DRIVING ATTITUDES AND BEHAVIORS: AN EXPLORATORY STUDY IN THE HIGH TRAFFIC FATALITY RATE OF ANTELOPE VALLEY, CALIFORNIA

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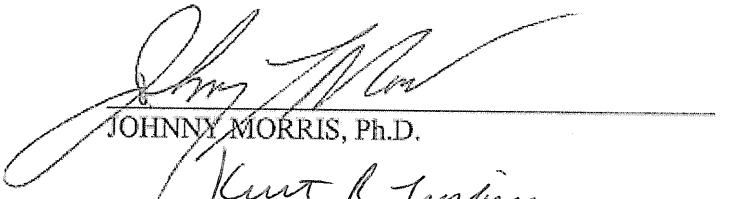

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Abstract

The commander of the California Highway Patrol Antelope Valley Office is facing a very serious management problem in the continually rising fatal motor vehicle accident rate in the Antelope Valley. Management's problem was exacerbated by having to cope with double-digit population growth in the valley while receiving no personnel increases or additional funding from the state. In helping management to understand the dynamics of this problem, this study has three purposes: presenting the commander with information on driving attitudes and behaviors and comparing responses between the public and law enforcement officers, presenting possible prevention and/or intervention programs for consideration, and establishing a basis for further study on this problem. The intent of this quantitative exploratory case study is not to determine any causal factors, but to present useful data and information for use by California Highway Patrol management in developing strategies in obviating motor vehicle accidents. The study also will demonstrate how prevention efforts must be through enforcement, engineering, education, and economy.

Dedication

This study is dedicated to those lives that might possibly be saved through future intervention and prevention programs regarding motor vehicle fatalities.

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CHAPTER 1. INTRODUCTION

Introduction to the Problem

The Antelope Valley region has the unfortunate distinction of having more deaths per capita rate caused by traffic fatalities than any other area in Los Angeles County, California, and is among the highest in the state. According to Los Angeles County Department of Health Services (2005) for years 2000-2003, the Antelope Valley had more than doubled the country rate of death from car mishaps with a 21.4 fatalities per 100,000 populations, while the county average was 9.4 deaths.

The California Highway Patrol (CHP) Antelope Valley Area office is responsible for approximately 3,400 miles of roadway in the Antelope Valley, of which 34 miles are freeway, 175 miles are state two-lane highways, and the remaining are "rural roadways." Two major urban areas are located within the Antelope Valley. The included cities of Lancaster and Palmdale have a combined total population of over 300,000. Outside these urban areas of the Antelope Valley, there are approximately 75,000 residents.

Background of the Study

Motor vehicle accidents on public roadways in the United States are annually responsible for approximately 50,000 deaths, 500,000 hospitalizations, and 5,000,000 injuries. They are the leading cause of death for Americans aged 1 to 34, and account for more than one-fifth of all causes of death of U.S. population from 5 to 39 years of age (Baker, 1992). Motor vehicle accident deaths account for about 30 % of injury deaths among children under 14 years-old, and more than 40 % of all injury deaths among teenagers 15-19 years old (Fingerhut, Annest, Baker,

Kochanek, & McLoughlin, 1996). While motor vehicles provide society mobility and ease of transport, they also create the potential for injury and death to vehicle occupants and other roadway users.

The California Highway Patrol (CHP) Antelope Valley Area has approximately 40 traffic officers patrolling these areas on a 24-hour basis. In the two major urban areas located within the Antelope Valley, the cities of Lancaster and Palmdale, the primary law enforcement agency for traffic accidents is the Los Angeles County Sheriff's Department (LASD); however, the CHP might be called upon for any assistance or expertise requested by the LASD. For the 75,000 residents that do not live within the city limits of these urban areas, the CHP has traffic responsibility; however, the LASD has police and crime investigative responsibility. The CHP and LASD have an outstanding working relationship and frequently assist each other according to needed support.

The evidence is mixed and controversy continues for safety experts and auto groups regarding reducing traffic fatalities. In 2004, the traffic fatality rate was at all time low, but the overall number of deaths increased, as 42,800 people died on the highways, an increase of 157 over 2003, with over 50 % of those killed not wearing seat belts (Thomas, 2005). The reason for the reduction in percent fatalities is that Americans are driving more miles, as fatality rate decreased from 1.48 deaths per 100 million vehicle miles in 2003 to 1.46 in 2004. This is the lowest since records began in 1966 when the rate was 5.50 deaths (Thomas, 2005). According to the National Highway Traffic Safety Administration, the number of vehicles registered grew to 235 million from 230.8 million in 2003; and vehicle miles traveled increased from 2.89 trillion in 2003 to 2.92 trillion for 2004.

In 2004, alcohol related deaths fell by 2.1 % to 16,654 from 2003 numbers. Fatal crashes involving teenagers (between ages of 16-20) increased from 7,353 in 2003 to 7,405 in 2004. Motorcycle fatalities rose for the seventh successive year by 7.3 % to 3,927.

Interestingly, opinions of causality of such a high traffic fatality rate vary by government agency. "Some agencies report an increase in number of traffic deaths; some report a decline" (Loughrie, 2005a, p. A1). The LASD feels that in the urban area there has been a decrease due to more traffic congestion that has slowed traffic down, and there has been more traffic infrastructure with additional traffic lights, turn lanes, etc. While the urban population in the Antelope Valley has had steady growth, urban traffic fatalities are on the decrease.

CHP has reported a rise and leveling of traffic fatalities in rural areas. "The accidents are random as far as time and location, with no real patterns to determine what roads or times of the year are deadlier than others" (Loughrie, 2005a, p. A4). CHP management has found no real patterns in urban or rural traffic deaths. CHP supervisors in the Antelope Valley office agree that because there are more open, rural highways in the area with little traffic, the accidents that occur are often fatal, as the Antelope Valley is the least congested area in Los Angeles County.

The steady increase in highway traffic fatalities is having a straining effect on the resources of the California Highway Patrol (Thompson, 2005). According to CHP management, what has developed is a vicious cycle where officers, due to higher accident and traffic death rates, are having to spend more time writing reports on accidents than in preventing them. Budgetary constraints have had a large impact on recruiting new officers, and the void caused by retirements and attrition has not been filled. CHP management feels that it needs 2,000 more officers at a minimum, for currently there are 4,700 officers patrolling over 100,000 miles of

state, federal, and unincorporated county roads. Officers are handling more then 230,000 crashes annually, which are 53,000 more than a decade ago. The time spent on writing reports has increased 25 % over the last five years, while time spent on patrol has decreased by 10 %. The result has been a reduction in traffic citations and warnings (Thompson, 2005).

Statement of the Problem

The problem of traffic accidents is not new and motor vehicle injuries and fatalities pose a significant threat to the health and well being of the nation. There are high economic and social costs associated with traffic accidents, especially those involving driving under the influence and young drivers. According to the National Highway Traffic Administration (2002) on a national basis:

1. Alcohol/drug related accidents cost the United States $45 billion annual, yet this estimate does not include suffering, pain, and loss of life.
2. Medical costs for 1993 traffic accidents injuries were approximately $22 billion.
3. The cost for each injured survivor of an alcohol-related accident averages $67,000.
4. Almost 1.4 million drivers were arrested for driving under the influence in 1997, which is more than all other reported criminal offenses except larceny and theft.
5. In 1997, an estimated 513,200 drivers found guilty of driving under the influence were on probation or incarcerated.
6. Persons ages 21 to 24 accounted for the largest number of driving under the influence arrests per 100,000 drivers in 1997.
7. While the crime rate in the U.S. has been on the decline, the rate of arrests for driving under the influence has been steadily increasing.

8. While 16- and 17-year-olds represent about two percent of all drivers, they are involved in approximately eleven percent of all motor vehicle crashes.
9. Traffic accidents are the leading cause of death for teenagers in the United States.

It is widely understood that traffic accidents are a major health and social problem in California, and Los Angeles County in particular. California has consistently ranked among the nation's leaders in fatal crashes and fatal crash rates. There is a very concerned and concerted effort to reduce traffic fatalities in California by the California Highway Patrol and county health agencies.

Specifically, the number of fatal traffic accidents has been increasing over the last five years in the Antelope Valley as it has become among the leaders in areas within California with the highest rate of traffic fatalities per population. The fatality rate has more than doubled from 2000 to 2004. According to the CHP Antelope Valley Area office, Table 1 is a synopsis of traffic fatalities over the last five years:

Table 1

Fatal Motor Vehicle Accidents in Antelope Valley: 2000-2004

Year	Fatalities	On State Freeway	On State Highway	On Rural Roadway
2000	25	8	9	8
2001	34	4	10	14
2002	39	9	5	21
2003	53	7	6	30
2004	47	8	11	24

Of particular interest to CHP and Los Angeles County Public Health Agency, is the concern about young drivers. Teen drivers have the highest crash rate per miles traveled of any age group in the United States in all categories from fatal to property damage (Robertson, 1996;

Voas, Fisher, & Tippetts, 2002). The statistics in Table 2 from the Insurance Institute for Highway Safety for 2002 are very telling:

Table 2

Percentage of Fatal Crashes by Characteristic and Age: 2002

Activity	16 yrs old	17-19 yrs old	20-49 yrs old
Driving error	85	78	66
Speeding	37	34	24
Single vehicle	50	46	40
3+ occupants	27	24	18
With 0.10+ BAC	11	22	43

Caught in the throes of state budget constraints and fiscal shortfalls, the CHP Antelope Valley Area commander is extremely interested in a study to examine public and law enforcement perceptions with regard to traffic fatalities in the hope of developing a community-wide fatal accident prevention and awareness program. The commander has been faced with shortfalls in funding, manpower, and resources in an area where the population has grown fourfold over the past 10 years.

Purpose of the Study

A lack of formal research, that is, "holes" in the literature, on motor vehicle fatalities in the Antelope Valley area supports the need for this investigation. A major goal of the study is to provide CHP management with effective information corroborated by quantitative research to support development of awareness and prevention programs by public and civic agencies. This study moves beyond the recognition of traffic fatalities as a social and public health problem, but aims at being an impetus for follow-on funding to investigate causal factors and potential interventions to curtail the growing traffic fatality rate.

The Antelope Valley area was selected because it has many features in common with a wide group of rural and rural-urban areas in California. The intent is to obtain the attitudes and perceptions of the public and professional law enforcement regarding driving and traffic fatalities in the Antelope Valley and compare the results with preexistent conditions (post hoc data). The intent is not to use fieldwork, questionnaires, interviews, or observations in an attempt to prove any thesis. The aim will be to record surveys of the public, survey experts, perform statistical analysis using Pearson *r* and chi-square for correlations and *t* test for test of independence of sample means, and compare results with post hoc data, identifying questions of causality, and suggesting potential areas for further study.

The purpose of this quantitative study is to explore synchronously the interwoven perceptions in fatal traffic accidents in the Antelope Valley. It will be an examination of individuals with and without polarized attitudes and their determined differences in behaviors and attitudes towards driving, enforcement, and possible interventions. The potential independent variables include:

1. Sex
2. Age
3. Race/Ethnicity
4. Education
5. Occupation
6. Number of years driving
7. Number of traffic citations received
8. Types of citations received

9. Attendance at driving school
10. Seat belt use
11. Types of roads traveled

These are proposed, and the final determination will be based on the data.

The possible dependent variables of various behaviors include:

1. Speeding
2. Alcohol use
3. Selection of highway type for travel
4. Adherence to traffic laws
5. Individualized driving behaviors
6. Traffic citations and types

Possible independent variables regarding attitudes include:

1. Attitude toward law enforcement
2. Attitude toward current speed limits
3. Opinion of current speed limits
4. Opinion of current road conditions
5. Opinion of current road signage
6. Attitude toward camera enforcement and radar enforcement
7. Attitude toward other drivers
8. Attitude toward high fatal accident rate
9. Attitude toward driving speed selection

Rationale

The results of any study concerning demographics, attitudes, and behaviors regarding driving in a rural roadway environment can provide useful information to the California Highway Patrol and the Los Angeles Public Health Department. If there is a perception of a difference in public, professional, and post hoc data, then it has potential use by these state and local agencies for sense of direction, training, community affairs and attitudes, and the possible establishment of intervention programs to reduce traffic fatalities in the Antelope Valley. The findings can also possibly assist school administrators and teachers, public officials, community and civic groups, advocacy groups, and the media in developing public awareness information and programs.

The intent is to identify data elements deemed to be potential contributory factors for fatal crashes and traffic fatalities. This will be done using a computerized database and querying tool for subsequent use in analyzing crash data, and investigating both behavioral and roadway-related causes of fatal motor vehicle accidents. The intent of this study is to be exploratory in nature, and not intended to find causal factors or develop countermeasures.

The Los Angeles Public Health Department has taken a keen interest in this study and is investigating the possibility of obtaining a state or federal grant to continue the study and provide possible additional funding for law enforcement and public works in improving roadways in the Antelope Valley. There has also been interest by top management of the California Highway Patrol to possibly fund similar studies in other areas in California.

Research Questions

Specific hypotheses will be developed upon analysis of the survey results and post hoc data. Preliminary hypotheses are as follows:

1. Is there an interaction of attitudinal responses based on major and minor demographic profiles?
2. Is there a relationship between the survey data from the public and law enforcement?
3. Do public and professional attitudes on factors reflect reality as seen in the research and post hoc data?
4. Is there a relationship between survey data and post hoc data?

Null hypotheses will be determined once preliminary data analysis has been conducted and a determination of a high/low concordance of data developed.

Significance of the Study

This study has academic as well as practical application for CHP management, Los Angeles County Health officials, public officials, state and county road maintenance management, and educators. This study gains some insight into the exact pathology of fatal traffic accidents in the Antelope Valley. The findings are important to state and local agencies in promoting safe driving and reducing traffic fatalities.

More than 52 % of traffic fatalities in the United States between 1999 and 2003 have occurred on rural, non-interstate roads and highways, a yearly average of 22,127 (NTSA, 2004). These roadways only account for 28 % of travel during this period. Improving safety on rural roads is a national imperative as rural residents, neighbors, and visitors are exposed to an

unacceptable level of traffic risk. California is among the top five states in the United States with the largest number of rural, non-interstate traffic deaths between 1999 and 2003.

Motorists on rural and state highways are approximately four times more likely to be involved in a fatal collision with vehicles going in the opposite direction than drivers traveling on all other types of roadways. Yet, only three percent of traffic fatalities on rural roadways were the result of passing another vehicle from 1999 to 2003. Most fatalities are the result of unintentional maneuvering, running off the road, or alcohol-related.

Rural roads and state highways are important to our national economy as they are critical links in the national transportation system. Rural roads are likely to have two lanes and poor roadway, including narrow lanes, limited shoulders, sharp curves, exposed hazards, pavement drop-offs, and limited clear zones alongside roadsides. The public is becoming more aware of additional state funding needed for rural and state highway improvements.

There has been increasing growth in rural communities, especially in California. As housing costs increase in metropolitan Los Angeles, more and more families are migrating to areas such as the Antelope Valley to acquire affordable housing and a small-town quality of life. Increased population has resulted in more travel on rural and state highways, increasing the potential for a rise in accidents and fatalities.

Many studies have recommended safety improvements including rumble strips, centerline rumble strips, improving signage and pavement/lane markings, installing lighting, removing/shielding roadside obstacles, adding guardrails, adding turn lanes at intersections, more stop signs/lights, improving roadway alignment and eliminating severe curves/turns, widening lanes, adding or paving shoulders, and more passing lanes.

More and more federal, state, and local areas are becoming more aggressive in addressing rural traffic safety. Other studies have pointed out successful community efforts on reducing traffic fatalities. These involve cooperative efforts between law enforcement, county health authorities, the media, public officials and councils, educators, and state and county road maintenance personnel.

This study has other important implications for other social organizations working toward reducing traffic accidents and fatalities and provides insights into what activities might be useful in attaining of goals.

Definition of Terms

Alcohol-related. A motor vehicle accident is considered to be "alcohol related" if the driver or non-occupant such as a pedestrian, that is involved in the mishap is determined to have a blood alcohol concentration (BAC) >0.01 gram per deciliter (g/dl). It is important to note that a collision that is "alcohol related" does not necessarily indicate that a crash or fatality was caused by the presence of alcohol (NHTSA, 2004).

Blood alcohol concentration (BAC). State of California law states that a BAC of 0.08 or greater is considered "driving under the influence" of alcohol.

Bott's Dots®. These are raised domes made out of plastic, ceramic or polyester that are placed on roadways using a fast-setting, tough epoxy. The rumble effect of the raised markers warns drivers that they are drifting out of the lane or drowsy drivers become awaken by the rumble effect (Lamm, 1996).

California Highway Patrol (CHP). The mission of the California Highway Patrol is to provide the highest level of safety, service, and security to the people of California. This is

accomplished through five departmental goals: (a) prevent loss of life, injuries, and property damage through minimizing the loss of life, personal injury, and property damage resulting from traffic collisions through enforcement, education, and engineering, and enforcing the provisions of the California Vehicle Code and other laws to prevent crime; (b) maximize service to the public and provide assistance to allied agencies through service to the public in need of aid or information, and to assist other public agencies when appropriate; (c) manage traffic and emergency incidents by promoting the safe and efficient movement of people and goods throughout California, and to minimize exposure of the public to unsafe conditions resulting from emergency incidents and highway impediments; (d) protect public and state assets through protection of the public, their property, state employees, and the state's infrastructure, and through collaboration with local, state, and federal public safety agencies to protect California; and (e) improve departmental efficiency by continuously look for ways to increase the efficiency and/or effectiveness of departmental operations.

Continuous shoulder rumble strips (CSRS). A shoulder rumble strip is a longitudinal design feature installed on a paved roadway shoulder near the travel lane. It is made of a series of indented or raised elements intended to alert inattentive drivers through vibration and sound that their vehicles have left the travel lane. On divided highways, they are typically installed on the median side of the roadway as well as on the outside (right) shoulder.

Curve speed warning system (CSWS). A CSWS is designed to warn if the vehicle is approaching a curve too fast for the current condition.

Divided roadways. A highway divided down the middle by a barrier that separates traffic going in different directions.

Driving under the influence (DUI). According to the California Vehicle Code a BAC > 0.08 g/dl is legally "driving under the influence."

Highway types. In California, highways take on all different forms of highway types from two lane conventional roads to modern freeways. The following is a list of terms and their definitions in the context of California. There are also some non-California terms that are applied to US highways in other states.

1. *Conventional highway*. As the name implies, this is the standard arterial road type in California. They can vary in width from two lanes to eight, but generally top out at four. They look and feel like a normal street, complete with stop signs, signals, and full access from businesses and residences.
2. *Expressway*. On the East Coast, an expressway is the catchall term for a grade separated limited access highway. In California an expressway is simply a limited access highway; essentially a freeway with at grade intersections, but divided and built to freeway standards. Technically, in California all expressways are freeways, but in general practice expressways are a different entity. Originally many current freeways were constructed as expressways during the late 1940s and early 1950s and had grade separated interchanges added later. Examples of expressways include SR-111/SR-86 between Indio and El Centro, SR-152 between SR-99 and the Pacheco Pass, and SR-76 to the north and east of Oceanside, California.
3. *Freeway*. Generally a freeway is a grade separated divided highway designed for high speeds. Contrary to popular belief, a freeway is not a highway "free" from tolls. The "free" in freeway instead refers to a legislative definition passed by the California

Legislature in 1939 which provided for a highway that would be free of encroaching properties and which provided for control of access. At the time this was very controversial since property owners next to the road could have no rights of direct access.

4. *Rural roadway (highway):* An arterial roadway that traverses a rural area and is usually two-lanes in opposite directions. Some state divided roads are located in rural areas and are also considered rural roadways.

Lane drift warning system (LDWS). A LDWS is designed to warn in the event of an unintentional drift out of the travel lane, typically due to driver drowsiness, distraction, or inattention.

Los Angeles Sheriff's Department (LASD). The Los Angeles Sheriff's Department operates the county jails and courts and provides law enforcement for communities that have not incorporated into cities. Palmdale, Lancaster, and other cities in the Los Angeles County contract with the Los Angeles County Sheriff's Department to provide services in their cities, including law enforcement, traffic and fire/paramedic services. This contract provides all services of a normal police department (including extra services such as SWAT teams, specialized detective units, air support and emergency services) to contracted cities.

Primary cause factor (PCF): This is the terminology used by the California Highway Patrol in investigating accidents and determining causal factors.

*Primary seat beltl aw:*A police officer may stop a car for that violation for that offense.

Run off the road (ROTR): Run off the road (ROR) accidents, either single or multivehicle, and are often listed as a primary cause factor (PCF) in traffic collisions.

*Secondary seat beltl aw:*A police officer can only cite for the offense when the vehicle was stopped for another reason.

State roadway. A roadway that has state designation and is entirely located in that state.

Statewide Integrated Traffic Records System (SWITRS). This is a database of all traffic accidents and fatalities in California and is compiled by year.

Traffic collision (TC). A term used by law enforcement for a traffic accident.

Vehicle code (VC). The *California Vehicle Code.*

Assumptions and Limitations

Assumptions

The following are preliminary assumptions concerning the study:

1. Empirical evidence will determine differences of the general public in their perceptions of driving and driving habits and will exhibit distinct differences based on specific demographics such as age and gender.
2. There will be a distinctly different perception of concepts such as speed, road condition, traffic enforcement, speed limits, traffic conditions, and traffic court between the general public and law enforcement professionals.
3. There is the presumption that the veracity of responses, even in an anonymous public survey, will have Type I and Type II errors, and results may or may not be fully valid. This may be the result of the respondent answering the survey in an expected manner rather than objectively.
4. There is the assumption that law enforcement professionals will not have the same expectation errors as the public sector regarding Type I and Type II.

5. There is the assumption that post hoc data is readily available for years indicated.

These factors will be verified through statistical analysis.

Scope

There is the danger, never wholly avoidable, of not being completely objective in viewing and studying a phenomenon in which one has personal knowledge and activity. It is possible to fall into the old error of beginning, despite best intentions, with emotionally weighted presuppositions and consequently failing to get outside the study area one has set out so bravely to objectify and study. Granted that no one phase of traffic fatalities can be adequately understood without the study of all the rest, the task of investigating traffic fatalities can be a monumental undertaking; however, time and funding preclude conducting an extensive study into causal relationships.

Instruments. The instruments to be used in the survey are modified from an instrument used by The Gallup Organization in 2003 for the National Highway Transportation Administration titled *National Survey of Speeding and Unsafe Driving Attitudes and Behaviors—2002*. (This study was not copywritten; however, attempts to ask permission as a courtesy proved fruitless.) The modifications were to make the instrument specific to the Antelope Valley rather than a national poll.

The survey instrument was designed as a collection of data on a number of units with a view to systematically collect a body of quantifiable data with respect to the variables. These variables will then be examined using statistical methods to discern any associative patterns (Robson, 2002). The instrument also binds the researcher by asking the same question of all respondents and having to impute the same intent to all respondents giving a particular response.

The intent is to gather data about a population's knowledge, opinions, attitudes, and behaviors. It also explores why people act or believe in a certain manner (Babbie, 2004; Leedy & Ormrod, 2005).

As a quantitative survey, the instruments attempt to find correlations between variables, and seek objectivity, generalization and reliability (Creswell, 2003). The researcher controls but is removed from the study. This method was selected because there is little or no existing research on this topic in the Antelope Valley.

The questionnaires will have demographic and semantic differential formats to determine meanings of attitudes and prove the construct profile and assist in direction and attitude. The Likert scale will be use to focus on intensity or responses. The last portion will have closed-ended questions based on finding from the pilot study and pretesting. These questions will determine consistency and help in the development of a key word listing (modified content analysis).

The design will attempt to ensure that respondents understand the questions in a way the researcher intends, have accessible information to answer them, be willing to answer the questions, and actually answer them in the form called for in the survey. The point is that respondents understand what is required, and are willing to truthfully answer the questions while the questions remain faithful to the research task (Babbie, 2004; Robson, 2002). This survey, not unlike other quantitative surveys, is intended to measure attitudes by demographic profiles

Population. The population for the study is not restrictively random, but a population of convenience and selected for ability or willingness to participate. The sample size may or may not be representative of the general population. The intent is to get a cross section of drivers of

age and gender in a form of dimensional sampling. Bias is a serious concern regarding representativeness. This carefully selected probability sample in combination with the standardized questionnaire offers the possibility of making descriptive assertions about the larger Antelope Valley population (Creswell, 2003).

Limitations

The following are the limitations of this study:

1. Since this is an exploratory study and uses convenience sampling, it cannot be generalized to other counties or areas within California or the United States. Even though the data are from a general population and expert samples will be rich, the results cannot be generalized, therefore external validity cannot be claimed.
2. The research uses a survey to collect actual project data using non-probabilistic sampling method. Since this is an exploratory study and the availability of actual post hoc data is one of the assumptions, the non-probabilistic sampling is accepted for this research.
3. "It is virtually impossible to determine whether or not the respondent is giving serious attention to the questions, or regarding the exercise as a tedious chore to be completed in a perfunctory manner" (Robson, 2002, p. 253).
4. Responses can affect data by respondents' characteristics, e.g., memory, knowledge, experience, motivation, and personality. Respondents may purposely or involuntarily have a social desirability response bias—responding in a way to show themselves in a good light (Robson, 2002).

5. The study was limited by the subjectivity of the researcher who functioned as the instrument of inquiry. The researcher was influenced by involvement with the California Highway Patrol, familiarity with traffic data, and past role in accident investigation. All efforts will be exercised to ensure against bias or influence.
6. Surveys often represent the least common denominator in assessing people's attitudes, orientations, circumstances, and experiences. Yet, this standardization can lend itself to the loss of important ideas or comments that may be lost, and the survey can seem superficial when dealing with complex concepts (Creswell, 2003). Surveys cannot measure social action, as they can only collect self-reports of recalled past action (Babbie, 2004).
7. A limitation can be validity, as the artificiality of the survey puts a strong emphasis on validity. Peoples' opinions on issue seldom take the form of *strongly agree*, *agree*, *neutral*, *disagree*, *strongly disagree*. Therefore, all data must be considered approximations.
8. The study is not able to examine the nature of other policy designed to reduce motor vehicle accidents such as air bags, seat belts, vehicle safety feature, accident prevention engineering in modern vehicles, or motor vehicle inspections.
9. The study will involve traffic fatalities under the purview and interest of the California Highway Patrol, and will not involve accidents and fatalities within the city limits of Lancaster and Palmdale, the major urban areas within the Antelope Valley which are patrolled and investigated by the Los Angeles County Sheriff's Department. The concentration will be traffic collisions on rural and state highways.

10. The primary researcher is a volunteer with the California Highway Patrol Antelope Valley Area and is very familiar with traffic accidents, accident investigations, and traffic accident reporting. Familiarity with the subject matter always has the potential of infusing unintended bias into the study.

Nature of the Study

The study will use the methodology of correlation research. Several characteristics of the general population of Antelope Valley will be correlated to discover the extent to which they are related. The proposed variables are sex and age, and dependent variables of various attitudes and behaviors concerning driving and fatal motor vehicle accidents with the possibility of these being temporal and others that are mediating. There is no intent to develop any cause and effect relationships. Attitudes and behaviors of the selected population will be compared with perceived attitudes and beliefs of law enforcement professionals. Both the general population and professional attitudes on these factors will be examined to see if they reflect reality as seen in the post hoc research data.

Organization of the Remainder of the Study

The intent of this case study is a search for understanding, a description of things that are happening, without the expectation of causal explanation. The study will attempt to perceive what is happening regarding driver attitudes and behaviors in the Antelope Valley in terms of descriptive variables, and represent what is happening with scales and measurements (Stake, 1995). Efforts will be to operationally bound the inquiry, to define the variables, and to minimize the importance of interpretation until the data are analyzed. The dependent variables will be

experientially rather than operationally defined, and even the independent variables are expected to be developed in unexpected ways.

Chapter 2 will contain the literature review pertinent to the study. The objective of the review is to provide a framework of the problem for the purpose of establishing a rich context for the study being undertaken. The literature will assist the reader by providing a background into the theories and research regarding motor vehicle accidents and fatalities.

Chapter 3 will explain the data gathering methodology and plan, and will include a definition of the case, a list of the research questions, identification of assistants, data sources, allocation of time, expenses, and intended reporting. Instruments will be explained with rationale, resources, development, scales, and reliability and validity issues. Populations and variables, independent and dependent, will be developed; and pilot test will be conducted.

Chapter 4 will contain the actual collection of data and analysis. Ethical guidelines will be presented as well and an explanation of the efforts taken to protect privacy and confidentiality of respondents. A step-by-step explanation of the collection process will be provided. The types of statistical analysis that will be used will be covered in detail with explanations and rationale in the hope that this aggregation will reveal issue-relevant meanings.

Chapter 5 will be a discussion of the results, conclusions, and recommendations. Also included will be a discussion of areas where further research would prove beneficial.

CHAPTER 2. LITERATURE REVIEW

Introduction

Rather than providing a definitive direction for the research, this literature review was developed to be consistent with quantitative research methodology and dealing with post hoc data. The purpose of this review is to provide a framework of the problem for the purpose of establishing a rich context for the study being undertaken. The goal of this framework is to provide a reference in the development of the survey instrument and examination of the post hoc data. Specifically, the literature review addresses motor vehicle fatalities from the aspects of social factors, drivers' attributes, roadway factors, driving behaviors, and enforcement.

Motor vehicles are important factors in modern society as they transport people and goods, provide recreational opportunities, and are used daily by people going and coming from their employment. Unfortunately, their use also creates the potential for injury and death to drivers, occupants, other road users, and pedestrians.

Globally, traffic accidents are a major cause of morbidity and mortality worldwide, and it is estimated that more than 3,000 people are killed every day in traffic fatalities worldwide, with at least 30,000 more injured or disabled. The total becomes over 1 million people killed and between 20-50 million injured or crippled worldwide every year (Dahl, 2004; Nantulya, Sleet, Reich, Rosenberg, Peden, & Waxweiler, 2003; Nantulya & Reich, 2003). Road traffic fatalities have an enormous emotional and economic effect on households, with medical costs, funeral costs, and income loss (Nantulya & Reich, 2003).

A number of studies have attempted to identify determinants of fatal motor vehicle accidents. Researchers have used a myriad of designs, and many differ with respect to the number and type of variables being investigated.

Social Factors

Economic Conditions

Several variables such as wages, the industrial-production index, real income, and unemployment rate have often been used to measure economic conditions. Pelzman (1975) argues that the effect of income on traffic fatalities was a priori ambiguous and used real earned income per working age adult as an economic condition variable. Pelzman argues that as income increases, consumer demand for safety and intensity of driving increases as in his assumption they are labeled as consumer goods. Crandall and Graham (1984) pursued this study and found that the coefficient on earned income was positive and significant in the occupant deaths case, positive and significant in occupant death rate case, but positive and insignificant in the pedestrian death rate case.

Foster et al. (1984) produced a study using a system of equations to study traffic fatalities. They found that real income was positively related to fatalities, indicating that the value of time dominates the income effect. The effect is waning safety habits at higher levels of income. They also found that real income had a negative effect on speed concentration, indicating that higher income leads to greater risk-taking. These authors concluded, with their equations, that increasing income apparently leads to forms of risk-taking that is not related to speed. Further studies by Zlatoper (1984), Garbacaz (1995), and Loeb and Giland (1984) suggest that income variable is significant and positively related to traffic fatalities.

Joksch (1984) used the motor vehicle accident death rate as an independent variable, and argued that many economic variables, such as automobile sales or unemployment with a trend, worked well as the index of industrial production (IIP). Joksch used the IIP and found it superior to the others and in all cases IIP was significant and positive. Wagennar's (1984) estimation coefficients showed that unemployment rate was negatively related to traffic accidents. Wagennar used monthly data that showed a lag relationship—an increase in drivers involved in crashes the month following a change in unemployment. Wagennar also found that the net effect of unemployment on crash involvement was inverse and quite small in magnitude. The study also found that there was not significant relationship between unemployment and vehicle miles traveled, but vehicle mileage was a significant variable in crashes. Partyka (1984) showed a significant negative relationship between the unemployment rate and total fatalities in both short (1975-1982) and longer (1960-1982) periods of time.

Evans and Graham (1984) supplied detailed explanations about the relationship between economic conditions and traffic fatalities. They proffered significant reasons why traffic fatalities might be related to economic conditions. They explain that since travel is an economic "good," the expectation is that traffic fatalities would increase with economic prosperity as travel would increase; alcohol consumption and driving under the influence may also be procyclical if alcohol and recreational driving after drinking are normal goods; there would be more teen drivers as a result of prosperity; more social drinking away from home can result in more driving under the influence; drivers might be more inclined to drive faster as higher wages increase their opportunity cost of driving; and the increase of vehicle occupancy rates due to recreational and

vacation family-travel increases with prosperity. In times of recession, teenage drivers might lose their driving privileges.

Evans and Graham (1984) also provided arguments related to traffic fatalities in recession periods. Drivers might be inclined to take more risks in periods of economic hardship of recession as they might have the perception of having less to lose regarding risk-taking. Suicides might increase during recession periods as unstable individuals might be faced with psychological depression. Recession might impact government agencies as they might be faced with road repair/construction cutbacks, reduced budget for police enforcement, and reduction of media promotion of safety programs.

Rural areas tend to have lower median household incomes, higher percentage of the population below the poverty line, and higher percentages of lower educational levels. Stamatiadis and Puccini (1999) found that socioeconomic characteristics had an effect on single-vehicle crashes, but they had no significant effect on multivehicle crashes.

Race. The burden of crash mortality and morbidity is distributed unevenly among ethnic groups. In the United States, Native Americans have the highest motor vehicle crash rates per 100,000 individuals, followed by Whites, African Americans, and Asians (Baker, O'Neill, Ginsburg, & Li, 1992). Crash-related death rates among Native Americans are two to three times higher than other population ethnic groups, as overall motor vehicle crashes account for about 40 % of all injury mortality among Native Americans. (Compos-Outcalt, Prybylski, Watkins, Roothfus, & Dellapenna, 1988; Grossman, Sugarman, Fox, & Moran, 1997).

Grossman, Sugarman, Fox, and Moran (1997) investigated crash injury risk factors in Native American groups in a two-county study in New Mexico from police reported crashes.

Compared to non-Native American victims, the investigators found a higher prevalence of alcohol-impaired drivers and a lower prevalence of restrained vehicle occupants among the Native American involved crash victims, especially in rural areas. While acknowledging the limitations of data based on police reporting, the investigators concluded that the increased risk of crash injury and mortality among Native Americans may be explained by a high rate of alcohol use and intoxication and low seat belt usage among Native American drivers (Grossman et al., 1997).

Schiff and Becker (1996) conducted a study of traffic fatalities in New Mexico, which has among the highest fatality rate in the United States. The study found that Native Americans had two to three times the fatality rate than Whites in New Mexico. They found that the most involved age groups were from 15-20 years old, higher in males than females, ad twice to three times higher than Hispanic rate and is supported by Briggs, Levine, Haliburton, Schlundt, Goldzweiz, and Warren (2005). Schiff and Becker (1996) also found that 77 % of Native Americans involved in fatal traffic accidents had detectable BAC, had fatalities on rural roads, traveled greater distances, had less access to emergency facilities, traveled at high rates of speed, traveled over roads of poor condition, and had less seat belt usage. They also reported a 28 % improvement over recent years due to mandatory seat belt law, improved medical services, increased vehicle safety requirements, road improvements, and educational campaigns.

Another study by Compos-Outcalt, Prybylski, Watkins, Roothfus, and Dellapenna (1988) documented a higher prevalence of alcohol-involved mishaps among fatally injured Native American crash victims, as compared to non-Native American victims. These findings led the

researchers to conclude that the issue of driving under the influence of alcohol need to be aggressively addressed among Native American populations.

It should be noted, however, that both of these studies measured risk factor prevalence among crash involved victims only. These measures do not necessarily reflect the rate of seat belts or alcohol usage in Native American and non-Native American populations. Using prevalence data to make inferences about the frequency of risk-taking behaviors in an entire population may lead to erroneous conclusions.

Minority groups, particularly African Americans, are disproportionately represented among those victims who die as a result of injury. Homicides account for much of this racial disparity; however, other forms of injury also contribute significantly to the differential. The reasons for higher rates of death to Blacks caused by residential fires, drowning, pedestrian mishaps, auto collisions, and homicides are unclear (Onwauchi-Sanders & Hawkins, 1993).

"Hispanics are over-represented in DUI arrests and in more multiple offenses than Whites" (Bond & Cherpitel, 2004, p. 1164). In California, 46 % of arrests for driving under the influence were of Hispanic ethnicity. This is twice the proportionate Hispanic population in California. Studies also found that more Hispanics were driving with suspended or no driver's licenses in California (Bond & Cherpitel, 2004). The study does not take into account the number of illegal and undocumented Hispanics that may not be represented in the census data.

Previous work has documented significant differences in injury mortality across racial groups. The researchers suggest that many risk factors are not linked to race per se, but are related to race through the effects of economic circumstances. For example, citing the over-representation of Black children in pedestrian fatalities in the U.S., it has been hypothesized that

income disparities between Blacks and Whites explains the greater exposure to risk experienced by Black children. Specifically, many Blacks live in areas where there are no safe places to play, where there are no pedestrian crossings, and there is a lack adequate street lighting. Many Native Americans and Blacks drive older and mechanically unsound vehicles than other ethnic groups. Many Native Americans live in rural areas where the roads are inadequate and emergency services are not readily available. Many researchers have concluded that the "effect" of race on differences in injury mortality rates reflects the effect of social class.

Drivers' Attributes

Gender

In a Finnish study, Laapotti & Keskinen (1998) investigated the differences in male and female drivers between 18 and 21 years regarding loss of control of the vehicle. In males it was found that 70 % of the time it was a single-vehicle crash as a result of losing control of the vehicle. Most of the incidents were in evenings and nights, in dry conditions, and likely to involve alcohol. Males were more inclined to exhibit risky driving habits, often in "showing off" their abilities.

Females drive fewer miles than males, and are more likely to be injured or killed as a passenger rather than driver. Females were more likely to lose control and be involved in a multi-vehicle accident. The majority of female driving accidents were in poor weather conditions, where they lost vehicle handling (Cooper, Pinili, & Chen, 1995).

Mayhew, Ferguson, Desmond, and Simpson (2003) conducted an extensive study on female drivers. The study found that since the 1980s, female deaths in traffic collisions had been on the increase. Licensing of women has increased since 1975 and now constituted 50 % of all

licensed drivers, as 85 % of all women have licenses as compared to 93 % of males. Miles driven by women had gone up 135 % and their involvement in fatal accidents had correspondingly grown from 17 % in 1974 to 27 % by 1998. More women were entering the workforce and were driving more and exposing themselves to accidents at a greater rate (Dee & Sela, 2003; Mannering, 1993; Mayhew et al, 2003).

Older Drivers

According to the National Traffic Safety Administration (2004), in 2003 there were 26 million people age 70 years and older in the United States, or 9 % of the total population. It is anticipated that the percentage will change over the next two decades as "baby boomers" reach retirement age and beyond. There are approximately 20 million drivers 70 years or older, and in 2002 they were 10 % of the licensed drivers.

In 2003, there were 145,000 older individuals injured in traffic accidents, accounting for 5 % of all individuals involved in traffic collisions. These seniors made up 12 % of all vehicle occupant fatalities and 16 % of pedestrian fatalities (NHSA, 2003). Older persons involved in traffic fatalities 82 % of the time during daylight, 71 % on weekends, and 74 % of the time involved with other vehicles. Older drivers involved in fatal crashes had the lowest BAC of 0.08 or higher, i.e., the lowest proportion of intoxication among drivers. Seventy-four percent of all older occupants of passenger vehicles involved in fatal crashes were using seat belts, compared to 61 % for other age groups. It is anticipated that this number will grow (Dee & Sela, 2003).

In their study in Alabama, Stalvey and Owsley (2000) found that older drivers are more likely to be killed than younger ones in a traffic accident. "Older adults have a higher crash involvement rate/mile driven than all other age groups" (Stalvey & Owsley, 2000, p. 442). The

study attributes this to a decline in performance capabilities, a high incidence of cognitive and visual impairment, and a feeling of loss of independence if there is a cessation. “Most older drivers in this study do not currently perform self-regulatory actions on a regular basis, yet have self-efficacy in their ability to do so” (Stalvey & Owsley, 2000, p. 450). Most seniors feel the need to drive as it is a factor of their independence (Wang, Abe, and Kano, 2003).

Stalvey and Owsley (2000) found that driving behavior was 94 % of the cause of motor vehicle accidents involving seniors. Their study advocated a program of prevention that included: education on proper driving behaviors, lifestyle improvements regarding nutrition, exercise, and smoking, making seniors aware of limitations, how to avoid risky situations, and reducing driving situations by using public transportation, family, and younger friends. Other studies found that roadway warning devices such as CSRS can help reduce traffic accidents among older drivers as it helps in judgment and confidence of seniors (Wang, Abe, and Kano, 2003).

Young Drivers

Teens have the highest probability of having a fatal accident than any other age group measured on miles traveled (Beck, Hartos, & Simons-Morton, 2002; Dee & Evans, 2001; Gregerson & Berg, 1994; Hartos & Eitel, 2002; Hoover, Hover, & Young, 2000; Williams & Karpf, 1984). Interestingly, they have the highest involvement rates in all types of crashes from fatality to property damage only. The worst age group is 16 year-olds, who are beginning drivers and have limited experience and immaturity that results in risk-taking and overestimation of their skill level (Dee & Evans, 2001; Hartos, Eitel, Haynie, Simons-Morton, 2000; Gregersen & Berg, 1994).

In 2003, NHTSA FARS data points out that 16- to 24-year-olds comprised 24 % of all traffic fatalities compared to 6 % for ages 0 to 15, 45 % for ages 25 to 54, and 24 % for ages 55 and older. Based on a per population basis, drivers under the age of 25 had the highest rate of fatal crashes than any other driving group. The restraint rate (53 %) is the lowest for vehicle occupants ages 10 to 24, the highest being those over age 65 (74 %). A sixteen-year-old driver is more often involved in driver error fatalities; and when combined with the remainder of the teenage drivers, the number is more than double that of drivers from 20-49. More of the 16-year-old fatal traffic accidents involve a single vehicle and are typically high-speed crashes in which the driver lost control or ran off the road. Sixteen year-olds are more apt to have passengers in the car when involved in a fatal traffic accident, and the risk increases with each passenger (Cooper, Pinelli, & Chen, 1995)

Many teens feel that the newly minted driver's license is their ticket to freedom, and parents now have someone who is more than willing to run those tedious errands and no longer have to chauffeur these children around. However, the price can be dear as teen traffic fatalities have been on the increase over the years (Dee & Evans, 2001).

Graduated licensing, instituted in California, is one method of helping reduce teen accidents and fatalities. This method contains various restrictions on teenagers obtaining a driver's license. The goal is to have them go through an iterative process thereby having them gain some experience and maturity before allowing them to go unfettered out onto state roads. The methodology is to restrict night driving, limit teen passengers, establish zero tolerance for driving under the influence, and have a required specific amount of supervised driving practice with an adult over the age of 25. While graduated licensing laws have reduced teenagers' crash

rates in the United States, Canada, and New Zealand, not all states have adopted such laws (Foss & Evenson, 1999).

Driver education in high schools can contribute to lowering the accident rate among teens, but should not be considered as a panacea. Studies have shown that it, in itself, does not produce safer drivers. Poor driving skills and lack of knowledge of traffic laws are not always the causal factors in teen fatal accidents. Teens are naturally rebellious and their attitudes and decision-making skills can be a significant contributory factor (Clarke, Ward, & Truman, 2005). Peer pressure weighed greatly on teens, and often has more influence than parents or adults. They often feel that they are immortal and in many cases overestimate their skill or safety protection provided by modern vehicles. This can be a causal factor in their desire for speed, thrill-seeking, lack of safety belt use, and showing off. Changing these behaviors requires more than education and training. Also research has shown that there is no empirical evidence that post-license education is effective in preventing road injuries or crashes (Beck, Hartos, & Simons-Morton, 2002).

A study by Hoover, Hoover, and Young (2000) found similar results as Youth Risk Behavior Surveillance Survey (YRBSS) in 1999 conducted by Kann, Kinchen, Williams, Ross, Lowry, Grunbaum, & Kolbe concerning teen drinking. They found that 50 % have used alcohol, 37 % drank heavily, 33 % had ridden with an intoxicated driver, 16 % had been arrested for DUI, and 13 % admitted to driving under the influence.

Hoover, Hoover, and Young (2000) point to an effective program “Every 15 Minutes” at Kickapoo High School in Green County, Missouri. It is a pre-, postintervention program directed at high school students. Emphasis is on alcohol consumption, behavior toward alcohol and drugs,

effects and driving, and overwhelming statistical evidence of alcohol-related deaths of teenagers on the roadways. Postintervention findings were a reduction in teen deaths but required reinforcement from teachers, administrators, public officials, and parents to be effective.

Windle (2003) conducted a study on drinking among college students. Findings were that 40 % of college students indulge in binge drinking and average age of initiation to alcohol was 15.9 years and 32 % had experimented with alcohol before the age of 13. Twenty seven percent admitted to having driven under the influence of alcohol (Whites 31.2 %, Hispanics 24.8 %, and African American 14.7 %) and 35 % had ridden in a vehicle where the driver was under the influence of alcohol or drugs. This study pointed to the importance of having anti-DUI campaigns in universities and colleges.

In a study at a Tennessee university, Mauck and Zagummy (2000) found that "many studies have found that U.S. college students prefer to drink alcohol over the use of other drugs, indicating that driving under the influence prevention remains an important issue" (p. 23). They found that 2.5 % had been stopped by the police for DUI, 79.8 % had ridden with a driver under the influence, and 26.9 % had a family member or friend involve in an alcohol-related motor vehicle accident. Mauck and Zagummy emphasize the importance of changing social norms on drinking and driving among college students and promotion of the "designated driver" program. These findings are reinforced in a similar study by Usdan, Schumacker, and Bernhardt (2004) of Harvard University.

The most influential factor in reducing teen drinking and driving and teen traffic fatalities are parents (Beck, Hartos, & Simons-Morton, 2002; Dee & Evans, 2001; Hartos, Eitel, & Simon-Morton, 2002; Laapotti & Keskinen, 2004; Robertson & Zador, 1978). It is important to have

parents restrict accessibility to automobiles, develop limits in teens expressing independence and autonomy, monitoring young peoples' activities, developing rules and expectations, and provide supervising guidelines regarding driving (Hartos, Eitel, & Simon-Morton, 2002). Only school or public based programs are not as effective as parental control (Beck, Hartos, & Simon-Morton, 2002). The best programs involve parents, teachers, administrators, public officials, law enforcement, courts, and volunteers (Hoover, Hoover, & Young, 2000).

A German study (Gregersen & Berg, 1994) suggested the importance of teen lifestyle as a factor in driving behavior. This includes how one lives, which groups does one belong to, and what are interests, activities, and preferences. This study found that the high risk teen drivers were those that have a lot of leisure time away from home, frequent discos, pubs, and clubs, prefer action films, reject social films, are considered punk rockers, and drink a lot of alcohol. This study is interesting but lacks statistical reliability due to small sample taken. This is an interesting study when used in conjunction with other factors: level of actual knowledge and skill in driving, driving experience, and individual level of development and maturity.

Alcohol use by sixteen year-olds is somewhat less than the other groups. Thirteen percent of drivers involved in traffic fatalities in 1998 had positive blood alcohol concentrations (BAC), and 8% had BACs of 0.10 or greater. (NHTSA, 2003a). Nighttime driving can be very hazardous for novice drivers, and the nighttime fatal crash rate for 16 year-olds is about twice that of the day rate. Of serious concern is the general reluctance of teenagers to wear seat belts.

Seat Belts

Seat belts reduce substantially the risk of driver injury or fatality (Golden & Hatcher, 2001; Foss, 1989; Houston & Richardson, 2002). Manual lap and shoulder belts are more

effective than other constraint types. Seat belts are most beneficial in single car crashes and ROTR-type accidents than in multivehicle collisions (Preusser, Williams, & Lund, 1991). The traffic safety literature indicates that air bags offer a modest degree of additional protection to belted occupants and the seat belts without air bags are more effective than air bags without seat belts (Calkins & Zlatoper, 2001; Preusser, Williams, and Lund, 1991).

Drivers involved in traffic fatalities, on the whole, operate their vehicles in a riskier manner than those not involved in accidents. The rate of seat belt use is greater in the general population than those killed in traffic accidents (Houston & Richardson, 2002). Hunter (1993) found that unbelted drivers had a crash involvement rate 35 % higher than seat belt wearers.

Unbelted and belted drivers suffer different injury experiences, as, according to Lestina et al. (1987), unrestrained drivers are more to suffer severe injuries, and their injuries are more likely to result from steering wheel or windshield contact. These differences are explained by the mechanism of restraints, as these belts tie the occupant to the car, helping the occupant to decelerate over a relatively long period, and keeps the occupant from striking the interior of the vehicle, making the person's course of motion within the car more predictable and safety can be engineered within the car. Unrestrained occupants keep in motion upon striking another object in a collision, and the direction is unpredictable, and the person's motion will only stop when hitting another rigid surface or outside the automobile, making it impossible to design-in safety.

All 50 states and the District of Columbia have child restraint laws (Foss, 1989). However, Kingston, Chen, Elliott, Arbogast, and Durbin (2004) found that 62 % of children aged 4 to 8 years remain unrestrained. The effectiveness of mandated seat belt regulations is very ambiguous, bother theoretically and empirically according to Calkins and Zlatoper (2001). Their

study suggests that it has been empirically demonstrated that seat belt regulations as a primary enforcement factor has been somewhat effective, but the efficacy of any mandated seat belt laws is mixed. Injury severity has decreased but accident frequency has increased, and rear seat fatalities have risen when only a front seat law is enforced. In a Japanese study, Ichikawa, Nakahara, and Wakai (2002) found that compared with the risk of death and severe injury of front seat occupants in cars with unbelted rear seat occupants, the "risk of death of unbelted front seat occupants with unbelted rear seat was five times" (p. 43). They state that if the rear seat passengers had used seat belts, 80 % of deaths of rear seat occupants could have been avoided.

Interestingly, Calkins and Zlatoper (2001) found "Although it is generally agreed that motorists wearing seat belts will be better protected than those not using seat belts, new evidence has emerged on the overall effectiveness of mandated usage" (p. 716). They suggest that this may be the result of offsetting behavior, that is, the feeling that a person can indulge in more risky driving behaviors because of seat belt security and improved automobile safety.

Roadway Factors

Rural Roads

Of the traffic fatalities in the United States from 1999-2003, more than half (52 %) have occurred on rural, non-interstate highways and roads, even though these roads account for only 28 % of the road traffic during the same period. According to The Road Information Program (TRIP), a national nonprofit transportation research group, in a news report released March 3, 2005, found that there has been an annual average of 22,127 traffic fatalities on U.S. rural roads from 1999-2003, which accounted for 52 % of all traffic fatalities during that period (44,301 people killed annually). In 2002 alone, 42,815 people died on highways, 60 % were on rural

highways which constitute 75 % of U.S. highways but only 40 % of total vehicle miles (Dissanyake & Ratnayake, 2005). The TRIP report found that the five states with the largest number of rural traffic deaths from 1999-2003 are: Texas, California, Florida, North Carolina, and Pennsylvania. Motorists traveling on rural roadways and highways are six and one half times more likely to be killed in a motor vehicle accident than other motorists. However, as the TRIP (2005) report points out:

> Rural roads are a critical link in the nation's transportation system, increasingly providing access between urban areas and the U. S. Heartland. Rural roads are the backbone of the country's food distribution system and the primary means of travel for the more than 60 million Americans who live in rural areas and for those who visit these areas. However, traffic fatalities on rural roads are occurring at a rate approximately three-times higher than on all other roads. Meeting the growing demand for safe and efficient mobility in rural America will require a significant increase in the commitment to improving the design and efficiency of the nation's rural road system. (pp. 25-26)

Rural area growth in areas such as the Antelope Valley has been fueled by significant domestic and international migration to the region that affords affordable housing, small-town quality, and within commuting distance of the greater Los Angeles metropolitan area. The Antelope Valley has an extensive network of rural, two-lane roads that include narrow lanes, limited shoulders, soft sand shoulders, exposed hazards, pavement drop-offs, and limited clear zones along roadsides.

The TRIP (2005) found that usage of rural roads increased as the rural population increased and there is an accompanying dependence on these rural roads. Approximately 60

million people (21 % of U.S. population) live in rural communities, an increase of 11 % since 1990. Rural road travel has increased 27 % from 1990-2002, and 30 % of rural Americans have a one-way daily commute of 30 minutes or more.

Tessner (1996) found through comparative analysis on rural and urban automobile accidents, that there were 40 % more accidents in rural than urban areas. Underlying this is the fact that the vehicle miles traveled (VMT) on rural roads were significantly smaller than the VMT for urban roads (14.2 trillion for rural versus 19.7 for urban miles from 1975-1993).

Dissanayake and Ratnayake (2005) conducted a study of rural crashes in Kansas in attempting to identify critical factors contributing toward increased crash severity in rural Kansas. They used information from the Kansas Accident Reporting System (KARS), a probit model, and factors of alcohol, seat belt use, excessive speed, and ejection or entrapment of the driver. “Rural crashes are more severe than urban as compared to urban highway crashes and thus, safety of the users of rural highways is one of the critical issues in improving the overall safety of the highway system” (Dissanayake & Ratnayake, 2005, p. 3).

Rural highways receive less attention, less funding and resources, and are relegated to being local issues in Kansas (Dissanayake & Ratnayake, 2005). The Dissanyake and Ratnayake (2005) study involved three factors: driver related, crash type, and roadway factor. In driver related findings, the higher the speed limit the more severe the crash. If at least one person does not wear a seat belt, crash severity and potential of death was increased. Male injury severity was less than female, and possibly as factor was “females cannot bear the physical or mental trauma” (Dissanayake & Ratnayake, 2005, p. 10). If alcohol was involved, level of severity of the accident was increased. Under crash types, single vehicle incidents had higher rates of severity

than two vehicle collisions. There was also an increased possibility of severity if the vehicle runs off the road and/or rolls over. Roadway conditions also played a factor. If the road was icy and wet, severity was less perhaps because drivers paid more attention and were more cautious. Lack of funding to local communities had resulted in many Kansas roads being of average or poor condition, and these were contributing factors toward rural highway incidents. Similar findings were found by Shankar, Mannering, and Barfield (1996) in their study along a rural section of Interstate 90 in Washington, located 50 miles east of Seattle, from 1988-1993.

"Every day, approximately 70 people die on rural roads" (Fleming, 2004, p. 35). Only $330 million of $27.4 billion in federal-aid highway funds were appropriated to states for rural road safety, yet 21 % of the population live in rural areas and spend more time on the roads than urban dwellers (Fleming, 2004). Basically, there are four factors involved in rural traffic accidents: human behavior, care victims receive after crash, unsafe vehicles, and roadway conditions (Bond & Cherpitel, 2004; Dissanayake & Ratnayake, 2005; Fleming, 2004; Grossman et al.

, 1997; Nolan & Oh, 2004; Schiff & Becker, 1996; Shankar, Mannering, & Barfield, 1996). Fleming (2004) found that in California, mediating factors were lack of highway markings, high speed on roads with slower vehicles, and failure to use seat belts. Fleming conducted a study in Mendocino County in California where the Mendocino County Department of Transportation improved signage in rural areas, improved markings on arterial and collector roads in the county as the result of discovering that most accidents involved running off the road on curves and turns and in low visibility areas. Other effective measures were more lighting, rumble strips, widening lanes, removing roadside trees, installing intersection beacon lights, and establishing correct

speed limits. Also included was an educational effort that targeted young drivers. The result was a 42 % reduction in fatalities over a ten-year period.

Brodsky (1990) conducted a study of emergency medical service rescue time in fatal road accidents in Missouri. The study showed that about one out of every five fatal accidents occurs in a rural area that required a half-hour or more for an ambulance to arrive. The Missouri data showed that in 10 to 20 % of fatal accidents, the police waited five minutes or more to notify the ambulance dispatcher.

Noland and Oh (2004) challenge many of these findings of these previous studies in a study they conducted on rural highway accidents in Illinois and a lowered fatality rate. They state:

> Results cannot confirm the hypothesis that changes in road infrastructure and geometric design have been beneficial for safety. Increases in the number of lanes appear to be associated with both increased traffic-related accidents and fatalities. Increased lane width appears to be associated with increased fatalities. Increases in outside shoulder width appear to be associated with decrease in accidents. (p. 525)

Noland and Oh found no statistical association with changes in safety with median widths, inside shoulder widths, and horizontal and vertical curvature. Their study found significance in reducing fatal accidents from seat belt use, demographic changes, and improved medical response and care.

The majority of fatal automobile accidents on rural roads involve residents, rural dwellers, and small town residents, and these rural drivers drive more per vehicle miles in personal vehicles than urban dwellers. (Blatt & Furman, 1998). Rural residents were involved in

59 % of alcohol/drug-related crashes and comprise 17 % of the population. Only 15 % of rural fatalities involved urban, suburban, and second-city residents (Blatt & Furman, 1998). Blatt and Furman (1998) found that "most people involved in crashes were on roads that they were familiar" (p. 710).

Sixteen percent of 18 to 24 year-olds involved in fatal accidents were from rural areas. Sixty one percent of all fatal crashes were young adults from 15 to 25 who live in rural areas. The result is that 17 % of the population of young adults living in rural areas account for 40 % of all young adult traffic fatalities. In the young male population, 18 % live in rural areas and are involved in 44 % of male fatalities, and 18 % of young females live in rural locations and are involved in 30 % of female fatalities (Blatt & Furman, 1998).

Blatt and Furman (1998) found that contributing factors were road design, limited sight distance due to hills and curves, and roads are mostly two-lane, two-way traffic. The fatality rate was exacerbated by speed limits in excess of 55 mph, less seat belt use, and delays in discovery and arrival of emergency assistance.

Persuad and Musci (1995) attempted to show how hourly volumes in regression models could be used for estimating accident potential on Canadian two-lane rural roads. They found that the effects of day/night conditions were different for single vehicle and multivehicle accidents, and it was found that for single vehicle accidents, the accident potential was higher during daytime. Conversely, they found that for multivehicle accidents the accident potential was higher during nighttime.

Maierle and Wolfgram (1987) published a study that demonstrates that improved geometry, such as pavement width, shoulder width, and curvature on rural two-lane highways

correlates with lower accident rates. However, this study was limited to mobility accidents, accidents that are unrelated to intersections, driveways, animals, and railroads.

A study by Zador, Stein, Hall, and Wright (1987) studied survey data on curvature and grade collected at sites of fatal single-vehicle rollover crashes randomly selected at sites in New Mexico and Georgia. They found that road sections with extreme horizontal and vertical alignments were as much as 50 times more common at crash sites than at other comparison sites. The inference is that states need to develop their own priorities for hazard identification based on comparison between the bivariate curve-grade distributions of fatal single vehicle crash sites and other representative roadway samples.

The clearer the road edge lines and the better the contrast between road and shoulder, the safer the roadway (De Waard, Teyvers, & Brookhuis, 2004). It is not clear if speed is a factor. Design consistency is important, especially when there are speed changes with curves and sight distance with hill crests and corners. The important factor is to eliminate surprises for drivers (Easa, 2003). There has been a movement to obviate this with curve speed warning systems (CSWS) that are designed to warn if the vehicle is approaching a curve too fast for the current condition. These have been experimentally installed in numerous locations throughout the United States.

A number of studies recommend some or all of the following: rumble strips, centerline rumble strips, improving signage and markings, installing lighting, removing or shielding roadside obstacles, adding or improving guardrails, adding turn lanes at intersections, resurfacing pavement, adding median barriers, reducing angle of curves, widening lanes, adding intermittent passing lanes or adding a third or fourth lane conditions (Bond & Cherpitel, 2004; Dissanayake

& Ratnayake, 2005; Fleming, 2004; Grossman et al., 1997; Nolan & Oh, 2004; Schiff & Becker, 1996; Shankar, Mannering, & Barfield, 1996; Shibata & Fukuda, 1994; TRIP, 2005).

Passing Zones

Alexander and Pisano (1992) under the auspices of the Federal Highway Administration conducted research to determine (a) if there is a safety problem in passing zones on two-lane, two-way highways, (b) the magnitude of the problem and associated risk, and (c) causal and/or contributory factors to the problem. "The passing maneuver on two-land highways is one of the most demanding and hazardous operations performed by motorists" (Alexander & Pisano, 1992). It is not uncommon for drivers on rural roads to want to pass slower moving vehicles.

This research points out that there is a difference in the passing lane criteria of the American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Geometric Design on Highway and Secondary Streets* and marking criteria for no-passing zones on the same roads found in the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) (Anderson & Pisano, 1992, p. 49). Current policy is that passing zones are not specifically marked; instead, they exist where no-passing zones are not warranted. The warrants for no-passing zones are established by the MUTCD, and the MUTCD values are clearly different form the AASHTO values, which are used in the design of two-land roads and not for specific traffic control. The net result was that two different sets of "minimum passing sight distances" were developed. However, the FHWA and others recognized that the values in the MUTCD are not minimum passing sight distances, but rather they are minimum sight distance requirements. Furthermore, it was recognized that these two sets of values serve two different functions. The general consensus is that the MUTCD values are too low, and the

AASHTO requirements are too conservative, and some researchers concluded that they were inadequate for car-passing-truck and truck-passing-truck scenarios (Alexander & Pisano, 1992).

The intention of Alexander and Pisano (1992) was to assess elements such as passing zone pavement markings, passing zone safety problems, and magnitude of this problem. They intended to assess the level of safety of the two-lane roads with respect to the vehicles passing each other as defined as the MUTCD. They found that there was a greater tendency for sideswipe-in-passing accidents to occur in no-passing zones, while the tendency for head-on and rear-end collisions was noticeably higher in passing zones; and occupants involved in passing zone accidents were more likely to sustain injuries and fatalities than those involve in no-passing zone accidents. They also found that the occurrence or magnitude of passing accidents seemed to be extremely random and not on the increase. This project found that the current MUTCD minimum sight distance requirements do not appear to pose a driving hazard. Most accidents, both passing and non-passing, occur under favorable driving conditions, dry roadway surfaces, straight and level roads with shoulders, and in clear weather. However, there seemed to be a need for more passing lanes in rural areas (Alexander & Pisano, 1992).

Botts' Dots®

Another innovation is the Botts' Dots®, invented by Elbert Botts of the California Department of Transportation in the 1950s. These are raised domes made out of plastic, ceramic or polyester that are placed on roadways using a fast-setting, tough epoxy. The rumble effect of the raised markers warns drivers that they are drifting out of the lane or drowsy drivers become awaken by the rumble effect (Lamm, 1996). They are prevalent in areas in California except where snow removal equipment might shave them off.

Modern Botts' Dots® are in two major forms: square, reflective markers made of high-impact polyester and plain round domes made of dense ceramic or plastic, both with reflective paint; and both are adhered to the road surface using a quick-drying, bituminous epoxy (Lamm, 1996). The domes are often used as parallel lane dividers, while the reflective markers are used to identify centerlines on two-lane roadways, wrong-direction indicators, and fire hydrant location.

Continuous Shoulder Rumble Strips (CSRS)

The continuous shoulder rumble strip is a longitudinal design feature installed on a paved roadway shoulder near the travel lane. It is made of a series of indented or raised elements intended to alert inattentive drivers through vibration and sound that their vehicles have left the travel lane. On divided highways, they are typically installed on the median side of the roadway as well as on the outside (right) shoulder.

Griffith (1999) found that the single vehicle run off the road crashes resulted in about one-third of all highway fatalities and one-half million injuries annually. Use of CSRS on freeways indicated that on average, CSRS reduced single vehicle ROTR crashes by 18 % on all freeways and 21.1 % on rural freeways.

Hickey (1997) conducted a study of a CSRS called the Sonic Nap Alert Pattern (SNAP) used on segments of the Pennsylvania Turnpike. The intent of the SNAP system is to alert drowsy drivers. The function of SNAP was to produce an alerting sound when drowsy or inattentive drivers' vehicles drifted to the right and crossed the pattern of recessed grooves along the shoulder of the turnpike. After installation of the SNAP system, ROTR accidents decreased by 70 %, and later, the in the follow-up periods accidents decreased by 65 %.

Nationally, ROTR incidents account for about 12,000 fatalities per year and are one-third of all traffic fatalities. ROTR crashes account for approximately 41 % of the fatal traffic accidents in Virginia. In Virginia, Chen, Darko, and Richardson (2003) have been conducting a study of CSRS since 1994. The study has concentrated on CSRS design and determining cost-benefit ratio. Of the three methods (rolled, milled, and corrugated), "forty states have adopted milled CSRS as a standard" (Chen et al., 2003, p. 32). The study found that there were 519 fewer ROTR incidents after the installation of the milled CSRS. On Virginia's rural highways, there was a decrease of 50 % of ROTR accidents after the installation of milled CSRS.

Highway engineers state that CSRS can reduce the frequency of ROTR incidents. Discussion and theories abound on what is the optimal pattern effectiveness of CSRS as there has not been a statistical analysis on pattern effectiveness.

Driving Behaviors

Speed and Speeding.

Excessive speed reduces a driver's ability to negotiate curves or objects in the roadway, extends the stopping distance, and increases the distance a driver travels when encountering a dangerous situation. Speeding is one of the most prevalent factors contributing to traffic crashes and fatalities.

Studies have shown that speed limits are one of the oldest strategies for controlling vehicle operating speeds, but speed limits are not effective in all driving situations. Controls include highway design, infrastructure improvements, intelligent-vehicle and highway-related technologies, interventions for special populations, particularly older and newer drivers (Grantham, 2000). Cooper (1997) studied the relationship between speeding and crash

involvement and found that the accumulation of speeding tickets increases the potential of being involved in a fatal motor vehicle accident.

Lamm and Kloeckner (1984) performed a study that showed an increase in traffic safety by using strict surveillance of speed limits with automatic radar devices. It was determined that posted speed limits alone would not guarantee compliance, but when reinforced by strict police/highway patrol enforcement, speed limits would reduce speed and alleviate accidents.

Maroney and Dewar (1987) studied the effects of two experiments that were conducted to examine alternatives to enforcement as a means of reducing speeding. One experiment consisted of traverse lines being painted on the roadway at progressively diminishing separations to produce an alerting response and an illusion of vehicle acceleration. After the lines were placed, a 25 % decrease in vehicle speeding was observed; but after three weeks, the effect on speed began to lessen. The second experiment involved the use of a traffic sign to relay information to drivers about the percentage of drivers who were not speeding on the previous day. After being implemented for three and a half months, the data gathered indicated that excessive speeding could be reduced by 40 %. It was noted that this speed reduction was maintained for weeks after the sign was removed.

While governments determine speed laws to conserve fuel, reduce noise, and promote safety, speed is the drivers' willingness to expose themselves to a high risk of accident (Wasielewski, 1984). From a series of worldwide studies, Wilmot and Khanal (1999) found that people do not adhere to speed limits, but "drive at a speed they deem as safe" (p. 315). The also found that "speed was not linked significantly to incidents of accidents, although it is statistically significant in accident severity" (p. 315).

Wasilewski's 1984 study found that the highest speeds were by younger drivers, those with previous accidents or speeding violations, in newer cars, and without passengers. Rodriquez (1990) points out that the higher the speed, the higher the kinetic energy and therefore the more energy disbursed at impact, and that it is more of speed dispersion than pure speed that is a key factor in fatal motor vehicle accidents. From these studies, it can be seen that highway safety and speed are the outcomes of a complex system of independent behaviors (Lave & Elias, 1997).

Drivers select speed based on personal characteristics and attitudes, and base their speed on driver's perception of the hazard(s), ability and comprehension of information regarding the speed limit established, sensitivity to the perceived cost implications of alternative speeds, probability of detection by law enforcement, severity of traffic penalties, and the potential of time saving or loss. Less skilled drivers tend to overestimate their abilities, and younger drivers tend to drive faster than average, due to the lower financial burden of being detected (Jorgensen & Polak, 1993).

Speed Limits.

Those setting speed limits and standards seldom consider law enforcement efforts, perhaps assuming full compliance (Graves, Lee, & Sexton, 1989). Giles (2004) and Greenstone (2002) have reported that on rural roads that the incident of accidents decreased, while the severity of the collisions increased. Drivers with newer cars, more safety features, better road conditions have a sense of more safety and security at higher speeds. Too low speed limits encourage the public to break the laws, and "laws without enforcement are meaningless" (Graves et al., 1989). Greenstone (2002) found that in many jurisdictions police are more concerned with lowering the fatality rate than enforcement as they often lacked the manpower to do both.

As pointed out in an Israeli study by Richter, Barach, Friedman, Krikler, and Israeli (2004), there exists a controversy on the effects of raised speed limits. They found that at higher speeds with its high impact force negate the effects of seat belts, airbags, enforcement, enforcement, improved roadway and lighting, and trauma car availability. Their study also found that citizens wanted speed limits raised even higher.

Speed and Speed Variance

The controversy continues as to whether it is speed or speed variance that is the main cause of traffic fatalities. This debate was the result of longitudinal data collected by Lave in 1985, for the years 1981 and 1982. In Lave's estimation, speed and speed variance, along with other right-hand-side variables using ordinary least squares regression, provided evidence for his hypothesis that driving slower is the more dangerous.

Loeb (1989) attributed Lave's conclusion to the possibility of omitted variables, and conducted a study with a more comprehensive model using measures of the inspection system, speed, speed variance, speed limit of rural and interstate highways, minimum drinking age, per capita consumption of alcohol, and miles driven. Loeb's conclusion was that speed was a significant factor in traffic fatalities.

Snyder (1989) questioned Lave's assumptions, and conducted a study, using data from 1972-1974, based on slow speed, fast speed, and speed variance in an estimation equation. Synder suggested that speed was an important determinant of highway fatalities as widely assumed from other studies. Snyder further claimed that speed was an important factor for only fast drivers, as slow vehicles do not have a statistically detectable influence on fatality rates.

Forester, McNown, and Singell (1984) assumed that speed is a function of the following variables: earned income, vehicle mileage, age, motorcycle registration, gasoline prices, and 55 mph speed limit. The speed equation was only one in a series of equations. They found that speed was positively related to income, mileage, age and price of gasoline; but negatively related to motorcycle registration and speed limits. Of these results, only the coefficients on gasoline prices and age were significant, and speed was significantly and positively related to total motor vehicle fatalities.

Research from a variety of sources reveals some compelling information concerning speed and speeding. Drivers with multiple moving violations are twice as likely to be involved in a fatal accident, and habitual speeders are more likely to be involved in a motor vehicle collision. Speed is a significant factor in fatal traffic accidents, as a higher kinetic energy of the vehicle is dispersed against occupants, serious injury doubles in a collision of 40 mph compared to 30 mph, and higher speed in a collision increases the probability of a fatality. Speed variance has a strong relationship to traffic accidents in rural areas, and raising or lowering rural speed limits has had no effect on the rate of traffic fatalities. With newer cars equipped with safety features, drivers feel that they can drive faster safer. Most drivers do not follow posted speed limits but base speed on their age, environmental factors, the nature of adjoining landscape, geometry of the road, current weather conditions, level of traffic congestion, and perceived level of traffic enforcement (Graves, Lee, & Sexton, 1989; Giles, 2004; Greenstone, 2002; Jorgensen & Polak, 1993; Lave & Elias, 1997; Newby, 1970; Richter et al., 2004; Rodriquez, 1990; Shankar, Mannering, & Barfield, 1996; Wilmot & Khanal, 1999).

Driving Under the Influence (DUI)

DUI Laws and Data

"Drinking under the influence" (DUI) laws have progressed over the years to the current legislation of three basic drinking and driving laws: (1) 0.09 BAC Illegal Per Se law, Open Container law, and Administrative License Revocation law. The 0.08 BAC Illegal Per se law states that it is illegal to drive a motor vehicle with a blood alcohol concentration at or above the 0.08 grams per deciliter (g/dl) level. The Open Container law prohibits both the possession of any open alcoholic beverage container and consumption of any alcoholic beverage, including the passenger area of any motor vehicle. The Administrative License Revocation law is based on objective chemical tests (blood, breath, or urine) similar to the "illegal per se" criminal law against impaired driving. This law allows police and driver-licensing agencies the authority to revoke a driver's license while waiting for a trial, and protects the offender's right of due process through an appeal system. Administrative License Revocation law automatically suspends the driver's license for failing or refusing to complete a blood alcohol concentration test. All of these laws are in-place in California, and this traffic law system serves to create and maintain deterrent threats to control drinking and driving through a process of laws, law enforcement, adjudication, and sanctions (Liban, Vingilis, & Blefgen, 1987).

A motor vehicle crash is considered alcohol-related if at least one driver or non-occupant, such as a pedestrian or cyclist) involved in the crash is determined to have a BAC level of 0.01 or higher, and any fatality is considered to be alcohol-related. The term, as defined by the National Highway Traffic Safety Administration, does not indicate that a crash or fatality was caused by the presence of alcohol.

There were 17,013 alcohol-related fatalities in 2003, 40 % of the traffic fatalities for the year. This represented an average of one alcohol-related fatality every 31 minutes. In 2003, 21 % of the children up to 14 years old who were killed in motor vehicle crashes were alcohol-related accidents. In fatal crashes in 2003, the highest percentage of drivers with BAC levels equal to or above 0.08 was for drivers in the 21-24-year-old group (32 %), followed by ages 25-34 (27 %) and 35-44 (24 %). Seat belts were used only by 25 % of fatally injured drivers with BAC at or above 0.08, compared with 40 % with BAC at or above 0.01-0.07, and 56 % of fatally injured drivers with no BAC level. (Hingson & Winter, 2003). "When motorists are in fatal traffic crashes, the more serious the crash, the greater the likelihood that alcohol was a factor" (Hingson, 1993, p. 29).

Drinking drivers are seven times more likely to cause a fatal motor vehicle accident, and legally drunk drivers are 13 times more likely than sober ones and 40 % more likely with BAC over 0.15 (Evans, 1990; Levitt & Porter, 2001; Skog, 2003). Levitt and Porter (2001) report that "according to police reports, at least one driver has been drinking (although not necessarily over the legal BAC limit) in over 30 % of fatal crashes. During the time in which alcohol usage is greatest, that proportion rises to almost 60 % (p. 1199). It becomes obvious, and supported by a large body of literature, that alcohol plays an important part in relation to motor vehicle accidents and fatalities in many states and countries (Skog, 2003). Drivers with a BAC over 0.08 are impaired in recovery from glare, complex visual tracking, parking, driving at low speeds, and steering and braking (Hingson, 1993).

Evans (1990) suggested that if the BAC allowed was lowered to 0.05, fatalities would be reduced by 41 %. Burian, Liguori, and Robinson (2002) suggested that the current BAC allowed

levels can alter a person's decision-making such that the willingness to enter high risk situations and events is increased. McCarthy (2003) found that DUI arrests and increased pricing of alcohol reduced fatal traffic collisions, and that there was no effect by the number of liquor-selling establishments and density on fatal traffic accidents. Labouvre and Pinsky (2001), supported by another study by Shibata and Fukuda, 1994, found that males are more involved in alcohol-related incidents than females and risk of involvement decreases with age.

A study by Hingson and Winter (2003) found that there are an average of 1.5 million DUI arrests every year. In the year 2000, they reported that 78 % of collisions involved males and 46 % were alcohol related, compared to 29 % for women. From 1990-1994, traffic collisions involved 72 % White, 12 % African American, 2.4 % Native American, and 1.2 % Asians. They also found that 68 % of Native American fatalities, 38 % of White, 38 % of African American, and 19 % of Asian American Pacific Islander fatal accidents had alcohol involvement. They also discovered that 77% of alcohol-related fatalities happened between 1800 – 0600 hours; and occurrence is 16 % on Friday, 24 % on Saturday, and 21 % on Sunday.

Snow and Wells-Parker (2001) studied the relationship between drinking locations and drinking problems among convicted DUI drivers. They found that severe drinkers drink in their car, and from unlicensed locations other than bars, taverns, restaurants, and cafes. The most severe drinking drivers do so while mobile. These findings are counter to the public perception that these establishments are major culprits in contributing to drinking and driving. The study found that locations where individuals consume alcohol were: (a) 46% at home, (b) 32 % outdoors, (c) 18% at someone else's home, (d) 18 % at a bar/lounge, (e) 16% riding in a car, (f) 13 % at a party, (g) 6% in a parked car, and (h) 5% in a restaurant.

Prevention Programs

Wilkinson (1987) estimated that if drunk drivers were eliminated, there would be an annual reduction in fatalities of over 17,000. Wilkinson believes that there is a need to more effectively allocate financial and political resources. While enforcement is important, it cannot be the only prevention effort (Greene, 2003; Kenkel & Koch, 2001; Kunitz, McCarthy, 2003; Woodhall, Zhao, Wheeler, Lillis, & Rogers, 2002; Stein & Lebeau-Craven, 2002; Voas, Trippetts, Johnson, Lange, & Barber, 2002; Voas and Fisher, 2001; Wilkinson, 1987).

Voas and Fisher (2001) contend that "A large proportion of motorists whose drinking is impaired go undetected as evidenced by the fact that at least two-thirds of the most serious (that is, fatal) alcohol-involved crashes are caused by drinking drivers who have never before been apprehended by the police" (p. 33). Greene (2003) estimated that drivers have driven under the influence from 300 to 2,000 times prior to being arrested for DUI. However, they found that DUI fatalities have decreased, but the reasons not fully understood.

The tradition approach by the courts has been fines and incarceration, but a Canadian study by Sen (2001) found that "on average, penalties for impaired drivers have limited impact on impaired drivers" (p. 149). Sen found them not to be effective due to lenient treatment by the police, and the court not imposing heavy fines or sanctions. In the U.S., courts in recent years have been combining the traditional approach with other methods including: license suspension and rehabilitative programs, impounding vehicles or plates, installing interlocks, and home electronic monitoring/house arrest (Voas & Fisher, 2001). "Effective court monitoring is critical component in supporting recovering and compelling offenders to participate in rehabilitation programs" (Voas & Fisher, 2001, p. 32). Voas and Fisher (2001) found that over the past two

decades alcohol-related accidents has been on the decrease, but the reasons are not fully understood. It could be due to tougher laws, increased perceived sanctions and punishment, and reduced recidivism due to intervention programs (Hingson, 1993; Voas & Fisher, 2001).

"During the past decade, hundreds of new state laws have increased the certainty, severity, and swiftness of punishment for drunk driving" (Kenkel & Koch, 2001, p. 845). However, these laws only can deter driving under the influence only to the extent that people know and understand them. Many feel that is important to make people aware through various means what the penalties are and ramifications to driving while intoxicated. Kenkel and Koch (2001) found that many people knew of the penalties, but most underestimated the severity or consequences.

Voas et al. (2002) conducted a study of DUI enforcement at the California-Tijuana border, concentration on the 18-20-year-old age group in Operation Safe Crossing (OSC). They found that to be effective enforcement must be well publicized and involve youth groups, parents, school administrators, public health officers, law enforcement, and the media. OSC was initiated to reduce impaired teen drivers from returning from Mexico after binge drinking. Efforts included sobriety checkpoints at the border, barring entry to Mexico if under 17 years old without a parent, and media concentration on underage drinking. Results included a reduction of teens crossing the border of over 30 % on the weekends, and a significant reduction in teen motor vehicle accidents. The program was so successful that OSC received federal and state funding to continue their efforts. The overall success cannot be attributed totally to the program due to other mediating factors: training in Mexico to not serve underage minors, more Mexican

police involvement, warning signage, and presence of law enforcement officers on both sides of the border.

Sideman and Kirschbaum (2002) conducted a study of females at risk incarcerated in the Arizona Department of Corrections for DUI. These women tended to be single parents, under- or unemployed, recently separated, divorced, or widowed, victims of abuse, sexually abused, suffering shame or condemnation, and victims of failed relationships. Intervention program included improving education and employment opportunities, improving social and familial functioning, reducing consequences due to alcohol use, reducing recidivism, and reducing involvement and exposure to domestic violence and child/sex abuse. The intervention involved small group discussions concerning information about alcohol impairment, information about risks and hazards of alcohol use and driving, promoting safe and responsible decision-making about driving, examining drinking behaviors, assisting in behavioral changes, and gaining a positive self-concept. Initial results were very promising, but the study has not been fully completed, but it can serve as a potential model for other interventions programs, especially concerning young drivers.

Massachusetts began a Saving Lives Program in 1988. Hingson, McGovern, Howland, Heeren, Winter, and Zakocs (1996) studied the program and compared the results of this alcohol-impaired driving program results from 1988-1993 and from 1983-1988. The program involved increased police enforcement of DUI, volunteer involvement, media campaign, business information program, drunk-driving awareness days, speed hotlines, high school education programs, Students Against Drunk Driving (SADD) and Mothers Against Drunk Driving (MADD) involvement, liquor outlet information program, hospital personnel training, signs

positing fines for DUI, police checkpoints, telephone surveys, monitoring citations, and alcohol-free programs. The results were a decrease in fatal crashes of 25 %, alcohol-involved fatal crashes down 42 %, speeding by teens down 50 %, and vehicle injury accidents reduced by 5 %.

In a study by Kunitz, Woodhall, Zhao, Wheeler, Lillis, and Rogers (2002) in the Southwest aimed specifically at Native Americans, they found that DUI policies must be more than a concentration on fines, sanctions, and incarceration. They found that successful interventions combined court actions, education, counseling, monitoring, and follow-up. The programs included DUI prevention information, a variety of low intensity therapeutic techniques, action planning to avoid impaired driving, aftercare, and finally incarceration. Concentration was on a holistic approach including alcohol abuse/DUI awareness, stress management, health and nutrition, goal setting, family issues and alcohol, domestic violence, and HIV/AIDS prevention. After five years, 76 % of the treatment group were not rearrested, compared to 59 % of the non-treatment group.

The efforts of MADD and strong sanctions have been instrumental in reducing alcohol-related traffic fatalities (Snow & Wells-Parker, 2001). Yet, it still remains a serious public health problem. To further reduced fatalities involving alcohol, it will take a concerted effort by not just law enforcement but schools, media, civic groups, public officials, public health officials, and community leaders working in conjunction.

Enforcement

Camera Enforcement

Retung and Kyrychenko (2002) report that 50 communities in the U.S. have some form of camera traffic enforcement. Their study focused on Oxnard, California and Fairfax, Virginia.

They found that there was a change in driving behaviors rather than just encouraging drivers to obey traffic signals at specific locations, but less is known about the effect on collisions. The result of the camera enforcement was a reduction of injury crashes of 29 %, right angle crashes decreased 32 %, and right angle with injury accidents down 68 %. There needs to be more studies on camera enforcement as there are other moderating factors and results have been different in different communities.

DUI Enforcement

A recent Canadian found that intoxicated drivers in British Columbia that require hospitalization as a direct result of an alcohol-related traffic accident are seldom convicted of impaired driving or any other criminal offense (Purssell, et al., 2004). Canada has similar statistics to the U.S., the leading cause of death for those aged from 15 to 29 is a motor vehicle crash: 32 % of fatal drivers were over the legal limit, 7 % were twice the legal limit, and only 69 % were wearing seat belts. The authors contended that the reason for the lack of prosecution was the protracted time to process (over three hours), the complex paperwork (8 forms), and trial time (usually over four hours), lack of staff, the probability that the culprit would be found "not guilty," and many pled to lesser offense of reckless driving.

Sen (2001) found similar findings in another Canadian study. "On average, penalties for impaired driving have limited impact on impaired drivers" (p. 149). Findings revealed that the lack of efficiency was due to more lenient treatment by police and courts by not imposing heavy fines or sanctions. It would not be surprising that many U.S. jurisdictions operate in a similar fashion.

In a California study, DeYoung, Peck, and Helander (1997) found that most suspended drivers or those with revoked licenses continued to drive. The data indicates that these persons are over-involved in motor vehicle fatal crashes, but the number is unknown until they are actually involved in a crash or arrested for a violation. The study also found that for those drivers at fault in two-vehicle fatal accidents, 65 % had valid driver's license, 23 % had license suspended or revoked, and 12 % were unlicensed.

For many years, law enforcement has attempted to detect impaired drivers through various innovative efforts and measures, as there is a need to reduce the needless loss of life. The methods law enforcement use is dependent on the level of funding, resource allocation, and targeted area population.

Most DUI offenders never get arrested (Greene, 2003; Voas & Fisher, 2001). "Because the police cannot catch all offenders, the success of alcohol-impaired driving laws depends on deterring potential offenders that apprehension and punishment of offenders is probable" (Greene, 2003, p. 3). The likelihood of apprehension is more important in deterring offenders than the severity of the punishment according to Greene (2003).

DUI checkpoints, while enhancing public awareness and education, are not very effective (Greene, 2003). California establishes checkpoints according to specified requirements including proper publicity, posted periods, and the need to have an avoidance route. Because of the restrictions, they are more designed to educate and encourage "designated driver" programs than apprehend violators. They do not usually result in significantly high DUI arrests, but act more of as a deterrent program for not only DUI but also seat belt and child restraint violations, vehicle defects, and commercial violations.

Greene (2003) conducted a study on use of sobriety checkpoints in various states. In 2000, the Missouri Highway Patrol had 58 checkpoints and arrested 323 drivers and the Ohio Highway Patrol had 12 checkpoints with 77 arrests. The Mississippi Highway Patrol had 822 checkpoints and arrested 1,666 violators and from 1994-1995 the Tennessee Highway Patrol had over 900 checkpoints in conjunction with local law enforcement.

Saturation patrols involve a targeted area to identify and arrest impaired drivers. These locations are selected pursuant to numerous violations of crossing the centerline, following too close, reckless driving, aggressive driving, speeding, erratic driving, and non-compliance with seat belt laws. They often involve multiple agencies and the purpose is to enhance public perceptions, gain media attentions, and engender judicial support.

DUI checkpoints and saturation patrols offer more exposure to enforcement efforts and likelihood of arrests to the public, improve detection of offenders and DUI by law enforcement. This also helps law enforcement to identify problem areas, crash locations, and potential violators. In conjunction there should be an aggressive, continuous, and committed media effort concerning DUI. As follow-on, courts need also to have more consistent efforts in punishing violators and deterring DUI.

CHAPTER 3. METHODOLOGY

Procedure

Subjects

The respondents of the survey instrument will be selected, convenient samples from the general population including: graduate students, military members, undergraduate students, high school students, senior citizens, professors, university administrators, clients of county public health service, and general population at random in a public mall. The second group of respondents will be traffic law enforcement officers in the Antelope Valley Area office of the California Highway Patrol. Permission was granted to administer the data to officers by the Commander of the Antelope Valley Area.

All participants will be briefed and given a form explaining the voluntary nature of the survey, how privacy and confidentiality will be protected, how respondents may remove themselves from the survey at any time, how respondents can select to not answer any specific questions, and that respondents may withdraw from the study at any time. It is also clear that no compensation is involved in completing the survey. Every respondent was given the researcher's phone number and Capella University Institutional Review Board's number to ask any question or present any problems with the questionnaire or the study.

Study Sample

The researcher will visit locations and institutions and administer the survey. Groups have been selected on a convenient basis, and attempts will be made to make the sample as representative as possible to include young, mature, and older drivers, and of various groups and

ethnicity. In California, there is a large population with limited English skills, therefore the researcher prepared a questionnaire in Spanish, validated by a university Spanish instructor.

The professional, expert law enforcement subjects will include all management, supervisors, and officers of the Antelope Valley Area serving in the Antelope Valley.

Variables

The proposed variables of this study are sex and age, and dependent variables of various attitudes and behaviors concerning driving and fatal motor vehicle accidents with the possibility of these being temporal and others that are mediating. It is important to note that there is no intent to develop any cause and effect relationships. There is a strong possibility that there will be intervening variables such as ethnicity, education level, years driving, number of citations received, type of roads traveled, and driving miles, and these must be considered in this study.

Data Gathering

A questionnaire format will be used to gather data for the study, and complexity of the survey will be kept to a minimum as the time to completion is between 10 to 20 minutes. There will be a pilot study to pretest the instruments. A college class at a local community college of 25 students was selected based on the demographic diversity of the group. A debriefing will be held after they have taken the test to review the instrument and determine its internal validity. Amendments will then be made to the instrument prior to its use.

Scores on a measure of demographic items will be correlated with scores on attitudes and driving behaviors. A separate questionnaire will be administered to law enforcement professionals concerning their perceptions of driver attitudes and behaviors. Statewide Integrated

Traffic Records System (SWITRS) from the California Highway Patrol will be used to obtain the post hoc data.

Data Analysis

The collected data will be codified, arranged, and separated into groups, each of which will correspond to a part of the research question(s). Basically, the intent is to separate the questions into potential subproblems with corresponding data. The coding will be conventional and data will be entered by only one person into the SPSS® program. All data will be screened for quality, accuracy, and proper entry into the database by the researcher and another associate, with quality control and verification done through a random selection of responses.

Quantitative techniques will be used to help interpret or explain the surveys' results, and attempt to explain any particular phenomenon or behavior identified. Definitive hypotheses will be developed during data collection and analysis of the surveys, and then will be subjected to quantitative statistical analysis.

Interpreting the data will involve (a) relating the findings to the original research question and to specific research question(s) and hypotheses, (b) relating findings to preexisting literature, concepts, theories, and research studies, (c) determining whether the findings have practical significance as well as statistical significance, and (d) further identifying limitations of the study.

Using ANOVA, there will be a determination of differences between responses of the two groups. Specific areas of correlation will be identified using chi-square. Specific areas of difference will be found using *t* tests. A predetermined temporary confidence level of $p<0.05$ has been selected but may possibly be changed.

There will be a determination of any areas of difference or agreement that is significant from the survey data and any correlation with post hoc data. Pre and posttest of post hoc data will lend themselves to parametric *t* test which can identify any potential correlations, and if there is any significance in their means. A significance factor of $p< 0.05$ will be used. A broad field ANOVA will be done on subsets (variables) to find if there is any interaction among variables.

There will be a determination of the potential use of data display through graphs and tables of correlation and the possibility of conclusions being drawn through the use of inferential statistics, test of significance, etc., and tied together in a quantitative approach. A rationale will be given for any approach being used.

CHAPTER 4. DATA COLLECTION AND ANALYSIS

As stated in Chapter 1, the study reported here was a case study in detail of the behaviors, attitudes, and opinions of the public and California Highway Patrol officers in the Antelope Valley in order to provide CHP management data and information in their attempts to resolve the escalating motor vehicle traffic deaths in the Antelope Valley.

The instrument used for data collection was a survey given to the public and to California Highway Patrol officers. The public sample was a convenience, but every attempt was made to capture a random audience, with 220 respondents (Appendix A). The CHP sample surveyed 30 officers out of 36 assigned to the Antelope Valley office, and considered an expert population (Appendix B). In order to capture responses from the Hispanic population, a Spanish language survey was made available (Appendix C). The researcher extended every effort to keep the responses and respondents confidential. Currently, the data are secured in a confidential location. The results are completely anonymous and lack any identifying information, making it virtually impossible to determine either who the respondents were, or to link a respondent to any specific survey.

The researcher conducted a pilot study on both survey instruments, using a group of college students at the local community college and selected public health personnel. Comments were gathered with the most frequent comment being on the extensive length of the instrument. However, subjects in the pilot study sensed the importance of the survey and generally felt that the length was not a problem. The average completion time in the pilot study was 22 minutes.

The stated purpose of this study was to assist the management of the California Highway Patrol to examine attitudes and behaviors of the public and law enforcement officers in the

Antelope Valley. The overall intent of this inaugural study was to assist CHP management in the development of possible interventions and programs designed to reduce the escalating fatality accident rate on the Antelope Valley's unincorporated roadways. In addition, the design of this study was to provide a basis for further investigations into possible causal factors. An additional important aspect of this study was to examine attendant post hoc data and compare with the study's research findings and current literature.

Post Hoc Data

Post hoc data was obtained from the California Highway Patrol's data base, Statewide Integrated Traffic Records System (SWITRS) as an extract of history files of fatal accidents in the CHP Antelope Valley Area Office's jurisdiction from 2000-2004.

Table 3

Accident Fatalities According to Sex and Race

Year	No. of Fatal Collisions	Number of Deaths	Sex M/F	White	Hispanic	Black	Asian	Native American
2000	20	25	21/4	DNA	DNA	DNA	DNA	DNA
2001	28	34	28/6	DNA	DNA	DNA	DNA	DNA
2002	35	39	26/13	25	8	3	1	2
2003	43	53	36/17	25	19	7	2	0
2004	43	47	38/9	22	19	4	2	0

DNA: Data not available

Table 3 depicts by year the fatal accidents in the unincorporated areas of the Antelope Valley by collision, number of deaths, sex, and ethnicity. Collisions have increased 115 % from 2000 to 2004, and deaths have increased 88 %. The ratio of male to female deaths corresponds to national averages and was consistent with predictions from the literature (Laapotti & Keskinen, 1998; Mannering, 1993; Mayhew et al., 2003). This increase in traffic deaths remains

troublesome and is of serious concern to both the CHP management and the Los Angeles County Health Department.

The ethnic breakdown of deaths is consistent with the literature, except for the rate of Hispanics involved in fatal accidents (Baker et al., 1992; Campos-Outcalt et al., 1998; Grossman et al., 1997). This figure is higher than the national average and might be a subject of follow-on studies as there is a paucity of research on Hispanics and fatal vehicle accidents.

Table 4

Antelope Valley Fatal Traffic Collisions and Location

Year	No. of Collisions	Rural	SR 14	SR 138	SR 2	SR 18
2000	25	10	8	4	3	0
2001	28	14	4	6	3	1
2002	35	21	9	3	1	1
2003	43	30	7	4	2	0
2004	43	24	8	8	2	1

SR 14: California State Highway 14 (multi-lane divided roadway).
SR 138: California State Highway 138 (two-lane undivided roadway)
SR 2: California State Highway 2 (Angeles Crest Highway: two-lane undivided roadway in mountainous area)
SR 18: California State Highway 18 (two-lane undivided roadway)

Table 4 is a record of fatal traffic accidents and location in the Antelope Valley. While fatal accidents have remained stable on state roads, the number of accidents on rural roadways has increased at an average of six per year. This finding was consistent with the current literature (Evan & Graham, 1984; Stamatiadis & Puccini, 1999).

The local media has nicknamed State Road 138 as “Blood Alley,” but the data contradicts this assertion, as fatalities on this roadway only account for 18.6 % of the fatal accidents. This was most likely mediated by current road construction to widen SR 138, increased law enforcement through a state grant for overtime, increased volume of traffic that reduced speeds,

and road improvements of increased Botts' Dots®, wider shoulders, and improved signage. These improvements were possibly the result of political pressure as SR 138 was rated as one of the most dangerous state roadways in California.

Table 5

Antelope Valley Fatal Traffic Collisions and Time of Occurrence

		Time		
Year	No. of Collisions	0600 - 1400	1400 - 2200	2200 - 0600
2000	20	8	4	8
2001	28	12	9	7
2002	35	7	17	11
2003	43	14	23	6
2004	43	11	20	12

Table 5 lists the fatal collisions and the time of day of occurrence. The time sectors were chosen to correspond to CHP work shifts: 0600-1400 ("A" Watch), 1400-2200 ("B" Watch) and 2200-0600 (C" Watch). The data posits that there has been a significant increase in fatal accidents on CHP "B" shift (1400-2200) and "C" or "graveyard" shift (2200-0600) which has the fewest officers in the field. This statistic might prove helpful to management in dedicating available officers to appropriate shifts with highest fatal accident potential. Persuad and Musci (1995) found that accident potential for single vehicle accidents was higher during daylight whereas for multivehicle accidents it was higher at night.

Table 6

Antelope Valley Fatal Traffic Collisions and Age of Victims

		Age				
Year	No. of Fatalities	0 – 20	21- 29	30 – 45	46 – 64	65+
2000	25	7	5	8	5	0
2001	34	10	5	7	8	4
2002	39	16	5	7	5	6
2003	53	12	8	16	5	12
2004	47	8	13	11	7	8

Table 6 is a listing of fatalities according to age group of the victims. While the findings are somewhat consistent with the literature, there were some unexpected differences. The decrease in the 0-20 age group was not consistent with prediction from the literature (Beck, Hartos, & Simons-Morton, 2002; Dee & Evans, 2001 Gregerson & Berg, 1994; Hartos & Eitel, 2002). This would be a possible area for further investigation to reveal potential causal factors, particularly if this trend continues.

Table 7

Antelope Valley Fatal Traffic Collisions and Number of Vehicles and Victim Position

Year	Fatalities	Single Vehicle	Multiple Vehicle	Driver	Passenger	Pedestrian
2000	25	13	12	17	8	0
2001	34	11	17	23	9	2
2002	39	12	23	29	8	2
2003	53	14	29	33	14	6
2004	47	16	31	39	7	1

Table 7 is a listing of elements of traffic fatalities: involvement of single or multiple vehicles and the relative physical position of the victim. The data shows that there was large increases in multiple vehicle involvement while the solo vehicle fatal accidents remained

somewhat stable, which is consistent with literature (Dissanayake & Ratnayake, 2005). According to Fleming (2004), this is possibly the result of an increase in the number of vehicles on the road commensurate with the increasing population in the Antelope Valley.

Table 8

Antelope Valley Fatal Traffic Collisions and Seat Belt and Helmet Use

Year	Used SB	Did not use SB	Wore helmet	Did not wear helmet	Unknown	Not applicable
2000	12	6	4	1	2	0
2001	15	12	4	0	1	0
2002	19	13	2	0	4	1
2003	21	13	8	0	5	6
2004	23	17	3	3	1	0

Table 8 shows fatal accidents and seat belt/helmet use of victim. In 2000, 24 % of the victims did not wear their seat belt. In 2004, 36 % of the victims did not use their seat belts. Interestingly, a decrease in seat belt use came about despite a massive statewide law enforcement and media campaign in California on seat belt usage. Public reluctance in wearing seat belts was consistent with the literature (Fleming, 2004; Kingston et al., 2004). California passed a primary seat belt law, yet the incidence of fatality and not wearing a seat belt has increased. This is consistent with the findings of Calkins and Zlatoper (2001). This is potential fertile ground for a more exhaustive study on causal factors.

Table 9 contains data concerning fatal traffic accidents and alcohol/drug involvement. It was noteworthy that as fatalities increased, alcohol/drug involvement increased in a direct proportion. The literature is replete with exhaustive studies into causal factors such as Liban, Vingils, and Blefgen (1987). This problem has been of keen interest to both the California

Highway Patrol and Los Angeles Sheriff's Department as DUIs have increased over the last four years. Chapter 5 contains some successful intervention programs that might be worth considering by CHP and Sheriff's Department management.

Table 9

Antelope Valley Fatal Traffic Collisions and Alcohol/Drug Use

Year	Fatalities	Alcohol/Drugs involved	Alcohol/Drugs not involved	Unknown
2000	25	12	6	7
2001	34	6	20	8
2002	39	13	24	2
2003	53	17	32	4
2004	47	24	18	5

Study Data Analysis

In this study there were 220 respondents from the general public and 30 from the California Highway Patrol. The respondents answered over 100 questions relating to attitudes and opinions about driving and driver safety. Responses were coded and SPSS was used to compile the data. The following section is a discussion of the results of the surveys with comparisons and correlations.

Behaviors

Tables 10 and 11 are compilations of reported citations issued to drivers and the ranking of citations issued by CHP officers. Of interest was the number of respondents who were never cited for a violation. This was possibly the response of younger drivers with minimal driving experience. As expected, speeding was the most frequent violation and was the highest-ranking citation issued by traffic officers. This was consistent with current literature and national averages (Cooper, 1997; Lave & Elias, 1997; Wasilewski, 1984). A noteworthy factor was the

low seat belt citations received by respondents. Perhaps a desirability effect skewed the data. This refers to a "response set," where respondents answer the questions from a particular perspective rather than answering the question directly. Respondents may have tried to answer the questions in "the most acceptable manner" rather than honestly creating a bias factor despite efforts to build in consistency checks to determine if respondents were less than honest in their answers.

Table 10

Citations Issued to Public Respondents

Activity	Number	Percent
Speeding	93	33%
Illegal Turn	19	7%
HOV violation	6	2%
Rolling stop (through stop sign/light)	17	6%
Reckless driving	3	1%
Driving under the influence (DUI)	3	1%
Seat belt violation	5	2%
Tinted windows or other "fix-it" ticket	15	5%
Other (parking, expired tags, tailgating, etc.)	23	8%
Never cited	101	36%
Total	280	100%*

* Numbers are rounded

Table 11

Frequency of Citations Issued by CHP Officers

Citations Issued	Ranking
Excessive speed	1
Illegal passing/unsafe lane change	2
Seat belt violation	3
DUI	4
Running red light/stop sign	5
Illegal turn	6
HOV violation (car pool lane)	7
Commercial (truck) violation	8
Reckless driving/racing	9
Parking	10

Table 12

Unsafe Driving Behaviors Observed on Roads: Public Response

	Public		Police	
Activity	Number	Percent	Number	Percent
Tailgating	149	17%	26	17%
Highly excessive speed	139	16%	25	17%
Failing to yield	71	8%	5	3%
Weaving in and out	105	12%	13	9%
Drinking and driving	22	2%	7	5%
Running red lights	50	6%	8	5%
Ignoring stop signs	48	5%	13	9%
Inattention/distracted	110	12%	25	17%
Cell phone use	187	21%	28	19%
Total	881	*100%	150	*100%

* Numbers are rounded

Table 12 was the public and law enforcement officers' responses to observed driving behaviors on Antelope Valley roads. Using the Pearson product-moment correlation coefficient (Pearson *r*), a correlation of 0.880 was found. This is significant at the 0.01 level. This demonstrated a strong positive correlation on the public and police observations of local driving behaviors.

Another way at looking at the above table is based on the following null and alternate hypothesis:

H_o: There is no correlation between the public and police observations of driving behaviors in the Antelope Valley.

H_a: There is correlation between the public and police observations of driving behaviors in the Antelope Valley

Since p < alpha (0.01 - significance level), reject the null hypothesis of no correlation between public and police perceptions of unsafe driving behaviors, and accept the alternative

hypothesis that the public and police have the same perceptions about driving behaviors in the Antelope Valley and accept the hypothesis that the public and police have the same perceptions about driving behaviors in the Antelope Valley.

This was useful information for CHP management in promoting new prevention programs. The Start Smart Program (discussed in Chapter 5) was the direct result of this data. CHP management have instituted other programs based on both the public and police perception that local driving behaviors have become more aggressive over the past several years. Road rage is another area of concern and is a potential candidate for further study.

Attitudes and Opinions

One of the objectives of the study was concerning attitudes of driving behavior by the public and police personnel. Researchers used a random number generator on the 220 public responses to draw a sample of 30 responses. This was compared to the 30 police responses. The objective was to determine if there are any correlations between specific views on driving behaviors.

Table 13a

Public and Police Attitudes Regarding Driving Behaviors in the Antelope Valley

		BEHAV1	BEHAV2	BEHAV3	BEHAV4
BEHAV1	Pearson Correlation	-.133	000	.157	000
	Sig (2-tailed)	.483	1.00	.408	1.000
	N	30	30	30	30
BEHAV2	Pearson Correlation	-.094	-.084	.147	000
	Sig (2-tailed)	.622	.859	.438	1.000
	N	30	30	30	30
BEHAV3	Pearson Correlation	.179	.321	.155	.100
	Sig (2-tailed)	.343	.084	.414	.600
	N	30	30	30	30
BEHAV4	Pearson Correlation	-.171	.038	-.067	-.079
	Sig (2-tailed)	.366	.841	.724	.677
	N	30	30	30	30

Table 13b

Public and Police Attitudes Regarding Driving Behaviors in the Antelope Valley (Cont.)

		BEHAV5	BEHAV6	BEHAV7
BEHAV1	Pearson Correlation	-.101	.172	..210
	Sig (2-taled)	.549	.362	.266
	N	30	30	30
BEHAV2	Pearson Correlation	-.103	-.043	.155
	Sig (2-tailed)	.588	.822	.414
	N	30	30	30
BEHAV3	Pearson Correlation	.030	.191	.175
	Sig (2-tailed)	.874	.918	.355
	N	30	30	30
BEHAV4	Pearson Correlation	-.224	.020	-.122
	Sig (2-tailed)	.233	.841	.520
	N	30	30	30

Table 13c

Public and Police Attitudes Regarding Driving Behaviors in the Antelope Valley (Cont.)

		BEHAV1	BEHAV2	BEHAV3	BEHAV4
BEHAV5	Pearson Correlation	-.309	-.322	.202	000
	Sig (2-tailed)	.097	.082	.285	1.000
	N	30	30	30	30
BEHAV6	Pearson Correlation	-.202	-.045	.147	000
	Sig (2-tailed)	.284	.813	.294	1.000
	N	30	30	30	30
BEHAV7	Pearson Correlation	-.230	-.086	.155	.100
	Sig (2-tailed)	.211	.652	.414	.600
	N	30	30	30	30

Table 13d

Public and Police Attitudes Regarding Driving Behaviors in the Antelope Valley (Cont.)

		BEHAV5	BEHAV6	BEHAV7
BEHAV5	Pearson Correlation	-.252	-.219	-.031
	Sig (2-tailed)	.179	.362	.266
	N	30	30	30
BEHAV6	Pearson Correlation	-.171	.192	.265
	Sig (2-tailed)	.367	.309	.156
	N	30	30	30
BEHAV7	Pearson Correlation	-.178	-.204	-.101
	Sig (2-tailed)	..346	.279	.596
	N	30	30	30

Note: The public responses were along the vertical axis and police responses were along the horizontal axis.

Table 14:

Key for Tables 13 – 13d

BEHAV 1	Drivers drive through intersections when light shows red
BEHAV 2	Drivers enter intersections just as light turned yellow to red
BEHAV3	Drivers slow down, but do not completely stop at stop signs/lights
BEHAV4	Drivers drive when they have had too much to drink
BEHAV5	Drivers make a U-turn when it says not to
BEHAV6	Driver violate HOV regulations
BEHAV7	Drivers cut closely in front of other drivers

Scale used for these responses were Likert-type:*often* , *sometimes*, *rarely/never*. The associated null and alternative hypotheses are:

H_o: There is no correlation between the public and police observations of driving behaviors in the Antelope Valley.

H_a: There is a correlation between the public and police observations of driving behaviors in the Antelope Valley.

SPSS flags any correlation with good correlation ($p < 0.05$) as a single asterisk and excellent correlation ($p < 0.01$) with a dual asterisk. Table 13 above shows no significant correlations were found. Therefore, the null was accepted. It is important to note that researchers are not generally interested in accepting the null hypothesis, as they want to show that a relationship between variables does exist, not to demonstrate that they are not related. Accepting the null is problematic as it is difficult to interpret, and the results might not be non-significant even when a relationship between the populations does exist. An overall summary of the analysis is that the public attitude is that they do not demonstrate any of the offending behaviors as often as the police feel they do. This possibly warrants further investigation.

Table 15a

ANOVA Two-Factor with Replication Regarding Speed

Summary					Total
	2				
Count	30	30	30	30	120
Sum	87	77	66	73	303
Average	2.9	2.566667	2.2	2.433333	2.525
Variance	2.989655	3.357471	3.751724	2.736782	3.192647
	1				
Count	30	30	30	30	120
Sum	49	62	69	82	262
Average	1.633333	2.566667	2.3	2.433333	2.525
Variance	0.378161	3.357471	3.751724	2.736782	3.192647
	Total				
Count	60	60	60	60	
Sum	136	139	135	155	
Average	2.266667	2.316667	2.25	2.583333	
Variance	2.063277	1.914972	2.021186	1.5014412	

Table 15b

ANOVA Two-Factor with Replication Regarding Speed (Cont.)

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*
Sample	7.004167	1	7.004167	3.932322	0.048546
Columns	4.345833	3	1.448611	0.813288	0.487648
Interaction	22.3125	3	7.4375	4.175607	0.006646
Within	413.2333	232	1.781178		
Total	446.8958	239			

The public and police were asked: "How important are posted speed limits in selecting driving speed?" The four questions were: (a) on interstates/freeways, (b) rural roads posted at 55 mph, (c) rural roads posted at 45 mph, and (d) urban areas posted at 35-45 mph. The Likert responses were: *very important*, *important*, *relatively important*, and *not important*. Analysis used SPSS analysis of variance (ANOVA). Tables 14 and 14b posit that the police consider it very important on interstate/freeways and the public considers the limit too low. Police consider rural roadway speed limits as more important than the public impression. There seemed to be no agreement between the police and public, and this was expected.

Table 16 is an independent samples test (*t* test) regarding the public's and law enforcement's opinion on speed limits.

Table 16

How Important Are Speed Limits in Selecting Driving Speed?

	Levene's Test for Equality of Variances		t Test for Equality of Means		
	F	*Sig.*	*t*	*df*	*Sig.* (2-tailed)
Equal variances assumed	.295	.589	-.1047	58	.300
Equal variances not assumed			-1.047	47.569	.301

As in previous SPSS Correlation analysis, there was no significant correlation between the public's perception of posted speed limits and the police responses. Further analysis, using SPSS two-sample independent sample mean comparison showed the p-value to be 0.30 (see above). This is far in excess to the chosen alpha of 0.05.

The survey asked law enforcement officers to indicate which group would most likely be involved in a traffic fatality. The intention was to get their expert opinions to pass along to CHP management in order to target the more at risk groups in future intervention and prevention programs. Table 17 is the response.

Table 17

Age Groups Most Likely to be Involved in a Fatal Traffic Accident: Police Response

Age	Response	Percent
16-19	5	15.6%
20-29	21	65.6%
30-45	6	18.8%
46-64	0	0
65+	0	0
Total	32	100%

The response indicated that the 20-29-year-old age group is most likely to be involved in a traffic fatality. This was at variance with the literature (Beck et al., 2002; Dee & Evans, 2001; Hoover, Hoover, & Young, 2000), and with post hoc data from the Antelope Valley area. Fatalities in the 20-29 age group compared to others only increased in 2004. Following in Table 17 are law enforcement officers' opinion compared to post hoc data.

Table 18

Police Officer Opinion on Most At-Risk Group Compared to Post Hoc Data

		Survey	Data2000	Data2001	Data2002	Data2003	Data2004
Survey	Pearson Correlation	1	.251	-.259	-.156	-.177	.901*
	Sig. (2-tailed)		.684	.674	.802	.852	.037
	N		5	5	5	5	5
Data2000	Pearson Correlation		1	.713	.404	.231	.291
	Sig. (2-tailed)			.176	.500	.709	.635
	N			5	5	5	5
Data2001	Pearson Correlation			1	.735	-.010	-.401
	Sig. (2-tailed)				.157	.987	.504
	N				5	5	5
Data2002	Pearson Correlation				1	.368	-.288
	Sig. (2-tailed)					.542	.638
	N					5	5
Data2003	Pearson Correlation					1	.208
	Sig. (2-tailed)						.736
	N						5
Data2004	Pearson Correlation						1
	Sig. (2-tailed)						
	N						

In Table 18 , the astrick (*) indicates that correlation is significant at the 0.05 level (2-tailed).

Table 18 indicates that only at the 0.05 significance level is there good positive correlation between the survey results and the actual year 2004 data. Officer opinion does not correlate with post hoc data for any other years.

Table 19

Survey Response to Where Are the Most Dangerous Roads in Antelope Valley

Location	Public	Percent	Police	Percent
Within city limits of Lancaster/Palmdale	58	21%	11	31%
State Highway 14	41	15%	3	8%
State Highway 138 between Palmdale and Victorville	112	40%	9	25%
Antelope Valley Rural Roads	59	21%	13	36%
State Highway 2	1	1%	0	0
Total	281	100%	36	100%

Table 19 reported the response of the public and police regarding their opinion as to the most dangerous roads, with respect to traffic fatalities, in the Antelope Valley. Public and police opinion correlated at a significance level just under 0.05. A significant correlation (0.666) was found between police and public opinion on the location of greatest risk in the Antelope Valley. Formulated in terms of null and alternative hypotheses:

H_o: There is no correlation between the public and police response as to the location of the most dangerous roads in terms of traffic fatality potential.

H_a: There is correlation between the public and police response as to the location of the most dangerous roads in terms of traffic fatality potential.

From the p value approach to decision making, since "p value" indicates that the correlation exists at the 0.05 significance level, but not at the 0.01 level significance level, suggests that police and public perceptions, while not in total agreement, have a level of agreement. The post hoc data demonstrated that the rural roads are the most dangerous and SR 138 deaths have been on the decrease. However, interestingly law enforcement officers still consider it a dangerous roadway. This information might prove valuable for CHP management in informing the public as to the most dangerous roadways in the valley.

Enforcement

Of extreme interest to CHP management is the public and law enforcement officer attitudes and perceptions of current traffic enforcement in the Antelope Valley. The survey used a Likert-type scale: (a) *too much*, (b*) about right*, and (c) *not enough*. The following is a key to the 11 elements regarding their opinions of traffic enforcement:

Table 20

Key to Table 19; Opinions on Traffic Enforcement in the Antelope Valley

1	Excessive speed
2	HOV lane violations
3	Failing to yield the right of way
4	Running a stop sign/red light
5	Weaving in and out of lanes
6	Drinking and driving
7	Inattentive or distracted drivers
8	Road rage
9	Illegal turns
10	Mechanical defects
11	Racing

Table 21

ANOVA of Public and Police Opinions on Traffic Enforcement in Antelope Valley

SUMMARY												
1.0 Police												Total
Count	30	30	30	30	30	30	30	30	30	30	30	330
Sum	59	62	62	68	67	68	67	76	77	71	81	758
Average	1.97	2.07	2.07	2.27	2.23	2.27	2.23	2.53	2.57	2.37	2.70	2.30
Variance	0.52	0.27	0.34	0.34	0.32	0.41	0.39	1.98	3.50	3.62	3.32	1.37
2.0 Public												
Count	30	30	30	30	30	30	30	30	30	30	30	330
Sum	74	75	69	72	74	71	79	74	72	71	73	804
Average	2.47	2.50	2.30	2.40	2.47	2.37	2.63	2.47	2.40	2.37	2.43	2.44
Variance	0.26	0.26	0.22	0.25	0.26	0.31	0.24	0.26	0.25	0.31	0.25	1.37
Total												
Count	60	60	60	60	60	60	60	60	60	60	60	
Sum	133	137	131	140	141	139	146	150	149	142	154	
Average	2.22	2.28	2.18	2.33	2.35	2.32	2.43	2.50	2.48	2.37	2.57	
Variance	0.44	0.31	0.29	0.29	0.30	0.36	0.35	1.10	1.85	1.93	1.78	

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	3.21	1.00	3.21	3.95	0.05	3.86
Columns	8.57	10.00	0.86	1.05	0.40	1.85
Interaction	9.36	10.00	0.94	1.15	0.32	1.85
Within	518.13	638.00	0.81			
Total	539.27	659.00				

Table 21 is a graphic display of the public and police response on their opinion of traffic enforcement in the Antelope Valley. The following hypothesis is presented:

H_o: There is no difference between the public and police response as to opinion of traffic enforcement in the Antelope Valley.

H_a: There is a difference between the public and police response as to opinion of traffic enforcement in the Antelope Valley.

At a significance level of 0.01, there is not enough evidence to conclude that there is a significant difference between the public and police response relative to traffic law enforcement.

Therefore, accept the null. However, at the 0.05 significance level the null would be rejected, and a difference in the opinions of the public and police would be noted. The survey responses suggested that both the public and the police feel the need for more enforcement. This is likely the result of the public observing more and more violations, the media accounts of increasing traffic accidents and violations, and law enforcement officers feeling that they are understaffed and under-funded.

Possible Prevention Programs

The survey asked the general public and law enforcement officers what steps might possibly be taken to reduce traffic fatalities in the Antelope Valley. Respondents could make multiple responses. Table 21 below is a graphic representation of the results.

Table 22a

What Steps Should Be Taken to Reduce Traffic Fatalities in the Antelope Valley?

Activity	Public	Percent	Police	Percent
More traffic enforcement by police agencies	83	6.3%	19	9.8%
Have a higher law enforcement presence	84	6.3%	25	13.0%
More sobriety check points	91	7.0%	8	4.1%
Reinstitute driver's ed in high school	92	7.0%	15	7.8%
Higher penalties and fines by courts	59	4.5%	12	6.3%
More severe penalties for DUI	119	10.0%	20	10.4%
More signage on rural roads	45	3.4%	5	2.6%
Lower speed limits	21	1.5%	4	2.5%
Promote wearing seat belts	98	7.4%	15	7.8%
Install more stop signs and lights	54	4.2%	2	1.04%
More media coverage	23	1.7%	7	3.6%
More community involvement	50	3.7%	11	5.7%
Require drivers' school for drivers over 65 years old	64	4.8%	4	2.5%

Table 22b

What Steps Should Be Taken to Reduce Traffic Fatalities in the Antelope Valley (Cont)?

Activity	Public	Percent	Police	Percent
Increase driving age to 18 versus 16-years-old	56	4.3%	5	2.6%
Not allow driving when over the age of 80 years	70	5.3%	5	2.6%
Widen roads, especially SR 138	138	10.4%	13	6.7%
Have more passing lanes	91	6.9%	9	4.7%
Have photo enforcement installed	61	4.6%	10	5.2%
Put speed governors on cars	19	0.98%	3	1.5%
Total	1,318	*100%	192	*100%

*Numbers are rounded

Examining the correlations in Table 22a and Table 22b at a significance level of 0.01, there is a strong positive correlation (0.626) between police and public opinion on possible steps to be taken to reduce traffic fatalities in the Antelope Valley. Formulated in terms of null and research hypotheses:

H_o: There is no correlation between the public and police responses as to what steps should be taken to reduce traffic fatalities in the Antelope Valley.

H_a: There is a correlation between the public and police responses as to what steps should be taken to reduce traffic fatalities in the Antelope Valley.

From the p-value approach to decision-making, since p < alpha (0.01 significance level), the null hypothesis was rejected, and the alternative hypothesis accepted, that is, there was a positive correlation between the public's and police officers' responses. While the public and law enforcement officers agree on possible interventions, identifying specific causal relationships requires more investigation.

This finding has proven to be extremely helpful to CHP management in the institution of more aggressive prevention programs in the Antelope Valley. Chapter 5 contains a discussion of previously successful prevention and intervention programs and of on-going and newly instituted traffic-fatality prevention programs in the Antelope Valley.

CHAPTER 5. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents a discussion based upon data analysis and results of the study. This chapter also includes a presentation of the conclusion, limitations of the study, and further research recommendations. The first section will summarize the results of this research, including a review of the study's purpose, hypotheses, methods, and procedures. The second section will present the analysis of the data and findings. The third section is a discussion including comparison between the literature and study results, a proposal for a grant, and suggestions for further research. The fourth section presents effective prevention programs found in the literature. The fifth section contains the conclusions, including a report of significant findings.

Research Summary

Research Background

California Highway Patrol management in the Antelope Valley Area faced a Herculean challenge in the increasing traffic fatalities on the Antelope Valley roads from 2000 to 2005. Also, there were moderating factors of severe budget constraints, lack of personnel, and intensifying political pressure. CHP management requested an exploratory study of the attitudes and behaviors of drivers in the Antelope Valley in order to grasp the total external environment. There was further impetus to extend the survey to law enforcement officers' attitudes and opinions regarding driving behaviors and to compare the findings with post hoc data collected from 2000 to 2004.

The phenomenon of traffic fatalities is not new and volumes of data had been collected; however, there has never been a study of the northern Los County area known as the Antelope

Valley with its two major population areas, Lancaster and Palmdale. As of 2005, the overall population of the valley grew to over 430,000 residents. With this exponential growth was a corresponding increase in traffic accidents and fatalities.

There also was an accompanying economic and social costs involved with these motor vehicle accidents. Typically, costs associated with traffic fatalities included value of savings in medical treatment, property loss, opportunity costs due to injuries, opportunity costs due to disabilities, opportunity costs of family care, and income forgone due to deaths.

These factors were the impetus for this study. The goal was to present CHP management with data and information in order that they could better understand the external environment and to take appropriate monitoring actions to correct disequilibrium in the social system caused by increased traffic fatalities. CHP management in the public sector is constantly faced with the conundrum of actions aimed at the continued melioration of diverse, complex, often fragmented, and usually contested practices.

Management Challenge

"A steady increase in traffic accidents is straining the California Highway Patrol" (Thompson, 2005, p. A1) was the headline in the *Antelope Valley Press*. The article pointed out that CHP officers were so involved in responding to motor vehicle accidents and preparing subsequent reports that they had less time in accident prevention. It was obvious that CHP management is going to have to accomplish their mission without an overabundance of funding, a low manning level, and an increased workload. Meanwhile, CHP management's situation was exacerbated by budgetary constraints and fiscal shortfalls in the Department of Business, Transportation, and Housing in Sacramento.

The Antelope Valley saw not only an unprecedented population growth, but also an increase in the number of automobiles, motorcycles, sport vehicles, and cellular telephones used by residents. This caused an increase in the officers' workload and lessened opportunities for more proactive patrolling and enforcement.

The challenge facing the Antelope Valley CHP management was formidable. While the goal of this study was to provide significant information and shed some light for making decisions, the environment remained uncertain, clouded in ambiguity, and required significant non-programmed decisions.

CHP management faced bounded rationality, meaning that people have limits, or boundaries, on how rational they can be. Management had a limited time and ability to process only a limited amount of information with which to make decisions (Daft & Marcic, 2006). As a temporary measure, the situation forced CHP to "satisfice" because of the lack of time or cognitive ability to process complete information about a complex problem—the reduction of motor vehicle fatalities in the Antelope Valley. The political and budgetary constraints required that CHP management to satisfice with in response to external pressures. More complex and effective decisions involving reduction of motor vehicle fatalities were delayed pending further research.

Antelope Valley CHP management are faced with pressures from other organizations with diverse interests, goals and values. The complexity of solving the rising motor vehicle death toll hinders attempts at rationality and demands alacrity and prudence. Most often, decisions are the result of bargaining and discussion among political, community, media, and organizational members.

The anticipation is that this exploratory study can assist Antelope Valley CHP management by the presentation of the findings of the study. CHP management's intention is to use the results of this study in assisting in the formation of coalitions and support for follow-on community programs. Another objective of this study is to explore possible interventions to assist CHP management, public health management, school administrations, and public officials in determining a proactive accident prevention program.

Environmental Scanning

This exploratory study was designed to assist in scanning the external environment. It would assist in identifying early signals and detect changes in driving attitudes and behaviors already underway. The intent is that this study would assist CHP management in synthesizing ambiguous, incomplete, and unconnected data and information. Also, this study would lead to effective monitoring of the external environment by CHP management in order to track current and potential trends. As there was continuing growth of population in the Antelope Valley with a commensurate increase in motor vehicle population, there was an accompanying change in the demographics. It will be important for CHP management to establish and interact with diverse stakeholders through environmental scanning. This scanning and monitoring would not only provide CHP with information, but would be a method of imparting new knowledge and findings to its constituencies.

The design of this study was to assist CHP management in coping with an ambiguous and incomplete data involving the environment. This study was conducted to assist management in understanding the general attitudes and behaviors of the public and law enforcement officers' perceptions of those attitudes and behaviors. The intention was to provide a linkage between

management and external environmental analysis. This continuous process included four activities: scanning, monitoring, forecasting, and assessing. Scanning identified early signals of changes in the environment and potential changes. Monitoring was a means to establish potential through ongoing observations of changes and trends. Forecasting developed projections of potential and anticipated outcomes based on scanning and monitoring. Assessing was a determination of the timing and importance of observed environmental changes to develop a possible strategy (Hitt, Ireland, & Hoskisson, 2005).

The difficult part, which will require further study, is using the current study to assess the timing and significance that the effects of environmental and demographic changes will have on traffic enforcement so that the result will be to reduce traffic fatalities. Using this study and scanning, monitoring, and forecasting, CHP management should be able to better understand the environment and use it in prevention of motor vehicle accidents.

Research Purpose

Because this study has currency, relativity, and applicability, the intention is to provide CHP management with effective information engendered from quantitative research in the development of awareness and prevention programs in concert with public and civic agencies. The purpose of this study is to move beyond the simple recognition of traffic fatalities as a social and health problem, but aims at being an impetus for follow-on funding to research causal factors and possible interventions to curtail the growing motor vehicle fatality rate.

Data Analysis

Pilot Study

A pilot study was completed on both the public and law enforcement surveys. The test group was selected students from a local community college and volunteered public health officers. Comments and suggestions were compiled and respondents were interviewed. Most corrections were minor in nature and were added for clarity and understanding. A frequent comment was on the extensive length of the survey with over 100 responses required. However, the test group readily identified the importance of the study and noted that the time required was not excessive as the average completion time was 22 minutes. There were similar comments on the Spanish language survey and suggestions were incorporated.

Survey Instrument

The final survey instruments used for data collection are in Appendixes A and B. The sample was a convenience population, but every attempt was made to capture as representative of an audience as possible. Two hundred and twenty (220) general public surveys were received. A total of 30 of 36 highway patrol officers responded to the survey making it a total population, thereby increasing the veracity of responses.

Total participant anonymity was protected through judicious coding and masking any responses to any specific individual. All participants were briefed thoroughly prior to the conduct of the survey and consent forms were collected and stored. However, some participants were reluctant to sign any forms, so this element was not pursued in compliance with respondents' wishes. All of the survey responses remain confidential and secure in storage for possible

continued analysis. The survey was designed in such a manner that it was virtually impossible to identify respondents or any specific responses.

Limitations

First and foremost, causality and prediction through covariation of cause and effect are not inferred in the discussion. This was an exploratory study involving basic research and no causal relationships are neither discussed nor inferred. While some of the findings might not be significant, they provide at best a modest explanation of the association between the public and law enforcement officers. However, significant was that only 30 officers were available to respond to the study, significant in that there are only 36 officers assigned to the office. Such a small, yet expert, sample might prove to be problematic regarding responses.

Early in the study's history, the California Highway Patrol management was interested and supportive of the study. Captain Douglas Rich, Commander, Antelope Valley Area provided assistance and staff support in administering the survey instruments. Staff members were extremely helpful in providing information from SWITRS. However, SWITRS relies on information reported on by CHP area offices. There exists the possibility of measurement error as a result of "under reporting" or "misreporting" of traffic fatalities.

Sampling. The study utilized non-probability sampling called a "convenience sample" due to constraints on time and funding. The sampling bordered on purposive sampling in that specific groups were targeted: young drivers, older drivers, Spanish-speaking drivers, and middle class drivers from 25 to 40 years old.

External validity. There is the possibility of sample bias as it might not be an accurate representation of the population. This limits the ability to use the sample data to estimate the

population or to generalize the information and threatens external validity. Even though the data from a select population and expert samples were rich, the results cannot be generalized, therefore external validity cannot be claimed.

Construct validity. Construct validity refers to the degree to which inferences can legitimately be made from the study and the theoretical constructs upon which they were based. In the data, many interrelationships were discovered (convergent validity) and other elements were not related (divergent validity). Elements that threaten construct validity are respondents answering the questions as they think researchers want them to answer. This is response set which is the tendency to respond to the survey from a particular perspective rather than directly answer the questions. Another threat is evaluation apprehension where respondents were anxious about being evaluated. There is also the possibility that respondents purposely or involuntarily made socially desirable response thereby creating bias (Robson, 2002).

Internal validity. Surveys often represent the least common denominator in assessing individual's attitudes, orientations, circumstances, and experiences. The standardization threatened internal validity through the loss of important ideas or comments and were superficial when dealing with complex social concepts (Babbie, 2004; Creswell, 2003). The surveys threatened validity for respondents' rarely had opinions of the form of *strongly agree*, *agree*, *neutral*, *disagree*, *strongly disagree* from the Likert design. Therefore, researchers considered all data as approximations.

Reliability. A study has reliability if it can be replicated assuming that element being measured has not changed. Using human respondents threatens the reliability and consistency. The instrument is long and respondents might have answered the questions in a haphazard

manner in order to finish. A single researcher coded and entered all the data to ensure reliability of the data.

Findings. Many of the study's findings are consistent with the literature. Many of these findings will assist CHP management and prove valuable in developing programs to reduce the increase in traffic fatalities in the Antelope Valley

Discussion

This exploratory study has currency and applicability. The preliminary findings of this study were partially instrumental in the Antelope Valley Area office of California Highway Patrol'x inauguration of the new program targeting young drivers. "The program, called Start Smart, will begin early in 2006 and bring together the CHP and newly licensed teen drivers, along with their parents and guardians, to discuss ways to prevent the young adults from developing bad—read: aggressive—driving behaviors that lead to injuries and fatalities" (Haley, 2005, p. A1). This will be a statewide program and begins in the Antelope Valley in February, 2006. As reinforced through the literature, young drivers are at the most risk of being involved in a traffic fatality (Beck et al., 2002; Hartos & Eitel, 2002). The goal of the Start Smart program is to develop good driving habits in younger drivers who lack experience behind the wheel and are not often aware of the consequences of their actions.

As of December 2005, deaths in the Antelope Valley (including both the urban and unincorporated areas) total 80. The majority of these deaths are the results of irresponsible, reckless, or careless driving behaviors. Road rage is on the increase and the CHP is stepping up enforcement efforts in preventing road rage by arresting offenders.

Literature and Study Findings

In the literature review of research done in the field of traffic fatalities, studies presented many controversies: the controversy over the effectiveness of safety regulations; controversy over speed limits and their impact on ameliorating fatalities; the controversy over the effects of speed variance; the controversy over road construction and physical interventions; and the controversy over the use of modeling in reducing motor vehicle fatalities. These controversies have not been resolved. Underlying all of the aforementioned arguments is the issue of latent variables which is related to the problem of missing variable and misspecifications. Unless some method is found to engender a true structure or model of traffic fatality relationships, these controversies will continue.

There were some consistencies with this study's finding and previous research on speed limits. Many of the law enforcement officers and management claim that the speed limits are too high. The survey posits that this is in conflict with the public who feel limits are too low on major roads. Local controversy has developed as local elected Antelope Valley officials find nothing wrong with current speed limits, and are reluctant to change them, despite protestations from law enforcement management. Research points out that speed limits are not effective in all driving situations (Fleming, 2004). From the literature and this study, there are alternate approaches to controlling speed including highway design, infrastructure improvements, traffic control through intelligent vehicle and highway related technologies, and interventions for special populations, particularly older drivers and new teenage drivers.

Grant Proposal

The research from this study has been the basis for the request to submit a proposal for a grant to continue the study, and use the techniques in other CHP commands. The Los Angeles County Department of Public Health is extremely interested in pursuing continued study of motor vehicle fatalities in the Antelope Valley, with the goal of developing programs and interventions to reduce the problematic rising motor vehicle death rate.

Suggestions for Further Research

The intention of this study is exploratory in nature and does not attempt to find causal factors. Researchers could expand this study and develop the plethora of survey results into a study of motor vehicle fatalities' causal factors.

There are relatively few studies on motor vehicle fatalities and ethnicity of victims in the literature. Notable studies include studies on Native Americans and traffic fatalities by Baker et al. (1992), Compos-Outcalt et al. (1998), Grossman et al. (1997), and Shiff and Becker in New Mexico (1996). Bond and Cherpitel (2004) completed a study on Hispanics, but their study did not include undocumented workers or illegal aliens.

In the Antelope Valley there has been an increase in the Hispanic population since 2000. Table 23 is a breakdown of the population demographics of the Antelope Valley.

Table 23

Demographic Breakdown of Antelope Valley by Ethnicity

Category	Number	Percent
Total Population	442,029	100.00%
Caucasian	272,260	61.6%
Hispanic	92,898	21.01%
African-American	57,947	13.11%
Asian	13,972	3.16%
American/Alaskan Native	4,952	1.12%

With the growth of the Hispanic population, so was there an increase in undocumented individuals in the Antelope Valley. This study captured some of their attitudes and behaviors with the use of a Spanish-language survey instrument (Appendix C). Many of these individuals, due to current California law, do not possess driver's licenses, insurance, or have had any driver's education and training. For that reason, there was reluctance by many of them to participate in the survey, despite guarantees to keep their anonymity.

Table 24 points out the increasing DUI arrests that are not in proportion to population breakdown.

Table 24
DUI Arrests in Antelope Valley by CHP and Hispanic Ethnicity

2000-2004			2005 (as of November)		
DUI Arrests	Hispanics	Percent	DUI Arrests	Hispanics	Percent
3,129	977	31%	701	271	38.6%

The reason for this exponential DUI rate could possibly be due to cultural factors, lack of driver training, and/or lack of licensing with requisite vehicle code knowledge and examinations. It would be very useful in DUI arrest reduction by conducting research on causal factors and potential prevention programs.

Other areas for consideration of further research includes relationship between age and fatal accidents in the Antelope Valley, attitudes concerning appropriate speed limits, and driving behaviors in correlation with age, education, economic situation, and years driving.

Effective Prevention Programs

There have been a number of effective accident/traffic fatality prevention programs and are proffered for management review. In this exploratory study, the researcher found three successful programs: Shingletown Project, Community Partnership Program, and Saving Lives Program.

Shingletown Project

Shingletown is a community of approximately 5,000 residents, located in Northern California in Shasta County, east of Redding. In 2001, this small community suffered 11 fatal motor vehicle accidents, especially along a 50 mile stretch of State Highway 44, which ran down the main street of Shingletown. A study was conducted concerning Highway 44 crashes from 1998, and the following were the findings of the 711 crashes, of which 23 were fatal with 30 citizens killed.

Table 25

Shingletown Statistics on Crash Types, Number Killed, and Primary Cause Factors

Crash Type	Number Killed	Primary Cause Factor	Number Killed
Head-on	14	DUI	14
Hitting an object	7	Unsafe turn	7
Overturned vehicle	4	Crossing onto traffic	6
Broadside	3	Unsafe speed	2
Sideswipe	1	Loss of control	1
Rear-end	1		

Table 26

Shingletown Statistics on Age, Number, and Month of Traffic Fatalities

Age Group	Number Killed	Month	Number Killed
11-20 years	6	February	1
21-30 years	2	April	1
31-40 years	7	June	5
41-50 years	8	July	4
51-60 years	1	August	9
61-70 years	5	September	6
71-80 years	1	October	2
Over 80 years	0	November	2

Source: Shingletown HWY 44 Safety Project, 2004

Findings. The Shingletown study revealed that along the 50-mile stretch of Highway 44, between 4,000 to 5,000 cars travel per day. Twenty-five of the thirty people killed were local Shasta County residents. Driving under the influence was involved in nearly one-half of the fatalities. Almost all the fatalities occurred in the summer months and on days with clear and dry weather. Tables 25 and 26 are graphic representations of the data uncovered.

Shingletown response. The Shingletown residents formed a community group and received grant money to examine potential advocacies to reduce the number of traffic fatalities. The Shingletown Highway 44 Safety Project (SHSP) was formed in 2002. The group retained a consulting group to conduct a survey and interviews to ascertain the residents' opinion on safety issues on Highway 44 and to gather ideas from residents about appropriate responses to current safety problems.

Respondents of the surveys and interviews felt that the continued or increased involvement of CHP officers was an important and desired element of community responses to highway safety. Respondent were interested in a range of appropriate actions including (a)

increased presence of law enforcement officers and (b) increased enforcement of speed limits and other driving regulations.

Survey and interview participants valued community education and/or public awareness campaigns. Education efforts mentioned were drivers' education classes (particularly for those cited for violations) concentrating on awareness of speed limits, safety rules and precautions, promoting safety messages/reminders, presentations to students and parents at parent nights at local schools, and increased public awareness of fatalities and causes of crashes.

Surveyed residents felt that roadway structural changes were an important element in a response to highway safety issues. The most frequently noted structural change mentioned were more turnouts and passing lanes. In the survey, 88 % of respondents selected turnouts and passing lanes as a measure that would make a difference in highway safety. Lower speed limits and improved signage (slow, curve ahead, caution, stop signs, etc.) were the second most frequently mentioned structural changes.

Many respondents mentioned potential roles for citizens and community groups in promoting highway safety. Potential roles and actions included community education, personal encouragement to drive safely, mentoring, reporting unsafe driving to CHP, setting an example of safe driving, discussing the problem openly, and advocating to related agencies and legislators community needs regarding highway safety.

More than half, 58 %, of the respondents mentioned that sobriety check points would make a difference in reducing traffic fatalities. Interestingly, in the more open-ended interviews, sobriety checkpoints were not mentioned as a possible response, even though comments

throughout the interviews suggested that drinking and alcohol/drug abuse, as well as driving under the influence were problems in the area.

Forty-one percent of respondents said that they received most of their information about local news through word-of-mouth; another 31 % received local news and information from local paper, *Record Searchlight*; and 16 % received news from local television news program, *Ridge Rider News*. The respondents felt that the most effective way to reach residents with highway safety messages was through local newspaper (53%), Public Service Announcement on local television (47%), and the schools (46%). A majority of the respondents supported having at least one sign with a safety message in Shingletown, and they shared a number of highway safety messages for use on a reader board or educational campaign.

Prevention program. The SHSP, with a California grant, began a community effort involving the county public health organization, California Highway Patrol, California Department of Transportation (Caltrans), True North (a local community group), Partnerships for Public Health, the media, schools, and local residents. The concentration was on public awareness and education.

Community efforts. The SHSP team held safety meetings to train members or to organize and mobilize efforts. They printed and distributed brochures and flyers on traffic safety to residents, businesses, and schools. They purchased promotional items, key chains, bumper stickers, buttons, etc., advocating highway safety. They successfully advocated for more involvement from Shasta County Sheriff's Department. They also wrote a grant and received funding for marquee signs along Highway 44. The team implemented a "Highway Safety

Awareness Campaign," with numerous articles and interviews in the media, school education events, increased visibility in booths at civic events, and distribution of safety literature.

Public health group assisted with leadership, mentoring, and resources including funding, technical assistance, and training of the SHSP. They also assisted in community-wide DUI awareness programs and developed and distributed brochures regarding traffic safety. Partnership for Public Health provided assistance in community relations, awareness of problem in medical community, and acting as supporting advocates for SHSP.

The California Highway Patrol assisted in designating Highway 44 as a "DUI Safety Corridor," and assisted in DUI Task Force public meetings. CHP successfully advocated for more funds for enforcement and more DUI checkpoints along Highway 44. CHP was actively involved in "Buckle Up" campaign in the community during the Seat Belt Compliance Campaign.

Caltrans was contacted and received funding for roadway improvement efforts. These included speed studies, seven additional speed zone signs, lowering speed limits in selected areas, added restricted parking areas along Highway 44, and improved signage along the highway.

The result of these efforts was zero traffic fatalities in 2003 and 2004 in Shingletown area.

Community Partnership Program

Goodrow, Scherzer, and Florence (2004) conducted a study on the Community Partnership Program (CPP), a collaborative campus-community partnership acting as a model for an intervention program to reduce motor vehicle accident fatalities along a rural Appalachian

highway in eastern Tennessee. It was a collaborative effort with students from Eastern Tennessee State University in the public health, nursing, and medical programs in coordination with the local community to identify problems and plan a strategy in addressing the problem.

"An inquiry-based learning model proved to be an appropriate approach to engage student teams with community leaders in identifying and resolving health needs" (Goodrow et al., 2004, p. 152). According to Goodrow, Scherzer, and Florence (2004), the proffered inquiry-based model closely matched the objectives of the CPP "more closely than the classroom oriented problem-based approach" (p. 152). The goal was to place students in learning situations to use their investigative techniques to arrive at working solutions to the high traffic accident rate in the area. This approach effectively demonstrated the role students can play in mobilizing the myriad of resources in identifying health and traffic safety concern and prevent motor vehicle fatalities. This method allowed students, through inquiry-based learning methods, to gain life experience in applying "principles of health statistics, epidemiology, community organization, health risk communication, health education planning and program implementation" (Goodrow et al., 2004, pp. 152-153.

Project objectives. The CPP project received funding from the W. K. Kellogg Foundation as one of seven similar programs in the United States. It began in 1991 through a grant initiated in response to commission reports and position papers. The objective was integration of inter-professional for a collaborative effort, emphasizing critical thinking and problem-solving in a cooperative program involving the university and the community. The expectation was to produce a new generation of professionals with multi-disciplinary skills and expand the

boundaries of the medical model to one of community-centered advocacy (Goodrow, et al., 2004).

Inquiry-based learning promotes cooperative thinking and professional interdependence in problem-solving through collaborative community-based exercises and experiences, especially when placed in a multidisciplinary curriculum and seeks to develop cognitive abilities for solving problems in a real world setting (Goodrow et al., 2004; Inouye & Flannelly, 1998). The goal of this process is to teach students in a field the skill of examining substantive issues from diverse viewpoints in seeking solutions.

The success of CPP was dependent on cooperation between the university and local communities. The researchers found that the inquiry-based model was appropriate in the students and the communities in solving the problem of traffic accidents and fatalities.

Students are presented with a problem, and faculty mentors assist students with a self-directed focused investigation around the learning issues. Inquiry-based strategies place students in guided community-based learning situations where their investigations lead to working solutions (Goodrow et al., 2004). CPP students were supported by instruction from an interdisciplinary faculty team and from members of the community. The variety and authenticity of these experiences provided an effective means to prepare students for comparable situations they will face after graduation (Goodrow et al., 2004; Virgin & Goodrow, 1997).

Intervention program. CPP students, along with local citizens and community leaders, initiated a community-based intervention program focusing on reducing deaths from motor vehicle accidents. The population at risk was vehicular travelers on one of the most dangerous stretches of highway in Tennessee.

The students found that the rate for motor vehicle accidents was significantly higher in the target county than in each of the contiguous counties and in the region as a whole. Upon compiling age and sex specific rates, an epidemiological profile emerged, where most of the elevated risks for accidents and fatalities were among teenage male drivers not wearing seat belts. This preventable pattern mirrored what has been called a rural motor vehicle epidemic (Edney, Muelleman, & Walker, 1993). Forty two percent of all the motor vehicle fatalities in the county were teenagers, with three times as many teenage males killed as females. Over three-fourths of the fatalities occurred among drivers or passengers not wearing seat belts.

Program results. As a direct effort of forming coalitions among students, faculty, law enforcement, public health, medical personnel, emergency response personnel, highway maintenance agencies, school administrators, teachers, parents, the media, and civic organizations, an agreement (formal and informal) was formulated with each group to better coordinate efforts to address the problem. Outcomes of the project included measurable reduction in automobile-related fatalities and the initiation by the state department of transportation of a series of investigations expected to pave the way for physical improvements to the roadway (Goodrow et al., 2004). This cooperative effort significantly heightened awareness in the community with subsequent reduction in fatalities, especially among the teenage population. Ancillary advantages were the learning experiences of students and staff of East Tennessee University in multiple disciplines.

Saving Lives Program

The Saving Lives Program (SLP) was initiated in 1988 by an organization of multiple city departments and private citizens in Massachusetts to reduce alcohol-impaired driving,

related driving risks, and traffic deaths and injuries (Hingson, McGovern, Howland, Heeren, Winter, & Zakocs, 1996). This project was funded by the Massachusetts Governor's Highway Safety Bureau and the Commonwealth Fund of New York and of the 30 community that submitted proposals, 11 qualified for funding. Six were selected that varied in size and geographical location, and were to be as similar as possible to the other five unfunded communities.

Research. The research included examining trends in fatal crashes and injuries per 100 crashes as compared with the SLP and the rest of Massachusetts from 1984 through 1993. Annual roadside surveys were conducted at random locations and seat belt use and travel speeds were statistics were gathered. Lastly, four state-wide telephone surveys were conducted as to self-reported driving after drinking (Hingson et al., 1996).

Program initiation. In each community selected, a full-time coordinator from the mayor's office or city manager's office organized a task force of concerned private citizens and organizations and officials representing schools, health, police, fire, recreation, and civic groups. Voluntary effort was a key factor with active task force membership ranging from 20 to more than 100 involved persons (Hingson et al., 1996).

It was the individual communities, not any state or federal agencies that developed most of the program initiatives. Communities introduced media campaigns to reduce drunk driving and speeding, business information programs, speeding and drunk-driving awareness days, speed watch telephone hotlines, police training, high school peer education, Students Against Drunk Driving (SADD) chapters, college prevention programs, alcohol-free prom nights, beer keg registration, and increased liquor outlet surveillance. To increase pedestrian safety and seat belt

use, program communities undertook media campaigns and police checkpoints, posted crosswalk signs warning motorist of fines for failure to yield to pedestrians, added crosswalk guards, and offered preschool education programs and training for hospital and prenatal clinic staff.

Table 27

Baseline Characteristics of the Saving Lives Program Cities and the Rest of Massachusetts

	Saving Lives Cities	Massachusetts	5 Comparison Cities
1980 population	293,175	5,082,500	361,362
1990 population	318, 974	5,318,785	378,666
White percent	90%	90%	89%
Welfare Recipients	14%	18%	13%
Employed	54%	54%	50%
Living in poverty	10%	8%	13%
Per capita income	$15,116	$17,342	$14,284
Fatality rate per 1000 population (1984-1987)	0.5	0.5	0.3
Visible injury per 1000 population (1984-1987)	58.8	58.3	68.0
Injury rate per 100 crashes	48.1%	47.3	52.1
1987 traffic citation rate per 1000 population	167.4	164.1	163.4
1987 speeding citation rate per 1000 population	100.3	85.9	79.0
1987 DUI rate per 1000 population	2.0	2.7	2.5

Source: Hingson et al., 1996

At baseline (Table 25) Saving Lives Program cities were slightly less affluent than the rest of Massachusetts but slightly more affluent than comparison (non-program) cities), but otherwise they had similar demographic characteristics, rates of traffic citations, and rates of fatal accidents. Although injury rates per population were slightly lower in program cities, trends in the rates of total injuries per 100 crashes and fatal crashes during the preprogram years did not differ. Relative to SLP cities, comparison cities were a bit less affluent, had higher preprogram rates, and lower fatality rates; preprogram trends in fatal crashes did not differ significantly.

Results. During the SLP, Massachusetts had the lowest traffic fatality rate per vehicle miles driven of any state in the U.S. Nonetheless, during the five program years, there was a 25 % greater decline in fatal crashes in the SLP cities than the rest of Massachusetts.

The Hingson et al. study (1996) revealed that this community program that addressed drunk driving, speeding, seat belts, and pedestrian safety produced declines in fatal crashes greater than those typically achieved by individual state-level legal countermeasures. Of note is that during the study period, Massachusetts had neither administrative license revocation nor mandatory seat belt legislation.

Laws designed to reduce traffic deaths are most effective when accompanied by active enforcement, engineering (both vehicle and roadway efforts), and education. During the SLP speeding fines were increased in Massachusetts, and program cities experienced more marked reductions in the proportion of vehicles observed speeding than did comparison cities. The results also suggest that community programs can have an important independent effect in reducing alcohol-related fatal crashes. That may account for only a 7 % increase in seat belt use in SLP cities, and 4 % statewide. However, when the program started, a greater proportion of

drivers were observed speeding and safety belt use was lower in program cities than in the rest of the state.

While the decline in injuries per 100 crashes in SLP cities during the program was not significantly greater than that in the comparison cities, the decline in fatal crashes was significantly greater in SLP cities than in both the comparison cities and the rest of Massachusetts. This suggests that the program reduced fatal crashes independent of underlying community motivation. Perhaps the fatal crash declines were more marked than the injury declines in the program cities because two of the major foci of the program, alcohol-impaired driving and speeding, were more likely to be factors in fatal crashes than in injury crashes. For example, alcohol is a factor in nearly 50 % of traffic fatalities but in only 20 % of moderate to severe injuries and 10 % of all traffic injuries.

Relative to the previous ten years, the SLP cities experienced a 19 % greater decline in annual fatal crashes during the five program years than the rest of Massachusetts ($p < 0.05$).

There was little evidence that the program's effects were the result of increased police enforcement and resultant general deterrence. The perceived likelihood of police apprehension is only one of the many factors that can reduce driving under the influence and fatal crashes.

> On balance, the Saving Lives Program provided a community organizational structure that enabled private citizens and public officials from multiple city departments to develop their own innovative initiatives that markedly reduced drunk driving and speeding as well as related fatal crashes, particularly among young drivers. This type of intervention is financially within the means of most communities and can enhance existing traffic safety laws. (Hingson et al., 1996, p. 796)

Conclusions

The research of this study posits that there are four essential factors in traffic fatality prevention supported by the literature. These included enforcement, engineering, education, and economy.

Enforcement. Traffic law enforcement remains a pivotal element in reducing traffic fatalities. The study posited that more enforcement is needed, and, considering the insufficient number of CHP officers available, more strategic placement of those personnel. Management can target specific areas and times referring to this finding of this study. CHP supervisors can assign more special enforcement units to concentrate on areas with the most violations. Another possible intervention is adding sobriety checkpoints, especially during the holiday and heavy traffic seasons to mediate drinking and driving.

Engineering. Automobile manufacturers are continually making safety advances in the design and testing of new automobiles. The addition of surround air bags, anti-skid braking systems, and other safety features are instrumental in reducing fatalities (Golden & Hatcher, 2001). However, according to the literature, many drivers feel that safer cars mean that they can drive faster and take more risks (Richter et al., 2004).

The TRIP study (2005) found that as population increased, so did the dependence on rural roads, an area of the most accidents according to this study's findings. However, rural roads receive less attention, less funding and resources (Dissanayake & Ratnayake, 2005).

Serious consideration by public officials on improving road conditions in the Antelope Valley is essential in reducing traffic fatalities. Possible improvements include continuous shoulder rumble strips (CSRS), curve speed warning system (CSWS), lane drift warning system

(LDWS), improved signage, Botts' Dots® at stop intersections, improved signage, and widening of roads in known dangerous locations.

Education. As proven by the Shingletown study, education of the public is an essential factor in reducing traffic fatalities. This educational effort should include the media, law enforcement, civic groups, educations, and public officials. The effort must be concerted and involve all of the groups, for research demonstrates that any one unit acting alone is not sufficient.

The Shingletown study demonstrates how a involved community can make a positive impact on reducing traffic fatalities. Antelope Valley CHP management is making a positive step with the Start Smart program. In December 2005, the LASD Lancaster office received a federal grant for an "Avoid Collisions Through Increased Vigilance, Education, and Enforcement" (ACTIVE) program. This program was the result of a significant increase in night-time driving under the influence of alcohol or drugs and auto-bicycle collisions within Lancaster city limits. This is a two years program to combine education with enforcement to reduce the number of accidents and fatalities. The Office of Traffic Safety statistics on collisions indicated that Lancaster had experienced a 20 % increase in total collisions from 2001 to 2003, including an 81 % increase in DUI collisions and a 66 % increase in auto-bicycle collisions. ACTIVE's goals are to reduce the number of fatalities by 15 %, traffic injuries by 10 %, DUI collisions by 10 % and bicyclists' injuries by 10 %. Efforts also include reducing underage consumption of, and access to, alcohol by deterring adults from furnishing them outside of licensed premises, raising public awareness about underage drinking problem, reducing the percentage of licensees selling alcoholic beverages to minors, and reducing the number of underage 21 DUI collisions.

Economy. This element is the funding required to put the previously mentioned programs into effect. The realities of governmental funding of roads are crucial in developing strategies in making roadway improvements. Investments of the government on traffic road safety are frequently seen as important means for improving community economic development prospects. The general approach taken in an economic analysis of road safety investment is to compare transportation cost savings with the capital, operational and maintenance costs of the government budget allocation. The government budgets on road safety can be divided into two categories. First, the budgets allocated for direct road safety, which include monitoring of motor vehicles and road users on the roads, land transportation schools, land transportation examination, automobiles condition checking. vehicle registration and driver license holders, the construction roadway countermeasure (lighting, roadway barriers), the correction of hazardous roads sections, road safety education programs, and audit of road safety; and second, indirect budgets for road safety which include the construction of roads and bridges, the maintenance of roads and bridges, and the adjustment of roads and bridges.

Typically, cost savings of economic loss from motor vehicle traffic accidents include value of savings in medical treatment, property loss, opportunity costs due to injuries, opportunity cost due to disabilities, opportunity cost of family care, and income forgone due to deaths. By considering these relevant costs, if the discounted benefits or cost savings are greater than the costs, a government investment is efficient and would be beneficial to society.

Closing. "Motorists in the Antelope Valley are nearly three times more likely to die in traffic crashes than to be murdered " (Loughrie, 2005b. A1). The political/legal elements of the CHP and interest groups compete for attention, resources, and a voice in guiding actions of

vehicle accident prevention. There have been 78 road deaths in the Antelope Valley from January 1 to December 5, 2005. These were the combined totals of the California Highway Patrol and Los Angeles Sheriff's Department offices in Palmdale and Lancaster.

There is tremendous political pressure on the local law enforcement agencies regarding the ever-climbing motor vehicle death rate. All of the local agencies have formed the Antelope Valley Traffic Task Force, which performs operations ranging from DUI checkpoints to pedestrian crossing stings. Hopefully, this study will help CHP management in their efforts to reduce traffic fatalities in the Antelope Valley area.

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APPENDIX A

INSTRUMENT: PUBLIC

The purpose of this questionnaire is to explore driving behaviors in the Antelope Valley in hope of reducing the number of yearly fatalities. Thank your for volunteering, and all responses shall remain confidential and anonymous.

1. Gender
   - o Male
   - o Female

2. Age
   - o 16-20
   - o 21-29
   - o 30-45
   - o 46-64
   - o 65+

3. Ethnic Group
White (non-Hispanic) ____
Hispanic ____
Asian-American ____
African-American ____
Native-American ____
Multi-racial ____

4. Education
   - o High school graduate
   - o Some college
   - o Four-year college graduate
   - o Graduate school education

5. Status
   - o LA County health official
   - o City/County official (appointed or elected)
   - o City/County employee
   - o Country/state road maintenance employee
   - o Educator
   - o Student
   - o Employed
   - o Unemployed
   - o Retired

6. Do you have a valid driver's license?
   - o Yes
   - o No

7. Total number of years driving _____

8. How many times have you been cited for traffic violation(s) in last 10 years?
   - o 0
   - o 1
   - o 2
   - o 3
   - o 4
   - o 5+

9. Have you been cited for a traffic violation in the last 18 months?
   - o Yes
   - o No

10. Have you been given a warning (verbal or written) in past 18 months? Yes __ No __

11. Have you ever been cited for the following? (Check those applicable)
   - o Speeding
   - o Illegal turn
   - o Illegal lane change (or violation of HOV lane requirements)
   - o Rolling stop (rolling through stop sign)
   - o Reckless driving
   - o Driving under the influence
   - o Seat belt violation
   - o Tinted windows or mechanical (fix-it)
   - o Other _____
   - o Never cited

12. Citation was given by:
   - o California Highway Patrol
   - o County Sheriff's department
   - o City police
   - o Other _____
   - o No citation

13. Have you ever attended driving school after receiving a citation? Yes _ No__N/A __

14. Do you usually drive with a radar detector?
   - o Yes
   - o No

15. I wear my seat belt
   - o Always
   - o Most of the time
   - o Rarely

16-18. Thinking of a typical week, how often do you drive on the following types of roads:
Multilane interstate: Sometimes ____ Frequently _____ Rarely _____
Two lane rural roads: Sometimes ____ Frequently _____ Rarely _____
City, neighborhood: Sometimes ____ Frequently _____ Rarely _____

19. Thinking about the roads you drive on daily, would you say these roads are mostly:
- o Interstate, divided highways (commuter)
- o Two-lane rural roads
- o City, town, or neighborhoods

20. Thinking about the roads you often, but not on daily basis, drive on, would you say that these roads are:
- o Mostly interstate/state highways
- o Mostly rural two lane roads
- o Urban, city, neighborhood roads

21. Thinking about the roads you normally drive on, would you say they are:
- o More rural than urban
- o More urban than rural

22. Which statement best describes your driving?
- o I tend to pass most drivers
- o I pass some slower drivers
- o I try to maintain speed of traffic
- o Most drivers pass me

23. When was the last time you drove 15 mph over the speed limit on a multi-lane interstate/state highway with speed limit of 65 mph?
- o Today
- o Within the past week
- o Within the past month
- o Rarely
- o Never

24. When was the last time you drove 15 mph over the speed limit on a rural two lane highway with speed limit of 55 mph?
- o Today
- o Within the past week
- o Within the past month
- o Rarely
- o Never

25. When was the last time you drove 15 mph over the speed limit on an urban/city street with speed limit of 35-45 mph?
- o Today
- o Within the past week
- o Within the past month
- o Rarely
- o Never

26. In your opinion, how much over the speed limit can you go before police will normally give you a speeding ticket if they see you or detect you on radar?
- o 0-5 mph
- o 5-10 mph
- o 10-15 mph
- o 15-20+ mph

27-33. Please indicate how frequently you think the average driver exhibits the following behaviors

Activity	Often	Sometimes	Rarely/Never
Drive through light that was red before entering intersection	○	○	○
Enter intersection just as light turned from yellow to red	○	○	○
Slow down, but not come to complete stop at stop sign	○	○	○
Drive when you think you have had too much to drink	○	○	○
Make u-turn when it says not too	○	○	○
Drive in HOV lane without required passenger(s)	○	○	○
Cut in front of another driver	○	○	○

34. Other than speeding, what types of unsafe driving behaviors do you normally encounter on the roads you drive? (Select those applicable)
- o Tailgating
- o Excessive speed
- o Failing to yield
- o Weaving in and out
- o Drinking and driving
- o Running red lights
- o Ignoring stop signs
- o Inattentive/distracted
- o Cell phone use

35. Compared to a year ago, do you consider drivers in the AV area drive:
- o More aggressively
- o Same
- o Less aggressively

36-50. Please indicate how often drivers do each of the following when you drive:

Activity	Often	Sometimes	Rarely	Never
Drive 10 mph faster than most other vehicles.	○	○	○	○
Drive 20 mph over posted speed limit on interstate/state highways.....	○	○	○	○
Drive 10 mph over posted speed limit on interstate/state highways	○	○	○	○
Drive 20 mph over posted speed limit on rural roads	○	○	○	○
Drive 10 mph faster over posted speed limit on rural roads	○	○	○	○
Drive 20 mph faster than most other vehicles	○	○	○	○
Cut in front of another driver	○	○	○	○
Tailgate other vehicles	○	○	○	○
Drive through stop signs without fully stopping or minimal slowing	○	○	○	○
Race other vehicles	○	○	○	○
Drive through traffic by switching lanes frequently	○	○	○	○
Use shoulder to pass in heavy traffic	○	○	○	○
Make an obscene gesture to another driver	○	○	○	○
Pass in no passing zone	○	○	○	○
Pass school bus with red lights flashing and arm out on two lane road	○	○	○	○

51- 59. People have different feelings about driving. Please indicate whether you agree or disagree with the following statements about the average driver:

Activity	Strongly agree	Agree	Disagree	Strongly disagree
I enjoy the feeling of driving fast	○	○	○	○
The faster I drive, the more alert I am	○	○	○	○
I often get impatient with slow drivers	○	○	○	○
I try to get to where I am going as fast as I can	○	○	○	○
I worry a lot about having a crash	○	○	○	○
I don’t like it when people pass me	○	○	○	○
Traffic laws are being effectively enforced	○	○	○	○
There has been a rise over the years of fatal accidents in the Antelope Valley	○	○	○	○
The Antelope Valley has one of the highest fatal accident rates in the state of California	○	○	○	○
The driver and passengers should wear seat belts any time the vehicle is operating and moving	○	○	○	○

60-64. In general, are posted speed limits too high, about right, or too low?

Activity	Too high	About right	Too Low
Interstate/state divided highways posted at 65 mph or greater	○	○	○
Rural two-lane undivided roads with post speed limit of 55 mph	○	○	○
Rural roads of posted 45 mph speed limit	○	○	○
Urban/city/neighborhood roads of 35-45 mph	○	○	○
School zones at 25 mph	○	○	○

65. What do you think is the ideal speed limit for rural two-way, two-lane highways?
- o 70 mph
- o 65 mph
- o 60 mph
- o 55 mph or less

66. How important is it that there is greater enforcement to reduce speeding on two lane roads with one lane of traffic in each direction and 55 mph speed limit?
- o Somewhat more important
- o A lot more important

67. In your opinion, how much of a threat is it to the personal safety of you and your family if other drivers are speeding?
- o Minor threat
- o Major threat
- o No threat

68-74. For many people, different factors can affect how they decide to drive on different types of roads. Please indicate how important each of the following factors are to drivers in the Antelope Valley in selecting the speed at which they drive on the roads they drive most often.

	Very Important	Important	Relatively Important	Not Important
Speed of other traffic	○	○	○	○
Posted speed limit	○	○	○	○
The chance of being stopped by police	○	○	○	○
How much traffic is on the road	○	○	○	○
How much time you have to get to destination	○	○	○	○
Your past experience on traveling on the same road(s)	○	○	○	○
Weather conditions	○	○	○	○

75-81. Compared to someone driving at the speed limit, how much more likely is someone traveling at the following speeds likely to be involved in an auto accident?

Activity	More Likely	Somewhat More Likely	Not likely
Exceeding speed limit by 15 mph +	○	○	○
Exceeding speed limit by 11-14 mph	○	○	○
Exceeding speed limit by 10 mph	○	○	○
Exceeding speed limit by 5-9 mph	○	○	○
Traveling at the speed limit	○	○	○
Traveling up to 5 mph under the speed limit	○	○	○
Traveling in excess of 5 mph under the speed limit	○	○	○

82-89. In your opinion, how much of a threat is it to the personal safety of you and your family if the other drivers do the following:

Activity	Major Threat	Minor Threat	No Threat
Tailgating	○	○	○
Excessive speed	○	○	○
Failing to yield right of way	○	○	○
Running a stop light/sign	○	○	○
Weaving in and out	○	○	○
Drinking and driving	○	○	○
Inattentive or distraction of driver	○	○	○
Road rage	○	○	○

90. How often in the past year have you felt that the behavior of another driver was a personal threat to you or your passenger?

- o Never
- o Once a month or less
- o Several times a month
- o Several times a week
- o Every/nearly every day

91. When was the last time you felt a driver's behavior was a personal threat?

- o Not within the last year
- o More than a month ago
- o Within past month
- o Within past week
- o Today

92. Thinking about the last time you felt this way, what did the driver do that made you feel threatened?

- o Cut very closely in front of me
- o Drove very close behind/beside me
- o Was distracted by cell phone, or other reason
- o Made an obscene/threatening gesture
- o Passed me in a dangerous/no passing zone
- o Cut me off at an intersection
- o Speed related
- o Ran a stop sign

93. What did you do?

- o Stopped/slowed down
- o Moved vehicle away from the problem
- o Another avoidance technique
- o Nothing/ignored
- o Took aggressive action (honked, made gesture, etc.)

94-104. What is your opinion of police enforcement of traffic laws on the roads that you drive regarding:

Violation	Too much	About right	Not enough
Excessive speed	○	○	○
HOV lane violations	○	○	○
Failing to yield right of way	○	○	○
Running a stop light/sign	○	○	○
Weaving in and out	○	○	○
Drinking and driving	○	○	○
Inattentive or distraction of driver	○	○	○
Road rage	○	○	○
Illegal turns	○	○	○
Mechanical defects (taillights, tinted windows, loud exhaust, etc.)	○	○	○
Racing	○	○	○

105. A suggestion for controlling speed is to have speed governors on vehicle that mechanically limit speed.

- o Good idea
- o Neutral idea
- o Poor idea

106. Another suggestion, and incorporated in many areas, is the installation of automated photo enforcement that does not require the officer to stop and ticket violators.

- Good idea
- Neutral idea
- Poor idea

107. Do you think photo enforcement should be utilized for

- Speeding in rural areas
- Running red lights
- Not stopping at stop signs
- Speeding in school zone
- Not used

108. Thinking about locations where photo enforcement might be useful, at what locations would you find it acceptable?

- Where it would be hazardous to the driver or officer to stop
- Where stopping traffic might cause congestion
- Where there have been many accidents
- In school zones
- Not used at all

109. If photo enforcement were used, do you think it should take a picture of the front of the vehicle so that the specific driver can be identified and matched to pictures from state driver's licenses or do you think the picture should only be of the rear license plate?

- Front photo to identify driver for points
- Rear photo only to identify license plate for points

110. Where do you think the greatest danger of being in an accident is located?

- Within the city limits of Lancaster and/or Palmdale
- On Highway 14
- On Highway 138 between Palmdale and Victorville
- On Antelope Valley rural roads
- Lake Elizabeth Road
- Bouquet Canyon or San Francisquito Road

111. What is your opinion of driver's education in our high schools?

- Would reduce accidents involving teenagers
- Would somewhat reduce accidents among teenagers
- Would have little effect in reducing accidents among teenagers
- No effect at all

112. Driving under the influence of drugs/alcohol is a problem in the Antelope Valley?
- Agree
- Neutral
- Disagree

113. Wearing the seat belt in an automobile saves lives in cases of collisions?
- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

114. Which age group will most likely be in a fatal accident in the AV?
- 16-19
- 20-29
- 30-45
- 46-64
- 65+

115. Which age group will most likely be arrested for driving under the influence in AV?
- 16-19
- 20-29
- 30-45
- 46-64
- 65+

116. What steps should be taken to reduce traffic fatalities in the Antelope Valley (check all applicable?
- More traffic enforcement by police
- Have a higher law enforcement presence
- More sobriety check points
- Reinstitute driver's education in high schools
- Higher penalties and fines by court
- More severe penalties for driving under the influence
- More signage on rural roads
- Lower speed limits
- Promote wearing seat belts
- Install more stop signs and lights
- More media coverage
- More community involvement
- Require driver's school yearly for drivers over 65 yrs old
- Increase driving age to 18 vice 16.
- Not allow driving over 80 yrs old
- Widen roads, especially Highway 138

- Have more passing lanes
- Have photo enforcement installed
- Put governors on cars
- Other (specify) _____
  _____
  _____
  _____
  _____

Thanks for your participation and support. Hopefully, this will help reduce traffic fatalities in our Antelope Valley.

APPENDIX B

INSTRUMENT: LAW ENFORCEMENT

The purpose of this questionnaire is to explore driving behaviors in the Antelope Valley in hope of reducing the number of yearly fatalities. Thank your for volunteering, and all responses shall remain confidential and anonymous.

1. Gender
   - o Male
   - o Female

2. Age
   - o 21-29
   - o 30-39
   - o 40-49
   - o 50+

3. Ethnic Group
   White (non-Hispanic) ____
   Hispanic ____
   Asian-American ____
   African-American ____
   Native-American ____
   Multi-racial ____

4. Education
   - o Non-high school graduate
   - o High school graduate
   - o Some college and associate's degree
   - o Four-year college graduate
   - o Graduate school education

5. Status
   - o Management (Sergeant or above)
   - o Officer

6. Number of years as California Highway Patrol officer?
   - o 1-5 years
   - o 5-9 years
   - o 10-15 years
   - o 16-20 years
   - o 21-25 years
   - o >25 years

7. Average number of traffic citations do you issue per shift?
   - o 1-5
   - o 5-9
   - o 10-15
   - o 16-20
   - o 20

8. Rank the order of the citations from most (1) to least (10) frequent

Violation	Ranking
Excessive speed	
Illegal passing/unsafe lane change	
Driving under the influence	
Illegal turn	
Mechanical violation or tinted window	
Running red light/sign	
Commercial violation	
Parking	
Reckless driving/racing	
HOV	

9-16. Please indicate how frequently you think the average driver exhibits the following behaviors:

Activity	Often	Sometimes	Rarely/Never
Drive through light that was red before entering intersection.	○	○	○
Enter intersection just as light turned from yellow to red	○	○	○
Slow down, but not come to complete stop at stop sign	○	○	○
Drive when having had too much to drink	○	○	○
Make u-turn when it says not to	○	○	○
Drive in HOV lane without required passenger(s)	○	○	○
Cut in front of another driver	○	○	○
Other (Specify)	○	○	○

17. Other than speeding, what types of unsafe driving behaviors do you normally observe on the roads you both on and off duty? (Select those applicable)

- ○ Tailgating
- ○ Failing to yield
- ○ Weaving in and out
- ○ Drinking and driving
- ○ Running red lights
- ○ Ignoring stop signs
- ○ Inattentive/distracted
- ○ Cell phone use

18. Compared to a year ago, do you consider drivers in the Antelope Valley drive:

- ○ More aggressively
- ○ Same
- ○ Less aggressively

19-33. Please indicate how often you think the average driver exhibits the following behaviors:

Activity	Often	Sometimes	Rarely	Never
Drive 10 mph faster than most other vehicles.	○	○	○	○
Drive 20 mph over posted speed limit on interstate/state highways	○	○	○	○
Drive 10 mph over posted speed limit on interstate/state highways	○	○	○	○
Drive 20 mph over posted speed limit on rural roads	○	○	○	○
Drive 10 mph faster over posted speed limit on rural roads...	○	○	○	○
Drive 20 mph faster than most other vehicles	○	○	○	○
Cut in front of another driver	○	○	○	○
Tailgate other vehicles	○	○	○	○
Drive through stop signs without fully stopping or minimal slowing	○	○	○	○
Race other vehicles	○	○	○	○
Drive through traffic by switching lanes frequently	○	○	○	○
Use shoulder to pass in heavy traffic	○	○	○	○
Make an obscene gesture to another driver	○	○	○	○
Pass in no passing zone	○	○	○	○
Pass school bus with red lights flashing and arm out on two lane road	○	○	○	○

34-42. People have different feelings about driving. Please indicate whether you agree or disagree with the following statements concerning most drivers:

Activity	Strongly agree	Agree	Disagree	Strongly disagree
I enjoy the feeling of driving fast	○	○	○	○
The faster I drive, the more alert I am	○	○	○	○
I often get impatient with slow drivers	○	○	○	○
I try to get to where I am going as fast as I can	○	○	○	○
I worry a lot about having a crash	○	○	○	○
I don't like it when people pass me	○	○	○	○
Traffic laws are being effectively enforced	○	○	○	○
There has been a rise over the years of fatal accidents in the Antelope Valley	○	○	○	○
The Antelope Valley has one of the highest fatal accident rates in the state of California	○	○	○	○

43-47. In general, what is your opinion about the following speed limits?

Activity	Too high	About right	Too Low
Interstate/state divided highways posted at 65 mph or greater	○	○	○
Rural two-lane undivided roads with post speed limit of 55 mph	○	○	○
Rural roads of posted 45 mph speed limit	○	○	○
Urban/city/neighborhood roads of 35-45 mph	○	○	○
School zones at 25 mph	○	○	○

48. What do you think is the ideal speed limit for rural two-way, two-lane highways?
- ○ 70 mph
- ○ 65 mph
- ○ 60 mph
- ○ 55 mph or less

49. How important is it that there is greater enforcement to reduce speeding on two lane roads with one lane of traffic in each direction and 55 mph speed limit?
- ○ Somewhat more important
- ○ A lot more important

50. In your opinion, how much of a threat is it to the personal safety of you and average drivers if other drivers are speeding?
- ○ Minor threat
- ○ Major threat
- ○ No threat

51-57. For many people, different factors can affect how they decide to drive on different types of roads. Please indicate how important each of the following factors are in drivers selecting their speed:

	Very Important	Important	Relatively Important	Not Important
Speed of other traffic	○	○	○	○
Posted speed limit	○	○	○	○
The chance of being stopped by police	○	○	○	○
How much traffic is on the road	○	○	○	○
How much time you have to get to destination	○	○	○	○
Your past experience on traveling on the same road(s)	○	○	○	○
Weather conditions	○	○	○	○

58-64. Compared to someone driving at the speed limit, how much more likely is someone traveling at the following speeds likely to be involved in an auto accident?

Activity	More Likely	Somewhat More Likely	Not likely
Exceeding speed limit by 15 mph +	○	○	○
Exceeding speed limit by 11-14 mph	○	○	○
Exceeding speed limit by 10 mph	○	○	○
Exceeding speed limit by 5-9 mph	○	○	○
Traveling at the speed limit	○	○	○
Traveling up to 5 mph under the speed limit	○	○	○
Traveling more than 5 mph under the speed limit	○	○	○

65-72. In your opinion, how much of a threat is it to the personal safety of drivers if the other drivers do the following:

Activity	Major Threat	Minor Threat	No Threat
Tailgating	○	○	○
Excessive speed	○	○	○
Failing to yield right of way	○	○	○
Running a stop light/sign	○	○	○
Weaving in and out	○	○	○
Drinking and driving	○	○	○
Inattentive or distraction of driver	○	○	○
Road rage	○	○	○

73. How often in the past year have you felt that the behavior of another driver was a personal threat to the average driver?

- o Never
- o Once a month or less
- o Several times a month
- o Several times a week
- o Every/nearly every day

74. The average driver understands the importance of wearing a seat belt?

- o Strongly agree
- o Agree
- o Neutral
- o Disagree
- o Strongly disagree

75. Thinking about the last time you felt this way, when off-duty what did a driver do that made you feel threatened?

- o Cut very closely in front of me
- o Drove very close behind/beside me
- o Was distracted by cell phone, or other reason
- o Made an obscene/threatening gesture
- o Passed me in a dangerous/no passing zone
- o Cut me off at an intersection
- o Speed related
- o Ran a stop sign

76. What did you do?

- o Stopped/slowed down
- o Moved vehicle away from the problem
- o Another avoidance technique
- o Nothing/ignored
- o Took aggressive action (honked, made gesture, etc.)
- o Call it in to law enforcement

77-88. What is your opinion of police enforcement of traffic laws on the roads in the Antelope Valley regarding:

Violation	Too much	About right	Not enough
Excessive speed	○	○	○
HOV lane violations	○	○	○
Failing to yield right of way	○	○	○
Running a stop light/sign	○	○	○
Weaving in and out	○	○	○
Drinking and driving	○	○	○
Inattentive or distraction of driver	○	○	○
Road rage	○	○	○
Illegal turns	○	○	○
Mechanical defects (taillights, tinted windows, loud exhaust, etc.)	○	○	○
Racing	○	○	○
Traffic relief of congestion	○	○	○

89. A suggestion for controlling speed is to have speed governors on vehicle that mechanically limit speed.

- o Good idea
- o Neutral idea
- o Poor idea

90. Another suggestion, and incorporated in many areas, is the installation of automated photo enforcement that does not require the officer to stop and ticket violators.
    - Good idea
    - Neutral idea
    - Poor idea

91. Do you think photo enforcement should be utilized for
    - Speeding in rural areas
    - Running red lights
    - Not stopping at stop signs
    - Speeding in school zone
    - Not used

92. Thinking about locations where photo enforcement might be useful, at what locations would you find it acceptable?
    - Where it would be hazardous to the driver or officer to stop
    - Where stopping traffic might cause congestion
    - Where there have been many accidents
    - In school zones
    - Not used at all

93. If photo enforcement were used, do you think it should take a picture of the front of the vehicle so that the specific driver can be identified and matched to pictures from state driver's licenses or do you think the picture should only be of the rear license plate?
    - Front photo to identify driver for points
    - Rear photo only to identify license plate for points

94. Where do you think the greatest danger of being in an accident is located?
    - Within the city limits of Lancaster and/or Palmdale
    - On Highway 14
    - On Highway 138 between Palmdale and Victorville
    - On Antelope Valley rural roads
    - Lake Elizabeth Road
    - Bouquet Canyon or San Francisquito Road

95. What is your opinion of driver's education in our high schools?
    - Would reduce accidents involving teenagers
    - Would somewhat reduce accidents among teenagers
    - Would have little effect in reducing accidents among teenagers
    - No effect at all

96. Driving under the influence of drugs/alcohol is a problem in the Antelope Valley?
    - Agree
    - Neutral
    - Disagree

97. Which age group will most likely be in a fatal accident in the AV?
    - 16-19
    - 20-29
    - 30-45
    - 46-64
    - 65+

98. Which age group will most likely be arrested for driving under the influence in AV?
    - 16-19
    - 20-29
    - 30-45l
    - 46-64
    - 65+

99. How often do you encounter/stop a driver in excess of 80 mph on rural, two-lane roads?
    - Often
    - Sometimes
    - Occasionally
    - Rarely
    - Never

100. How often do you encounter/stop a driver in violation of seat belt law?
    - Often
    - Sometimes
    - Occasionally
    - Rarely
    - Never

101. What is your opinion about signage on rural roads in AV.
    - Very adequate
    - Somewhat adequate
    - Just adequate
    - Less than adequate

102. Officers spend too much time in writing reports vice being out on the road?

- o Strongly agree
- o Agree
- o Neutral
- o Disagree
- o Strongly disagree

103. What steps should be taken to reduce traffic fatalities in the Antelope Valley (check all applicable?

- o More traffic enforcement by police
- o Have a higher law enforcement presence
- o More sobriety check points
- o Reinstitute driver's education in high schools
- o Higher penalties and fines by court
- o More severe penalties for driving under the influence
- o More signage on rural roads
- o Lower speed limits
- o Promote wearing seat belts
- o Install more stop signs and lights
- o More media coverage
- o More community involvement
- o Require driver's school yearly for drivers over 65 yrs old
- o Increase driving age to 18 vice 16.
- o Not allow driving over 80 yrs old
- o Widen roads, especially Highway 138
- o Have more passing lanes
- o Have photo enforcement installed
- o Put governors on cars
- o Other (specify) _____
  _____
  _____
  _____
  _____

Thanks for your participation and support. Hopefully, this will help reduce traffic fatalities in our Antelope Valley.

APPENDIX C

INSTRUMENT: SPANISH

La intención y meta de esto cuestionario es reducir a fatalidades de tráfico en nuestro Antelope Valley.

1. Género
   - Masculino
   - Feminino

2. Edad
   - 16-20
   - 21-29
   - 30-45
   - 46-64
   - 65+

3. Raza o Nacionalidad
   Mexicano(a) ____
   Cubano(a) ____
   Puertoriqueño(a) ____
   Español(a) ____
   Otro(a) ____

4. Ultimo Año de Escuela
   - Solamente asistido la escuela primaria
   - Asistido la escuela secundaria sin graduar
   - Graduado de la escuela secundaria
   - Graduado de la universidad

5. Status
   - Estudiante
   - Dama de la casa
   - Empleado
   - No soy empleado
   - Jubilado (retirado)

6. ¿Tiene una licencia ?
   - Sí
   - No

7. Los años que usted tiene manejando _____

8. ¿Cuántas veces ha recibido una violación de tráfico en los diez años pasados?
   - 0
   - 1
   - 2
   - 3
   - 4
   - 5+

9. ¿Han recibido una violación del tráfico en los pasados 18 meses?
   - o Sí
   - o No

10. ¿Ha recibido una aviso del tráfico (escrito o verbal) en los pasados 18 meses?
   - o Sí
   - o No

11. ¿Ha recibido usted un tiquet para lo siguiente? (Indique ésos aplicables)
   - o Manejar en exceso de velocidad
   - o Hacer una vuelta ilegal
   - o Cambiar ilegalment de carril o violar el requisito de pista de transporte en grupo.
   - o Pasarse por la luz roja
   - o Zigzaguenando
   - o Manejar bajo la influencia de alcohol o drogas
   - o Violación de cintrón de seguridad
   - o Ventanas tintas o problema mecánico
   - o Otro _____
   - o Nunca he recibido una violación

12. La violación fue escrito por:
   - o California Highway Patrol (la Patrulla de las Carreteras)
   - o County Sheriff's Department (El Alguacil)
   - o City police (Policía urbana como LAPD)
   - o Otro _____
   - o No violación

13. ¿Ha assistido usted una escuela de conducir despúesde recibir un tiquet?
   - o Sí
   - o No
   - o No es aplicable

14. ¿Conduce usted con una detector de radares?
   - o Sí
   - o No

15. Uso mi cintrón de seguridad
   - o Siempre
   - o La mayoría del tiempo
   - o Rara vez

16-18. ¿A menudo usted maneja estos caminos durante la semana?

Autopista, carretera dividida:

A veces ____ Muchas veces _____ Rara vez _____

Caminos rurales de dirección doble:

A veces ____ Muchas veces _____ Rara vez _____

En la ciudad, vecindad:

A veces ____ Muchas veces _____ Rara vez _____

19. La mayoría de los caminos que usted maneja cada día, son
- Autopista, carretera dividida
- Caminos rurales de dirección doble
- En la ciudad, vecindad

20. Usted maneja en lo siguiente con frequencia pero no cada día:
- Autopista, carretera dividida
- Caminos rurales de dirección doble
- En la ciudad, vecindad

21. La mayoría de los caminos que usted maneja cada día, son:
- Más en el campo que en la ciudad
- Más urbano que en el campo

22. Cuando usted maneja:
- Pasa la mayoría de los otros conductores
- Pasa algunos de los conductors más lentos
- Maneja la velocidad del tráfico
- La mayoría de los conductors me pasan.

23. ¿Cuándo fue la última vez que usted condujo 15 mph más que el límite de velocidad en una carretera del multi-carriles con un límite de velocidad de 65 mph?
- Hoy
- Durante la semana pasada
- Durante el último mes
- Rara vez
- Nunca

24. ¿Cuándo fue la vez última que usted condujo 15 mph más que el límite de velocidad en un camino rural con un límite de velocidad de 55 mph?
- Hoy
- Durante la semana pasada
- Durante el último mes
- Rara vez
- Nunca

25. Cuándo fue la vez última que usted condujo 15 mph más que el límite de velocidad en una calle en la ciudad con un límite de velocidad de 35-45 mph?

- o Hoy
- o Durante la semana pasada
- o Durante el último mes
- o Rara vez
- o Nunca

26. En su opinión: ¿Cuánto más que el límite de velocidad puede usted conducir antes de que el policía normalmente le dé un tiquet o le detecte en el radar?

- o 0-5 mph
- o 5-10 mph
- o 10-15 mph
- o 15-20+ mph

27-33. Favor de indicar como usted hace los siguientes:

Actividad	A menudo	No a menudo	Rara Vez/ Nunca
Cruzarse la luz que estaba en rojo antes de entrar en la intersección.	○	○	○
Usted entra en la intersección cuando la luz cambiaba de amarillo al rojo	○	○	○
Disminuye, pero no para totalmente en la señal de alto.	○	○	○
Maneja cuando ha tomado demasiado alcohol	○	○	○
Hace una vuelta ilegal (o en "U" que no es legal)	○	○	○
Hace una violación de pista de transporte en grupo	○	○	○
Se mete enfrente de otro conductor	○	○	○

34. ¿Qué tipos de comportamientos inseguros al manejar encuentra normalmente en los caminos que usted conduce?(Indique todos aplicables)?

- o Estar siguiendo muy cerca
- o Velocidad excesiva
- o No ceder el paso
- o Zigzagueando
- o Manejar bajo la influencia de alcohol o drugas
- o Pasarse la luz roja
- o No parar totalmente en la señal de alto
- o Desatento o distraído
- o Usar el teléfone celular.

35. ¿En comparsión con el año pasado, considera usted que los conductores en AV manejan?

- o Más agresivamente
- o El mismo
- o Menos agresivamente

36-50. Favor de indicar si usted hace lo siguiente y frequencia cuando usted maneja:

Actividad	Muchas veces	A veces	Rara vez	Nunca
Maneja 10 mph más rápido que los otros vehiculos.	○	○	○	○
Maneja 20 mph más que el límite de velocidad en las autopistas	○	○	○	○
Maneja 10 mph más que el límite de velocidad en las autopistas	○	○	○	○
Maneja 20 mph más que el límite de velocidad en los caminos rurales	○	○	○	○
Maneja 10 mph más que el límite de velocidad en los caminos rurales.	○	○	○	○
Maneja 20 mph más rápido que los otros vehiculos	○	○	○	○
Se mete rapidamente en frente de otros conductores.	○	○	○	○
Está siguiendo muy cerca el auto en frente	○	○	○	○
Se cruza a través las señales de altosin completamente parar o disminuir la velocidad.	○	○	○	○
Compite con otros vehículos	○	○	○	○
Zigzaguea por tráfico y cambia carriles rapidamente.	○	○	○	○
Utiliza el hombro del camino para pasar el tráfico denso o conjestionado.	○	○	○	○
Da un gesto obsceno a otro conductor	○	○	○	○
Se pasa en una zona que no se permite pasar	○	○	○	○
Se pasa un autobús escolar cuando tiene las luces rojas destellando y con su señal afuera.	○	○	○	○

51- 59. Individuos tiene sentimientos diversas sobre conducir. Indique por favor si usted conviene o no con las declaraciones siguientes

Actividad	De acuerdo fuertemente	De acuerdo	Desacuerdo	Disacuerdo fuertemente	No sé
Me gusta manejar rapidamente	○	○	○	○	○
Cuanto manejo más rápidamente, estoy más alerta	○	○	○	○	○
Soy impaciente con los conductores lentos	○	○	○	○	○
Viajo a mi destino tan rápido como posible.	○	○	○	○	○
Me preocupo mucho de tener un choque	○	○	○	○	○
No me gusta cuando otros conductores me pasan.	○	○	○	○	○
Los leyes del tráfico se enfuerzan con eficacia	○	○	○	○	○
Se han incrementado los accidentes fatales en el Antelope Valley.	○	○	○	○	○
Antelope Valley tiene uno de los índices de accidentes fatales más altos en el estado de California.	○	○	○	○	○
El conductor y los pasajeros deben usar las cintrones de seguridad siempre cuando el vehículo está funcionando y se está moviendo	○	○	○	○	○

60-64. ¿Generalmente, están los límites de velocidad fijados demasiado alto, correcto, o demasiado bajo?

Actividad	Demasiado alto	Correcto	Demasiado bajo
Autopistas con límite de 65 mph o más	○	○	○
Caminos rurales con límite de 55 mph o más.	○	○	○
Caminos rurales con límite de 45 mph o más	○	○	○
Caminos urbanos con límite de 35-45 mph	○	○	○
Zona escolar con límite de 25 mph	○	○	○

65. ¿Qué usted piensa es el límite de velocidad ideal para las carreteras rurales de doble vía y de dos carriles?

- ○ 70 mph
- ○ 65 mph
- ○ 60 mph
- ○ 55 mph o menor

66. ¿Qué tan importante se incremente el fuerzo para reducir violaciones de velocidad excesiva en los caminos rurales con un carril de tráfico en cada dirección y límite de velocidad de 55 mph?

- ○ Muy importante
- ○ Extremadamente importante

67. ¿En su opinión, cuánto de una amenaza está en la seguridad personal de usted y su familia si otros conductores están manejando a exceso del limite de velocidad?

- o Amenaza menor
- o Amenaza mayor
- o No hay amenaza

68-74. Para mucha gente, hay varios factores que determinan como manejan en diferentes tipos de caminos. Indique qué tan importante son los siguientes factorres que usted usa en seleccionar la velocidad a la cual usted conduce en los caminos que usted usa con frequencia:

Actividad	Muy importante	Importante	Poco importante	No es importante
La velocidad de tráfico	○	○	○	○
La velocidad máxima	○	○	○	○
La probabilidad de recibir un tiquet de un policía.	○	○	○	○
La congestión de tráfico	○	○	○	○
El tiempo que usted tiene para llegar a su destinación.	○	○	○	○
Su experiencia previa en manejar en los mismos caminos.	○	○	○	○
Condiciones de clima	○	○	○	○

75-81. ¿En comparación con alguien que maneja al límite de velocidad, qué es la probabilidad que alguien maneja las velocidades siguientes estará implicado en un accidente de tráfico?

Actividad	Es probable	Algo más probable	No es probable
En exceso de la límite de velocidad por 15 mph +	○	○	○
En exceso de la límite de velocidad por 11-14 mph	○	○	○
En exceso de la límite de velocidad por 10 mph	○	○	○
En exceso de la límite de velocidad por 5-9 mph	○	○	○
Está manejando en el límite de velocidad	○	○	○
Está manejando 5 mph bajo el límite de velocidad	○	○	○
Está manejando más que 5 mph bajo el límite de velocidad.	○	○	○

82-89. En su opinión, cuánto de una amenaza está a la seguridad personal de usted y su familia si otros conductores hacen el siguiente:

Actividad	Amenaza mayor	Amenaza menor	No hay amenaza
Estar siguiendo demasiado cerca	○	○	○
Velocidad excesiva	○	○	○
No ceder el paso	○	○	○
Pasar por la luz roja o semáforo rojo	○	○	○
Zigzagueó	○	○	○
Manejar bajo la influencia de alcohol	○	○	○
Él conducir de una manera desatenta	○	○	○
Violencia en el camino	○	○	○

90. ¿En el último año, con que frequencia ha sentido que el comportamiento de otro conductor es una amenaza personal para usted o su pasajero?

- o Nunca
- o Una vez por mes o menos
- o Muchas veces durante un mes
- o Muchas veces en una semana
- o Casí cada día

91. ¿Cuándo fue la última vez que se sentió amenazado personalmente por un otro conductor?

- o Nunca durante la última año
- o Occurió una vez hace un mes.
- o Occurió una vez hace dos semanas
- o Occurió una vez durante la última semana
- o Hoy

92. ¿Pensando en la última vez que pasó, qué hizo el otro conductor que lo hizo sentir amenazado?

- o Zigzaguó en frente de su auto
- o Estaba muy cerca atrás
- o Fue desatentado con un teléfono celular, o otra razón
- o Hizo un gesto grosero
- o Me pasó en una zona que no se permite pasar
- o Me recortó en la bocacalle
- o Manejaba en exceso del límite de velocidad
- o Pasó por una señal de alto

93. ¿Qué hizo usted?
- o Paró/disminuyó su velocidad
- o Movió el vehículo afuera del problema
- o Utilizó otra método para evitar el problema
- o Nada/No hizo caso
- o Tomó acción agresivo (bocinado, hizo un gesto, etc.)

94-104. ¿Cuál es su opinión a que grado la polícia enfuerza lo siguiente?

Violation	Demasiado	Correcto	No es bastante
Velocidad en exceso del límite	○	○	○
Violaciones de pista de transporte en grupo (HOV)	○	○	○
No ceder el paso	○	○	○
Pasar por un semáforo rojo/señal de alto	○	○	○
Zigzagueando	○	○	○
Manejar bajo la influencia del alcohol	○	○	○
Conducir distraido	○	○	○
Violencia en el camino	○	○	○
Hacer una vuelta ilegal	○	○	○
Defectos mecánicos (faros traseros, ventana tinta, silenciador, etc)	○	○	○
Jugar carreras	○	○	○

105. Una sugerencia para controlar la velocidad es tenerreguladores en el vehículo que mecánicamente impeden velocidad en exceso del límite.
- o Un buen idea
- o Idea buena
- o No es una idea buena

106. Otra sugerencia, ya incorporado en muchas áreas urbanas, es la instalacíon de cámaras automáticas que no require un policiá observar la violación y la boleta se manda por corréos.
- o Un buen idea
- o Idea buena
- o No es una idea buena

107. ¿Piensa usted que el uso de las cámeras automáticas deben ser utilizados para regular..?
- o Manejando muy rápido en áreas rurales
- o Pasando por la luz roja
- o No obedecer la señal de alto
- o Manejando muy rápido en zona escolar
- o No se utilice

108. ¿En qué localidad pineza usted que ststas cámaras deber ser usadas?
- Donde estaría peligroso para el conductor o la policía a parar
- Donde parar pueda crear congestión
- Donde hay muchos choques
- En zonas escolares
- No se usa

109. ¿Si se usarán las cámaras automáticas, pienza usted deberían tomar fotgraphias de frente del vehículo par que el conductor sea identificado con su licensia de manejar, o tomara la fotografía solo de la placa trasera del vehículo?

- Foto de frente para identificar el conductor
- Foto trasera a la placa

110. ¿Dónde piensa usted que el peligro más grande existe en Antelope Valley?
- En las ciudaded de Lancaster y Palmdale
- En El Camino del Estado 14
- En El Camino del Estado 138 entre Palmdale y Victorville
- En los caminos rurales de Antelope Valley
- Lake Elizabeth Road
- Bouquet Canyon o San Francisquito Road

111. ¿Cuál es su opinión de la educación de manejo en nuestras escuelas secundarias?
- Ayudaría a reducir las fatalidades del tráfico de adolescentes
- Es posible que ayudar la reducción en las accidentes fatalidades de los adolescentes
- Tendría poco efecto en la reducción de accidentes entre adolescentes
- No tendría ningún efecto en la reducción de accidentes entre adolescentes

112. Conductores que manejan bajo la influencia de alcohol es un problema en Antelop Valley?
- De acuerdo
- Neutral
- No de acuerdo

113. El utilizar los cintrones de seguridad ahorra vidas en casos de choques?
- Muy de acuerdo
- De acuerdo
- Neutral
- Poco de acuerdo
- No de acuerdo

114.¿Qué categoría de edad probablemente estará en un accidente fatal en Antelope Valley?

- 16-19 años
- 20-29 años
- 30-45 años
- 46-64 años
- 65+ años

115. ¿Qué categoría de edad probablement estará arrestado para manejar bajo la influencia de alcohol/drogas?

- 16-19 años
- 20-29 años
- 30-45 años
- 46-64 años
- 65+ años

116.¿Qué acciones se deben utilizar para reducir las fatalidades en AV? (Indique todos aplicables).

- Enforzar más las leyes de tráfico
- Incrementar la presencia de la polícia
- Incrementar los puntes de revisión de sobriedad (paradas para la reducción de manejo bajo la influencia de alcohol)
- Reinstalar la educación de manejo en escuelas secudarias
- Pagos más altos mandados por la corte
- Multas más severas para los conductores bajo la influencia de alcohol
- Incrementar las señales en los caminos rurales
- Límites de velocidad más bajo
- Provomer el uso de los cintos de seguridad
- Instalar más señales de alto y luces
- Incrementar la covertura por los medios de comunicación
- Incrementar la participación de la comunidad
- Requerir la escuela de manejo cada año para los conductores de 65 años o más
- Incrementar la edad de manejo a los de 18 años
- No permitir el manejo a conductors mayores de los 80 años
- Ensanchar los caminos, especialmente la carretera estatal 138
- Incrementar la lineas para pasa en los caminos rurales
- Instalar cámaras automáticas
- Instalar reguladores en los coches
- Otro _____
  _____
  _____
  _____
  _____

Gracías por su participación y ayuda. Esperamos que este ayude a reducir a fatalidades in nuestro Antelope Valley.