possible to assume that exposure is a constant if comparisons can be made among similar groups, for example, young drivers in certain classes of urban areas controlled for population, registered vehicles, and socioeconomic factors. However, this kind of comparison is frequently impracticable. Indianapolis, for instance, is demographically unlike any other city in Indiana.

The lack of data also makes it difficult to test hypotheses. Gasoline supplies most likely affect accident rates, but the effect of fluctuations probably will not be uniform among all groups. Discretionary travel probably is the most dramatically affected, while commuting patterns may prove relatively inelastic, at least in the short run. Fatality rates, which are thought to be more sensitive to discretionary travel, may fall. In Indiana, the total number of reported accidents rose by more than 31 000 during 1976-1978, while the number of fatal accidents increased by only 50. However, since the state has no reliable estimate of vehicle miles by type of travel, it is not known if the smaller proportional increase in fatalities was the result of a drop in discretionary travel.

Adequate exposure data are essential in identifying countermeasures. A problem group may have a high absolute number of accidents, but if it also has a high exposure rate and, hence, a low accident rate, effective countermeasures may involve inordinate expense.

Some studies can be conducted without exposure data. For example, the effect of repealing a state's mandatory motorcycle helmet law may be determined by comparing the ratio of fatalities to injuries or accidents before and after the law was repealed. If helmets had reduced fatalities, the ratio would be expected to increase over time. Unfortunately, not many highway safety problems lend themselves to this kind of analysis.

Significance of Overrepresentation

Even assuming that groups overrepresented in accidents can be statistically isolated, the significance of the figures must still be determined. The problem is that comparisons must be made with similar populations, not the total population. For example, the number of moped accidents has risen over the past four years in Indiana. But because there is no population with which to compare Indiana's sample, a goodness-of-fit test cannot be made, and the significance of the rise cannot be determined. In addition, the isolation of an overrepresented group may or may not indicate causality—even if a statistical relation among a set of variables can be demonstrated.

DIRECTION OF HIGHWAY SAFETY PROGRAM

Many highway safety agencies are not major forces in developing state highway safety policy or in implementing highway safety programs. The difficulty of the state agencies in directing highway safety efforts effectively is probably the most serious problem in the national program. Highway safety agencies must be strengthened within their organizational and political milieu. Their statutory authority must be increased and their technical staff must be upgraded. Unified federal guidance is needed in problem identification, program management, and evaluation.

As a first step, the federal government should conduct the research to develop accident causation methodology, exposure data, and analytical techniques. This research is properly the province of the federal government and research institutions, while the application of that research should be that of the states. Without federal assistance and cooperation, there is little chance that highway safety agencies will increase their effectiveness. Pennsylvania, like most states, is suffering from the shrinking tax dollar-revenues are down, expenses are up. We had experienced a considerable decline in fuel tax and associated revenues even before the current administration's federal budget reductions. To consolidate our resources and increase effectiveness in directing Pennsylania's Highway Safety Program, we have combined our operational and program personnel into a single department. As a result, Pennsylvania now has in place a responsive accident-reporting system that provides useful management information for implementing a statewide highway safety program.

HIGHWAY SAFETY ORGANIZATION

Until two years ago, Pennsylvania's Section 402 Highway Safety Program was managed by the Highway Safety Group (HSG) of the state's Department of Transportation (Penn DOT). The program manager, as head of this group, reported directly to the secretary of transportation, who was designated the governor's highway safety representative. Although idealistic in design, this structure was impractical. The HSG was independent of operational areas, but support from these areas was often difficult to enlist. In addition, HSG was only one of many responsibilities of the state's Secretary of Transportation, and consequently could command little of the secretary's attention.

Early in 1980, Transportation Secretary Thomas Larson approved a reorganization of Penn DOT. The HSG was combined with the former Bureau of Accident Analysis and other related, formerly independent groups to form the Bureau of Safety Programming. The new bureau was placed under the deputy secretary for safety administration (SA) one of five deputates reporting to the secretary—and Deputy Secretary John J. Zogby, as head of SA, was designated the governor's representative. In essence, this reorganization placed the accident data collectors and users together at the operational level.

As in any reorganization, establishing new lines of communication, redefining responsibilities, and physically realigning work areas made the work flow awkward at first, but the benefits became apparent almost immediately. The new organization has resulted in one of the finest problem identification efforts to be found in the highway safety plan process, and Pennsylvania is now in a position to devise a performance-oriented highway safety program.

ACCIDENT RECORD SYSTEM

The Pennsylvania Accident Record System (ARS) compiles information on 150 000 reportable motor vehicle accidents (including about 2000 fatal accidents) each year. Up to 657 data elements that relate to the driver, vehicle, roadway, conditions, and circumstances of the crash are recorded on each accident record. Accident information is maintained in a "live," year-to-date file accessible for analysis; a threeyear, fixed accident record file provides the basis for highway safety problem identification and program management.

The ARS provides a two-way exchange of information with the operator license (OL), vehicle registration (VR), and Pennsylvania roadway information system (PARIS) files. The creation of an accident record updates the driver record on the OL file, and the OL checks the validity of driver information on the accident record. Roadway information on the ARS report is checked against the PARIS data base, and incorrect data on the accident location are noted and corrected.

DATA ANALYSIS

Both MARK IV and DART/OMNITAB are used to run a number of year-end programs against our accident data base. These programs provide a number of outputs, including a municipal accident priority rating, which ranks each of Pennsylvania's 2564 municipalities; wet-weather accident location clusters under which our skid-testing program is directed (this program recently won praise from the National Transportation Safety Board based on our skidding accident rates); intersection rankings within municipalities; and fixed-object-hit clusters within engineering districts. Our programming capabilities have been expanded to the degree that, for some years now, Pennsylvania has not had to employ Fatal Accident Reporting System (FARS) analysts. The FARS information is programmatically retrieved from the various data bases, converted to FARS format, and submitted by tape each month.

With the output side relatively secure, our analyses are now constrained only by the limitations of input data. Data inadequacies are a result of the latitude of interpretations made by those reporting accidents and the lack of understanding in the field concerning how these data are used. By meeting with investigating agencies and by addressing problems in a bimonthly newsletter, we have significantly improved the data input to our system.

PROBLEM IDENTIFICATION: THE GAO PERSPECTIVE Dennis J. Parker, U.S. General Accounting Office

Why did the U.S. General Accounting Office (GAO) decide to review the highway safety grant program of NHTSA? Once every two years, the GAO auditing groups are required to develop a list of federal programs that should be reviewed for economy, efficiency, and effectiveness. Taking into consideration such factors as the amount of federal money involved and congressional interest, they then list by priority the programs they hope to review within a given time period.

In the June 1978 program plan for the transportation systems and policies issue area, the Highway Safety Audit Group (HSAG) identified as a priority assignment the evaluation of the management and effectiveness of federal highway safety grants to states and local communities. This program covers about two-thirds of NHTSA's annual budget and is of considerable interest to Congress.

SCOPE OF HIGHWAY SAFETY GRANT PROGRAM REVIEW

In May 1979, HSAG began a review of the highway safety grant program and, on October 15, 1980, the group issued a report to the Congress, Highway Safety Grant Program Achieves Limited Success (CED-81-16). This review focused on the activities of state highway safety agencies and summarized the overall accomplishments of the program. The administrative responsibilities and duties of NHTSA's and the Federal Highway Administration's (FHWA's) headquarters, regional, and division offices were also reviewed.

Nine states were included in the review: Maryland, Pennsylvania, Illinois, Ohio, Texas, New Mexico, Colorado, South Dakota, and Utah. These states were chosen because they represent the following variances:

1. Four of the states are in the West, where motor vehicle fatalities increased 25 percent from 1975 to 1978.

2. Three of the states are in the Midwest, where fatalities increased 11 percent from 1975 to 1978.

3. Two of the states are in the Northeast, where fatalities increased only 3 percent from 1975 to 1978.

About 25 percent of the total \$1.3 billion in grant funds allocated through FY 1979 were provided to those nine states. Allocations by state ranged from \$6 million to about \$50 million. About 25 percent of the recent motor vehicle fatalities occurred within those nine states. Fatalities by state ranged from 200 to 3600 annually.

As many highway safety officials as possible were interviewed within the nine states, NHTSA, and FHWA. A number of aspects of the highway safety grant program were discussed, including (a) the ability of federal and state governments to perform adequate safety planning through data analysis and problem identification techniques and (b) the requirements that affect how the safety grant program is carried out, including mandating (earmarking) grant funds to specific safety areas.

WEAKNESS OF THE PROBLEM IDENTIFICATION PROCESS

Inadequate Data

State and NHTSA officials were concerned primarily about the lack of adequate data. The specific problems included lack of trained staff to gather and analyze data; cost of maintaining and updating data; lack of an adequate collection system to ensure uniform, complete, and accurate data; and NHTSA's inability to fill in where state systems are weak.

NHTSA and FHWA recognized many of these weaknesses during a joint task force effort to improve the content and quality of state accident data. The following conclusions were outlined in a draft executive summary issued in July 1981, Accident Data Improvement Plan:

1. Accident data are not collected uniformly within all states.

2. Accident statistics compiled from state-furnished information are incomplete.

3. Data elements available for accident analysis vary significantly among states.

4. Routine feedback needed to improve report accuracy is missing in the majority of the states.

5. Adequate accident investigation training is not provided for state and local police officers.

Other groups outside of government are concerned with the accuracy and completeness of state accident data. The American Motorcyclist Association, for example, recently issued a second report on the accuracy of current motorcycle statistics. It concluded that uniform and representative data, as well as credible exposure data, must be maintained before properly founded motorcycle safety programs can be developed.

Lack of Problem Identification Criteria

NHTSA's problem identification manual calls for states to generate a large number of reports from their traffic records. However, there are no specific criteria for states to determine how significant a problem must be before grant funds can be used to resolve it. As a result, state officials also complained that time and money were being wasted on data analyses that would probably not affect how the funds were spent.

The GAO report recommended that the U.S. Secretary of Transportation establish criteria for the level of analysis necessary to address safety problems and evaluate results and to work with state highway safety agencies to ensure that the criteria are followed.