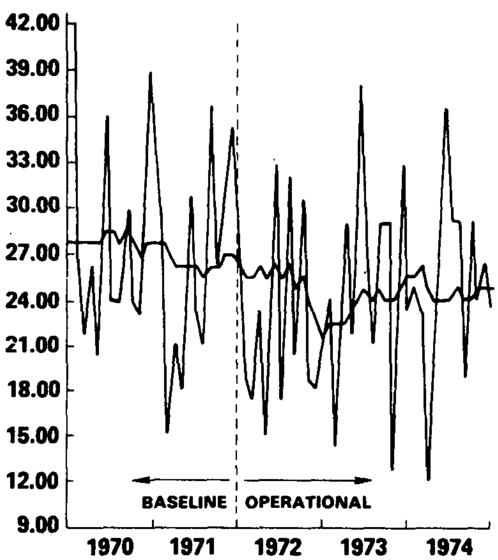
(——) COLUMBUS NIGHT FATAL CRASHES
(- - -) PIMA COUNTY, ARIZONA NIGHT FATAL CRASHES



COMPARISON SITE: PIMA COUNTY, ARIZONA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.46	-.86	.08
STANDARD DEVIATION	.96	.76	.54
VALUE OF t TEST	-.48	-1.14	.15

COLUMBUS ASAP NIGHT INJURY CRASHES 12-MONTH MOVING AVERAGE



Night injury crashes in Columbus were also analyzed to determine the effect of ASAP. No change was found during the period of ASAP operations.

ASAP SITE: COLUMBUS, GEORGIA

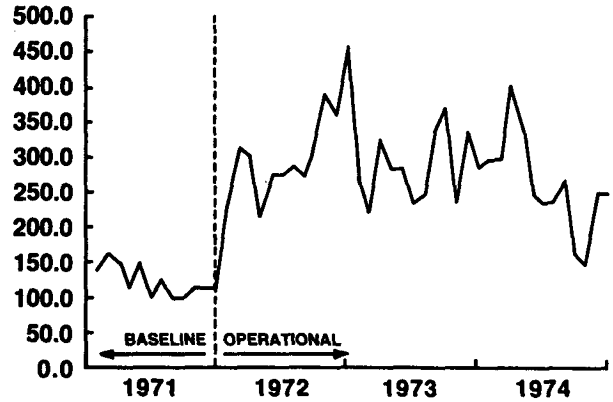
OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−1.52	3.22	−1.71
STANDARD DEVIATION	4.50	4.18	1.99
VALUE OF t TEST	−.34	.77	−.86
DELAY TIME	5 MOS.	2 MOS.	7 MOS.

DATE OF 55 MPH NMSL: FEBRUARY 1974

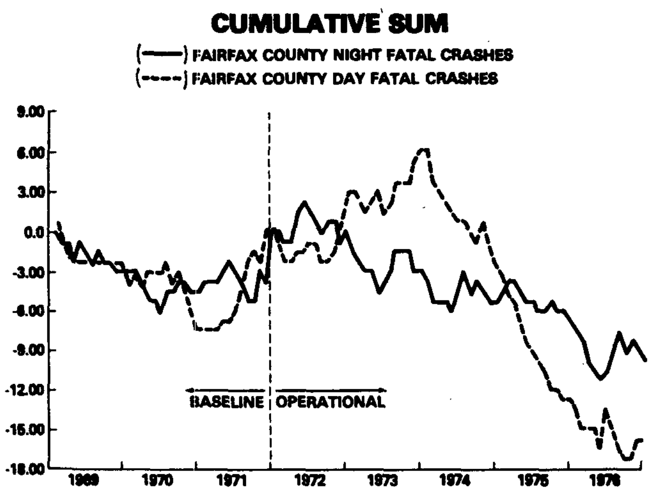
A graph of alcohol related arrests is included for the reader's information.

COLUMBUS ASAP ALCOHOL RELATED ARRESTS



FAIRFAX COUNTY, VIRGINIA ASAP

In January 1972 the Fairfax County, Virginia ASAP began operations. The original experimental design provided for a three year operational period (1972–1974). During 1974, the project was awarded a two year operational extension. The analysis compares night fatal crashes in the baseline (1969–1971) and operational (1972–1976) periods covering a total of eight years.



The results of analysis showed no reduction in night fatal crashes during the ASAP operational period. Neither the fuel crisis nor the 55 mph NMSL had any effect on Fairfax County night fatal crashes.

ASAP SITE: FAIRFAX COUNTY, VIRGINIA

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF=0	.24	-.70
STANDARD DEVIATION		.59	.60
VALUE OF t TEST		.41	-1.17
DELAY TIME		6 MOS.	0 MOS.

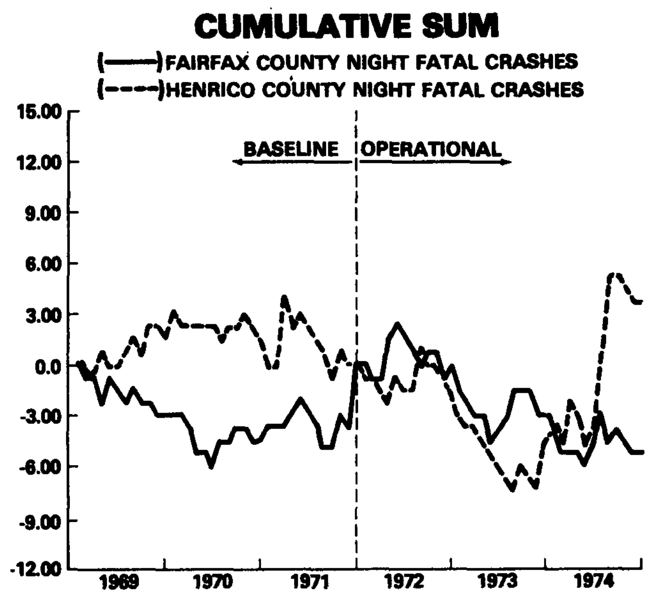
DATE OF 55 MPH NMSL: NOVEMBER 1973

There was no change in day fatal crashes in Fairfax County during the period of ASAP presence.

COMPARISON SITE: FAIRFAX COUNTY DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	CCF=0	-1.30	.33
STANDARD DEVIATION		.40	.41
VALUE OF t TEST		-3.25	.80
DELAY TIME		2 MOS.	0 MOS.

Henrico County, Virginia was the comparison site for Fairfax County. There was no change in the mean number of night fatal crashes coincident with the presence of ASAP in Fairfax County.

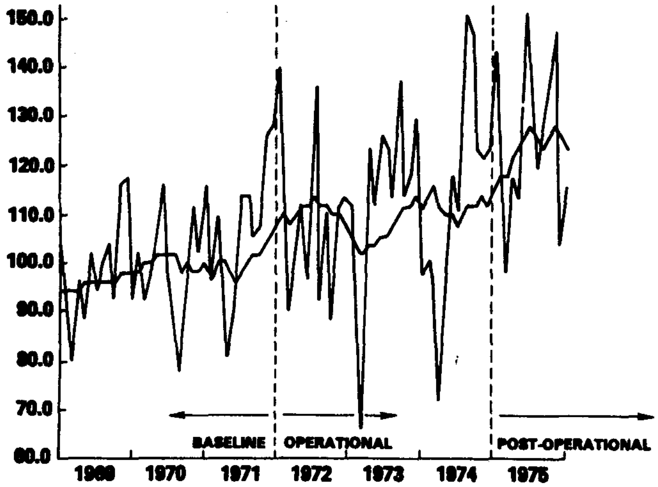


COMPARISON SITE: HENRICO COUNTY, VIRGINIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	.19	1.93	-.56
STANDARD DEVIATION	.98	.76	.57
VALUE OF t TEST	.19	2.54	-.99

In addition to night fatal crashes, night injury crashes were analyzed and graphed below.

FAIRFAX ASAP NIGHT INJURY CRASHES
12-MONTH MOVING AVERAGE



No effect was found for either the fuel crisis or the speed limit. In addition, there was no change between the baseline, operational and post operational periods attributable to ASAP.

ASAP SITE: FAIRFAX COUNTY, VIRGINIA

OUTPUT SERIES: NIGHT INJURY CRASHES

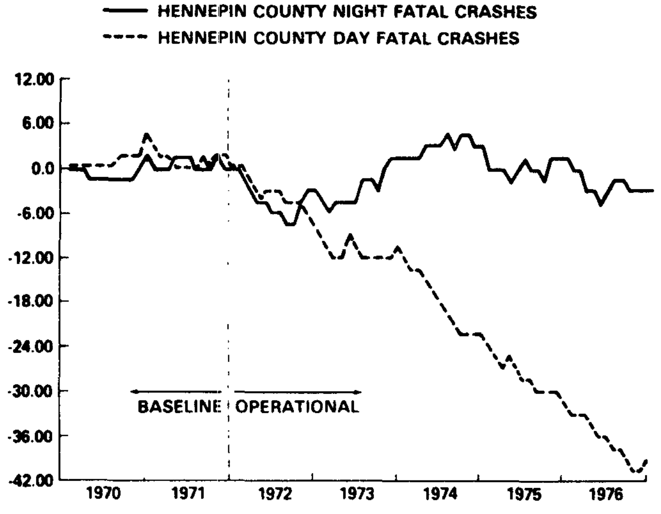
	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−6.01	8.96	−6.63
STANDARD DEVIATION	10.68	7.32	5.97
VALUE OF t TEST	−.56	1.22	−1.11
DELAY TIME	0 MOS.	7 MOS.	5 MOS.

DATE OF 55 MPH NMSL: NOVEMBER 1973

HENNEPIN COUNTY, MINNESOTA ASAP

ASAP operations began in Hennepin County, Minnesota in January 1972. The original design provided for a three year operational period (1972–1974) which was later extended for an additional two years in 1974. The analysis compares night fatal crashes between the baseline (1970–1971) and operational (1972–1976) periods. The first year of baseline data (1969) was never received from the project personnel.

CUMULATIVE SUM



The results of analysis showed no effect for either the fuel crisis or speed limit. No change was found in the mean number of night fatal crashes between the baseline and operational periods.

ASAP SITE: HENNEPIN COUNTY, MINNESOTA

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	1.85	-.28	-.09
STANDARD DEVIATION	1.05	.63	.69
VALUE OF t TEST	1.76	-.44	-.13
DELAY TIME	0 MOS.	2 MOS.	0 MOS.

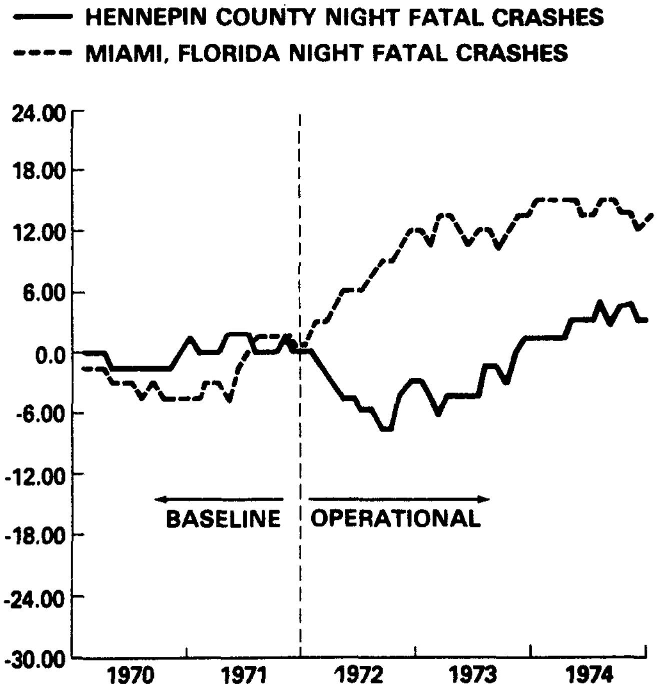
DATE OF 55 MPH NMSL: MARCH 1974

The analysis of day fatal crashes showed no change in the mean level coincident with the presence of ASAP.

COMPARISON SITE: HENNEPIN COUNTY DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-1.60	-.46	-1.05
STANDARD DEVIATION	.94	.57	.64
VALUE OF t TEST	-1.70	-.81	-1.63
DELAY TIME	3 MOS.	0 MOS.	0 MOS.

CUMULATIVE SUM



COMPARISON SITE: MIAMI, FLORIDA

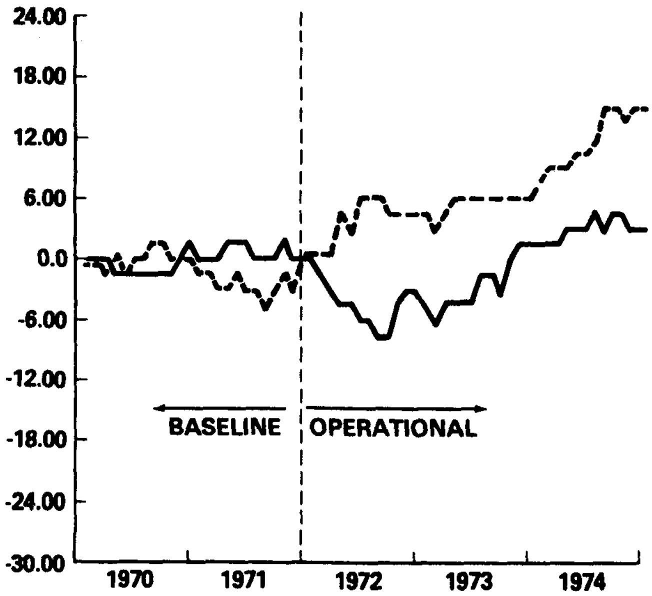
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	.45	-.87	.44
STANDARD DEVIATION	.63	.49	.35
VALUE OF t TEST	.72	-1.78	1.27

Miami, Florida and Omaha, Nebraska were the comparison sites for Hennepin County, Minnesota. No change in night fatal crashes was detected at either site coincident with ASAP presence in Hennepin County, Minnesota.

CUMULATIVE SUM

—— HENNEPIN COUNTY NIGHT FATAL CRASHES

---- OMAHA, NEBRASKA NIGHT FATAL CRASHES

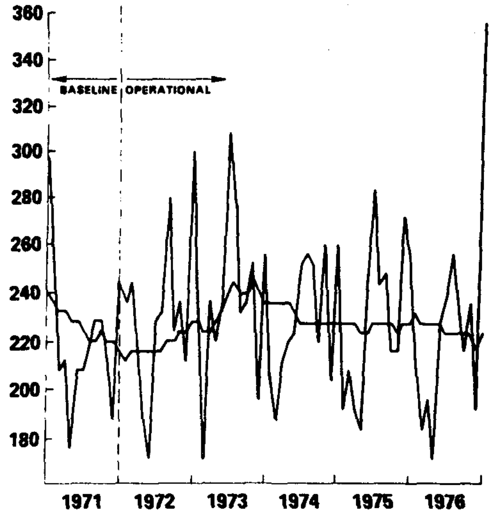


COMPARISON SITE: OMAHA, NEBRASKA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.15	.40	.38
STANDARD DEVIATION	.71	.59	.43
VALUE OF t TEST	-.21	.68	.88

In addition to fatal crash data, monthly injury crash data by time of day was submitted by the site. Monthly night injury crashes is graphed with a 12 month moving average superimposed.

HENNEPIN COUNTY ASAP NIGHT INJURY CRASHES 12-MONTH MOVING AVERAGE



The analysis of night injury crashes revealed no effect for either the fuel crisis or speed limit. In addition, no reduction in the mean level was found during the period of ASAP activity.

ASAP SITE: HENNEPIN COUNTY, MINNESOTA

OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-22.77	-12.26	14.23
STANDARD DEVIATION	14.13	10.34	16.01
VALUE OF t TEST	-1.61	-1.19	.89
DELAY TIME	0 MOS.	0 MOS.	0 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

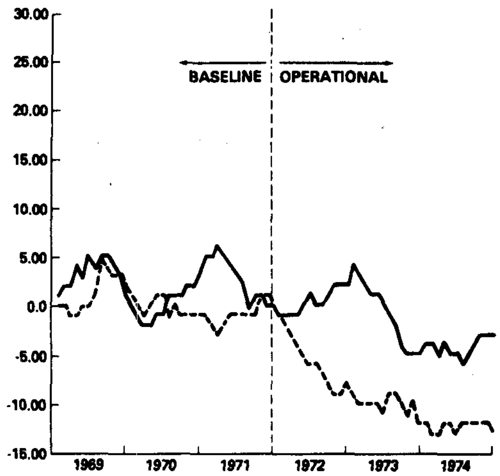
INDIANAPOLIS, INDIANA ASAP

The Indianapolis ASAP began operations in January 1972. The analysis considers a three year baseline period (1969–1971) and a three year operational period (1972–1974). Monthly crash data was not collected by the project. Estimates for monthly night fatal crashes were derived from the quarterly data according to the distribution of monthly fatality data which was available.

CUMULATIVE SUM

— INDIANAPOLIS NIGHT FATAL CRASHES

---- BIRMINGHAM, ALABAMA NIGHT FATAL CRASHES



The analysis showed no effect for both the fuel crisis and speed limit. No change in night fatal crashes was found during the period of ASAP operations.

ASAP SITE: INDIANAPOLIS, INDIANA

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-.77	.41	-.15
STANDARD DEVIATION	.62	.56	.34
VALUE OF t TEST	-1.24	.73	-.44
DELAY TIME	4 MOS.	2 MOS.	6 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

The results of the analysis of quarterly day fatal crash data showed a statistically significant reduction of two fatal crashes per quarter coincident with the ASAP operational period.

COMPARISON SITE: INDIANAPOLIS DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	.14	.14	-2.06
STANDARD DEVIATION	2.13	1.84	1.27
VALUE OF t TEST	.07	.08	-1.63

COMPARISON SITE: BIRMINGHAM, ALABAMA

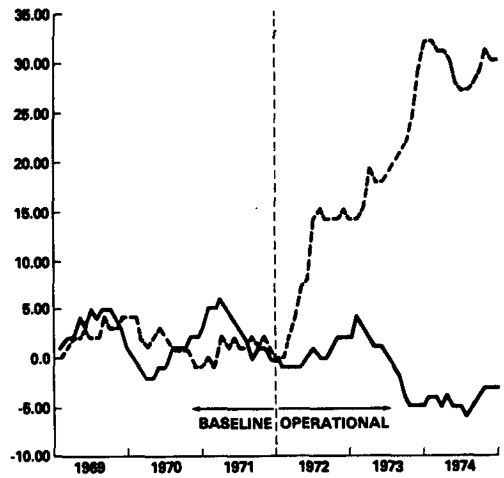
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.33	.81	-.60
STANDARD DEVIATION	.66	.55	.38
VALUE OF t TEST	-.50	1.47	-1.58

Birmingham, Alabama and Louisville, Kentucky were the comparison sites for Indianapolis, Indiana. Neither site experienced a change in night fatal crashes coincident with ASAP presence in Indianapolis.

CUMULATIVE SUM

— INDIANAPOLIS NIGHT FATAL CRASHES

---- LOUISVILLE, KENTUCKY NIGHT FATAL CRASHES



COMPARISON SITE: LOUISVILLE, KENTUCKY

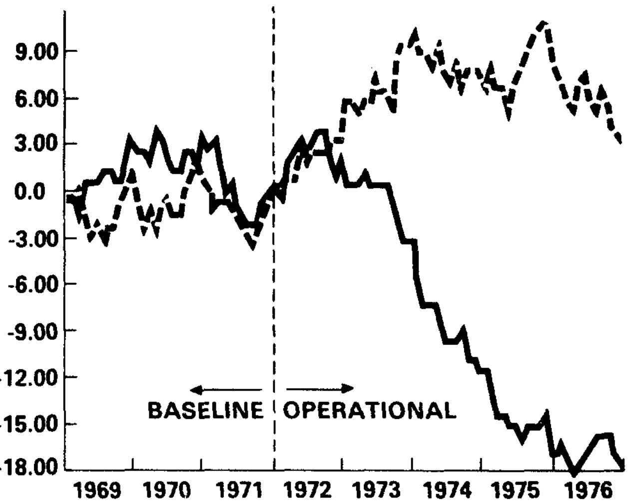
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	1.31	-2.39	1.87
STANDARD DEVIATION	1.02	.83	.62
VALUE OF t TEST	1.28	-2.88	3.02

KANSAS CITY, MISSOURI ASAP

January 1972 was the beginning of three years of ASAP operations in Kansas City. As the termination date approached (December 1974) the project was awarded a two year operational extension during which time ASAP activities would continue to function at the same level. The analysis considers a comparison between baseline (1969–1971) and operational (1972–1976) night fatal crashes, while also measuring the impact of the fuel crisis and 55 mph NMSL.

CUMULATIVE SUM

(—) KANSAS CITY NIGHT FATAL CRASHES
(– –) KANSAS CITY DAY FATAL CRASHES



The results of analysis of night fatal crashes show a statistically significant reduction of 1.78 fatal crashes per month for the period January–June 1974 due to the fuel crisis (note the three month delay). The speed limit had no effect on night fatal crashes. In addition, a statistically significant reduction of .74 fatal crashes per month for the period October 1972–December 1976 is attributed to the ASAP presence. This amounts to a total reduction of 37.74 fatal crashes during the operational period.

ASAP SITE: KANSAS CITY, MISSOURI

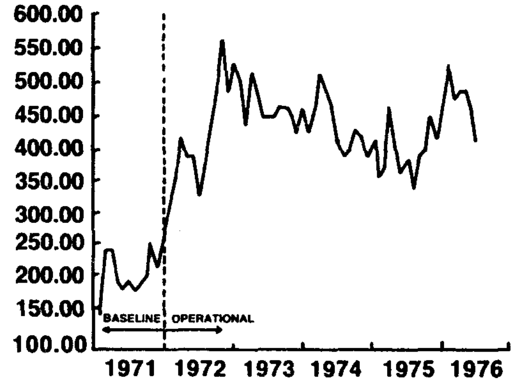
OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-1.78	.18	- .74
STANDARD DEVIATION	.80	.34	.34
VALUE OF t TEST	-2.23	.53	-2.18
DELAY TIME	3 MOS.	7 MOS.	9 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

The nine month delay for the ASAP effect is not unreasonable. Inspection of the graph of monthly total alcohol related arrests (January 1971–June 1976) shows that although arrests were increasing at the start of 1972, it was at least eight months until arrests reached a sufficiently high operating level.

KANSAS CITY, MISSOURI ASAP ALCOHOL RELATED ARRESTS

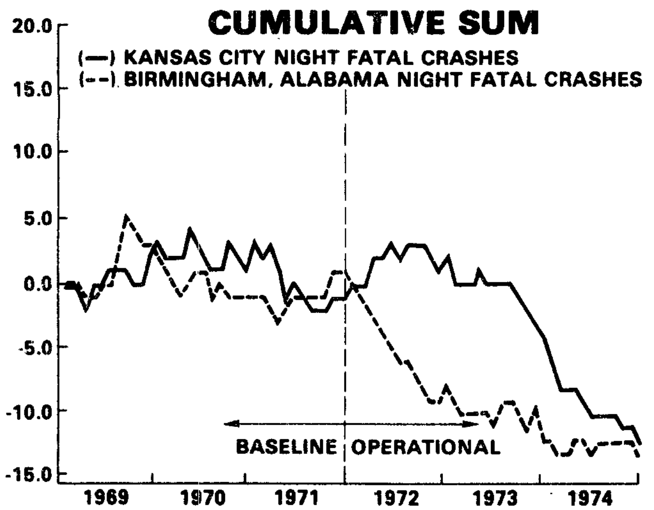


Due to the close relationship of the countermeasures in this system approach, it is reasonable to conclude that all countermeasure modalities experienced similar delays. Discussions with project personnel confirmed this point.

COMPARISON SITE: KANSAS CITY DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-1.43	-1.12	.52
STANDARD DEVIATION	.88	.57	.54
VALUE OF t TEST	-1.65	-1.97	.96
DELAY TIME	3 MOS.	6 MOS.	9 MOS.

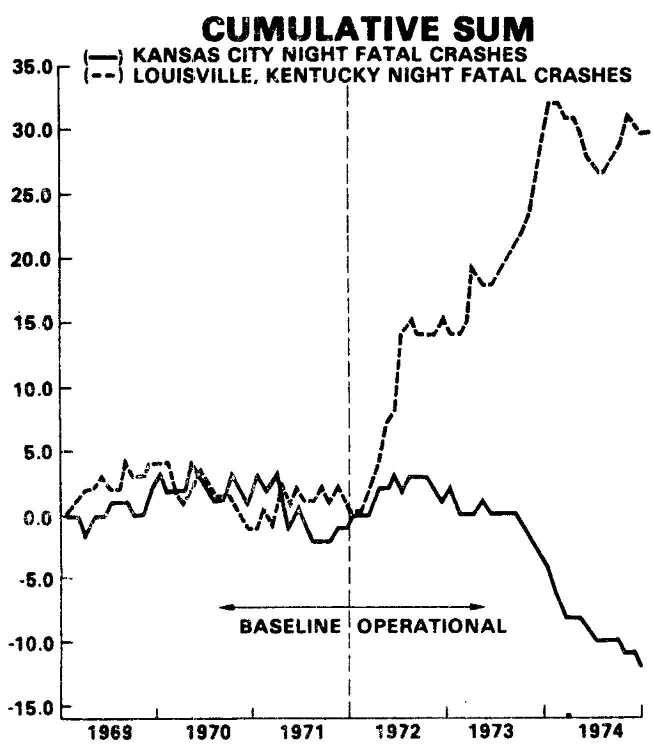
Analysis of day fatal crashes showed no change in the mean number coincident with ASAP presence.



COMPARISON SITE: BIRMINGHAM, ALABAMA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	- .33	.81	- .60
STANDARD DEVIATION	.66	.55	.38
VALUE OF t TEST	- .50	1.48	-1.59

Birmingham, Alabama and Louisville, Kentucky were the comparison sites for Kansas City, Missouri. No change was noted in Birmingham during the ASAP operational period. However, Louisville experienced an increase of 1.87 night fatal crashes per month during the period of ASAP presence in Kansas City (1971–1974).

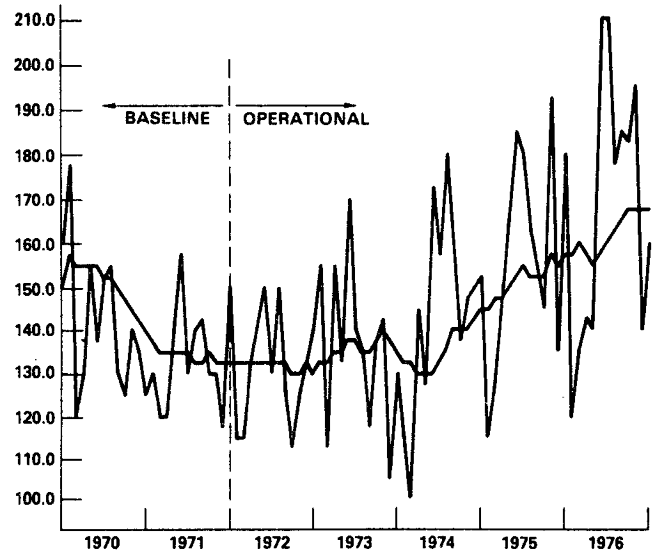


COMPARISON SITE: LOUISVILLE, KENTUCKY

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	1.31	-2.39	1.87
STANDARD DEVIATION	1.02	.83	.62
VALUE OF t TEST	1.28	-2.88	3.02

Below is a graph of monthly Kansas City night injury crashes with a 12 month moving average.

KANSAS CITY ASAP NIGHT INJURY CRASHES
12-MONTH MOVING AVERAGE



The analysis of monthly night injury crashes showed a statistically significant reduction of 20.71 crashes per month attributed to the fuel crisis (October 1973–March 1974). No effect was noted for the reduced speed limit. In addition, no effect was found attributable to the presence of ASAP in Kansas City.

ASAP SITE: KANSAS CITY, MISSOURI

OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-20.71	4.21	15.65
STANDARD DEVIATION	6.46	4.18	4.27
VALUE OF t TEST	-3.21	1.01	3.66
DELAY TIME	0 MOS.	4 MOS.	12 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

LINCOLN, NEBRASKA ASAP

The Lincoln, Nebraska ASAP began operations in January 1972. The project was funded to run for three years ending December 1974. No baseline data for the years 1969–1970 was ever received from the site, leaving only 1971 data as the preintervention baseline period. In addition, monthly data was not received from the site. This hindered the analysis of ASAP impact since the total night fatal crash series had only four years of quarterly data. For the purpose of this report, a multiple regression analysis was used since the small amount of data negated any reasonable attempt to use time series analysis. The resulting analysis showed no effect from either the fuel crisis or speed limit. There was no change between baseline and operational periods. However, the lack of data makes any attempt to draw definitive conclusions futile.

ASAP SITE: LINCOLN, NEBRASKA

OUTPUT SERIES:NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	.14	.81	-.64
STANDARD DEVIATION	.75	.65	.59
VALUE OF t TEST	.19	1.25	-1.08
DELAY TIME	0 MOS.	0 MOS.	0 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

COMPARISON SITE: LINCOLN DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-1.57	.43	.07
STANDARD DEVIATION	1.15	.99	.90
VALUE OF t TEST	-1.37	.43	.08

COMPARISON SITE: MIAMI, FLORIDA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	.45	-.87	.44
STANDARD DEVIATION	.63	.49	.35
VALUE OF t TEST	.72	-1.78	1.27

COMPARISON SITE: OMAHA, NEBRASKA

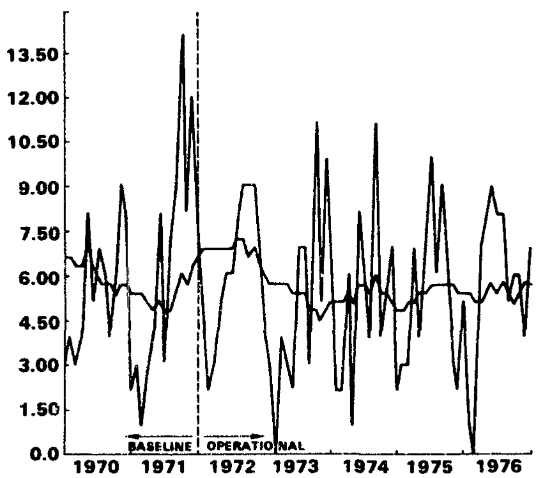
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.15	.40	.38
STANDARD DEVIATION	.71	.59	.43
VALUE OF t TEST	-.21	.68	.88

NEW HAMPSHIRE ASAP

The New Hampshire ASAP began operations in January 1972. This statewide project was originally funded for a three year operational period (1972–1974). In 1974, a two year extension was awarded to continue ASAP operations through December 1976. The analysis considers a comparison of night fatal crashes between the baseline (1969–1971) and operational (1972–1976) periods, taking into account the possible effects of the fuel crisis and 55 mph National Maximum Speed Limit.

The analysis of monthly night fatal crashes showed the series to have a distinct 12 month (annual) cycle which was "removed" using well defined time series analysis procedures. This periodicity is smoothed for graphic purposes using a 12 month moving average.

NEW HAMPSHIRE ASAP NIGHT FATAL CRASHES 12 MONTH MOVING AVERAGE



The resulting analysis showed that neither the fuel crisis nor the speed limit had affected night fatal crashes. However, a statistically significant reduction of 1.65 fatal crashes per month was attributed to the presence of the ASAP program. This equates to a savings of approximately 94 fatal crashes during the project life.

$$1.65 \frac{\text{fatal crashes}}{\text{mos.}} \times 57 \text{ mos.} = 94 \text{ fatal crashes}$$

57 months = 5 years − 3 months delay time

ASAP SITE: NEW HAMPSHIRE

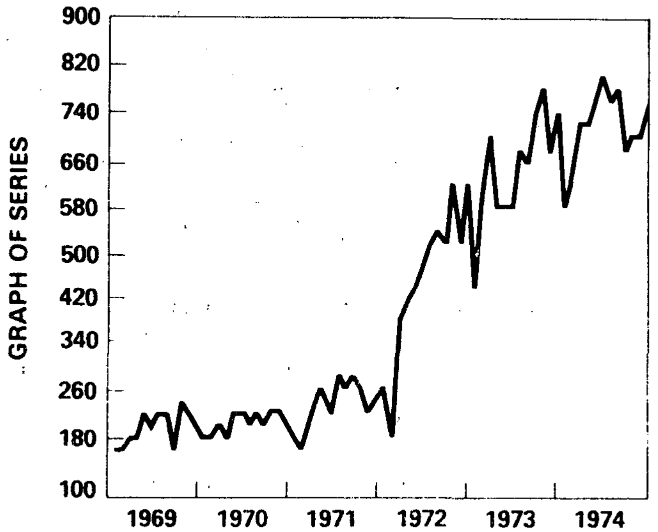
OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF=0	1.15	-1.65
STANDARD DEVIATION		.91	.96
VALUE OF t TEST		1.26	-1.72
DELAY TIME		3 MOS.	3 MOS.

DATE OF 55 MPH NMSL: DECEMBER 1973

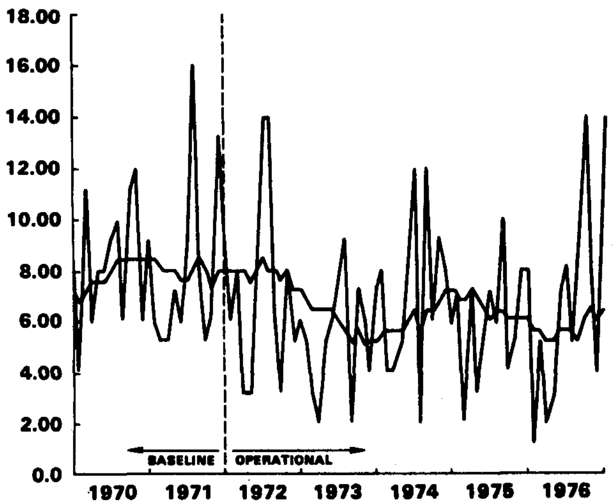
Inspection of the graph of New Hampshire ASAP alcohol related arrests presented below gives additional credibility to the three month delay time. Although operations began January 1972, arrests did not reach a sufficiently high level until April.

NEW HAMPSHIRE ARRESTS



The day fatal crash series exhibited no seasonal pattern. However, a statistically significant decrease of 1.72 in the mean number of fatal crashes was experienced coincident with the ASAP demonstration period.

**NEW HAMPSHIRE ASAP DAY FATAL CRASHES
12 MONTH MOVING AVERAGE**



COMPARISON SITE: NEW HAMPSHIRE DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	1.03	.61	-1.72
STANDARD DEVIATION	1.32	.92	1.01
VALUE OF t TEST	-.78	.66	-1.70
DELAY TIME	4 MOS.	6 MOS.	3 MOS.

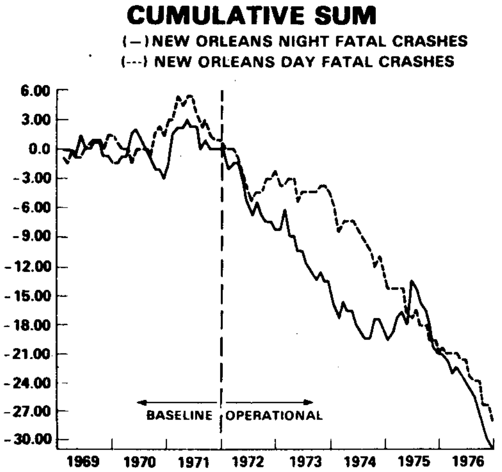
The State of West Virginia was the comparison site for the New Hampshire ASAP. No change in the mean number of night fatal crashes was detected coincident with ASAP operations in New Hampshire.

COMPARISON SITE: WEST VIRGINIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-9.46	11.39	-1.19
STANDARD DEVIATION	3.35	2.79	1.92
VALUE OF t TEST	-2.82	4.08	-.62
DELAY TIME	3 MOS.	2 MOS.	0 MOS.

NEW ORLEANS, LOUISIANA ASAP

The New Orleans, Louisiana ASAP began operations in January 1972. The project was funded for a three year operational period (1972–1974). In 1974, an operational extension was awarded to New Orleans to continue the ASAP program through December 1976. Night fatal crashes in the baseline (1969–1971) and operational (1972–1976) periods are compared to determine ASAP effectiveness.



The analysis of monthly night fatal crashes showed a statistically significant reduction of 1.12 fatal crashes per month attributed to ASAP presence in New Orleans (a reduction of 67.2 fatal crashes for the entire five year operational period). No effect was found for either the fuel crisis or speed limit.

ASAP SITE: NEW ORLEANS, LOUISIANA

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-.51	.62	-1.12
STANDARD DEVIATION	.90	.55	.54
VALUE OF t TEST	-.57	1.13	-2.07
DELAY TIME	5 MOS.	0 MOS.	0 MOS.

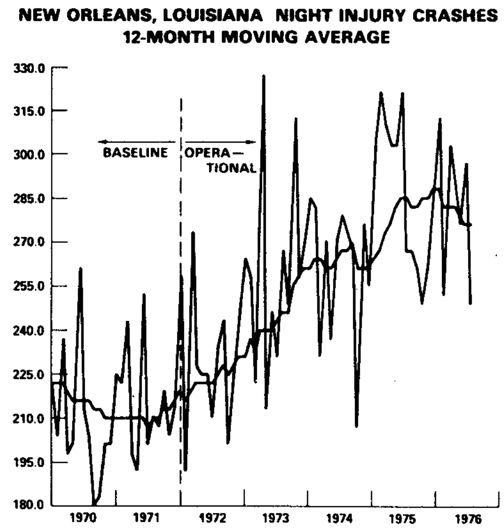
DATE OF 55 MPH NMSL: FEBRUARY 1974

The results of the analysis of day fatal crashes showed no change between the baseline and operational periods. Newark, New Jersey was the comparison site for New Orleans, Louisiana. Although this site was selected for use, complete data was not furnished. No analysis of Newark night fatal crashes was possible.

COMPARISON SITE: NEW ORLEANS DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	CCF=0	-.56	-.63
STANDARD DEVIATION		.46	.46
VALUE OF t TEST		-1.22	-1.37
DELAY TIME		0 MOS.	0 MOS.

Monthly night injury crashes in New Orleans are graphed below with a 12 month moving average.



The analysis found no effect for either the fuel crisis or the 55 mph speed limit. In addition, there was no reduction in night injury crashes during the period of ASAP presence.

ASAP SITE: NEW ORLEANS

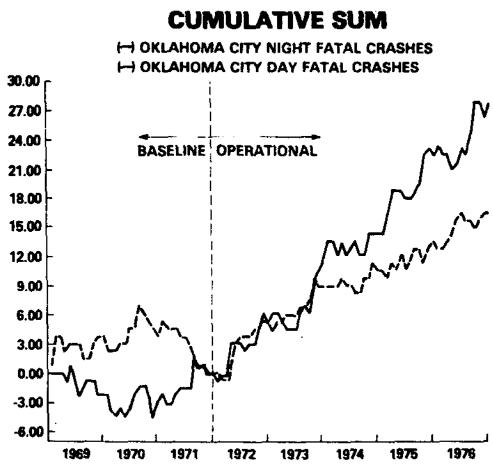
OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−7.39	27.84	32.94
STANDARD DEVIATION	13.89	9.40	8.83
VALUE OF t TEST	−0.53	2.96	3.73
DELAY TIME	5 MOS.	0 MOS.	0 MOS.

DATE OF 55 MPH NMSL: FEBRUARY 1974

OKLAHOMA CITY, OKLAHOMA ASAP

The ASAP project began operating in Oklahoma City in January 1972. This was the first year of a three year operational phase which was to end December 1974. As the termination date approached, a two year operational extension was awarded to the site, during which time all facets of ASAP would continue to function at the same high level of activity. The analysis compares night fatal crashes in the baseline (1969–1971) and operational (1972–1976) periods to determine the level of ASAP impact.



The results of the analysis showed that no change was experienced during the period of ASAP operations in Oklahoma City. There was no effect on night fatal crashes due to either the fuel crisis or speed limit.

***ASAP SITE:* OKLAHOMA CITY, OKLAHOMA**

OUTPUT SERIES: NIGHT FATAL CRASHES

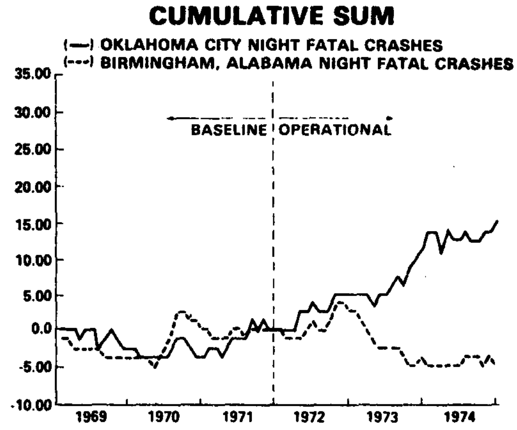
	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF=0	.09	.70
STANDARD DEVIATION		.46	.45
VALUE OF t TEST		.20	1.56
DELAY TIME		1 MOS.	0 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

The analysis of day fatal crashes also showed no change in the mean level of crashes coincident with the ASAP operational period.

***COMPARISON SITE:* OKLAHOMA CITY DAY FATAL CRASHES**

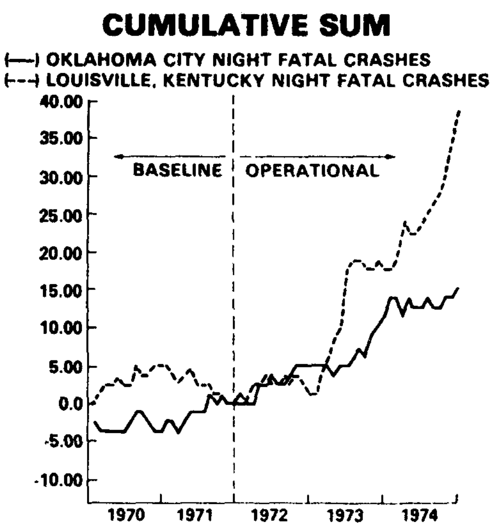
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.22	-.30	.69
STANDARD DEVIATION	.75	.45	.46
VALUE OF t TEST	.30	-.67	1.50
DELAY TIME	0 MOS.	0 MOS.	0 MOS.



***COMPARISON SITE:* BIRMINGHAM, ALABAMA**

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.33	.81	-.60
STANDARD DEVIATION	.66	.55	.38
VALUE OF t TEST	-.50	1.48	-1.58

Both Birmingham, Alabama and Louisville, Kentucky were the comparison sites for Oklahoma City, Oklahoma. Neither site experienced a change in night fatal crashes during the period of ASAP operations in Oklahoma.

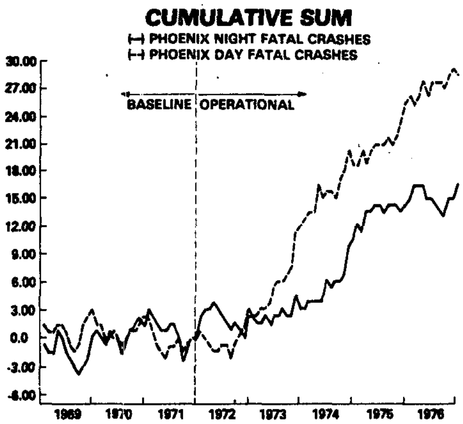


***COMPARISON SITE:* LOUISVILLE, KENTUCKY**

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	1.31	-2.39	1.87
STANDARD DEVIATION	1.02	.83	.62
VALUE OF t TEST	1.28	-2.88	3.02

PHOENIX, ARIZONA ASAP

The Phoenix, Arizona ASAP began operations in January 1972. The original design provided for a three year demonstration phase. In 1974, an operational extension was awarded to the site to continue ASAP activity through December 1976. The analysis of night fatal crashes covers a three year baseline period (1969–1971) and a five year operational period (1972–1976).



The results of analysis showed that neither the fuel crisis nor the speed limit had any effect on night fatal crashes. No change in night fatal crashes occurred during the period of ASAP operations in Phoenix.

ASAP SITE: PHOENIX, ARIZONA

OUTPUT SERIES: NIGHT FATAL CRASHES

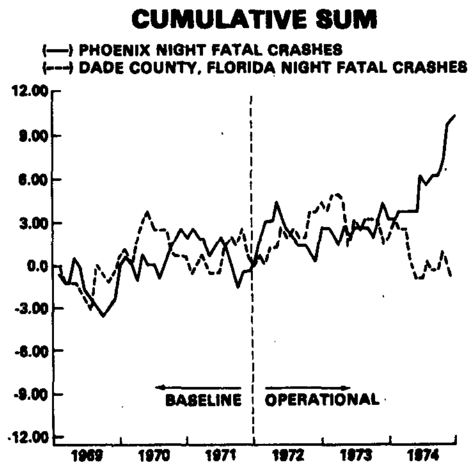
	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-.68	.18	.46
STANDARD DEVIATION	.98	.58	.58
VALUE OF t TEST	-.70	.31	.80
DELAY TIME	2 MOS.	6 MOS.	0 MOS.

DATE OF 55 MPH NMSL: JANUARY 1974

The analysis of day fatal crashes showed no change in the mean number of crashes during ASAP operations in Phoenix.

COMPARISON SITE: PHOENIX DAY FATAL CRASHES

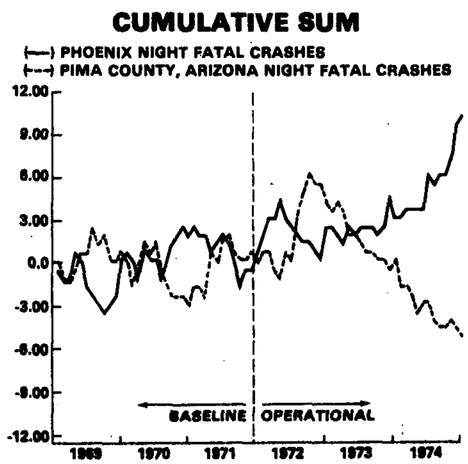
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	2.20	.09	.75
STANDARD DEVIATION	.90	.54	.53
VALUE OF t TEST	2.45	.17	1.42
DELAY TIME	1 MOS.	4 MOS.	0 MOS.



COMPARISON SITE: DADE COUNTY, FLORIDA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.25	-.68	.27
STANDARD DEVIATION	1.45	1.13	.80
VALUE OF t TEST	-.17	-.60	.34

Dade County, Florida and Pima County, Arizona were the comparison sites for Phoenix. No change was found at either site coincident with the ASAP operational period.



COMPARISON SITE: PIMA COUNTY, ARIZONA

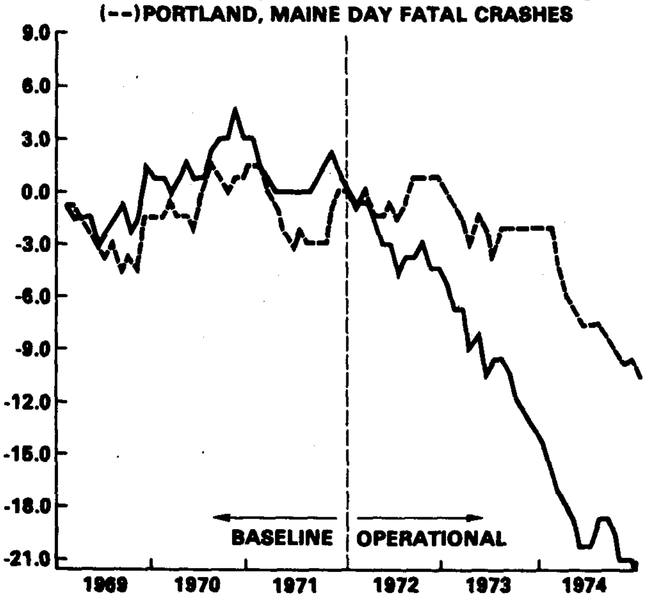
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.46	-.86	.08
STANDARD DEVIATION	.96	.76	.54
VALUE OF t TEST	-.48	-1.14	.15

PORTLAND, MAINE ASAP

The ASAP in Portland, Maine began operations in January 1972. The project ran three years, with ASAP activity terminating in December 1974. The analysis considers a six year time frame divided into baseline (1969–1971) and operational (1972–1974) periods.

CUMULATIVE SUM

(—) PORTLAND, MAINE NIGHT FATAL CRASHES
(--) PORTLAND, MAINE DAY FATAL CRASHES



The analysis of monthly night fatal crashes showed a statistically significant reduction of .76 night fatal crashes per month for the period June 1972–December 1974 attributed to the presence of the ASAP in Portland. This amounts to a reduction of 23.56 fatal crashes for the life of the project. There was no effect on night fatal crashes due to either the fuel crisis or the speed limit.

ASAP SITE: PORTLAND, MAINE

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-.99	CCF=0	-.76
STANDARD DEVIATION	.65		.32
VALUE OF t TEST	-1.53		-2.38
DELAY TIME	2 MOS.		5 MOS.

DATE OF 55 MPH NMSL: JANUARY 1974

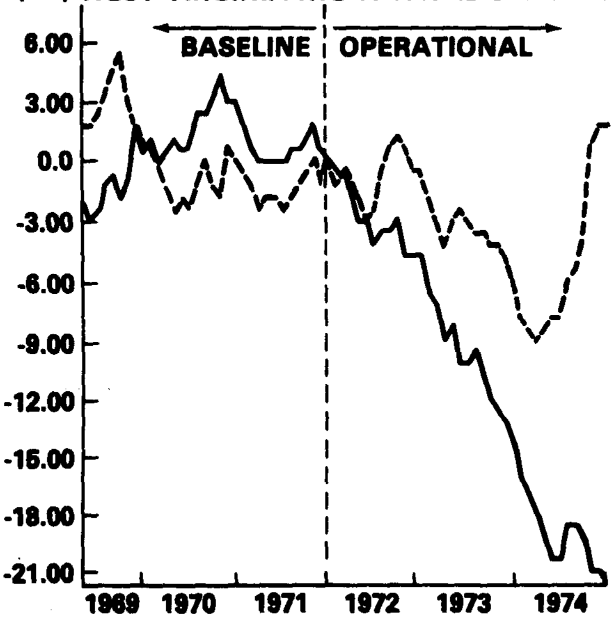
The results of the analysis of day fatal crashes showed no change coincident with the period of ASAP operations in Portland.

COMPARISON SITE: PORTLAND DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.34	-1.18	-.21
STANDARD DEVIATION	.76	.62	.49
VALUE OF t TEST	-.45	-1.91	-.43
DELAY TIME	0 MOS.	0 MOS.	5 MOS.

CUMULATIVE SUM

(—) PORTLAND, MAINE NIGHT FATAL CRASHES
(---) WEST VIRGINIA NIGHT FATAL CRASHES



West Virginia was the comparison site for Portland, Maine. There was no change in night fatal crashes during the period of ASAP presence in Portland, Maine.

COMPARISON SITE: WEST VIRGINIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	−9.45	11.39	−1.19
STANDARD DEVIATION	3.35	2.79	1.92
VALUE OF t TEST	−2.82	4.08	−.62

PULASKI COUNTY, ARKANSAS ASAP

The Pulaski County, Arkansas ASAP began operations in January 1972. The project was operational for three years ending in December 1974. Monthly fatal crash data was not submitted by the site. Estimates were derived by distributing quarterly fatal crashes according to the distribution of monthly fatality data which was available. The analysis compares night fatal crashes in the baseline (1969–1971) and operational (1972–1974) periods.

CUMULATIVE SUM

(—) PULASKI COUNTY NIGHT FATAL CRASHES
(---) SAN DIEGO, CALIFORNIA NIGHT FATAL CRASHES

The results of analysis showed that there was no change in night fatal crashes during the period of ASAP operations. Neither the fuel crisis nor the speed limit had an effect on night fatal crashes.

ASAP SITE: PULASKI COUNTY, ARKANSAS

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	.99	.01	.26
STANDARD DEVIATION	.62	.56	.39
VALUE OF t TEST	1.60	.02	.67
DELAY TIME	3 MOS.	3 MOS.	1 MOS.

DATE OF 55 MPH NMSL: JANUARY 1974

COMPARISON SITE: PULASKI COUNTY DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	CCF = 0	CCF = 0	.33
STANDARD DEVIATION			1.17
VALUE OF t TEST			.28

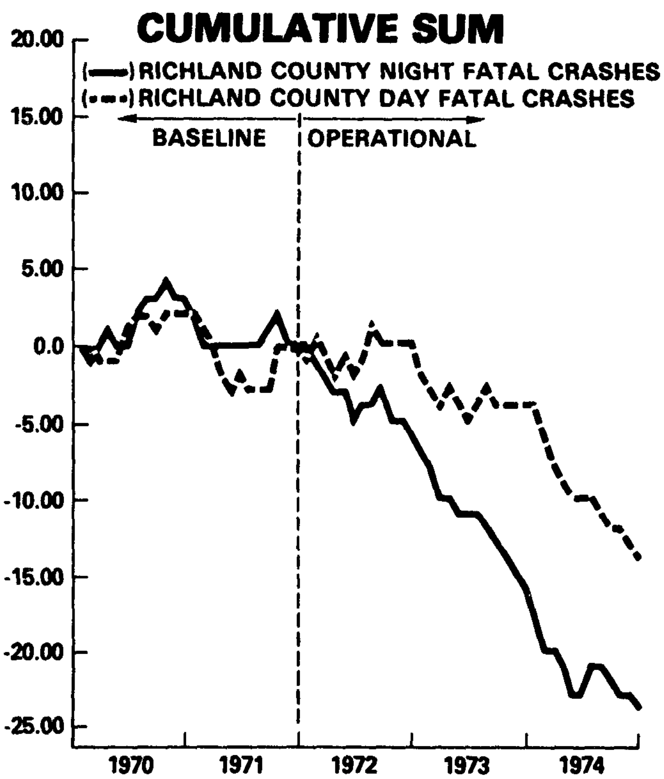
The analysis of quarterly day fatal crashes showed no change during the period of ASAP activity. San Diego, California was the comparison site for Pulaski County, Arkansas. No change in the mean number of night fatal crashes was found coincident with the period of ASAP operations in Pulaski County.

COMPARISON SITE: SAN DIEGO, CALIFORNIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.59	.45	.49
STANDARD DEVIATION	.64	.51	.42
VALUE OF t TEST	-.92	.88	1.17

RICHLAND COUNTY, SOUTH CAROLINA ASAP

January 1972 was the start of the ASAP program in Richland County, South Carolina. The design provided for a three year operational period ending in December 1974. Baseline crash data for the year 1969 was not submitted by the site due to its unavailability. The analysis considers a five year time frame composed of a two year baseline period (1970–1971) and a three year operational period (1972–1974).



The results of the analysis showed no effect due to either the fuel crisis or the 55 mph speed limit. However, a statistically significant reduction of.69 fatal crashes per month was attributed to the presence of the ASAP program. This amounts to a total reduction of 24.84 fatal crashes for the life of the project (1972–1974).

ASAP SITE: RICHLAND COUNTY, SOUTH CAROLINA

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF = 0	CCF = 0	-.69
STANDARD DEVIATION			.32
VALUE OF t TEST			-2.15
DELAY TIME			0 MOS.

DATE OF 55 MPH NMSL: FEBRUARY 1974

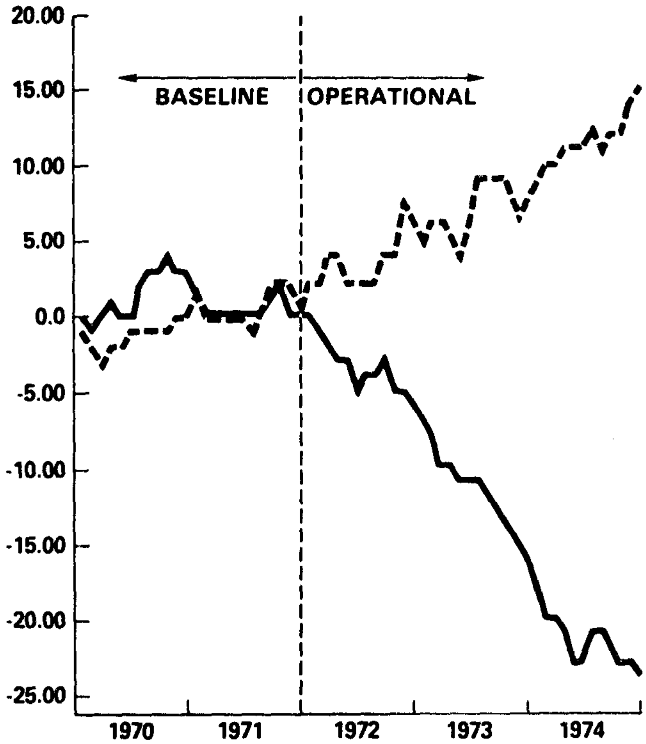
COMPARISON SITE: RICHLAND COUNTY DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	−1.26	−.75	−.16
STANDARD DEVIATION	.57	.57	.38
VALUE OF t TEST	−2.21	−1.31	−.42
DELAY TIME	3 MOS.	6 MOS.	0 MOS.

The analysis of day fatal crashes showed no change during the period of ASAP activity.

CUMULATIVE SUM

(—) RICHLAND COUNTY NIGHT FATAL CRASHES
(•–•) SAN DIEGO, CALIFORNIA NIGHT FATAL CRASHES



San Diego, California was the comparison site for Richland County, South Carolina. No change was found coincident with the period of ASAP operations in Richland County.

COMPARISON SITE: SAN DIEGO, CALIFORNIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.59	.45	.49
STANDARD DEVIATION	.64	.51	.42
VALUE OF t TEST	-.92	.88	1.17

The analysis of night injury crashes found a statistically significant reduction of 4.41 crashes per month attributed to the fuel crisis (October 1973–March 1974). No effect was found due to the reduced speed limit. In addition, a statistically significant reduction of 4.39 crashes per month was found during the ASAP operational period. A glance at the parameter table will reveal that this reduction occurred 18 months after ASAP began operations. This places the initial reduction approximately June 1973. It is possible that this reduction was the result of the fuel crisis which could have begun as early as the summer of 1973 in some locations. The interpretation of this result is left to the reader.

ASAP SITE: RICHLAND COUNTY

OUTPUT SERIES: NIGHT INJURY CRASHES

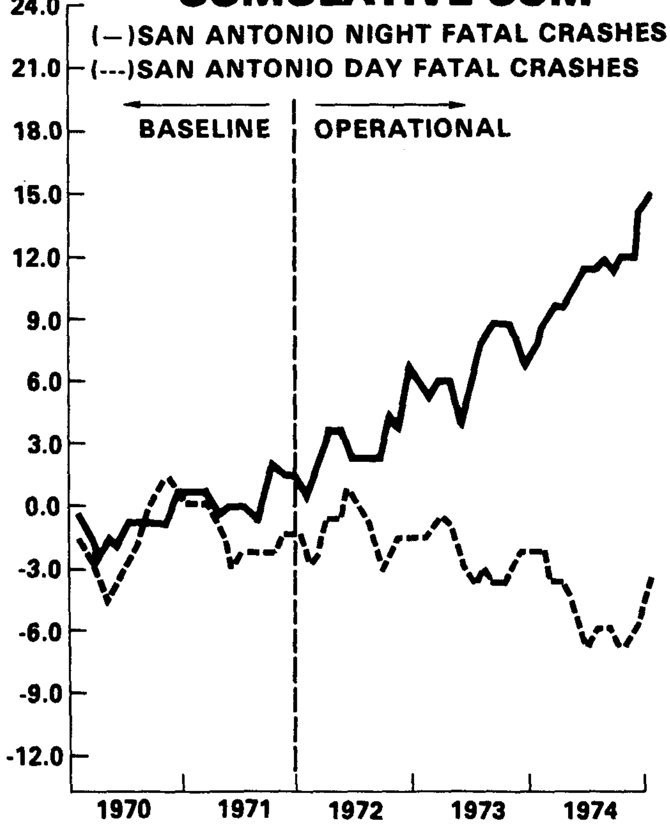
	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−4.41	8.16	−4.39
STANDARD DEVIATION	2.32	1.68	1.96
VALUE OF t TEST	−1.90	4.86	−2.24
DELAY TIME	0 MOS.	0 MOS.	18 MOS.

DATE OF 55 MPH NMSL: FEBRUARY 1974

SAN ANTONIO, TEXAS ASAP

ASAP operations began in San Antonio, Texas in January 1972. The project was originally funded for a three year operational period. In 1974, a two year operational extension was awarded to San Antonio to maintain ASAP activity until December 1976. Baseline crash data for the year 1969 was not submitted by the site due to its unavailability. The analysis considers a seven year time frame divided into baseline (1970–1971) and operational (1972–1976) periods.

CUMULATIVE SUM



The resulting analysis showed no change in night fatal crashes during the ASAP demonstration period. No effect was noted for either the fuel crisis or speed limit.

ASAP SITE: SAN ANTONIO, TEXAS

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	.65	.71	.56
STANDARD DEVIATION	1.08	.65	.73
VALUE OF t TEST	.60	1.09	.76
DELAY TIME	0 MOS.	2 MOS.	0 MOS.

DATE OF 55 MPH NMSL: JANUARY 1974

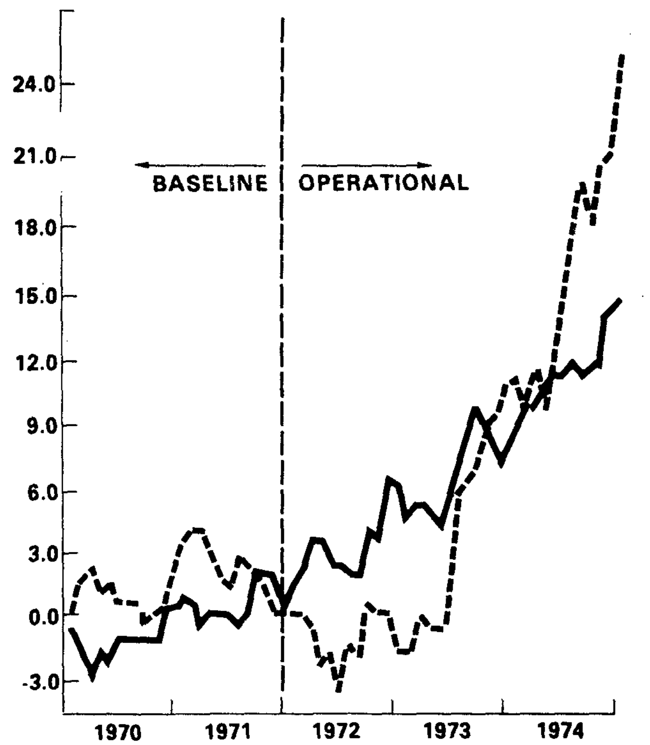
COMPARISON SITE: SAN ANTONIO DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	−.37	−.18	.74
STANDARD DEVIATION	.83	.51	.56
VALUE OF t TEST	−.44	−.35	1.32
DELAY TIME	4 MOS.	0 MOS.	0 MOS.

The analysis of day fatal crashes also noted no change during the period of ASAP operations. San Diego, California was the comparison site for San Antonio, Texas. No change in the mean level of crashes was found coincident with ASAP operations in San Antonio.

CUMULATIVE SUM

(—) SAN ANTONIO NIGHT FATAL CRASHES
(---) SAN DIEGO, CALIFORNIA NIGHT FATAL CRASHES

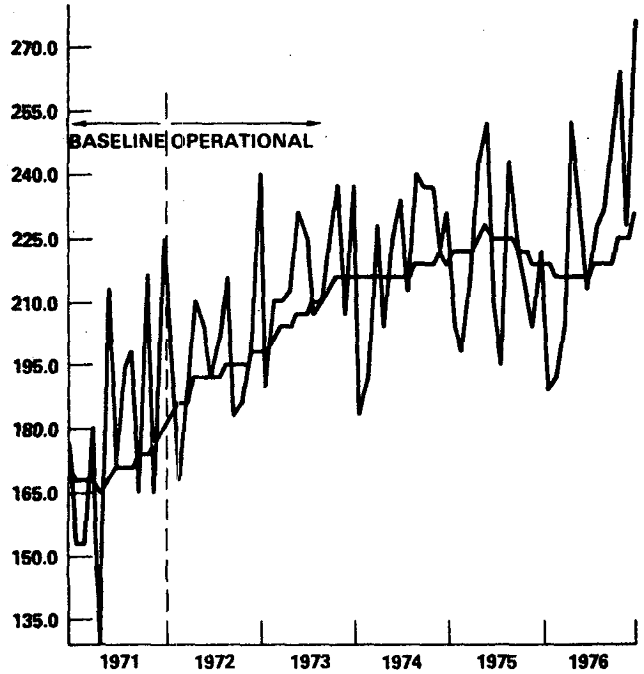


COMPARISON SITE: SAN DIEGO, CALIFORNIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.59	.45	.49
STANDARD DEVIATION	.64	.50	.42
VALUE OF t TEST	-.92	.88	1.17

San Antonio night injury crashes are graphed below with a 12 month moving average.

SAN ANTONIO, TEXAS NIGHT INJURY CRASHES
12-MONTH MOVING AVERAGE



The analysis found no effect for either the fuel crisis or the speed limit. In addition, no reduction was found during the period of ASAP activity.

ASAP SITE: SAN ANTONIO, TEXAS

OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−3.79	15.65	23.27
STANDARD DEVIATION	10.36	8.70	11.19
VALUE OF t TEST	−.36	1.80	2.08
DELAY TIME	3 MOS.	5 MOS.	10 MOS.

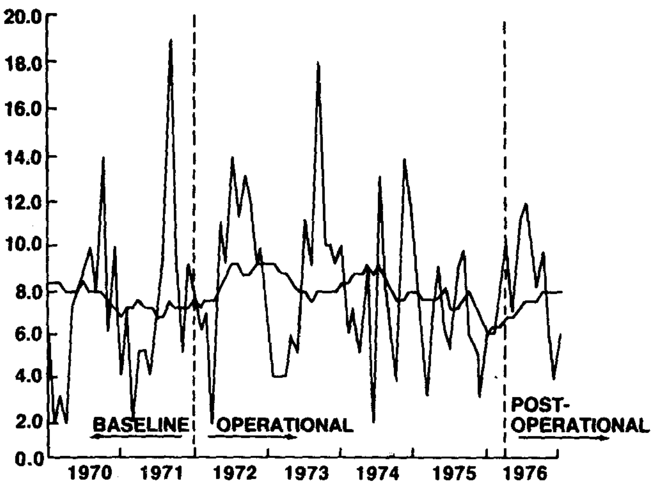
DATE OF 55 MPH NMSL: JANUARY 1974

SOUTH DAKOTA ASAP

The South Dakota ASAP began operations in January 1972. This statewide project was originally funded to run three years. However, in 1974, an operational extension was awarded to South Dakota to continue ASAP activity through December 1976. The ASAP activity actually terminated at the end of March 1976. The analysis covers an eight year time frame divided into baseline (1969–1971) operational (1972–March 1976) and post-operational (April–December 1976) periods.

12 MONTH MOVING AVERAGE

SOUTH DAKOTA NIGHT FATAL CRASHES



The analysis of night fatal crashes showed a strong 12 month (annual) cycle. This periodicity was accounted for in the analysis using well defined time series procedures. The results showed that the fuel crisis had no effect on night fatal crashes. There was a statistically significant decrease of 1.18 fatal crashes per month attributed to the reduced speed limit. This amounts to a savings of 31.86 fatal crashes. In addition, there was a statistically significant reduction of 1.15 fatal crashes per month attributed to the presence of ASAP. This amounts to a savings of 56.35 fatal crashes for the life of the project.

ASAP SITE: SOUTH DAKOTA

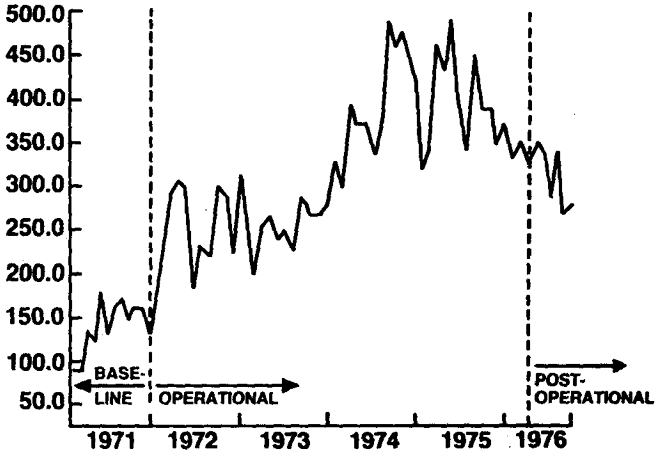
OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	1.93	-1.18	-1.15
STANDARD DEVIATION	1.51	.69	.69
VALUE OF t TEST	1.27	-1.71	-1.66
DELAY TIME	0 MOS.	5 MOS.	2 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

The two month delay seemed to coincide with the delay in increasing alcohol related arrests, graphed below.

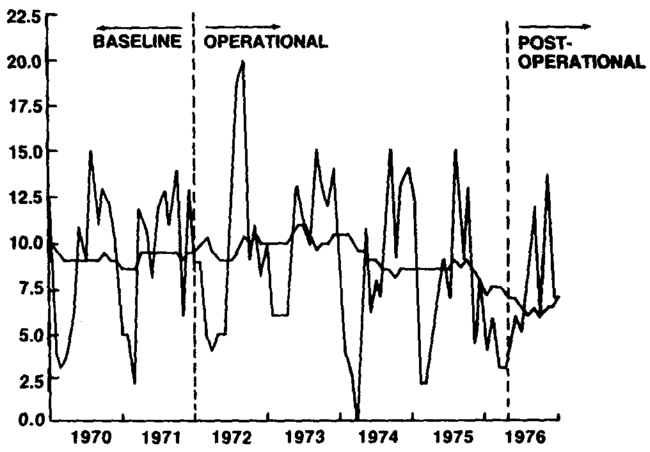
SOUTH DAKOTA ASAP ALCOHOL RELATED ARRESTS



The results of the analysis of day fatal crashes noted no change in during the period of ASAP activity.

12 MONTH MOVING AVERAGE

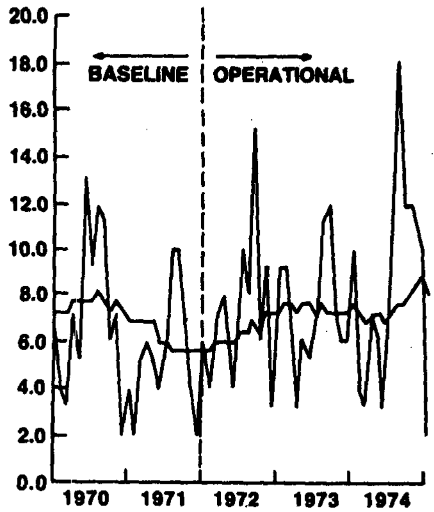
SOUTH DAKOTA DAY FATAL CRASHES



COMPARISON SITE: SOUTH DAKOTA DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	−3.70	−1.85	.37
STANDARD DEVIATION	1.86	1.20	1.18
VALUE OF t TEST	−1.99	−1.54	.31
DELAY TIME	3 MOS.	5 MOS.	2 MOS.

WYOMING NIGHT FATAL CRASHES
12-MONTH MOVING AVERAGE



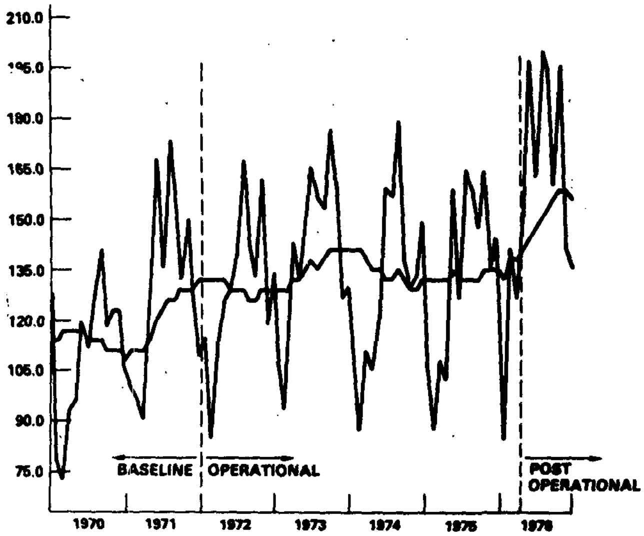
The State of Wyoming was the comparison site for South Dakota. There was no change in night fatal crashes coincident with the period of ASAP operations in South Dakota.

COMPARISON SITE: WYOMING

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-2.82	CCF=0	-.14
STANDARD DEVIATION	1.41		.83
VALUE OF t TEST	-2.00		-.16
DELAY TIME	2 MOS.		0 MOS.

Night injury crashes were analyzed to determine the impact of ASAP in South Dakota. The series is graphed below with a 12 month moving average superimposed.

SOUTH DAKOTA NIGHT INJURY CRASHES
12-MONTH MOVING AVERAGE



The analysis of monthly night injury crashes found a statistically significant reduction of 18.56 crashes per month due to the presence of the fuel crisis. No effect was found for the speed limit. In addition, there was no change in night injury crashes during the period of ASAP activity in South Dakota.

ASAP SITE: SOUTH DAKOTA

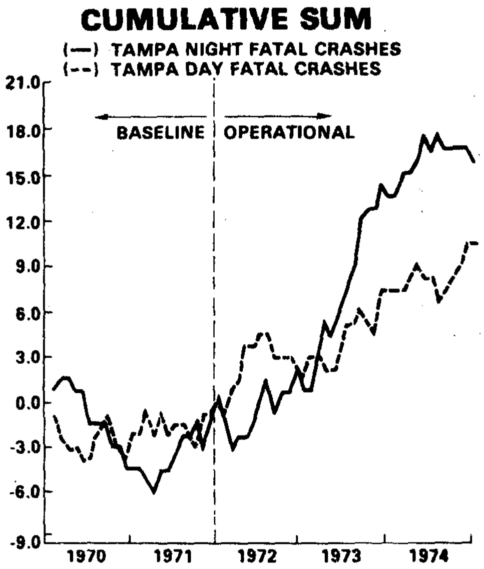
OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−18.56	5.86	−8.05
STANDARD DEVIATION	9.93	6.54	6.01
VALUE OF t TEST	−1.87	.90	−1.34
DELAY TIME	3 MOS.	5 MOS.	9 MOS.

DATE OF 55 MPH NMSL: MARCH, 1974

TAMPA, FLORIDA ASAP

ASAP operations began in Tampa, Florida in January 1972. Originally funded for a three year demonstration period, the project was awarded an operational extension in 1974 to continue ASAP activity until December 1976. The first year of baseline data (1969) was not available and therefore not reported by the project. The analysis compares night fatal crashes in the baseline (1970–1971) and operational (1972–1976) periods.



The results of the analysis of monthly night fatal crashes showed that there was no change in night fatal crashes during the ASAP operational period. There was no effect noted for the fuel crisis. However, there was a statistically significant decrease of 1.39 fatal crashes per month attributed to the reduced speed limit. For the period December 1973–1976, this amounts to a reduction of 51.43 fatal crashes.

ASAP SITE: TAMPA, FLORIDA

OUTPUT SERIES: NIGHT FATAL CRASHES

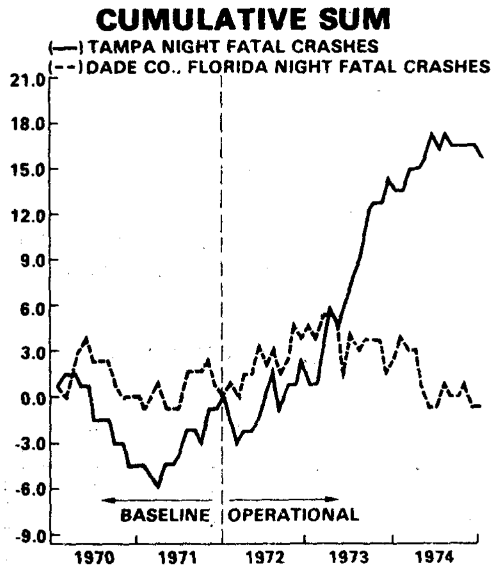
	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF = 0	−1.39	1.46
STANDARD DEVIATION		.66	.77
VALUE OF t TEST		−2.01	1.90
DELAY TIME		0 MOS.	0 MOS.

DATE OF 55 MPH NMSL: DECEMBER 1973

COMPARISON SITE: TAMPA DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	2.19	−1.53	.45
STANDARD DEVIATION	.88	.54	.60
VALUE OF t TEST	2.49	−2.83	.75
DELAY TIME	1 MOS.	0 MOS.	0 MOS.

There was no change in day fatal crashes during the period of ASAP activity.



COMPARISON SITE: DADE COUNTY, FLORIDA

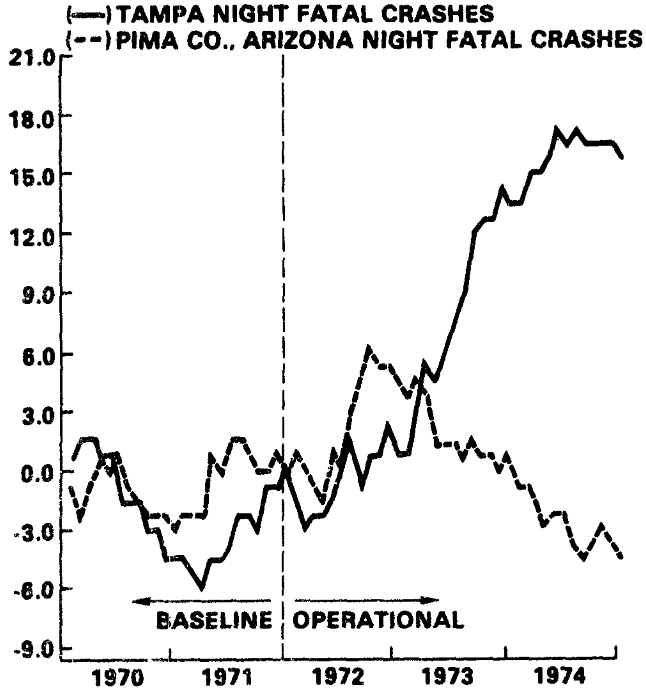
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.25	-.68	.27
STANDARD DEVIATION	1.45	1.13	.80
VALUE OF t TEST	-.17	-.60	.34

Dade County, Florida and Pima County, Arizona were the comparison sites for Tampa. There was no change noted at either site coincident with the period of ASAP operations in Tampa, Florida.

COMPARISON SITE: PIMA COUNTY, ARIZONA

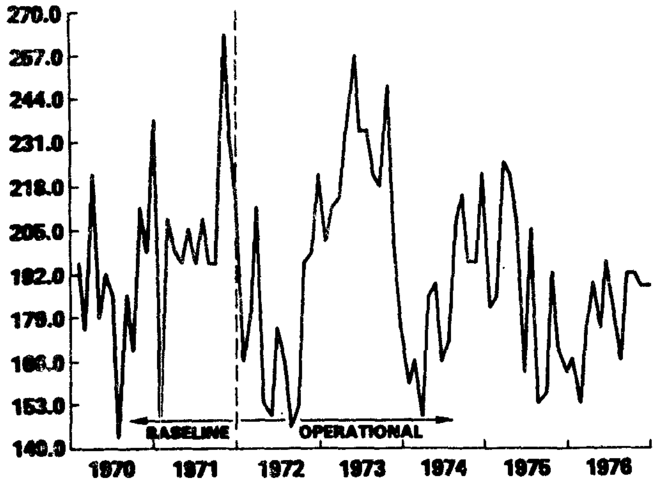
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	−.46	−.86	.08
STANDARD DEVIATION	.96	.76	.54
VALUE OF t TEST	−.67	−1.13	.15

CUMULATIVE SUM



In addition to night fatal crashes, monthly night injury crashes for the period of 1970–1976 were analyzed to determine ASAP impact. The series is graphed below with a 12 month moving average.

TAMPA ASAP NIGHT INJURY CRASHES



The results of the analysis showed no effect due to the fuel crisis. There was a statistically significant reduction of 42.98 injury crashes per month for the period December 1973–1976 due to the presence of the 55 mph speed limit. This amounts to a reduction of 1589.26 injury crashes. In addition, there was a statistically significant reduction of 47.20 injury crashes per month attributed to the presence of ASAP. For the period January 1972–December 1976, this equates to a total reduction of 2832 injury crashes.

ASAP SITE: TAMPA, FLORIDA

OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-2.87	-42.98	-47.20
STANDARD DEVIATION	6.13	24.42	17.60
VALUE OF t TEST	-.47	-1.76	-2.68
DELAY TIME	1 MOS.	0 MOS.	0 MOS.

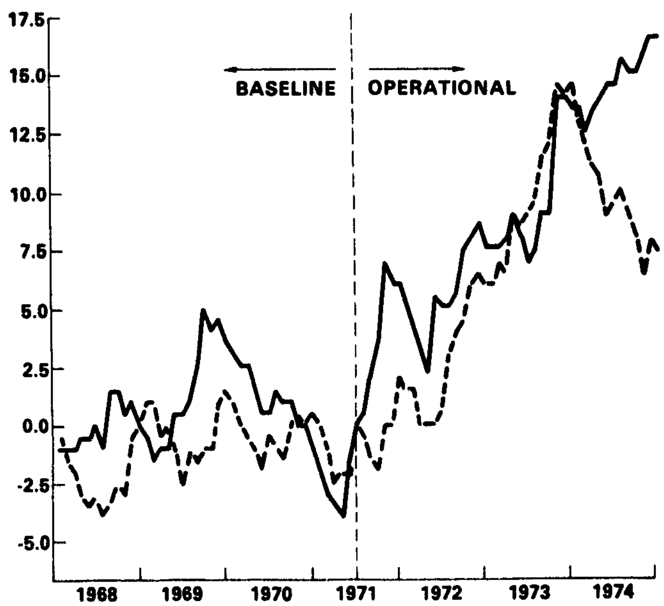
DATE OF 55 MPH NMSL: DECEMBER 1973

VERMONT ASAP

The Vermont ASAP was funded to begin operations in January 1971. Difficulties encountered by project personnel caused a six month delay, making July 1971 the actual start date for this project. The analysis considers a seven year time frame divided into baseline (January 1968–June 1971) and operational (July 1971–December 1974) periods.

CUMULATIVE SUM

(—) VERMONT NIGHT FATAL CRASHES
(---) VERMONT DAY FATAL CRASHES



The results of the analysis showed that neither the fuel crisis nor the speed limit affected night fatal crashes in Vermont. No change in night fatal crashes was found during the period of ASAP activity.

ASAP SITE: VERMONT

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	.90	-.41	-.10
STANDARD DEVIATION	.66	.51	.42
VALUE OF t TEST	1.36	-.80	-.24
DELAY TIME	0 MOS.	0 MOS.	4 MOS.

DATE OF 55 MPH NMSL: NOVEMBER 1973

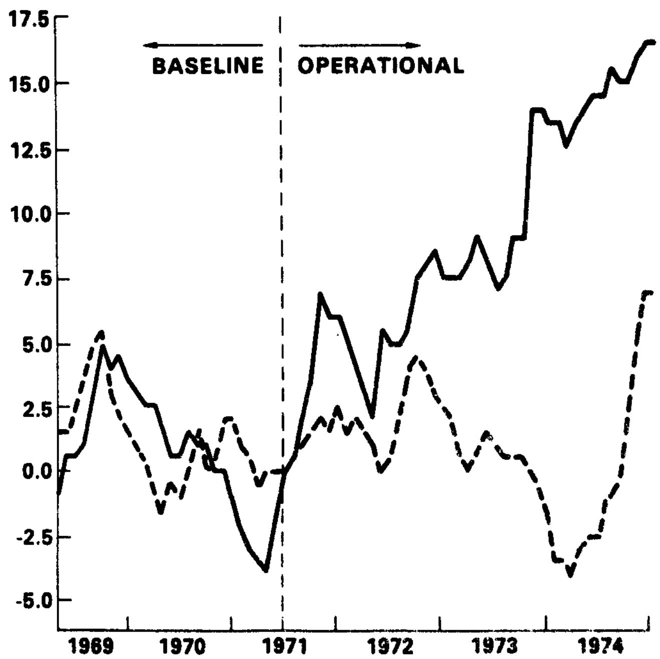
COMPARISON SITE: VERMONT DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	CCF=0	-1.26	.59
STANDARD DEVIATION		.40	.30
VALUE OF t TEST		-3.15	1.97
DELAY TIME		0 MOS.	4 MOS.

The analysis of day fatal crashes found no change during the period of ASAP operations.

CUMULATIVE SUM

(—) VERMONT NIGHT FATAL CRASHES
(---) WEST VIRGINIA NIGHT FATAL CRASHES



West Virginia was the comparison site for Vermont. No change in the mean level of night fatal crashes was noted coincident with ASAP activity in Vermont.

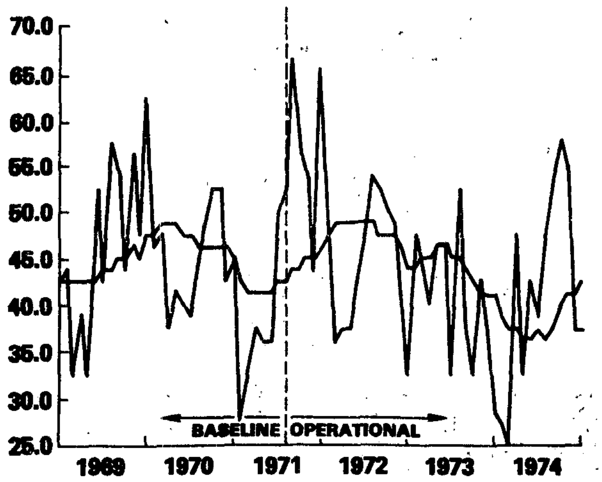
COMPARISON SITE: WEST VIRGINIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-9.74	10.57	.82
STANDARD DEVIATION	3.34	2.73	1.91
VALUE OF t TEST	-2.92	3.87	.43
DELAY TIME	3 MOS.	2 MOS.	0 MOS.

Monthly night injury crashes were analyzed to determine the effect of ASAP presence. The series is graphed below with a 12 month moving average.

The results of the analysis showed that neither the fuel crisis nor the speed limit affected night injury crashes in Vermont. No change was found during the ASAP operational period.

VERMONT ASAP NIGHT INJURY CRASHES 12-MONTH MOVING AVERAGE



ASAP SITE: VERMONT

OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−1.48	4.56	−3.49
STANDARD DEVIATION	5.06	4.24	2.42
VALUE OF t TEST	−.29	1.08	−1.44
DELAY TIME	4 MOS.	5 MOS.	5 MOS.

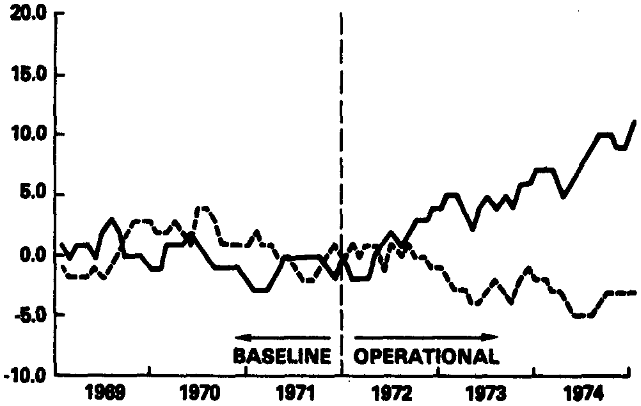
DATE OF 55 MPH NMSL: NOVEMBER 1973

WICHITA, KANSAS ASAP

January 1972 was the starting date for ASAP operations in Wichita, Kansas. The project was funded for three years of operations ending in December 1974. The analysis compares night fatal crashes in the baseline (1969–1971) and operational (1972–1974) periods.

CUMULATIVE SUM

(—) WICHITA NIGHT FATAL CRASHES
(---) WICHITA DAY FATAL CRASHES



The analysis of monthly night fatal crashes showed no impact of the fuel crisis or reduced speed limit. There was no change in night fatal crashes between the baseline and ASAP operational periods.

ASAP SITE: WICHITA, KANSAS

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-.44	.17	.39
STANDARD DEVIATION	.52	.43	.31
VALUE OF t TEST	-.85	.40	1.26
DELAY TIME	1 MOS.	0 MOS.	0 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

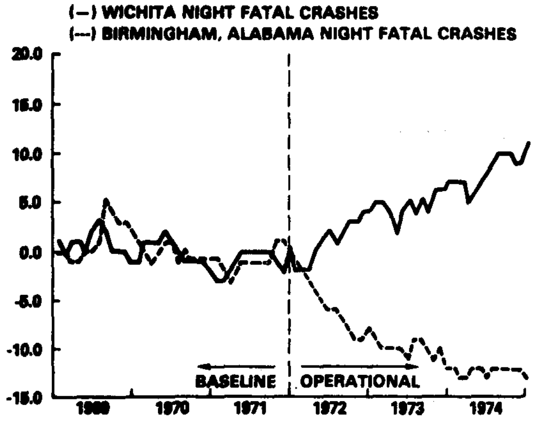
No change in day fatal crashes was found during the period of ASAP presence.

COMPARISON SITE: WICHITA DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.90	CCF=0	-.06
STANDARD DEVIATION	.58		.32
VALUE OF t TEST	-1.55		.19
DELAY TIME	2 MOS.		0 MOS.

CUMULATIVE SUM

(—) WICHITA NIGHT FATAL CRASHES
(---) BIRMINGHAM, ALABAMA NIGHT FATAL CRASHES



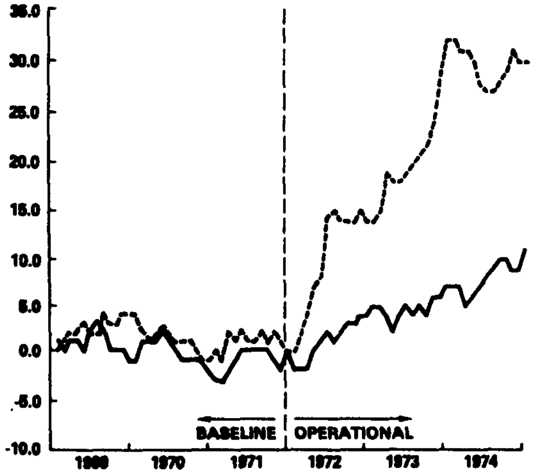
COMPARISON SITE: BIRMINGHAM, ALABAMA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.33	.81	-.60
STANDARD DEVIATION	.66	.55	.38
VALUE OF t TEST	-.50	1.48	-1.58

Birmingham, Alabama and Louisville, Kentucky were the comparison sites for Wichita, Kansas. There was no change in the mean level of night fatal crashes at either site coincident with the period of ASAP activity in Wichita.

CUMULATIVE SUM

(—) WICHITA NIGHT FATAL CRASHES
(---) LOUISVILLE, KENTUCKY NIGHT FATAL CRASHES



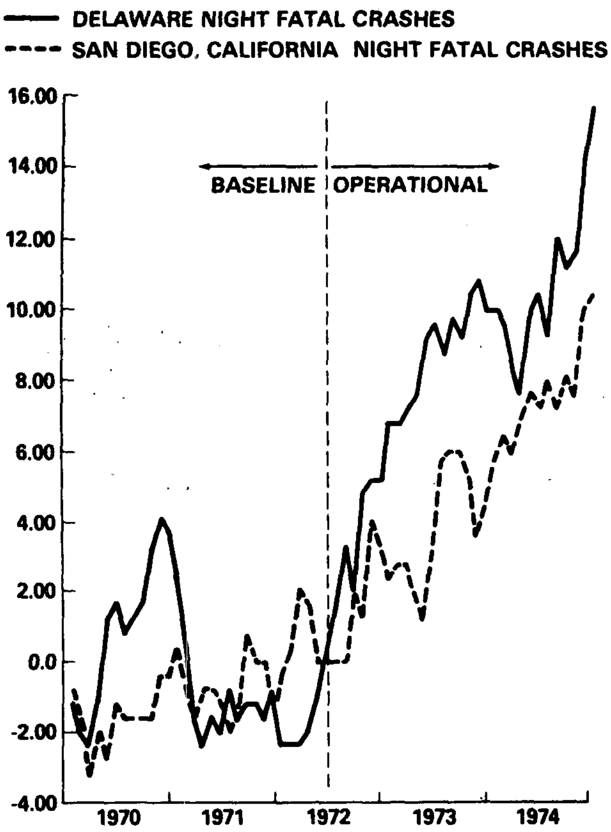
COMPARISON SITE: LOUISVILLE, KENTUCKY

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	1.31	-2.39	1.87
STANDARD DEVIATION	1.02	.83	.62
VALUE OF t TEST	1.29	-2.89	3.04

DELAWARE ASAP

The Delaware ASAP began operations in July 1972. This statewide project was funded to run for a three year period ending June 1975. Monthly fatal crash data was not reported by the site. Estimates were derived from the quarterly data using the distribution of available monthly fatality data. The analysis covers a six year time frame comparing night fatal crashes in the baseline (January 1969–1972) and operational (July 1972–December 1974) periods.

CUMULATIVE SUM



The results of the analysis found no effect on night fatal crashes due to either the fuel crisis or reduced speed limit. There was no change in night fatal crashes during the period of ASAP operations.

ASAP SITE: DELAWARE

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-1.63	-.45	.56
STANDARD DEVIATION	1.03	.80	.69
VALUE OF t TEST	-1.58	-.56	.81
DELAY TIME	1 MOS.	6 MOS.	2 MOS.

DATE OF 55 MPH NMSL: NOVEMBER 1973

COMPARISON SITE: DELAWARE DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-3.90	-2.20	-.32
STANDARD DEVIATION	3.37	2.54	2.14
VALUE OF t TEST	-1.16	-.86	-.15

The analysis of day fatal crashes showed no change during ASAP activity. San Diego, California was the comparison site for Delaware. There was no change in night fatal crashes coincident with the period of ASAP presence in Delaware.

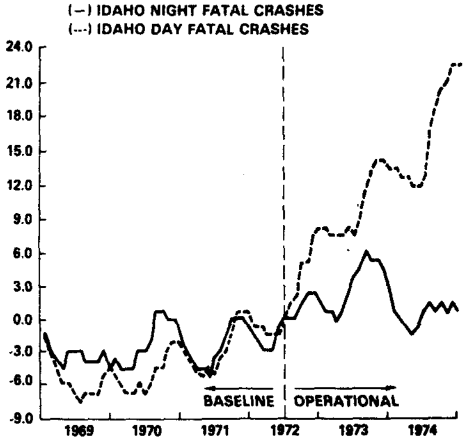
COMPARISON SITE: SAN DIEGO, CALIFORNIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.60	.44	.41
STANDARD DEVIATION	.65	.53	.44
VALUE OF t TEST	.92	.83	.93

IDAHO ASAP

ASAP operations began in Idaho in July 1972. The project was funded for three years of operations terminating in June 1975. The analysis covers a six year time frame divided into baseline (January 1969–June 1972) and operational (July 1972–December 1974) periods.

CUMULATIVE SUM



The results of the analysis showed a statistically significant reduction of 3.35 fatal crashes per month for the period November 1973–April 1974 attributed to the fuel crisis (a total savings of 20.10 fatal crashes). No effect was noted for the speed limit. There was no change in night fatal crashes between the baseline and operational periods.

ASAP SITE: IDAHO

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	-3.35	CCF=0	-1.21
STANDARD DEVIATION	1.97		1.11
VALUE OF t TEST	-1.70		-1.09
DELAY TIME	1 MOS.		0 MOS.

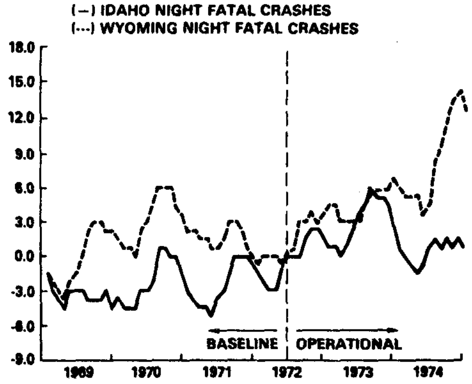
DATE OF 55 MPH NMSL: JANUARY 1974

COMPARISON SITE: IDAHO DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-3.70	1.09	-1.60
STANDARD DEVIATION	1.76	1.57	1.12
VALUE OF t TEST	-2.10	.69	-1.43
DELAY TIME	1 MOS.	2 MOS.	0 MOS.

There was no change in the mean level of day fatal crashes during the period of ASAP presence. Wyoming was the comparison site for Idaho. No change was found in night fatal crashes coincident with the period of ASAP activity in Idaho.

CUMULATIVE SUM

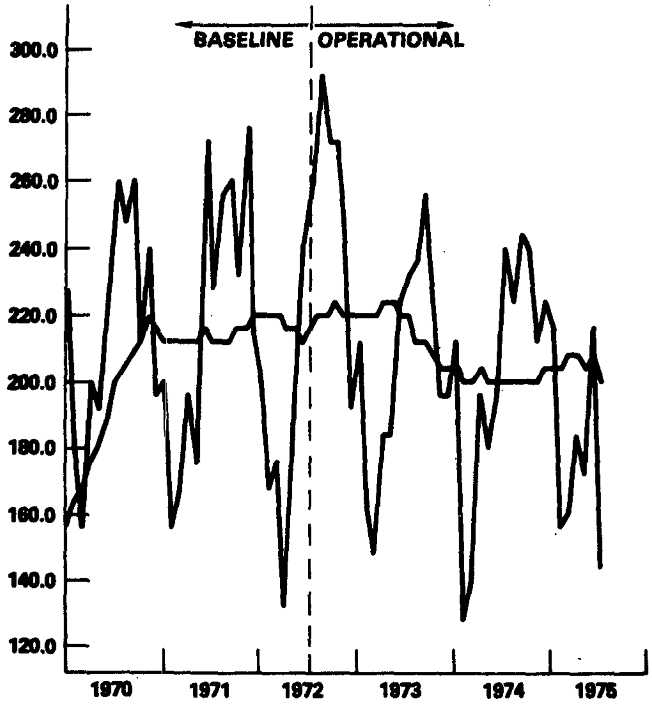


COMPARISON SITE: WYOMING

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-2.99	CCF=0	.32
STANDARD DEVIATION	1.40		.75
VALUE OF t TEST	-2.14		.43
DELAY TIME	2 MOS.		0 MOS.

Monthly night injury crashes are graphed below with a 12 month moving average.

IDAHO ASAP NIGHT INJURY CRASHES
12-MONTH MOVING AVERAGE



The analysis of night injury crashes found no effect for either the fuel crisis or the speed limit. However, a statistically significant reduction of 37.26 injury crashes per month was detected during the ASAP operational period.

ASAP SITE: IDAHO

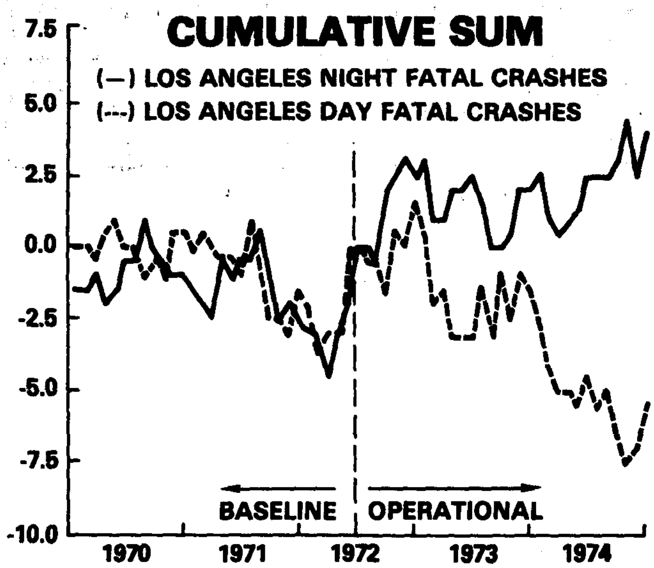
OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−6.12	13.72	−37.26
STANDARD DEVIATION	17.74	15.03	14.48
VALUE OF t TEST	−.34	−1.31	−2.57
DELAY TIME	0	1	3

DATE OF 55 MPH NMSL: JANUARY, 1974

LOS ANGELES, CALIFORNIA ASAP

The Los Angeles, California ASAP began operations in July 1972. The project was funded to run three years until June 1975. The first year of baseline data (1969) was not reported by the site. The analysis compares monthly night fatal crashes in the baseline (January 1970–June 1972) and operational (July 1972–December 1974) periods.



The results of the analysis showed no effect for either the fuel crisis or the reduced speed limit. There was no change in night fatal crashes during the period of ASAP activity.

ASAP SITE: LOS ANGELES, CALIFORNIA

OUTPUT SERIES: NIGHT FATAL CRASHES

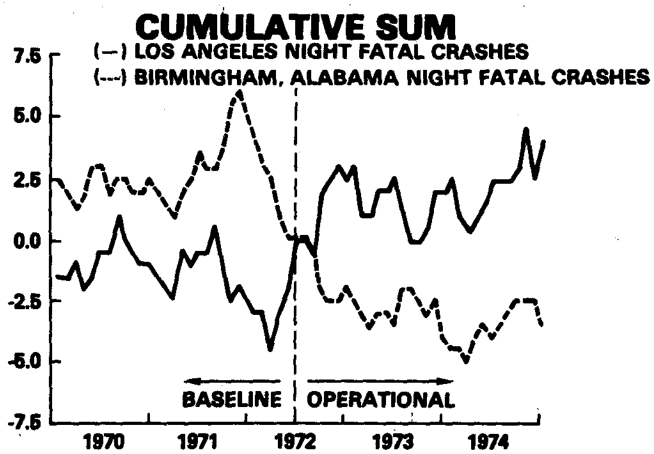
	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF=0	-.72	.05
STANDARD DEVIATION		.88	.54
VALUE OF t TEST		-.82	.09
DELAY TIME		1 MOS.	4 MOS.

DATE OF 55 MPH NMSL: JANUARY 1974

There was no change in the mean level of day fatal crashes during the ASAP operational period.

COMPARISON SITE: LOS ANGELES DAY FATAL CRASHES

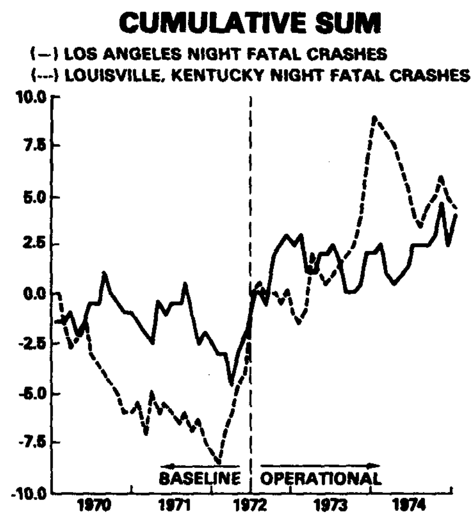
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.79	CCF=0	-.32
STANDARD DEVIATION	.85		.49
VALUE OF t TEST	-.93		-.65
DELAY TIME	0 MOS.		4 MOS.



COMPARISON SITE: BIRMINGHAM, ALABAMA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.06	.51	-.11
STANDARD DEVIATION	.69	.59	.43
VALUE OF t TEST	-.87	.86	.26

Birmingham, Alabama and Louisville, Kentucky were the comparison sites for Los Angeles, California. No change in night fatal crashes was found at either site coincident with the period of ASAP operations in Los Angeles.

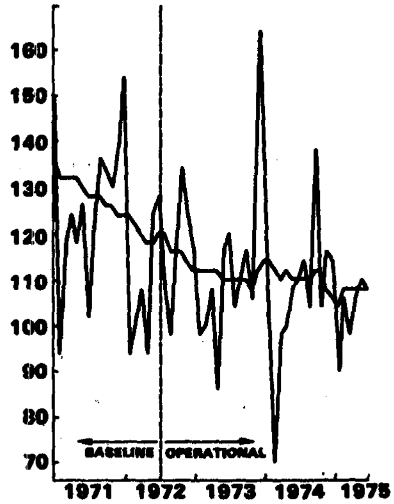


COMPARISON SITE: LOUISVILLE, KENTUCKY

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	1.80	-1.79	.65
STANDARD DEVIATION	1.10	.92	.71
VALUE OF t TEST	1.63	-1.95	.92

Los Angeles monthly night injury crashes are graphed below with a 12 month moving average.

LOS ANGELES ASAP NIGHT INJURY CRASHES 12 MONTH MOVING AVERAGE



The analysis of night injury crashes showed no effect due to the fuel crisis. However, there was a statistically significant reduction of 8.13 crashes per month due to the reduced speed limit (February–December 1974). No effect was found during the period of ASAP presence.

ASAP SITE: LOS ANGELES

OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	1.73	−8.13	−6.46
STANDARD DEVIATION	5.32	4.53	5.05
VALUE OF t TEST	0.33	−1.79	−1.28
DELAY TIME	0 MOS.	1 MOS.	0 MOS.

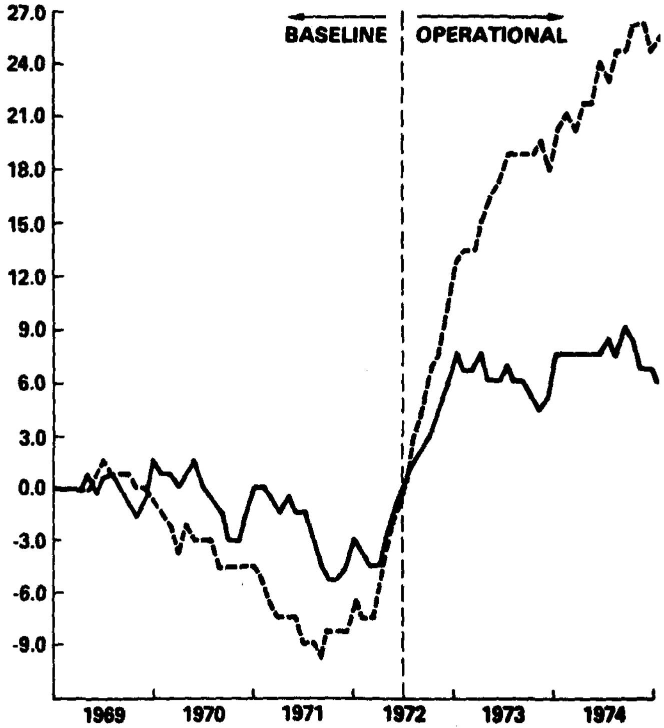
DATE OF 55 MPH NMSL: JANUARY 1974

PUERTO RICO ASAP

ASAP operations in Puerto Rico began July 1972 and were scheduled to remain for a three year operational phase. The analysis compares night fatal crashes in the baseline (January 1969–June 1972) and operational (July 1972–December 1974) periods.

CUMULATIVE SUM

(—) PUERTO RICO NIGHT FATAL CRASHES
(---) PUERTO RICO DAY FATAL CRASHES



The analysis of Puerto Rico night fatal crashes found no change in the mean level between baseline and operational periods. In addition, there was no change in day fatal crashes during the ASAP operational period. No comparison site was found for Puerto Rico.

ASAP SITE: PUERTO RICO

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	NOT	NOT	2.63
STANDARD DEVIATION	PRESENT	PRESENT	2.37
VALUE OF t TEST			1.10
DELAY TIME			0 MOS.

DATE OF 55 MPH NMSL: NOT APPLICABLE

COMPARISON SITE: PUERTO RICO

OUTPUT SERIES: DAY FATAL CRASHES

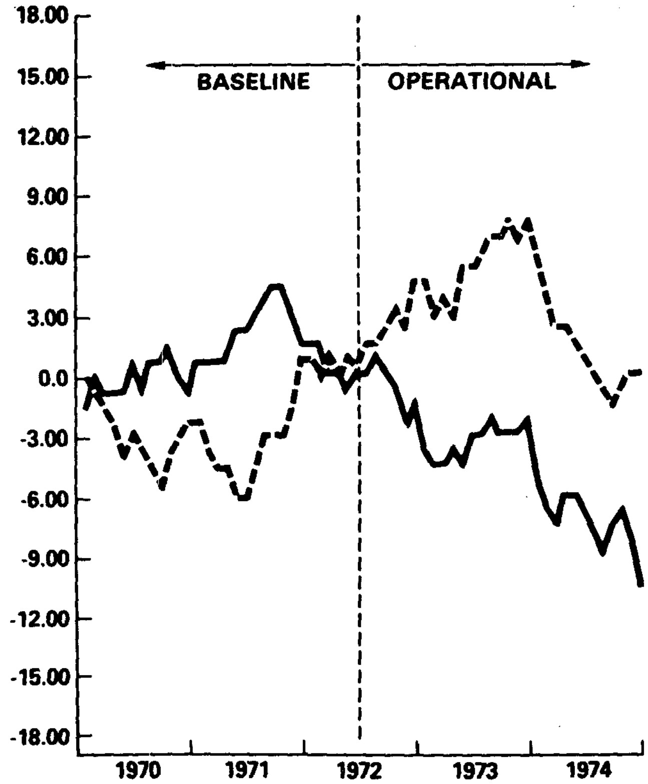
	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	NOT	NOT	5.75
STANDARD DEVIATION	PRESENT	PRESENT	1.25
VALUE OF t TEST			4.60
DELAY TIME			0 MOS.

SALT LAKE CITY, UTAH, ASAP

The Salt Lake City, Utah ASAP began operations in July 1972. The project was funded to run for three years ending in June 1975. The analysis covers a six year period divided into baseline (January 1969–June 1972) and operational (July 1972–December 1974) periods.

CUMULATIVE SUM

(——) SALT LAKE CITY NIGHT FATAL CRASHES
(- - -) SALT LAKE CITY DAY FATAL CRASHES



The results of the analysis of monthly night fatal crashes showed no effect for either the fuel crisis or the speed limit. However, a statistically significant reduction of 1.14 fatal crashes per month was attributed to the presence of the ASAP program (a savings of 23.94 fatal crashes for the project life).

ASAP SITE: SALT LAKE CITY, UTAH

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	CCF=0	.24	-1.14
STANDARD DEVIATION		.93	.64
VALUE OF t TEST		.26	-1.78
DELAY TIME		3 MOS.	3 MOS.

DATE OF 55 MPH NMSL: JANUARY 1974

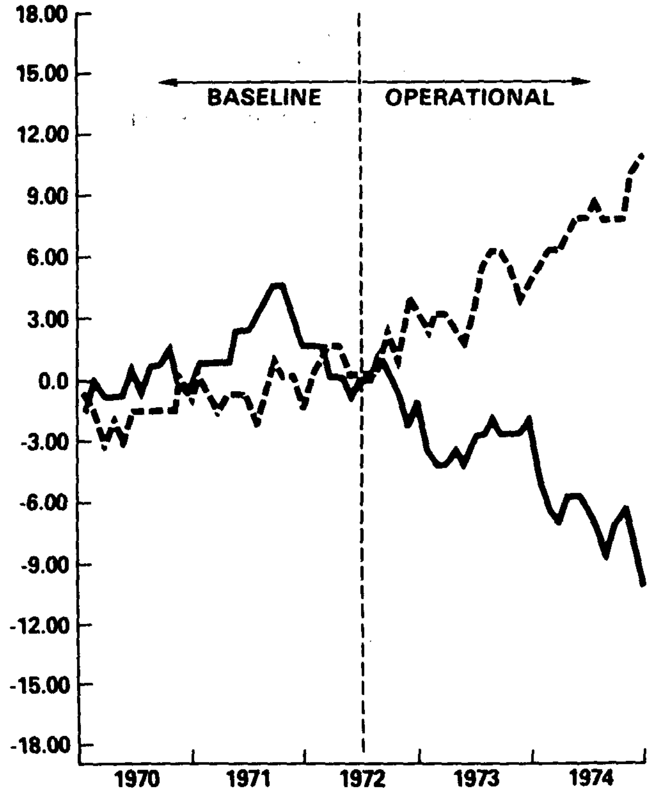
COMPARISON SITE: SALT LAKE CITY DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	CCF=0	CCF=0	-.57
STANDARD DEVIATION			.75
VALUE OF t TEST			-.76
DELAY TIME			3 MOS.

The analysis of day fatal crashes showed no change during the period of ASAP activity.

CUMULATIVE SUM

(——) SALT LAKE CITY NIGHT FATAL CRASHES
(- - -) SAN DIEGO, CALIFORNIA NIGHT FATAL CRASHES



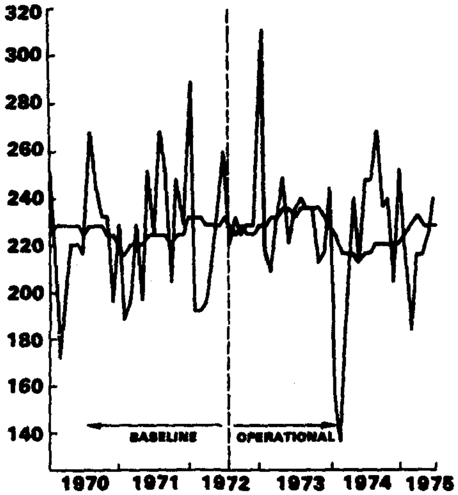
San Diego, California was the comparison site for Salt Lake City, Utah. No change in night fatal crashes was noted coincident with ASAP operations in Salt Lake City.

COMPARISON SITE: SAN DIEGO, CALIFORNIA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.60	.44	.41
STANDARD DEVIATION	.65	.53	.44
VALUE OF t TEST	-.91	.82	.94

Monthly night injury crashes in Salt Lake City are depicted below with a 12 month moving average.

SALT LAKE CITY ASAP NIGHT INJURY CRASHES 12 MONTH MOVING AVERAGE



The results of the analysis found a statistically significant reduction of 46.8 crashes per month for the period November 1973–April 1974 attributed to the fuel crisis. No impact was noted due to the reduced speed limit. In addition, no reduction was found during the ASAP operational period.

ASAP SITE: SALT LAKE CITY, UTAH

OUTPUT SERIES: NIGHT INJURY CRASHES

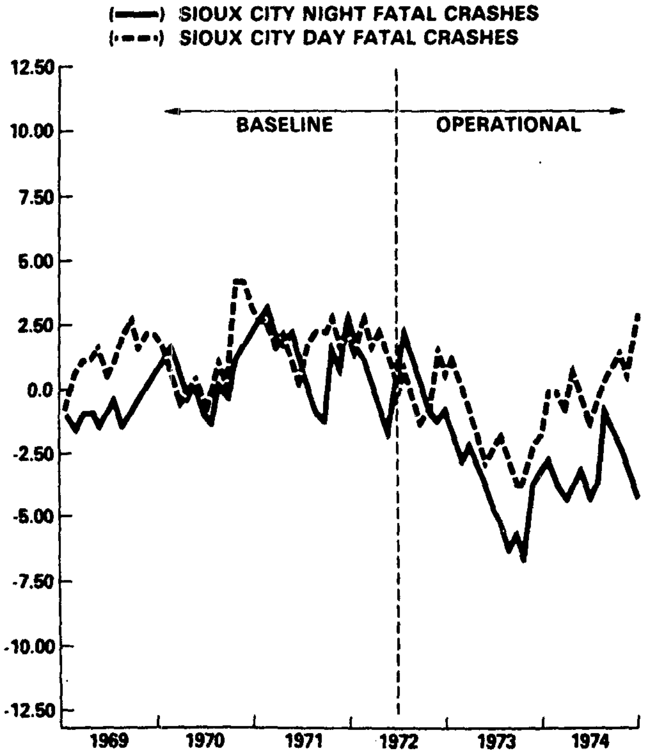
	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−46.8	8.4	−7.1
STANDARD DEVIATION	11.0	8.0	8.1
VALUE OF t TEST	−4.25	1.05	−0.88
DELAY TIME	1 MOS.	0 MOS.	0 MOS.

DATE OF 55 MPH NMSL: JANUARY 1974

SIOUX CITY, IOWA ASAP

ASAP operations began in Sioux City, Iowa in July 1972. This project was funded for a three year operational period ending in June 1975. The analysis considers a six year time frame divided into baseline (January 1969–June 1972) and operational (July 1972–December 1974) periods.

CUMULATIVE SUM



The results of the analysis showed a statistically significant reduction of .42 fatal crashes per month attributed to the ASAP program (a total reduction of 12.18 fatal crashes for the operational period). No effect was noted for either the fuel crisis or the reduced speed limit.

ASAP SITE: SIOUX CITY, IOWA

OUTPUT SERIES: NIGHT FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	.71	.64	−.42
STANDARD DEVIATION	.41	.29	.25
VALUE OF t TEST	1.73	2.21	−1.68
DELAY TIME	1 MOS.	5 MOS.	1 MOS.

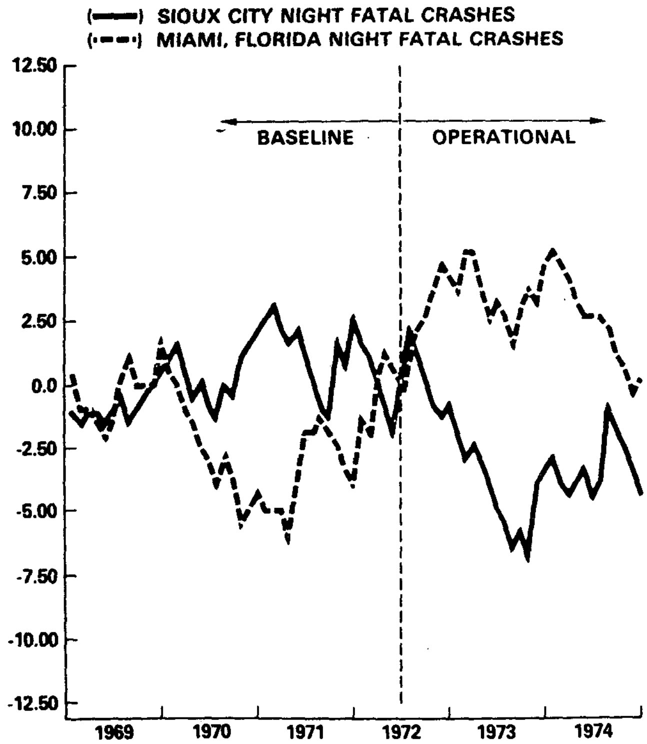
DATE OF 55 MPH NMSL: MARCH 1974

COMPARISON SITE: SIOUX CITY DAY FATAL CRASHES

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	.73	.51	-.27
STANDARD DEVIATION	.40	.35	.25
VALUE OF t TEST	1.83	1.46	-1.08
DELAY TIME	1 MOS.	1 MOS.	1 MOS.

The analysis of day fatal crashes also showed no change during the period of ASAP activity. Miami, Florida and Omaha, Nebraska were the comparison sites for Sioux City, Iowa. No change in the mean level of night fatal crashes was detected at either site coincident with ASAP operations in Sioux City.

CUMULATIVE SUM



COMPARISON SITE: MIAMI, FLORIDA

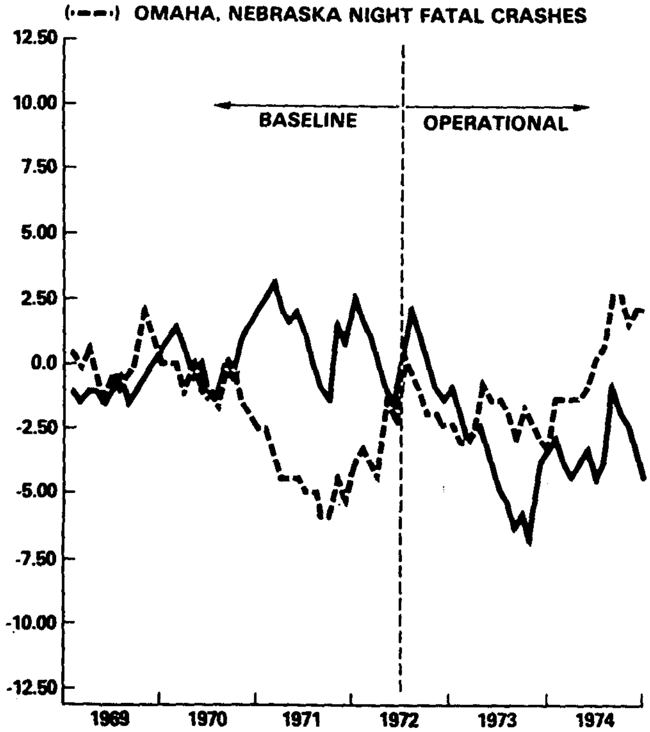
	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	.54	−.70	.13
STANDARD DEVIATION	.64	.52	.39
VALUE OF t TEST	.84	−1.35	.33

COMPARISON SITE: OMAHA, NEBRASKA

	FUEL CRISIS	55 MPH NMSL	EXPER. DUMVAR
PARAMETER ESTIMATE	-.15	.40	.38
STANDARD DEVIATION	.71	.59	.43
VALUE OF t TEST	-.21	.68	.88

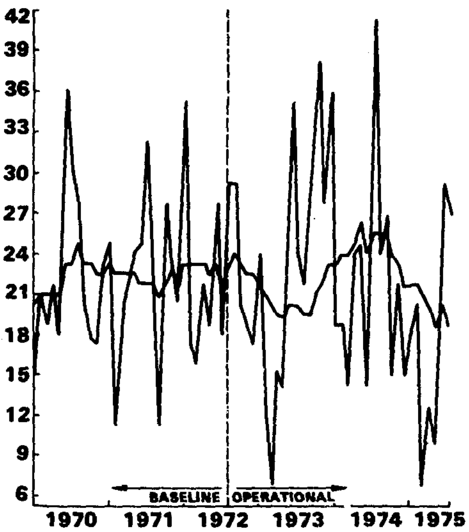
CUMULATIVE SUM

(——) SIOUX CITY NIGHT FATAL CRASHES
(-·-·) OMAHA, NEBRASKA NIGHT FATAL CRASHES



Sioux City monthly night injury crashes are graphed below with a 12 month moving average.

SIOUX CITY ASAP NIGHT INJURY CRASHES
12 MONTH MOVING AVERAGE



The resulting analysis found a statistically significant reduction of 8.80 crashes per month attributed to the fuel crisis. In addition, a statistically significant reduction of 9.16 crashes per month was attributed to the reduced speed limit. However, no reduction was found during the period of ASAP activity in Sioux City.

ASAP SITE: SIOUX CITY, IOWA

OUTPUT SERIES: NIGHT INJURY CRASHES

	FUEL CRISIS	55 MPH NMSL	ASAP DUMVAR
PARAMETER ESTIMATE	−8.80	−9.16	6.21
STANDARD DEVIATION	3.53	2.93	2.39
VALUE OF t TEST	−2.49	−3.13	2.60
DELAY TIME	2 MOS.	4 MOS.	8 MOS.

DATE OF 55 MPH NMSL: MARCH 1974

REFERENCES

1. Bo, O., Alcohol and Drug Countermeasures in Norway and some results from an investigation of the Drinking Driving Incidence in Oslo. Paper presented to the OECD International Symposium on Countermeasures to Driver Behavior Under the Influence of Alcohol and other Drugs. British Medical Association House, Tavistock Square, London September 1971.
2. Box, G.E.P., and Jenkins, G.M. *Time Series Analysis Forecasting and Control*. San Francisco, Holden Day, 1970.
3. Box, G.E.P., and Tiao, G.C. Intervention Analysis with Applications to Economic and Environmental Problems. *Journal of the American Statistical Association*. 1975, 70, pp.70–79.
4. Campbell, D.J., and Stanley, J.C. *Experimental and Quasi-Experimental Designs for Research*. Chicago, Rand McNally Co., 1966.
5. Carr, B.R., Goldberg, H. and Farbor, C.M.C. The Canadian Breathalyzer Legislation: An Inferential Evaluation. In Israelstam, S. and Lambert, S. (Eds.), *Alcohol, Drugs, and Traffic Safety*. Section VII, Proceedings of the Sixth International Conference on Alcohol, Drugs and Traffic Safety. Toronto, Canada: Addiction Research Foundation of Ontario, 1975. pp. 679–688.
6. Cerrelli, E.C. *The Effect of the Fuel Shortage on Travel and Highway Safety*. NHTSA Technical Report No. DOT-HS-801-715, August 1975. Available from NTIS, Springfield, Va. 22151.
7. Chambers, L.W., Roberts, R.S. and Voelkes. The Epidemiology of Traffic Accidents and the Effect of the 1969 Breathalyzer Law in Canada. In Isrealstam, S.and Lambert, S. (Eds.), *Alcohol, Drugs and Traffic Safety*. Proceedings of the Sixth International Conference on Alcohol, Drugs and Traffic Safety. Tortonto, Canada: Addiction Research Foundation of Ontario, 1975. pp. 689–698.
8. Croxton, F.E. and Cowden, D.V., *Applied General Statistics*, 1947, Prentice Hall, Inc.
9. Ellingstad, V.S. and Springer, T.J. *Program Level Evaluation of ASAP Diagnosis, Referral and Rehabilitation Efforts:* Volume III: Evaluation of Rehabilitation Effectiveness. Final Report on Contract No. DOT-HS-191-3-759-F3, June 1976. Available from NTIS Springfield, VA 22151.
10. Ellingstad, V.S. and Structman-Johnson, D.L. *Short Term Rehabilitation (STR) Study*. Interim Report, January 1978. Department of Transportation Report No. DOT-HS-803-285. Available from NTIS, Springfield, VA. 22151.
11. Glass, G.V., Wilson, V.L. and Gottman, J.M. *Design and Analysis of Time Series Experiments*. Boulder, Colorado, Colorado Associated University Press, 1975.
12. Hawkins, T.E., Scrimgeour, G., Krenek, R.F., Dreyer, C.B. *Summary of ASAP Results for Application to State and Local Programs, Volume II: ASAP Costs*. National Highway Traffic Safety Administration Report No. DOT-HS-801-964, August 1976. Available from NTIS, Springfield, VA 22151.
13. Hoel, P.G., *Introduction to Mathematical Statistics*, Wiley, 1971.
14. Johnson, P., Klein, T.M. and Levy, P.S. *Effect of the 55 MPH Speed Limit on Fatal Crashes in Texas*. NHTSA Technical Note DOT-HS-802-172, October 1976. Available from NTIS, Springfield, VA. 22151.
15. Johnson, P., Levy, P. and Voas, Robert. A critique of the "Statistical Evaluation of the Effectiveness of Alcohol Safety Action Programs." *Accident Analysis and Prevention*, 1976, 8, pp. 67–77.
16. Jones, R.K. and Joscelyn, K.B. *Alcohol and Highway Safety* 1978: A Review of the State of Knowledge: Summary. University of Michigan; Highway Safety Research Institute, Report No. UM-HSRI-78-9 Ann Arbor, Michigan, January 1978.
17. Kahane, C.J. *Lower Speed Limits, Reduced Speeds, Fewer Deaths, January–April 1974*. NHTSA Technical Report DOT-HS-801-667. Available from NTIS, Springfield, VA 22151.
18. Klein, T.M., Levy, P. and Voas, R.B. *Effect of Fuel Crisis and the 55 MPH Limit on Fatalities in Utah*. NHTSA Technical Note No. DOT-HS-801-854, February 1976. Available from NTIS, Springfield, VA. 22151.
19. Klette, H. Health Education, the Swedish Experience. Paper presented at the 7th International Conference on Alcohol, Drugs and Traffic Safety, Melbourne, Australia, January 28, 1976.
20. Krause, P.B., and Westra, D.P. *Alcohol Safety Action Projects—Interim Assessment of Total Project Impact: 1974*, Analytic Study No. 1, University of South Dakota, Human Factors Laboratory, 1975.
21. Krause, P.B., and Westra, D.P. *Alcohol Safety Projects, 1975 Interim Assessment of Total Project Impact —Analytic Study No. 1*. University of South Dakota, Human Factors Laboratory, Report on NHTSA Contract No. DOT-HS-191-3-759 January 1976. Available from NTIS, Springfield, Va. 22151.
22. Levy, P.S. and Klein, T.M. *The New Hampshire Alcohol Safety Action Project: An Effectiveness Evaluation*. NHTSA Technical Note DOT-HS-801-962, July 1976. Available from NTIS, Springfield, Va. 22151.
23. Maki, M., Linnoila, M., and Alha, A. Drinking and Driving in Helsinki. *Accident Analysis and Prevention*, September 1977, 3, pp. 183–189.

24. McKnight, A.J., Adams, B.B., and Personeus, E.E. *Handbook for Directors of Alcohol Safety Action Projects (ASAP)*. National Highway Traffic Safety Administration, Technical Report, DOT-HS-800-544, 1971. Available from NTIS, Springfield, Va. 22151.
25. Monaco, J.P. *The Collection of National Trend Data on Alcohol Related Crashes for Comparison with Alcohol Safety Action Project Results*. Two Volumes. Stanford Research Institute Final Report on NHTSA Contract No. DOT-HS-5-01229, July 1977. Available from NTIS, Springfield, Va. 22151.
26. *The National Highway Safety NEEDS Report*, pp. VI–II, HS-801-292.
27. New Hampshire ASAP. *Special Analytical Report; Analysis of Patrol Activity*, May 31, 1976. Available from NTIS, Springfield, Va. 22151.
28. Noordzij, P.C. The Introduction of a Statutory BAC Limit of 50 mg/100 ml and its effect on drinking and driving habits and traffic accidents. Paper presented at the 7th International Conference on Alcohol, Drugs and Traffic Safety, Melbourne, Australia, January 23–28, 1977.
29. Robertson, L.S. Evaluation of Community Programs. Paper presented at the 7th International Conference on Alcohol, Drugs and Traffic Safety, Melbourne, Australia, January 28, 1977. Available from the Insurance Institute for Highway Safety, Watergate Building, Washington, D.C.
30. Robertson, L.S., Rich, R.F., and Ross, H.L. Jail Sentences for driving while intoxicated in Chicago: A judicial policy that failed. *Law and Society Review*, 1973, 8, pp. 55–67.
31. Ross, H.L. Law, Science, and Accidents: The British Road Safety Act of 1967. *The Journal of Legal Studies*, 1973, 2, pp. 1–78.
32. Ross, H.L. The Scandinavian myth: The effectiveness of drinking and driving legislation in Sweden and Norway. *The Journal of Legal Studies*, 1975, 4, pp. 285–310.
33. Ross, H.L. Deterrence Regained: The Cheshire Constabularys. "Breathalyzer Blitz." *Journal of Legal Studies*, Vol. VI(1) University of Chicago Law School, January 1977, pp. 241–249.
34. U.S. Department of Transportation. *Alcohol and Highway Safety* Report to the U.S. Congress. Washington, D.C. 1968. Available from NTIS, Springfield, Va. 22151.
35. U.S. Department of Transportation. *Proceedings of National Highway Safety Bureau Priorities Seminar*. Volume II: Alcohol and Highway Safety Countermeasures, July 1969. Available from NTIS, Springfield, Va. 22151.
36. U.S. Department of Transportation, *Alcohol Safety Countermeasures: An Action Program*, March 1970. Available from NTIS, Springfield, Va. 22151.
37. U.S. Department of Transportation. *Alcohol Safety Action Projects, First Year Evaluation Preview National Highway Traffic Safety Administration, June 1972*. Available from NTIS, Springfield, Va. 22151.
38. U.S. Department of Transportation. *Alcohol Safety Action Projects, Evaluation of Operations*—1972. 3 Volumes. National Highway Traffic Safety Administration, Technical Report, DOT-HS-800-973. Available from NTIS, Springfield, Va. 22151.
39. U.S. Department of Transportation. *Alcohol Safety Action Projects, Evaluation of Operations*—1974, Volume II. National Highway Traffic Safety Administration, Technical Report, DOT-HS-800-795. Available from NTIS, Springfield, Va. 22151.
40. U.S. Department of Transportation. *Management and Evaluation Handbook for Demonstration Projects in Traffic Safety, 1976*. #DOT-HS-802-196, February 1977. Available from NTIS, Springfield, Va. 22151.
41. U.S. Department of Transportation. *Alcohol Safety Program Progress*. II Volumes, 1978 National Highway Traffic Safety Administration, Technical Report. In press.
42. Votey, H.L., Jr. The control of drunken driving: the deterrents of law enforcement and control of alcohol consumption in two countries that believe in strong measures. Paper presented before the Annual Meetings, Western Economic Association, San Francisco, California, 1976. Available from the author, University of California, Santa Barbara.
43. Wolfe, A.C. Characteristics of Late-Night, weekend drivers: Results of the U.S. National Roadside Breathtesting survey and several local surveys. In Israelstram, S. and Lambert, S. *Alcohol, Drugs and Traffic Safety*. Addiction Research Foundation of Ontario, Toronto, Canada, 1974, pp. 41–49.
44. Wolfe, A.C. Characteristics of Alcohol Impaired Drivers. Paper presented at the Society of Automobile Engineers, Detroit, Michigan, October 13–17, 1975.
45. Woodward, R.H. and Goldsmith, P.L. *Cumulative Sum Techniques*, 1964, Oliver and Boyd Publication for Imperial Chemical Industries, LTD. (England).
46. Zador, P. Statistical Evaluation of the Effectiveness of "Alcohol Safety Action Programs." *Accident Analysis and Prevention*, 1976, 8, pp. 51–66.
47. Zador, P. A rejoinder to "A Critique of the Paper 'Statistical Evaluation of Alcohol Safety Action Programs' by Johnson, et al" *Accident Analysis and Prevention*, 1977, 9, pp. 15–19.
48. Zylman, R.A. A Critical Evaluation of the Literature on Alcohol Involvement in Highway Deaths. *Accident Analysis and Prevention*, 6, 1974, pp. 163–204.

☆U.S. GOVERNMENT PRINTING OFFICE: 1979 634-120/537 1-3