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2007–2016 FATAL TRAFFIC CRASHES IN ALASKA, HAWAII, IDAHO, AND WASHINGTON AND CHARACTERISTICS OF TRAFFIC FATALITIES INVOLVING HAWAIIANS AND CSET MINORITIES

FINAL PROJECT REPORT

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16. Abstract

Data for this comparative study were collected from the Fatality Analysis and Reporting System (FARS) for the years 2007 to 2016 for the states of Alaska, Hawaii, Idaho, and Washington. The rates of roadway fatalities, especially those of American Indians (which include Aleuts and Eskimos), Guamanians, Samoans, and Native Hawaiians (which include part-Hawaiians) were the focus of the study; they are referred to as "CSET Minorities" in this report; all other races are referred to as "All Others." Three main contributing factors for fatal crashes—alcohol use, speeding, and non-usage of restraint—were analyzed for each population group. CSET states are lagging behind many countries in terms of traffic safety. Significant differences in the involvement of alcohol, speeding, and non-usage of restraint were indicated between CSET Minority fatalities and All Others. For all types of crashes examined, CSET Minorities exhibited statistically significant differences, nearly all of them being higher or worse than All Others, except for motorcycle crashes. In Hawaii, the proportion of Hawaiians in the population is steady at approximately 21%, but their proportion in FARS database is at 28% and rising. Aggregate data analysis of traffic fatalities focused on three rural, indigenous, tribal, and isolated (RITI) communities in Hawaii, the entire Big Island of Hawaii, and the rural communities of Waianae and Waimanalo on the island of Oahu. All three locations are known for their relatively large number of Hawaiians and part-Hawaiians. The percentage of Hawaiians in traffic fatalities was 32% on the Big Island, 50% in Waianae, and 78% in Waimanalo.

17. Key Words	18. Distribution Statement		
CSET Minorities, Race, Fatality Analysis, FARS, Hawaiians, Pacific Islanders, Minorities, Alcohol, Speeding, Restraint Use, Age, Gender, Urban, Rural			
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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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EXECUTIVE SUMMARY

The U.S. Fatality Analysis and Reporting System (FARS) data from 2007 to 2016 indicate that more than 33,000 traffic fatalities were recorded per year in the U.S. Related research has revealed that American Indian and Alaska Natives have the highest motor vehicle death rate in the U.S., significantly greater than that of any other race or ethnic group. Similarly, in Hawaii, the rate of Native-Hawaiian traffic fatalities is significantly high compared with the population's proportion.

This research was conducted as part of the research tasks of the Center for Safety Equity in Transportation (CSET). A consortium of four participating states—Alaska, Hawaii, Idaho, and Washington—CSET focuses on transportation safety equity. Rural, indigenous, tribal, and isolated (RITI) communities in these four states are the focus of this research. Based on the data available in FARS, American Indians (which include Aleuts and Eskimos), Native Hawaiians (which include part-Hawaiians), and Guamanians and Samoans are considered a RITI group and are referred to as "CSET Minorities." All other races are referred to as "All Others." This study is an analysis of three major contributing factors in traffic crashes—impaired driving (alcohol use), speeding, and non-usage of restraint—among CSET Minorities and All Others.

Our research goals were to compare various traffic safety indicators in four CSET states with those of other countries in the world, to compare the fatalities of CSET Minorities with All Others, and to provide initial policy recommendations about the safety needs of CSET Minority communities including Hawaiians and Pacific Islanders. Analysis of fatalities of CSET Minorities versus All Others included study of the contribution of alcohol, speeding, and restraint use with further stratification on the basis of demographic characteristics like age and gender, location of the crash (urban or rural), and the seating position of those involved in the fatalities (drivers, passengers, pedestrians, motorcyclists, and others).

In terms of fatalities per billion VMT (vehicle miles traveled), Washington had the lowest number of fatalities, with an average of 8.5 fatalities per billion VMT; Alaska had the highest number of fatalities, with 13.6 fatalities per billion VMT. Idaho also had a high number of fatalities, with 13.3 fatalities per billion VMT, a number similar to Alaska's.

In the 5 years between 2012 and 2016, Hawaii was the only state with a decrease in fatalities per billion VMT, with a decrease of 1% fatalities per billion VMT, whereas all other states showed an increase. A nearly 30% increase occurred in both Alaska and Idaho, followed by a 23% increase in Washington.

The OECD's International Road Safety Annual Report 2018 as used as the base for comparisons between the four CSET states and the countries covered in the report. The number of fatalities per 100,000 inhabitants was higher in all CSET states when compared with more than half of the countries included in the list. Among the four CSET states, Washington had the fewest fatalities per 100,000 inhabitants in 2016 with a value of 7.4, which was equal to Poland's. Washington also had the lowest number of traffic fatalities per 100,000 vehicles, whereas Alaska had the highest. Norway had the fewest fatalities, followed by Switzerland and Sweden. In general, our comparisons suggest that all four CSET states have worse traffic safety indices than many other countries. In some cases, the CSET states were the worst.

The state with the highest number of CSET Minority fatalities was Hawaii with 347 fatalities in 10 years, which was 31% of the state's total fatalities. Hawaii was followed by Washington with 299 fatalities, which was only 6% of that state's total fatalities. In Alaska and Washington, CSET Minority pedestrian

fatalities were significantly higher than pedestrian fatalities for All Others, whereas no significant difference was indicated in Hawaii and Idaho. CSET Minority motorcyclist fatalities were significantly lower than motorcyclist fatalities for All Others.

CSET Minority fatalities due to alcohol use in the age group 49+ were significantly lower than fatalities in the same age group for All Others. Female fatalities due to alcohol use among CSET Minorities were significantly higher than female fatalities for All Others in Alaska and Washington. No such difference was indicated in Hawaii and Idaho. Motorcyclist fatalities due to alcohol use for CSET Minorities were significantly lower than motorcyclist fatalities for All Others in all four states.

Motorcyclist fatalities due to speeding among CSET Minorities were significantly lower than fatalities for All Others. Female fatalities due to speeding among CSET Minorities were significantly higher than female fatalities for All Others in all CSET states, except Alaska. Fatalities due to speeding among CSET Minorities were significantly higher in rural areas than for All Others in Alaska and Washington; no such difference was indicated in Hawaii and Idaho.

CSET Minority fatalities due to non-usage of restraint were significantly higher than fatalities for All Others in Idaho and Washington. No such difference was indicated in Alaska and Hawaii. Female fatalities for CSET Minorities were significantly higher than fatalities for All Others in Alaska and Hawaii; no significant difference was indicated in Idaho and Washington.

All four CSET states vary considerably in terms of total population, CSET Minority population, VMT, as well as traffic fatalities. The fatality analysis herein revealed that most of the major findings for each state are mostly different. Large dissimilarities include the following: Of all the CSET Minority fatalities in Alaska, 36% were pedestrians; Idaho had only 10% CSET Minority pedestrian fatalities. Similarly, there were only 1% CSET Minority motorcyclist fatalities in Alaska, but 20% in Hawaii. Moreover, CSET Minority fatalities in the rural areas of Idaho and Washington were 87% and 80%, respectively. However, in Alaska and Hawaii, CSET Minority fatalities were 68% and 45%, respectively.

Traffic safety policy recommendations should be made separately for each state because the major findings for each state were different and each state itself as well as its minority population is different.

CHAPTER 1. INTRODUCTION

According to data from the Fatality Analysis and Reporting System (FARS) from 2007 to 2016, on average, more than 33,000 traffic fatalities were recorded per year in the U.S. Pollock et al. [1] found that the American Indian and Alaska Native population has the highest motor vehicle death rate in the U.S., significantly greater than that of any other race or ethnic group. Similarly, in Hawaii, the rate of Native Hawaiian traffic fatalities is significantly higher than the proportion of that population group [2].

This research was conducted as part of the research tasks of the Center of Safety Equity in Transportation (CSET), a consortium of four participating state universities—Alaska, Hawaii, Idaho, and Washington—conducting research and technology transfer on transportation safety equity. The mission of CSET is to provide equity-sensitive transportation deliverables that address the safety needs of rural, isolated, tribal, and indigenous (RITI) communities [3]. CSET aims to develop safety approaches that are sensitive to heritage, traditional ways of knowing and learning, and preservation of culture [3].

In the four CSET states just named, there are a total of 336 federally recognized American Indian reservations and off-reservation trust land areas, tribal subdivisions, state-recognized American Indian reservations, Alaska Native regional corporations, and Hawaiian home lands [3]. The CSET consortium states also account for 59% of federally recognized tribes and indigenous populations of the U.S. [3].

The FARS database enables analysis of similarities and differences as contributing factors in fatal vehicle crashes based on race. Information in terms of driving behaviors and crash characteristics is valuable for analyzing crash factors and for making plans and policies to mitigate the problem.

Ten years of fatality data were collected for the states of Alaska, Hawaii, Idaho, and Washington. Rural, indigenous, tribal, and isolated (RITI) communities in these four states were the focus of this research. Based on the data available in FARS, American Indians (which include Aleuts and Eskimos), Native Hawaiians (which include part-Hawaiians), and Guamanian and Samoans were considered the RITI group and were referred to as “CSET Minorities.” All other races were referred to as “All Others.” This study mainly focused on the analysis of three major contributing factors in traffic crashes: impaired driving (alcohol use), speeding, and non-usage of restraint for CSET Minorities and All Others.

Alcohol-related fatalities were defined as fatalities that occur in crashes where at least one of the drivers of a motor vehicle in the crash was drunk, i.e., had a positive blood alcohol concentration (BAC) value [4,5]. Similarly, a crash was defined as speeding-related [4,5] if at least one driver involved in the crash is:

- Driving at a speed that is greater than reasonable or prudent (not necessarily over the limit)
- Driving too fast for the prevailing conditions
- Driving above the speed limit
- Exceeding special limits (e.g., for trucks, buses, cycles, on bridge, at night, at a school zone, etc.)
- Racing

Improper use or no use of the restraint was considered non-usage of the restraint.

1.1 Study Goals

This study focused on the analysis of traffic fatalities in Alaska, Hawaii, Idaho, and Washington between 2007 and 2016. The goals of this study were as follows:

i. To compare various traffic safety indicators in four CSET states with other countries of the world;

ii. To compare the fatalities of CSET Minorities with All Others, analyzing the contribution of alcohol, speeding, and restraint use and further stratifying the analysis on the basis of demographic characteristics like age and gender, on the basis of location of the crash as urban and rural, and on the basis of seating position of fatalities as drivers, passengers, pedestrians, motorcyclists, and others; and

iii. To provide initial policy recommendations about the safety needs of CSET Minority communities including Hawaiians and Pacific Islanders.

1.2 Methodology

Data from various sources were compiled, and the methodology shown in Figure 1 was followed to achieve the research goals. A comparative study was done to find the standings of the four CSET states in terms of traffic safety by comparing them with each other, the U.S. as a whole (Chapter 3), and the standings of various countries in the 2018 annual report from the International Transportation Forum (Chapter 5). Another comparative fatality analysis between CSET Minorities and All Others was carried out on the basis of behavioral and operating characteristics, such as alcohol use, speeding, and non-usage of restraint (Chapter 4). Analysis in Chapter 6 includes sociodemographic, transportation, and safety records aiming at a better understanding of traffic fatalities of Hawaiians and Pacific Islanders in the State of Hawaii.

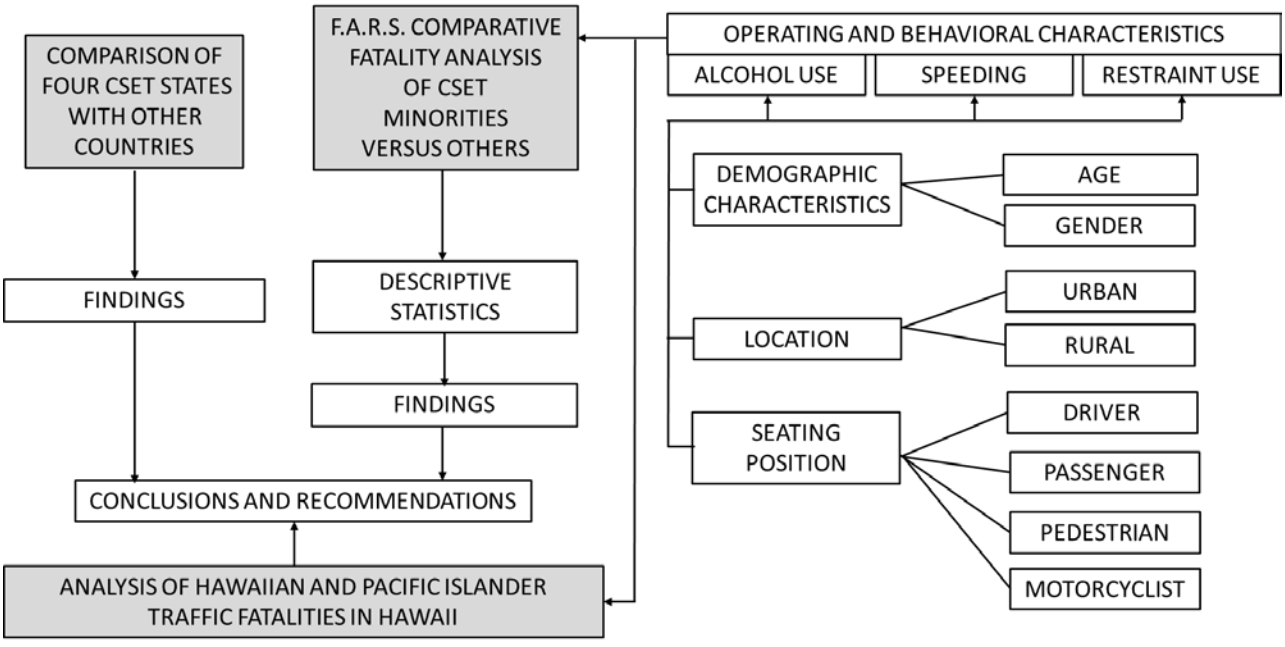


Figure 1. Methodology flowchart

CHAPTER 2. DATA

Data for fatal traffic crashes between 2007 and 2016 were taken from the FARS database [4,5].

2.1 FARS Database

FARS is a census of fatal motor vehicle crashes with a set of data files that documents all qualifying fatalities that occurred within the 50 states, the District of Columbia, and Puerto Rico since 1975 [4]. To qualify as a FARS case, the crash had to involve a motor vehicle traveling on a trafficway open to the public and must have resulted in the death of a motorist or a non-motorist within 30 days (720 hours) of the crash [4,5].

FARS is directed by the National Center for Statistics and Analysis (NCSA), which is a section of the National Highway Traffic Safety Administration (NHTSA). The NHTSA has a cooperative agreement with an agency in the government of each state to provide information on all qualifying fatal crashes in the state. These agreements are managed by NCSA's FARS program staff. Trained state employees, called "FARS Analysts," are responsible for gathering, translating, and transmitting their state's data to NCSA in a standard format [4,5].

FARS data are obtained from various documents from each state:

- Police Crash Reports
- Death Certificates
- State Vehicle Registration Files
- Coroner/Medical Examiner Reports
- State Driver Licensing Files
- State Highway Department Data
- Emergency Medical Service Reports
- Vital Statistics and other State Records

From these documents, the analysts code more than 100 FARS data elements. These data elements are compiled in separate data files. Currently, there are 20 data files in FARS. Three of these data files were used in this research:

- ACCIDENT: This data file contains information about crash characteristics and environmental conditions at the time of the crash. There is one record per crash.
- VEHICLE: This data file contains information describing the in-transport motor vehicles and the drivers of the in-transport motor vehicle involved in the crash. There is one record per motor vehicle.
- PERSON: This data file contains information describing all persons involved in the crash including motorists (e.g., drivers and passengers of in-transport motor vehicles) and non-motorists (e.g., pedestrians and cyclists). It provides information such as age, sex, vehicle occupant restraint use, injury severity, etc. There is one record per person.

Information regarding the urban or rural location of the crash and the race of fatalities was also provided.

The data provided for public use in the FARS database are available as Statistical Analysis System (SAS) data files as well as Database Files (DBF). The datafiles available in FARS can be readily used to extract basic information about the crash or person involved and about the vehicles involved. However, to get detailed and specific information, the researcher needs to use more than one data file simultaneously. Working with more than one data file simultaneously and deriving correctly corresponding information manually from Excel files for large amounts of data can be tedious, and the risk of making mistakes is high. For extracting most of the data required for this research, it was necessary to link the information from the accident, person, and vehicle data files. Hence, a database was created in MySQL Database System where all the required information could be extracted by writing queries once all the required data files had been uploaded correctly to the server.

2.2 MySQL Database System

MySQL is an open source relational database management system developed, distributed, and supported by Oracle Corporation [5]. MySQL is written in C and C++ and runs on virtually all platforms including Windows. It is based on the structured query language (SQL), which is used for adding, removing, and modifying information in a database. Standard SQL commands, such as ADD, DROP, INSERT, and UPDATE can be used with MySQL [5].

This relational database management system (RDBMS) supports large databases with millions of records and supports many data types including signed or unsigned integers 1, 2, 3, 4, and 8 bytes long; FLOAT; DOUBLE; CHAR; VARCHAR; BINARY; VARBINARY; TEXT; BLOB; DATE; TIME; DATETIME; TIMESTAMP; YEAR; SET; ENUM; and OpenGIS spatial types; fixed- and variable-length string types are also supported [5].

The free web application phpMyAdmin [6] was used as a convenient graphic user interface (GUI) for working with the MySQL database management system. One of the most popular MySQL administration tools, phpMyAdmin is used by millions of users worldwide. It can export and import databases created and managed by MySQL DBMS, as well as work with some other data formats [6]. An open source tool, phpMyAdmin is written in PHP and is intended to handle the administration of MySQL with the use of a web browser. It can perform various tasks such as creating, modifying, or deleting databases, tables, fields, or rows; executing SQL statements; or managing users and permissions [7]. phpMyAdmin was used to browse the database, manage user privileges, and execute SQL queries [6,7]. The step-by-step process of database creation and getting the required result by data querying is shown in Figure 2.

The raw data files were transformed into database tables, enabling us to format, select, and view only data that were relevant to our purposes. The following steps were performed to transform the existing raw data files to database tables:

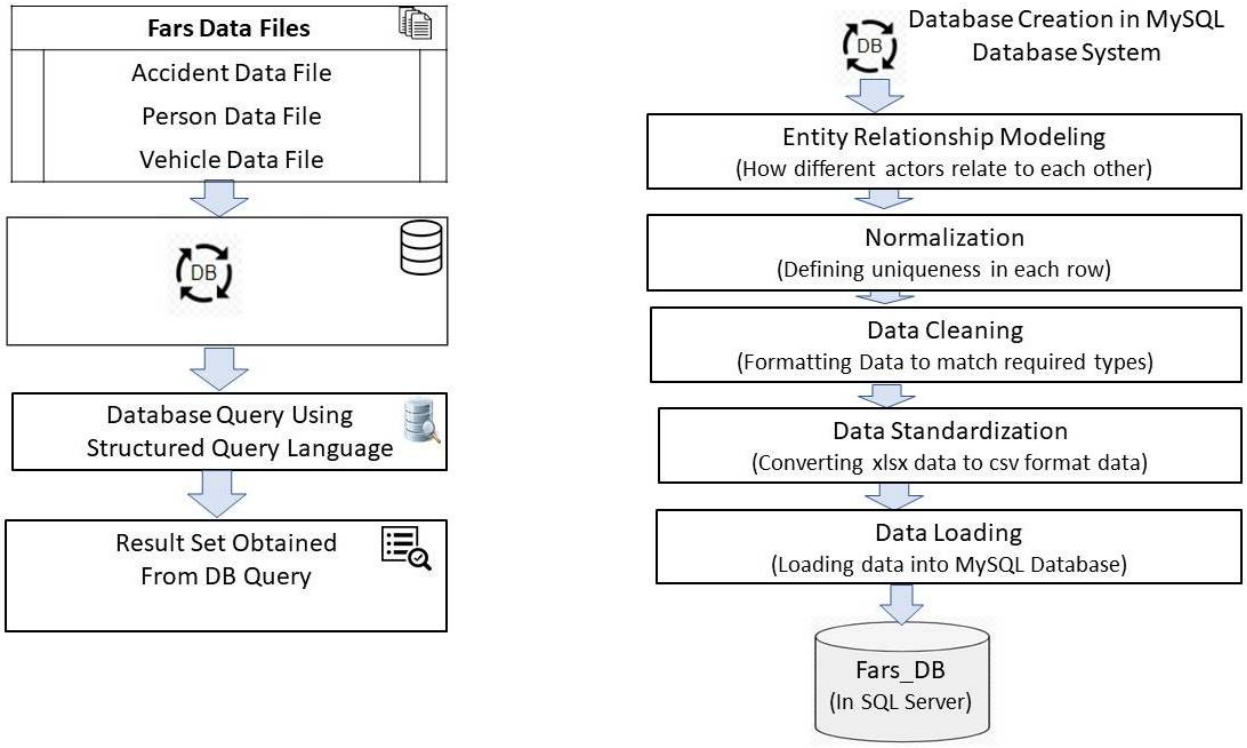


Figure 2. Flowchart of database creation and management

a. Entity Relationship Modeling: FARS raw data files are semi-structured data; everything is maintained in a tabular form. Each data file was saved in .XLS format, thus all data were stored in a row and column format. The relevant columns were selected from each data files (Accident, Person, Vehicle) to be stored in the database. The selected columns from each data file formed a table-like structure; thus, a non-normalized schema was created. Normalization of this schema was required to permit the data to be queried using a structured query language and to make the relational model more informative.

b. Normalization: The non-normalized schema created was then transformed to a normalized Entity Relationship (ER) model that had three distinct tables: Accident, Person, and Vehicle. To perform normalization, we assigned a primary key that uniquely defined each data row. The Accident table had an ST_CASE column that was used as the primary key column. In the Person table, a combination of ST_CASE and PER_NO column was used as the primary key. ST_CASE in the Person table was a foreign key that relates to the ST_CASE column in the Accident table. Similarly, in the Vehicle table, a combination of ST_CASE and VEH_NO was used as the primary key. Again, ST_CASE in the Vehicle table was a foreign key related to the ST_CASE column in the Accident table. The ER diagram thus obtained is shown in Figure 3. The ER diagram was normalized, as every other column depended directly on the primary key column and each data row was unique. The relationship between the Accident table and the Person table is a “has-a” or composition relationship. Simply put, every accident has a person involved. Similarly, the relationship between the Accident table and the Vehicle table is a “has-a” relationship; that is, every accident has a vehicle involved.

c. Data Cleaning: All the data rows in the .XLS format files were stored in strings. To convert these tabular format data to database tables, the data were transformed to match the correct data types

as per our need. For instance, AGE was supposed to be a number data type instead of a string. Similarly, VEH_NO and PER_NO were supposed to be numbers and, therefore, were transformed from strings to numbers.

d. Data Standardization: All the data files were stored in .XLS format. However, .XLS format is a non-open source format, as Microsoft Excel is required to open it. The free software phpMyAdmin could not load .XLS files. The .XLS file format was then transformed to the open source .CSV file format before importing the data files to the phpMyAdmin panel.

e. Data Loading: After transforming the .XLS files to .CSV files, the three tables—Accident, Person, and Vehicle—were created in the phpMyAdmin panel, and the .CSV files were uploaded in the phpMyAdmin panel.

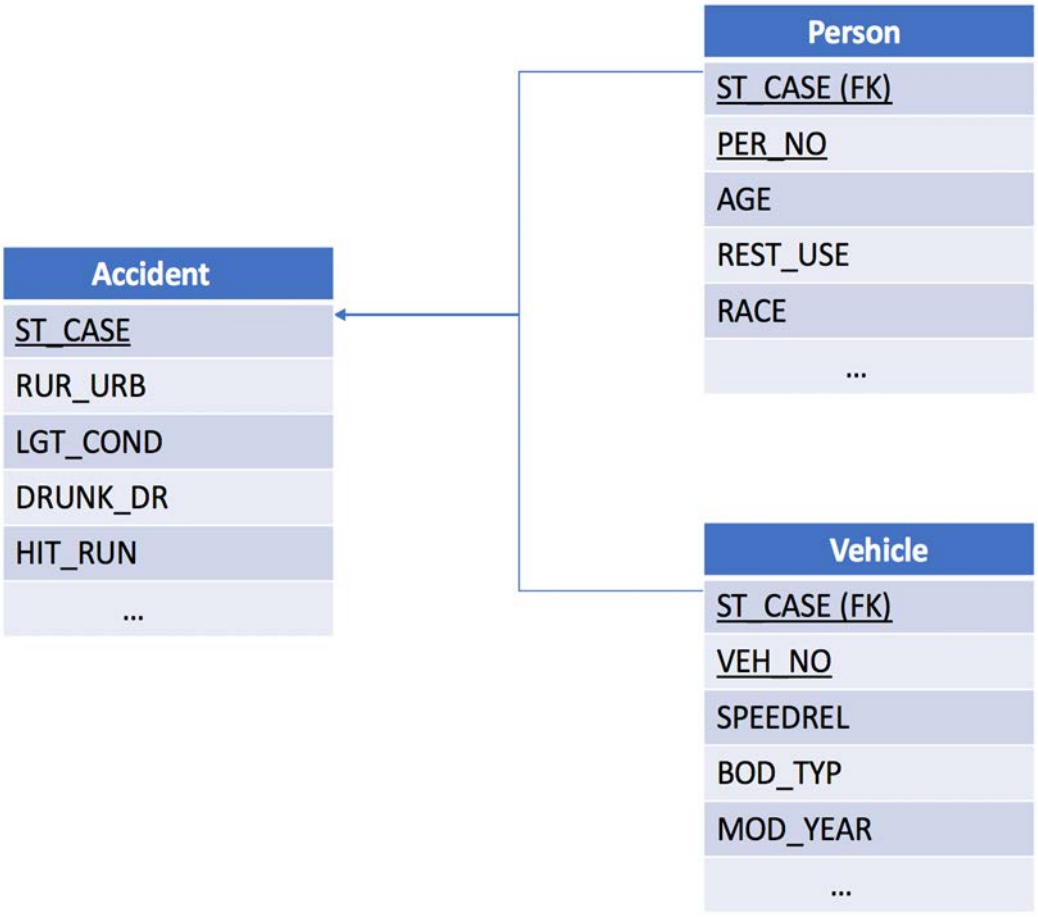


Figure 3. Entity relationship diagram

CHAPTER 3. 2007–2016 CHANGE IN TRAFFIC FATALITY RATES IN CSET STATES

The four CSET states differ from each other in terms of size, population, vehicle miles traveled (VMT), and traffic fatalities. The number of road fatalities each year from 2007 to 2016, road fatalities per 100,000 inhabitants, and road fatalities per billion VMT in each of the CSET states are shown in Tables 1, 2, and 3, respectively.

Alaska had the lowest number of fatalities with 668, while Washington had the highest number of fatalities with 4,922. Hawaii had 1,102 fatalities, and Idaho had 2,137 fatalities. On average over 10 years, Washington had the lowest number of fatalities per 100,000 inhabitants at 7.2, while Idaho had the highest number at 13.4.

Table 1. Road Fatalities in CSET States, 2007–2016

Year	AK	HI	ID	WA
2007	82	138	252	571
2008	62	107	232	521
2009	64	109	226	492
2010	56	113	209	460
2011	72	100	167	454
2012	59	125	184	438
2013	51	102	214	436
2014	73	95	186	462
2015	65	93	216	551
2016	84	120	253	537
Average	67	110	214	492

Table 2. Road Fatalities per 100,000 Inhabitants in CSET States, 2007–2016

Year	AK	HI	ID	WA
2007	12.1	10.5	16.7	8.8
2008	9.0	8.0	15.1	7.9
2009	9.2	8.1	14.5	7.4
2010	7.8	8.3	13.3	6.8
2011	10.0	7.3	10.5	6.7
2012	8.1	9.0	11.5	6.4
2013	6.9	7.2	13.1	6.2
2014	9.9	6.7	11.5	6.6
2015	8.8	6.5	13.1	7.7
2016	11.3	8.4	15.0	7.4
Average	9.3	8.0	13.4	7.2

Table 3. Road Fatalities per Billion VMT in CSET States, 2007–2016

Year	AK	HI	ID	WA
2007	15.9	13.5	16.0	9.4
2008	12.7	10.5	15.2	8.7
2009	13.0	10.8	14.6	8.5
2010	11.7	11.2	13.2	8.0
2011	15.7	9.4	10.5	8.0
2012	12.3	10.9	11.3	7.7
2013	10.5	8.4	13.4	7.6
2014	15.0	9.3	11.5	8.2
2015	12.9	8.4	13.0	9.9
2016	16.0	10.8	14.7	9.4
Average	13.6	10.3	13.3	8.5

In terms of fatalities per billion VMT, Washington had the lowest number of fatalities, with an average of 8.5 fatalities per billion VMT, while Alaska had the highest with 13.6 fatalities per billion VMT. Idaho also had a high number, with 13.3 fatalities per billion VMT.

The change in fatality rates per billion VMT in the four CSET states, shown in Table 4, was calculated for the (i) last 10 years, 2007–2016, (ii) last 5 years, 2012–2016, (iii) last 3 years, 2014–2016, and (iv) last year, 2015–2016.

Table 4. Change in Fatality Rates per Billion VMT

Time Period	AK	HI	ID	WA
Last 10 years	1%	-20%	-8%	0%
Last 5 years	30%	-1%	30%	23%
Last 3 years	7%	15%	28%	15%
Last 1 year	24%	29%	13%	-5%

In the 10 years between 2007 and 2016, Alaska had an increase of 1% in traffic fatalities per billion VMT, whereas Washington had no change. The best improvement among the four CSET states was in Hawaii, followed by Idaho. In Hawaii, there was a 20% decrease in fatalities per billion VMT in these 10 years, whereas in Idaho the decrease was 8%.

In the 5 years between 2012 and 2016, Hawaii was the only state with a decrease in fatalities per billion VMT, with a decrease of 1% in fatalities per billion VMT. There was an increase in all other states, with nearly a 30% increase in both Alaska and Idaho, followed by a 23% increase in Washington.

In the 3 years between 2014 and 2016, there was an increase in traffic fatalities per billion VMT in all four CSET states. Alaska had the lowest increase with 7%, followed by Hawaii and Washington with a 15% increase and Idaho with the highest increase of 28%.

From 2015 to 2016, the only decrease in fatalities per billion VMT occurred in Washington, with -5%. There was an increase in all other three states, with the highest increase in Hawaii, which had a 29% increase. Alaska had a 24% increase and Idaho had a 13% increase.

The last-year change for Alaska and Hawaii and last-3-years change in Idaho are worrisome as all of them show a well over 20% increase in fatalities. This combined the last-3-years increases in Alaska, Idaho and Washington indicate a reversal of the desirable downward trend of fatalities per billion VMT, despite the increasing sales of vehicles with collision avoidance systems and other driver aid systems.

CHAPTER 4. TRAFFIC SAFETY COMPARISON OF CSET STATES WITH SELECTED COUNTRIES

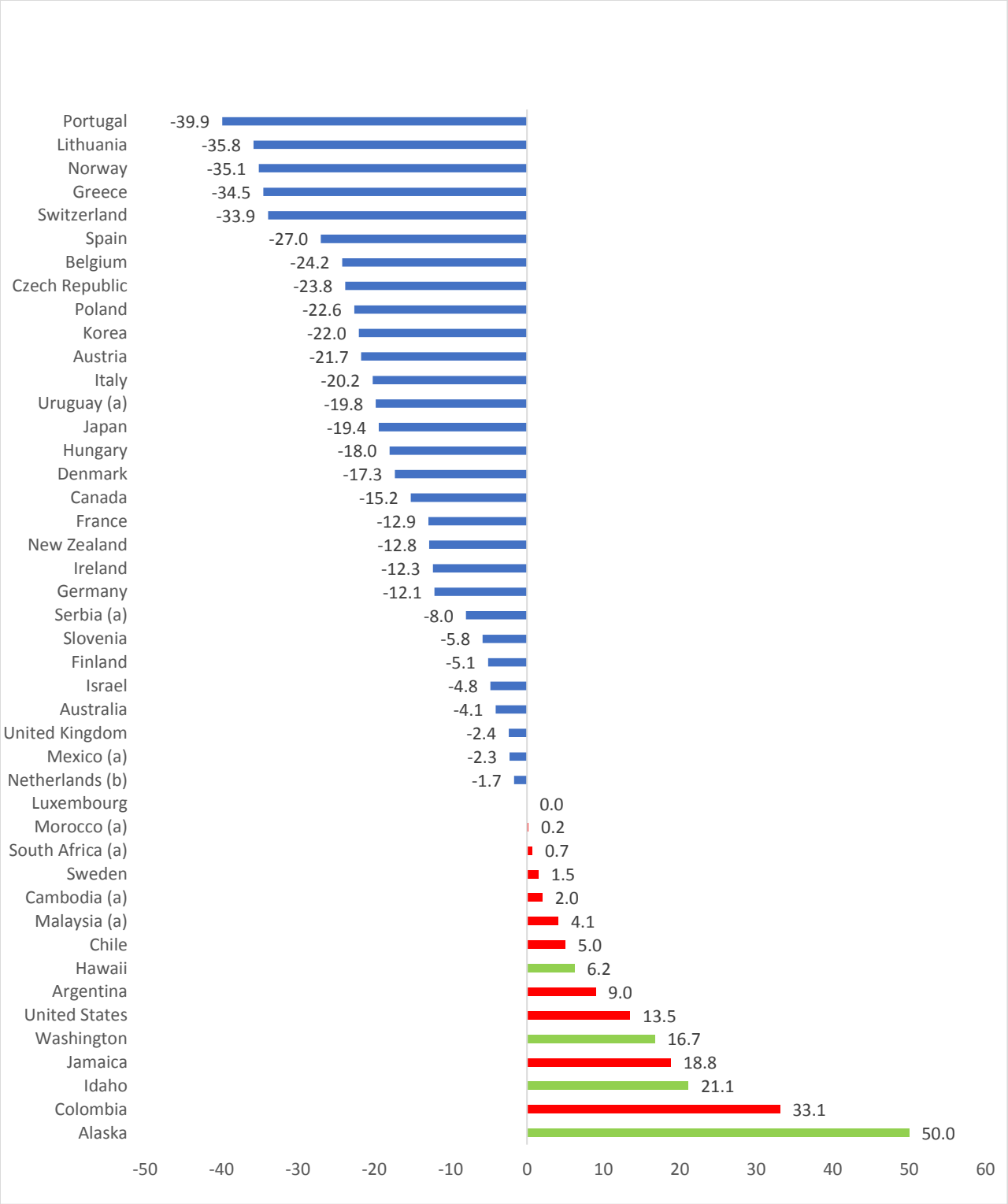
The 2018 Road Safety Report [8] by the Organization for Economic Co-operation and Development (OECD) was used as the base for comparisons between the four CSET states and the countries covered in the report. In all the figures of this section (Figures 4 to 8), the data bars in blue and red are as shown in the OECD report [8], and the bars in green were inserted to represent the statistics of the four CSET states.

The change in number of road deaths between 2010 and 2016 is shown in Figure 4. None of the CSET states had a decrease in road fatalities. The country with the highest decrease during this period was Portugal, with a decrease of almost 40%, followed by Lithuania and Norway. Alaska had the highest percentage increase at 50%. This percentage was even higher than the country with the highest increase in the original list, Columbia, with a 33.1% increase in road fatalities between 2010 and 2016.

Road fatalities per 100,000 inhabitants in 2017 or the latest year available are shown in Figure 5. The number of fatalities per 100,000 inhabitants in all CSET states was higher than over half of the countries included in the OECD list. Among the four CSET states, Washington had the fewest fatalities per 100,000 inhabitants in 2016, with a value of 7.4 which is equal to Poland's value.

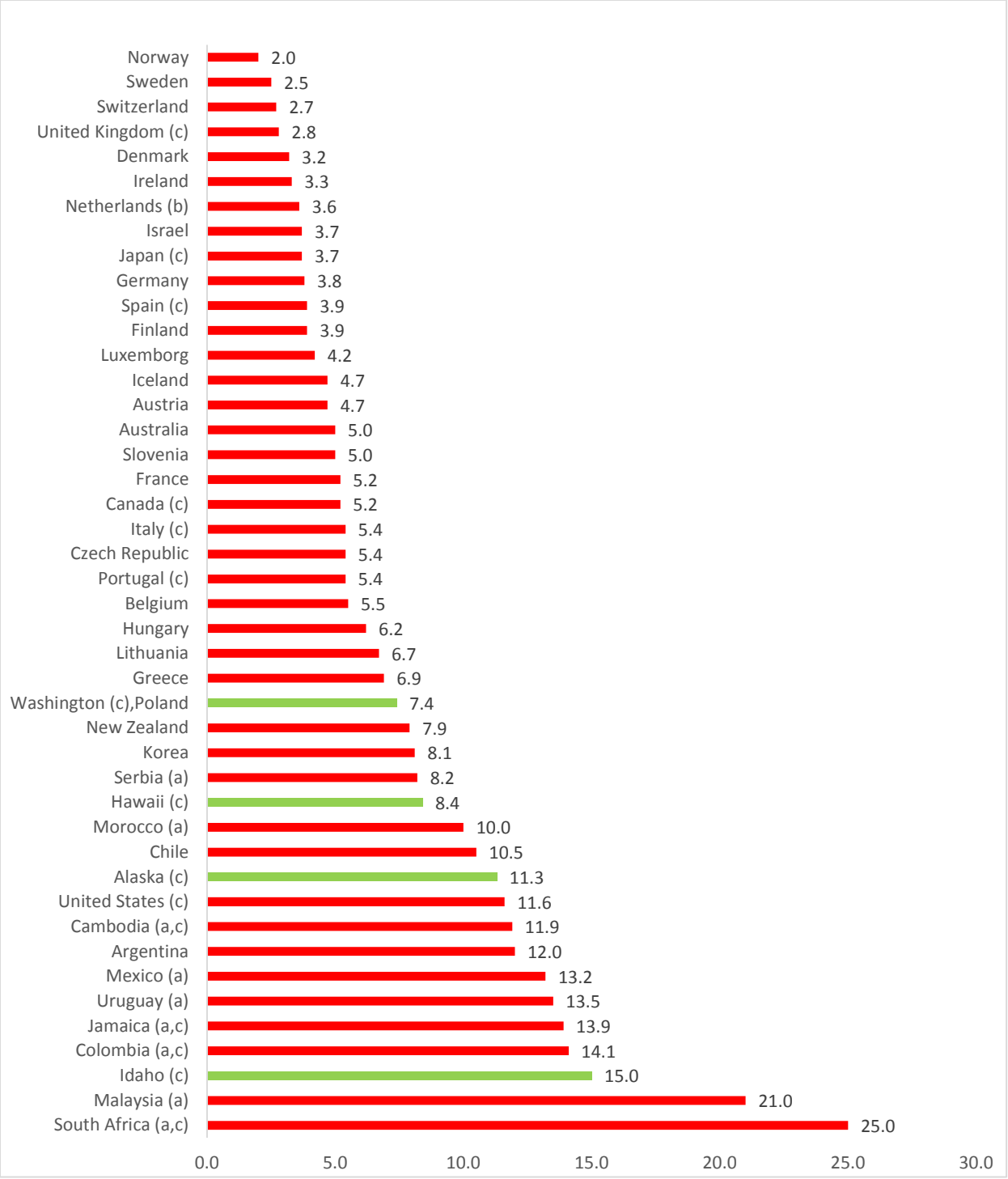
The number of road fatalities per billion vehicle kilometers is shown in Figure 6. Washington had the lowest number of traffic fatalities per billion VMT among the four CSET states, whereas Idaho had the highest number. Countries like Norway, Sweden, and Switzerland had the lowest number of road fatalities per billion vehicle kilometers of travel.

Fatalities per 100,000 vehicles are shown in Figure 7. Among the four CSET states, Washington had the lowest number of traffic fatalities, whereas Alaska had the highest number. Norway had the fewest fatalities, followed by Switzerland and Sweden.



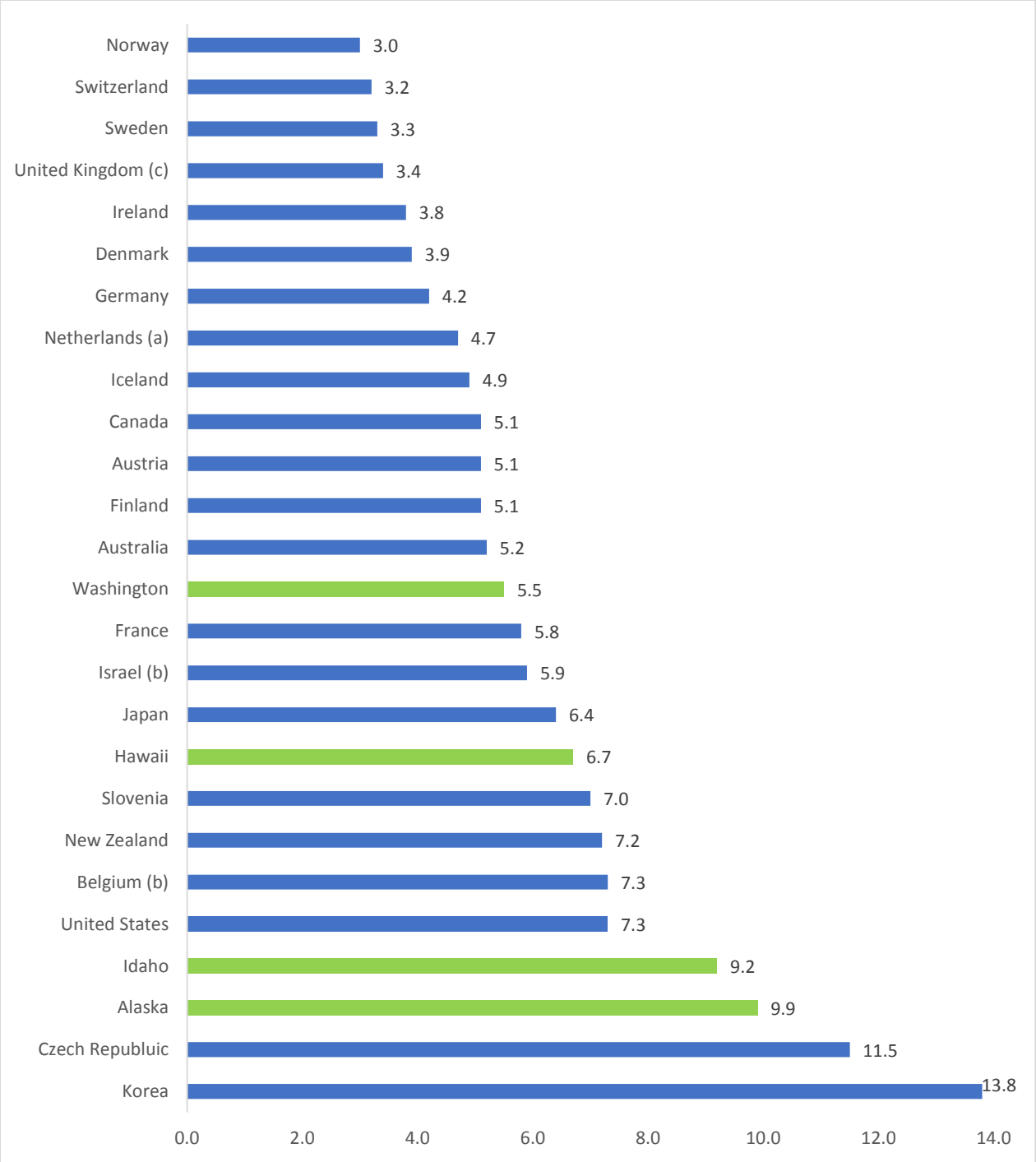
(a) Data as provided by the countries and not validated by IRTAD.
(b) Real data (actual numbers instead of reported numbers by the police).

Figure 4. Percentage change in the number of road deaths, 2010–2016



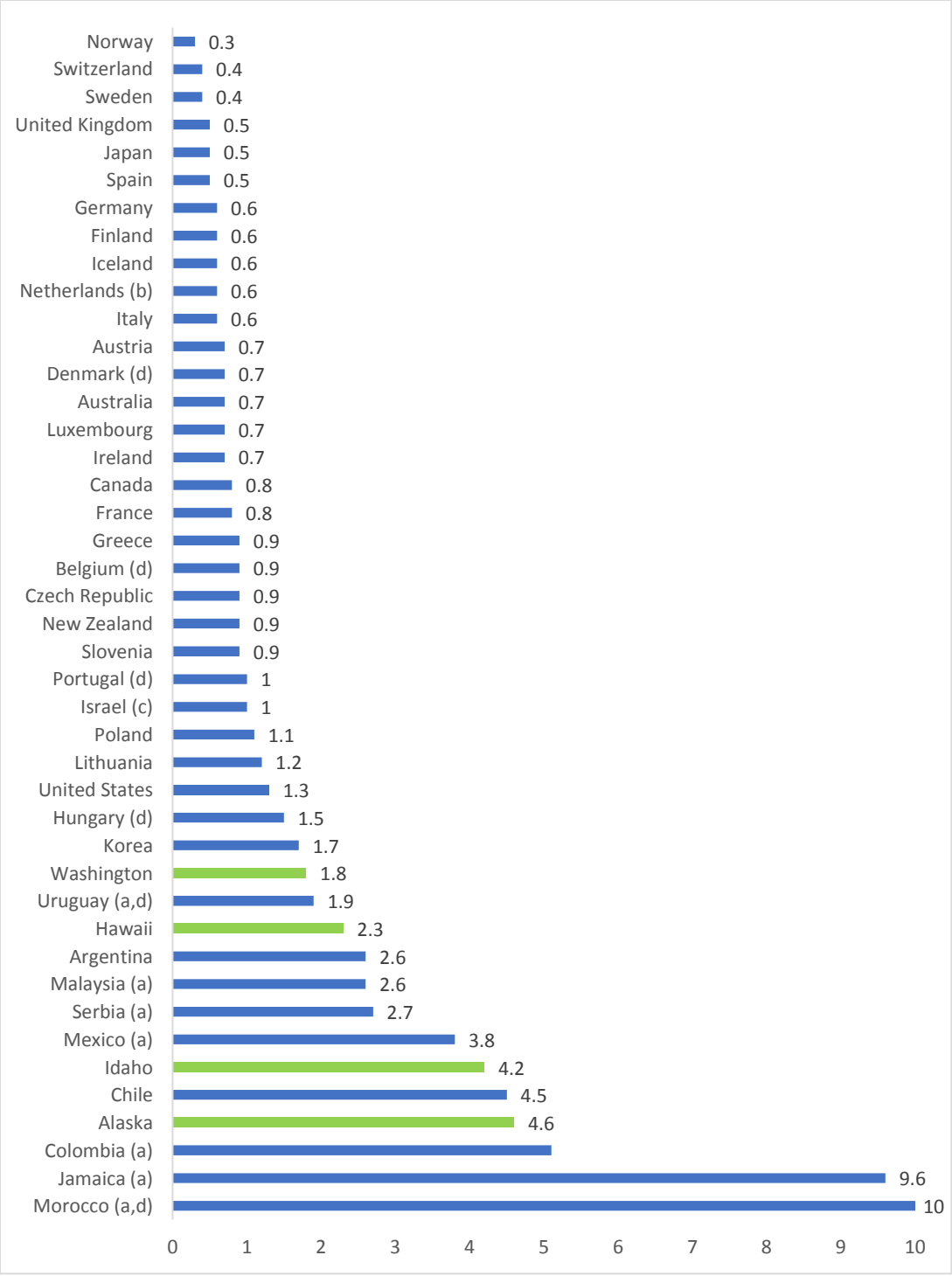
(a) Data as provided by the countries and not validated by IRTAD.
(b) Real data (actual numbers instead of reported numbers by the police).
(c) 2016 data

Figure 5. Road fatalities per 100,000 inhabitants in 2017 or latest year available



(a) Data as provided by the countries and not validated by IRTAD.
(b) Real data (actual numbers instead of reported numbers by the police).
(c) 2015 data

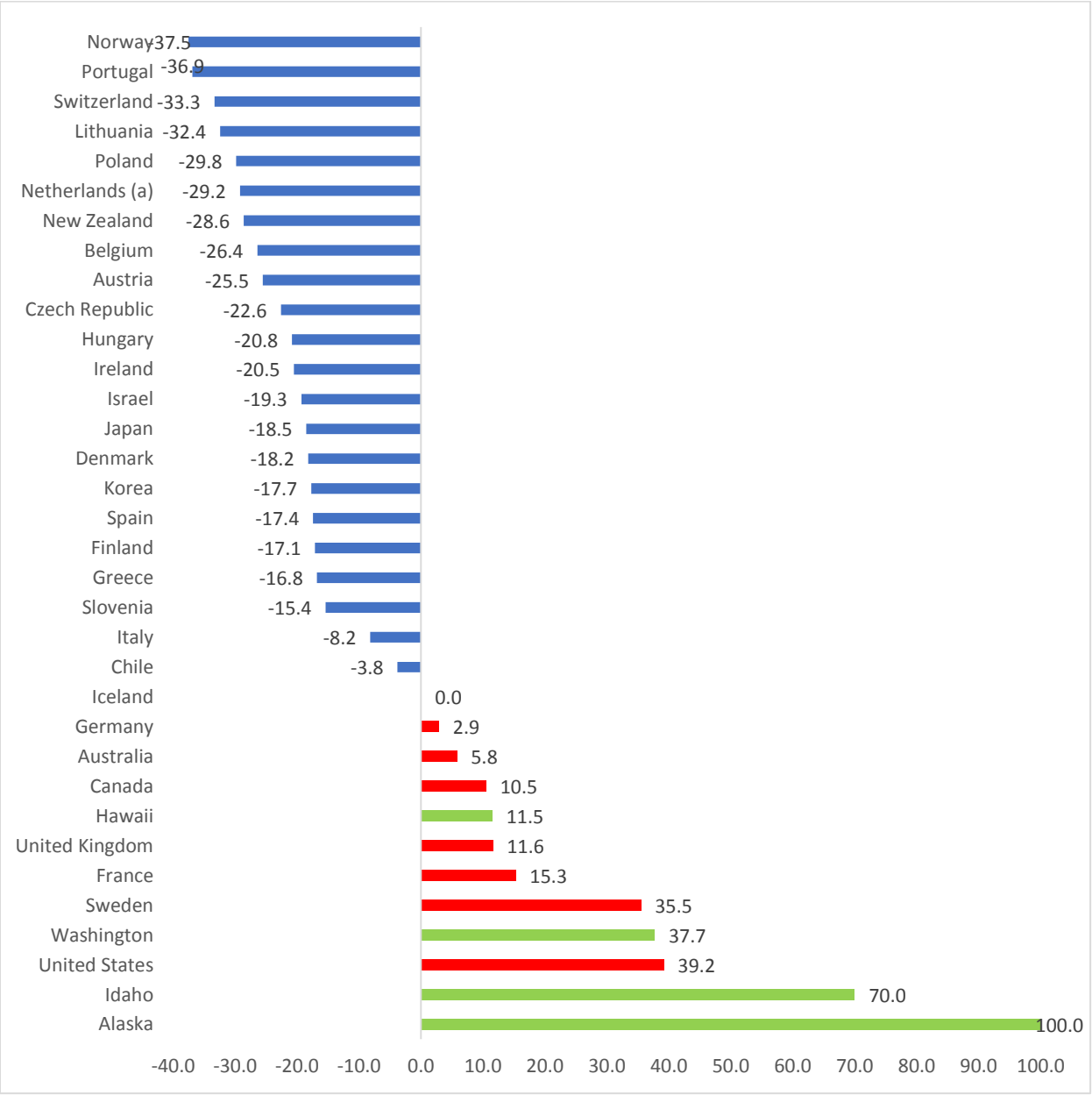
Figure 6. Road deaths per distance traveled (per billion vehicle kilometers)



(a) Data as provided by the countries and not validated by IRTAD.
(b) Real data (actual numbers instead of reported numbers by the police).
(c) 2015 data.
(d) Mopeds are not included in the registered vehicles.

Figure 7. Road deaths per 100,000 vehicles, 2016

The percentage change in pedestrian deaths from 2010 to 2016 is shown in Figure 8. In all four CSET states, there was growth in the number of pedestrian deaths in 2016 compared with pedestrian deaths in 2010. Alaska had the highest increase of 100%, followed by Idaho at 70%. Washington had a 37.7% increase, whereas Hawaii had the lowest increase at 11.5%. The absolute number of pedestrian fatalities in the CSET states for the years 2010 and 2016 is shown in Table 5.



(a) Data as provided by the countries and not validated by IRTAD.

Figure 8. Percentage change in pedestrian deaths, 2010–2016

Table 5. Pedestrian Deaths, 2010–2016

State/Year	AK	HI	ID	WA
2010	6	26	10	61
2016	12	29	17	84
Change (%)	100.0%	11.5%	70.0%	37.7%

The results of the comparisons suggest that all four CSET states are behind many of the countries in the OECD report that have good traffic safety indicators. In some cases, CSET states were the worst. Among the four CSET states, Washington had a better performance in traffic safety indicators, with the least fatalities per population, per vehicle kilometers traveled, and per vehicle registered. A lot of effort to improve traffic safety is required to catch up with countries that have good traffic safety indicators.

CHAPTER 5. COMPARATIVE TRAFFIC FATALITY ANALYSIS OF CSET MINORITIES AND OTHERS

Fatality analysis was conducted while controlling for race, that is, by comparing CSET Minorities and All Others. This analysis was done for the 10-year period between 2007 and 2016. This chapter has four sections. In Section 5.1, the overall comparison of total traffic fatalities for CSET Minorities and All Others is shown for each state. Sections 5.2, 5.3, and 5.4 contain fatality analysis between CSET Minorities and All Others for alcohol use, speeding, and non-usage of restraint, respectively.

5.1 Analysis of Total Traffic Fatalities, 2007–2016

All the traffic fatalities recorded in the FARS database for the years 2007 to 2016 in the states of Alaska, Hawaii, Idaho, and Washington were analyzed based on age, gender, seating position during the fatality (e.g., driver, passenger, pedestrian, or motorcyclist), and urban and rural areas.

5.1.1 Alaska

Alaska had the lowest number of traffic fatalities among the four CSET states, which can be partly attributed to the fewest vehicle miles traveled (VMT). However, Alaska had most traffic fatalities per billion VMT compared with Hawaii and Washington. Traffic fatality statistics based on age, gender, seating position, and area are shown in Table 6.

In Alaska, only 24% of CSET Minority fatalities were age 50 and above; this figure was almost 38% for All Others. This difference was statistically significant, as shown in the last column of Table 6; the annual data are shown in Appendix A, Figure A.1.1.1. Similarly, the number of female fatalities for CSET Minorities was significantly higher than for All Others (see A.1.1.3.)[1]

In Alaska, almost 36% of CSET Minority fatalities were pedestrians; this figure was only 7% for All Others. This difference was also statistically significant (see A.1.1.5). Motorcyclist fatalities for CSET Minorities were significantly lower compared with motorcyclist fatalities for All Others (see A.1.1.6).

[1] For the remainder of this chapter, the statement (see A.1.1.3) means that "the annual data are shown in Appendix Figure A.1.1.3."

Table 6. Total Fatalities in Alaska, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		154 (23.05%)	514 (76.95%)	668	
Age (years)	<16	12 (7.8%)	31 (6.0%)	43 (6.4%)	N
	16-24	42 (27.3%)	111 (21.6%)	153 (22.9%)	N
	25-34	30 (19.5%)	86 (16.7%)	116 (17.4%)	N
	35-49	33 (21.4%)	93 (18.1%)	126 (18.9%)	N
	>49	37 (24.0%)	193 (37.5%)	230 (34.4%)	Y
Gender	Male	83 (53.9%)	367 (71.4%)	450 (67.4%)	Y
	Female	71 (46.1%)	147 (28.6%)	218 (32.6%)	Y
Seat	Driver	57 (37.0%)	266 (51.8%)	323 (48.4%)	Y
	Passenger	34 (22.1%)	120 (23.3%)	154 (23.1%)	N
	Pedestrian	55 (35.7%)	37 (7.2%)	92 (13.8%)	Y
	Motorcyclist	2 (1.3%)	81 (15.8%)	83 (12.4%)	Y
Region	Urban	69 (44.8%)	188 (36.6%)	257 (38.5%)	N
	Rural	84 (54.5%)	325 (63.2%)	409 (61.2%)	N

5.1.2 Hawaii

In Hawaii, almost 60% of CSET Minority fatalities were younger than 35 years of age, and 40% were younger than 25 years of age, as shown in Table 7. These percentages were significantly higher when compared with fatalities for All Others in the same age group. Fatalities for age group 49+ were only 19% in CSET Minorities, and almost 43% in All Others (see A.2.1.1 and A.2.1.2). The percentage of pedestrian fatalities and motorcyclists for CSET Minorities was significantly lower compared with All Others (see A.2.1.3 and A.2.1.4).

Table 7. Total Fatalities in Hawaii, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		347 (31.5%)	755 (69.5%)	1102	
Age (years)	<16	17 (4.9%)	11 (1.5%)	28 (2.5%)	N
	16-24	121 (34.9%)	127 (16.8%)	248 (22.5%)	Y
	25-34	71 (20.5%)	145 (19.2%)	216 (19.6%)	N
	35-49	71 (20.5%)	148 (19.6%)	219 (19.9%)	N
	>49	67 (19.3%)	324 (42.9%)	391 (35.5%)	Y
Gender	Male	244 (70.3%)	566 (75.0%)	810 (73.5%)	N
	Female	103 (29.7%)	189 (25.0%)	292 (26.5%)	N
Seat	Driver	147 (42.4%)	218 (28.9%)	365 (33.1%)	N
	Passenger	78 (22.5%)	104 (13.8%)	182 (16.5%)	N
	Pedestrian	44 (12.7%)	195 (25.8%)	239 (21.7%)	Y
	Motorcyclist	68 (19.6%)	216 (28.6%)	284 (25.8%)	Y
Region	Urban	191 (55.0%)	499 (66.1%)	690 (62.6%)	N
	Rural	156 (45.0%)	255 (33.8%)	411 (37.3%)	N

5.1.3 Idaho

In Idaho, 69% of CSET Minority fatalities were younger than 35, and 45% were younger than 25. In comparison, for All Others fatalities, only 42% were younger than 35, and 27% were younger than 25, as shown in Table 8. The difference in the age group 16–24 was statistically significant (see A.3.1.1.). Similarly, in the age group 49+, the number of CSET Minorities fatalities was significantly lower when compared with All Others (see A.3.1.2). Moreover, motorcyclist fatalities were lower for CSET Minorities (see A.3.1.4).

Table 8. Total Fatalities in Idaho, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		73 (3.4%)	2066 (96.6%)	2139	
Age (years)	<16	7 (9.6%)	140 (6.8%)	147 (6.9%)	N
	16-24	26 (35.6%)	423 (20.5%)	449 (21.0%)	Y
	25-34	17 (23.3%)	323 (15.6%)	340 (23.3%)	N
	35-49	14 (19.2%)	393 (19.0%)	407 (19.0%)	N
	>49	9 (12.3%)	785 (38.0%)	794 (37.2%)	Y
Gender	Male	46 (63.0%)	1437 (69.6%)	1483 (69.3%)	N
	Female	27 (37.0%)	629 (30.4%)	656 (30.7%)	N
Seat	Driver	36 (49.3%)	1159 (56.1%)	1195 (55.9%)	N
	Passenger	29 (39.7%)	490 (23.7%)	519 (24.3%)	Y
	Pedestrian	7 (9.6%)	115 (5.6%)	122 (5.7%)	N
	Motorcyclist	1 (1.4%)	258 (12.5%)	259 (12.1%)	Y
Region	Urban	9 (12.7%)	409 (20.0%)	418 (19.8%)	N
	Rural	62 (87.3%)	1634 (80.0%)	1696 (80.2%)	N

5.1.4 Washington

Among all CSET states, Washington had the highest number of traffic fatalities, but only 6% of those fatalities involved CSET Minorities, as shown in Table 9. In Washington, only 22% of CSET Minorities were age 49+, whereas 39% of All Others were age 49+. Only 4% of motorcyclist fatalities were CSET Minorities; 16% of motorcyclist fatalities were All Others. The age group with statistically different results was 35–49 (see A.4.1.1) and 49+ (see A.4.1.2). For all other age groups, there was no significant difference between CSET Minorities and All Others. Female fatalities among CSET Minorities were significantly higher than female fatalities among All Others (see A.4.1.4). Also, 70% of CSET Minorities fatalities were in rural areas, whereas only 54% of All Others fatalities were in rural areas (see A.4.1.8).

Table 9. Total Fatalities in Washington, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		299 (6.1%)	4623 (93.9%)	4922	
Age (years)	<16	13 (4.3%)	180 (3.9%)	193 (3.9%)	N
	16-24	80 (26.8%)	994 (21.5%)	1074 (21.8%)	N
	25-34	56 (18.7%)	760 (16.4%)	816 (16.6%)	N
	35-49	83 (27.8%)	904 (19.6%)	987 (20.1%)	Y
	>49	67 (22.4%)	1785 (38.6%)	1852 (37.6%)	Y
Gender	Male	194 (64.9%)	3333 (72.1%)	3527 (71.7%)	Y
	Female	105 (35.1%)	1287 (27.8%)	1392 (28.3%)	Y
Seat	Driver	146 (48.8%)	2204 (47.7%)	2350 (47.74%)	N
	Passenger	77 (25.8%)	932 (20.2%)	1009 (20.50%)	N
	Pedestrian	56 (18.7%)	614 (13.3%)	670 (13.61%)	Y
	Motorcyclist	12 (4.0%)	735 (15.9%)	747 (15.18%)	Y
Region	Urban	84 (28.1%)	2122 (45.9%)	2206 (44.8%)	Y
	Rural	209 (69.9%)	2483 (53.7%)	2692 (54.7%)	Y

5.1.5 Summary

The state with the highest number of CSET Minority fatalities was Hawaii with 347 fatalities in 10 years, which was 31% of the total fatalities in Hawaii. Washington followed Hawaii with 299 CSET Minority fatalities, which was only 6% of the total fatalities in Washington. Alaska had the third highest number of CSET Minority fatalities at 154, which was 23% of the total fatalities in Alaska. Idaho had the lowest number of CSET Minority fatalities at 73, which was less than 4% of the total fatalities in Idaho. CSET Minority fatality data for each year from 2007 to 2016 are provided in Appendix A.1 and Appendix A.2.

In all four CSET states, CSET Minority fatalities of age 49+ were significantly lower in number than the fatalities for All Others. In Hawaii and Idaho, there were significantly more CSET Minority fatalities age 16–24 than fatalities in that age group for All Others. In all four states, CSET Minority motorcyclist fatalities were significantly lower in number than motorcyclist fatalities for All Others. Similarly, in

Alaska and Washington, CSET Minority pedestrian fatalities were significantly higher in number than pedestrian fatalities for All Others, whereas no such significant difference was indicated for Hawaii and Idaho. Moreover, in Alaska and Washington, CSET Minority female fatalities were significantly lower in number than female fatalities for All Others.

5.2 Analysis of Traffic Fatalities Involving Alcohol Use, 2007–2016

5.2.1 Alaska

In Alaska, 255 fatalities due to impaired driving were recorded in 10 years. Of those, 72 of the fatalities were CSET Minorities and 183 were All Others, as shown in Table 10. Overall, there was no significant difference in fatalities involving alcohol between CSET Minorities and All Others. There were significantly fewer CSET Minority fatalities for age group 49+ than for All Others (see A.1.2.1). Female CSET Minority fatalities involving alcohol use were significantly higher compared with All Others (see A.1.2.3). Similarly, pedestrian fatalities involving alcohol use were also significantly higher for CSET Minorities compared with All Others (see A.1.2.4).

Table 10. Fatalities Involving Alcohol in Alaska, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		72 (46.8%)	183 (35.6%)	255 (38.2%)	N
Age (years)	<16	3 (4.2%)	4 (2.2%)	7 (2.7%)	N
	16-24	22 (30.6%)	44 (24.0%)	66 (25.9%)	N
	25-34	21 (29.2%)	41 (22.4%)	62 (24.3%)	N
	35-49	15 (20.8%)	40 (21.9%)	55 (21.6%)	N
	>49	11 (15.3%)	54 (29.5%)	65 (25.5%)	Y
Gender	Male	42 (58.3%)	152 (83.1%)	194 (76.1%)	Y
	Female	30 (41.7%)	31 (16.9%)	61 (23.9%)	Y
Seat	Driver	40 (55.6%)	112 (61.2%)	152 (59.6%)	N
	Passenger	17 (23.6%)	38 (20.8%)	55 (21.6%)	N
	Pedestrian	13 (18.1%)	2 (1.1%)	15 (5.9%)	Y
	Motorcyclist	0 (0.0%)	29 (15.8%)	29 (11.4%)	Y
Region	Urban	22 (30.6%)	70 (38.3%)	92 (36.1%)	Y
	Rural	49 (68.1%)	113 (61.7%)	162 (63.5%)	Y

Pedestrian fatalities involving alcohol use comprises fatalities involving pedestrians having a positive BAC or involving a pedestrian killed when the driver of the vehicle in motion that was involved in the accident had a positive BAC. From 2007 to 2016, no motorcyclist fatality involving alcohol use was recorded in CSET Minorities, whereas 29 motorcyclist fatalities involving alcohol use were recorded among All Others. CSET Minority fatalities involving alcohol use in rural areas were significantly higher compared with fatalities from All Others (see A.1.2.7).

5.2.2 Hawaii

Among fatalities in Hawaii due to alcohol impairment, 69% of CSET Minorities were younger than 35 years of age, and 54% of All Others were younger than 35 years of age, as shown in Table 11. CSET Minority fatalities in the age group 16–24 were significantly higher in number than fatalities for All Others in the same age group (see A.2.2.1). Similarly, only 10% of CSET Minority fatalities were of age group 49+, whereas 21% of All Others fatalities were in the same age group (see A.2.2.2). Only 18% were intoxicated motorcyclist fatalities for CSET Minorities; this figure was 29% for All Others (see A.2.2.3).

Table 11. Fatalities Involving Alcohol in Hawaii, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		164 (47.3%)	292 (38.7%)	456 (41.4%)	N
Age (years)	<16	10 (6.1%)	5 (1.7%)	15 (3.3%)	N
	16-24	64 (39.0%)	70 (24.0%)	134 (29.4%)	Y
	25-34	37 (22.6%)	88 (30.1%)	125 (27.4%)	N
	35-49	37 (22.6%)	67 (22.9%)	104 (22.8%)	N
	>49	16 (9.8%)	62 (21.2%)	78 (17.1%)	Y
Gender	Male	164 (77.7%)	293 (84.9%)	457 (82.2%)	N
	Female	47 (22.3%)	52 (15.1%)	99 (17.8%)	N
Seat	Driver	79 (48.2%)	111 (38.0%)	190 (41.7%)	N
	Passenger	39 (23.8%)	53 (18.2%)	92 (20.2%)	N
	Pedestrian	9 (5.5%)	26 (8.9%)	35 (7.7%)	N
	Motorcyclist	30 (18.3%)	85 (29.1%)	115 (25.2%)	Y
Region	Urban	90 (54.9%)	162 (57.0%)	252 (56.2%)	N
	Rural	74 (45.1%)	122 (43.0%)	196 (43.8%)	N

5.2.3 Idaho

In Idaho, a total of 706 fatalities were recorded involving alcohol impairment, as shown in Table 12. No age group showed significant differences, though for age group 49+, fatalities among CSET Minorities were significantly fewer than fatalities for All Others (see A.3.2.1). Similarly, motorcyclist fatalities involving alcohol impairment were significantly lower in number for CSET Minorities (see A.3.2.2).

Table 12. Fatalities Involving Alcohol in Idaho, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		39 (53.4%)	667 (32.3%)	706 (33.0%)	N
Age (years)	<16	2 (5.1%)	17 (2.5%)	19 (2.7%)	N
	16-24	11 (28.2%)	169 (25.3%)	180 (25.5%)	N
	25-34	13 (33.3%)	151 (22.6%)	164 (23.2%)	N
	35-49	10 (25.6%)	170 (25.5%)	180 (25.5%)	N
	>49	3 (7.7%)	160 (24.0%)	163 (23.1%)	Y
Gender	Male	25 (64.1%)	518 (77.7%)	543 (76.9%)	N
	Female	14 (35.9%)	149 (22.3%)	163 (23.1%)	N
Seat	Driver	20 (51.3%)	428 (64.2%)	448 (63.5%)	N
	Passenger	16 (41.0%)	145 (21.7%)	161 (22.8%)	N
	Pedestrian	2 (5.1%)	11 (1.6%)	13 (1.8%)	N
	Motorcyclist	1 (2.6%)	77 (11.5%)	78 (11.0%)	Y
Region	Urban	4 (10.3%)	118 (17.7%)	122 (17.3%)	N
	Rural	34 (87.2%)	541 (81.1%)	575 (81.4%)	N

5.2.4 Washington

In Washington, 53% of CSET fatalities involved alcohol impairment; this figure was 41% for All Others, as shown in Table 13. This difference was significant (see A.4.2.1). The number of CSET Minority fatalities due to alcohol impairment in age group 49+ was significantly lower than the number for All Others fatalities due to alcohol impairment in the same age group. Similarly, female fatalities due to alcohol impairment were significantly higher among CSET Minorities compared with All Others (see A.4.2.4). Less than 3% of CSET Minority motorcyclist fatalities were due to impairment, but about 15% of All Others were impaired (see A.4.2.5). Also, 77% of CSET Minority fatalities due to alcohol impairment occurred in rural areas, which was a significantly higher percentage than for All Others at 55% (see A.4.2.7).

Table 13. Fatalities Involving Alcohol in Washington, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		160 (53.5%)	1758 (41.5%)	1918 (42.2%)	Y
Age (years)	<16	5 (3.1%)	37 (2.1%)	42 (2.2%)	N
	16-24	51 (31.9%)	472 (26.8%)	523 (27.3%)	N
	25-34	38 (23.8%)	411 (23.4%)	449 (23.4%)	N
	35-49	43 (26.9%)	408 (23.2%)	451 (23.5%)	N
	>49	23 (14.4%)	430 (24.5%)	453 (23.6%)	Y
Gender	Male	104 (65.0%)	1394 (79.3%)	1498 (78.1%)	Y
	Female	56 (35.0%)	363 (20.7%)	419 (21.9%)	Y
Seat	Driver	94 (58.8%)	1000 (56.9%)	1094 (57.0%)	N
	Passenger	51 (31.9%)	379 (21.6%)	430 (22.4%)	N
	Pedestrian	11 (6.9%)	89 (5.1%)	100 (5.2%)	N
	Motorcyclist	4 (2.5%)	269 (15.3%)	273 (14.2%)	Y
Region	Urban	34 (21.3%)	778 (44.3%)	812 (42.3%)	Y
	Rural	123 (76.9%)	969 (55.1%)	1092 (56.9%)	Y

5.2.5 Summary

For all four CSET states, the CSET Minority fatalities involving alcohol intoxication in the age group 49+ were significantly lower in number compared with fatalities in the same age group for All Others. Female fatalities involving alcohol use were significantly higher for CSET Minorities compared with female fatalities for All Others in Alaska and Washington; there was no significant difference in Hawaii and Idaho. Motorcyclist fatalities involving alcohol use were significantly lower for CSET Minorities compared with motorcyclist fatalities for All Others in all four CSET states, without exception. Moreover, fatalities involving alcohol use in rural areas were significantly higher for CSET Minorities compared with fatalities for All Others in Alaska and Washington; there was no significant difference in Hawaii and Idaho.

5.3 Analysis of Traffic Fatalities Involving Speeding, 2007–2016

5.3.1 Alaska

In Alaska, almost 35% of fatalities were attributed to speeding, as shown in Table 14. Overall, there was no significant difference in fatalities involving speeding among CSET Minorities and All Others. There was no significant difference among various age groups except for the age group 49+, which had a significantly lower number of CSET Minority fatalities (see A.3.1.1). Similarly, there were significantly fewer motorcyclist fatalities involving speeding among CSET Minorities (see A.3.1.2). There were significantly more fatalities involving speeding among CSET Minorities in rural areas compared with fatalities for All Others (see A.3.1.4).

Table 14. Fatalities Involving Speeding in Alaska, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		48 (31.2%)	184 (35.8%)	232 (34.7%)	N
Age (years)	<16	2 (4.2%)	7 (3.8%)	9 (3.9%)	N
	16-24	20 (41.7%)	59 (32.1%)	79 (34.1%)	N
	25-34	11 (22.9%)	44 (23.9%)	55 (23.7%)	N
	35-49	10 (20.8%)	31 (16.8%)	41 (17.7%)	N
	>49	5 (10.4%)	43 (23.4%)	48 (20.7%)	Y
Gender	Male	27 (56.2%)	145 (78.8%)	172 (74.1%)	N
	Female	10 (43.8%)	39 (21.2%)	60 (25.9%)	N
Seat	Driver	29 (60.4%)	107 (58.2%)	136 (58.6%)	N
	Passenger	18 (37.5%)	46 (25.0%)	64 (27.6%)	N
	Pedestrian	0 (0.0%)	0 (0.0%)	0 (0.0%)	N
	Motorcyclist	1 (2.1%)	31 (16.8%)	32 (13.8%)	Y
Region	Urban	10 (20.8%)	73 (39.7%)	83 (35.8%)	Y
	Rural	38 (79.2%)	111 (60.3%)	149 (64.2%)	Y

5.3.2 Hawaii

There were 431 fatalities involving speeding in Hawaii in the last 10 years, of which 168 (48%) were CSET Minorities. The other 263 were All Others, as shown in Table 15. Also, 50% of the CSET Minority fatalities involving speeding in Hawaii were persons below the age of 25; the same statistic is only 29% for All Others. The age groups with significantly higher CSET Minority fatalities were age groups younger than 16 (see A.2.3.2) and 16–24 (see A.2.3.3). Female fatalities involving speeding were significantly higher for CSET Minorities compared with females for All Others (see A.2.3.5). There were significantly fewer motorcyclist fatalities involving speeding for CSET Minorities compared with motorcyclist fatalities involving speeding for All Others (see A.2.3.8).

Table 15. Fatalities Involving Speeding in Hawaii, 2007–2016

Variables		CSET Minorities	All Others	Total	Stat. Sign.
		n (%)	n (%)	n (%)	Yes/No
Overall		168 (48.4%)	263 (34.8%)	431 (39.1%)	Y
Age (years)	<16	10 (6.0%)	2 (0.8%)	12 (2.8%)	Y
	16-24	75 (44.6%)	75 (28.5%)	150 (34.8%)	Y
	25-34	40 (23.8%)	88 (33.5%)	128 (29.7%)	N
	35-49	28 (16.7%)	56 (21.3%)	84 (19.5%)	N
	>49	15 (8.9%)	42 (16.0%)	57 (13.2%)	N
Gender	Male	114 (71.3%)	223 (82.3%)	337 (78.2%)	Y
	Female	46 (28.8%)	48 (17.7%)	94 (21.8%)	Y
Seat	Driver	82 (48.8%)	97 (36.9%)	179 (41.5%)	Y
	Passenger	47 (28.0%)	39 (14.8%)	86 (20.0%)	Y
	Pedestrian	1 (0.6%)	1 (0.4%)	2 (0.5%)	N
	Motorcyclist	37 (22.0%)	126 (47.9%)	163 (37.8%)	Y
Region	Urban	101 (63.1%)	191 (70.5%)	292 (67.7%)	N
	Rural	59 (36.9%)	80 (29.5%)	139 (32.3%)	N

5.3.3 Idaho

There were 560 fatalities in Idaho involving speeding, of which only 27 fatalities were CSET Minorities; 533 were All Others, as shown in Table 16. Female fatalities involving speeding were significantly higher for CSET Minorities compared with female fatalities involving speeding for All Others (see A.3.3.2). There were no motorcyclist fatalities involving speeding among CSET Minorities and there were 72 motorcyclist fatalities involving speeding for All Others (A.3.3.4).

Table 16. Fatalities Involving Speeding in Idaho, 2007–2016

Variables		CSET Minorities	All Others	Total	Stat. Sign.
		n (%)	n (%)	n (%)	Yes/No
Overall		27 (32.9%)	533 (25.8%)	560 (26.0%)	N
Age (years)	<16	4 (14.8%)	40 (7.5%)	44 (7.9%)	N
	16-24	9 (33.3%)	164 (30.8%)	173 (30.9%)	N
	25-34	7 (25.9%)	101 (18.9%)	108 (19.3%)	N
	35-49	4 (14.8%)	101 (18.9%)	105 (18.8%)	N
	>49	3 (11.1%)	127 (23.8%)	130 (23.2%)	N
Gender	Male	13 (48.1%)	382 (71.7%)	395 (70.5%)	Y
	Female	14 (51.9%)	151 (28.3%)	165 (29.5%)	Y
Seat	Driver	12 (44.4%)	302 (56.7%)	314 (56.1%)	Y
	Passenger	15 (55.6%)	154 (28.9%)	169 (30.2%)	N
	Pedestrian	0 (0.0%)	0 (0.0%)	0 (0.0%)	N

	Motorcyclist	0 (0.0%)	72 (13.5%)	72 (12.9%)	Y
Region	Urban	3 (11.1%)	93 (17.4%)	96 (17.1%)	N
	Rural	24 (88.9%)	440 (82.6%)	464 (82.9%)	N

5.3.4 Washington

In the state of Washington, 1626 fatalities recorded involved speeding, which was 33% of the total fatalities, as shown in Table 17. No age group showed significant differences. Female fatalities involving speeding were significantly higher in number for CSET Minorities compared with female fatalities involving speeding for All Others (see A.4.3.2). Motorcyclist fatalities involving speeding were significantly lower in number for CSET Minorities compared with fatalities for All Others (see A.4.3.4). Additionally, CSET Minority fatalities were significantly higher in number in the rural areas when compared with fatalities for All Others (see A.4.3.6).

Table 17. Fatalities Involving Speeding in Washington, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		108 (36.1%)	1518 (32.8%)	1626 (33.0%)	N
Age (years)	<16	3 (2.8%)	48 (3.2%)	51 (3.1%)	N
	16-24	38 (35.2%)	531 (35.0%)	569 (35.0%)	N
	25-34	27 (25.0%)	352 (23.2%)	379 (23.3%)	N
	35-49	29 (26.9%)	316 (20.8%)	345 (21.2%)	N
	>49	11 (10.2%)	271 (17.9%)	282 (17.3%)	N
Gender	Male	64 (59.3%)	1225 (80.7%)	1289 (79.3%)	Y
	Female	44 (40.7%)	293 (19.3%)	337 (20.7%)	Y
Seat	Driver	72 (66.7%)	795 (52.4%)	867 (53.3%)	Y
	Passenger	28 (25.9%)	369 (24.3%)	397 (24.4%)	N
	Pedestrian	0 (0.0%)	0 (0.0%)	0 (0.0%)	N
	Motorcyclist	8 (7.4%)	352 (23.2%)	360 (22.1%)	Y
Region	Urban	31 (28.7%)	755 (49.7%)	786 (48.3%)	Y
	Rural	77 (71.3%)	763 (50.3%)	840 (51.7%)	Y

5.3.5 Summary

Motorcyclist fatalities involving speeding were significantly lower in number for CSET Minorities when compared with fatalities for All Others in the four CSET states, without exception. Female fatalities involving speeding were significantly higher in number for CSET Minorities compared with female fatalities for All Others in all CSET states, except Alaska. Additionally, fatalities involving speeding were significantly higher in rural areas for CSET Minorities compared with All Others in Alaska and Washington; there was no such difference in Hawaii and Idaho.

5.4 Analysis of Traffic Fatalities Involving Non-usage of Restraint

5.4.1 Alaska

Non-usage of restraint was a contributing factor for 47% of female CSET Minority fatalities and 21% of female All Others fatalities, as shown in Table 18. Non-usage of restraint was a contributing factor in 70.6% of CSET Minority fatalities in rural areas, and a contributing factor in almost 48% for All Others in rural areas (see A.4.1.1 to A.4.1.4).

Table 18. Fatalities Involving the Non-usage of Restraint in Alaska, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		51 (33.1%)	177 (34.4%)	228 (34.1%)	N
Age (years)	<16	2 (3.9%)	5 (2.8%)	7 (3.1%)	N
	16-24	20 (39.2%)	56 (31.6%)	76 (33.3%)	N
	25-34	12 (23.5%)	33 (18.6%)	45 (19.7%)	N
	35-49	12 (23.5%)	33 (18.6%)	45 (19.7%)	N
	>49	5 (9.8%)	50 (28.2%)	55 (24.1%)	N
Gender	Male	27 (52.9%)	140 (79.1%)	167 (73.2%)	Y
	Female	24 (47.1%)	42 (20.9%)	66 (26.8%)	Y
Region	Urban	15 (29.4%)	93 (52.5%)	108 (47.4%)	Y
	Rural	36 (70.6%)	89 (47.5%)	125 (52.6%)	Y

5.4.2 Hawaii

In Hawaii, 50% of CSET fatalities attributable to non-usage of restraint were persons below the age of 25. For All Others, the proportion was 25%, as shown in Table 19. Non-usage of restraint was a contributing factor in the death of 29% of females for CSET Minorities and in the death of 16% of females for All Others (see A.2.4.3).

Table 19. Fatalities Involving the Non-usage of Restraint in Hawaii, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		132 (38.0%)	157 (20.8%)	289 (26.2%)	N
Age (years)	<16	6 (4.6%)	4 (2.5%)	10 (3.5%)	N
	16-24	60 (46.2%)	37 (23.3%)	97 (33.6%)	Y
	25-34	24 (18.5%)	46 (28.9%)	70 (24.2%)	N
	35-49	26 (20.0%)	36 (22.6%)	62 (21.5%)	N
	>49	14 (10.8%)	36 (22.6%)	50 (17.3%)	N
Gender	Male	94 (71.2%)	132 (84.1%)	226 (78.2%)	Y
	Female	38 (28.8%)	25 (15.9%)	63 (21.8%)	Y
Region	Urban	64 (48.5%)	76 (48.4%)	140 (48.4%)	N
	Rural	68 (51.5%)	81 (51.6%)	149 (51.6%)	N

5.4.3 Idaho

Fatalities involving the non-usage of restraint in Idaho were nearly 45%, as shown in Table 20.

Table 20. Fatalities Involving Non-usage of Restraint in Idaho, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		47 (64.4%)	928 (44.9%)	975 (45.6%)	Y
Age (years)	<16	2 (4.3%)	48 (5.2%)	50 (5.2%)	N
	16-24	18 (38.3%)	241 (26.1%)	259 (26.7%)	Y
	25-34	13 (27.7%)	186 (20.2%)	199 (20.5%)	N
	35-49	10 (21.3%)	197 (21.3%)	207 (21.3%)	N
	>49	4 (8.5%)	251 (27.2%)	255 (26.3%)	Y
Gender	Male	27 (57.4%)	654 (70.5%)	681 (69.8%)	N
	Female	20 (42.6%)	274 (29.5%)	294 (30.2%)	N
Region	Urban	3 (6.4%)	129 (13.9%)	132 (13.6%)	N
	Rural	44 (93.6%)	799 (86.1%)	843 (86.4%)	N

In Idaho, non-usage of restraint was higher for CSET Minorities than for All Others. Fatalities involving the non-usage of restraint in the age group 16–24 were significantly higher in number for CSET Minorities compared with All Others (see A.3.4.2). However, the opposite was found for age group 49+ (see A.3.4.3). There were no other significant differences between CSET Minorities and All Others.

5.4.4 Washington

Fatalities involving the non-usage of restraint in Washington were nearly 24%, the lowest percentage among all four CSET states, as shown in Table 21. The percentage of non-usage of restraint was higher for CSET Minorities than for All Others. CSET Minority fatalities involving the non-usage of restraint were significantly higher in number than fatalities for All Others in rural areas (see A.4.4.3). There were no other significant differences between CSET Minorities and All Others.

Table 21. Fatalities Involving the Non-usage of Restraint in Washington, 2007–2016

Variables		**CSET Minorities**	**All Others**	**Total**	**Stat. Sign.**
		n (%)	**n (%)**	**n (%)**	**Yes/No**
Overall		126 (42.1%)	1067 (23.1%)	1193 (24.2%)	Y
Age (years)	<16	5 (4.0%)	32 (3.0%)	37 (3.1%)	N
	16-24	39 (31.0%)	299 (28.0%)	338 (28.3%)	N
	25-34	28 (22.2%)	241 (22.6%)	269 (22.5%)	N
	35-49	31 (24.6%)	196 (18.4%)	227 (19.0%)	N
	>49	23 (18.3%)	299 (28.0%)	322 (27.0%)	N
Gender	Male	87 (69.0%)	812 (76.1%)	899 (75.4%)	N
	Female	39 (31.0%)	257 (23.9%)	296 (24.6%)	N
Region	Urban	18 (14.3%)	380 (35.6%)	398 (33.4%)	Y
	Rural	108 (85.7%)	689 (64.4%)	797 (66.6%)	Y

5.4.5 Summary

CSET Minority fatalities involving non-usage of restraint were significantly higher in number than fatalities for All Others in Idaho and Washington. No such difference was indicated for Alaska and Hawaii. There was a significantly higher number of female fatalities for CSET Minorities than for All Others in Alaska and Hawaii, but no significant difference in Idaho and Washington. There were significantly more fatalities among CSET Minorities than among All Others in rural areas in Alaska and Washington, but not in Hawaii and Idaho.

CHAPTER 6. DETAILED ANALYSIS OF TRAFFIC ACCIDENTS INVOLVING HAWAIIANS

This chapter focuses on the task of taking a deeper look into FARS data and similar statistics to identify patterns of road fatalities involving Hawaiians and Pacific Islanders. The fact that these minorities are overrepresented in accident statistics has been known for a while; for example

1) A summary statistical report by NHTSA [9] showed that Hawaiians and Pacific Islanders had the second highest fatality rate per 100,000 population at 13.9, while Hispanics, Whites, and African-Americans were at about 12.3; American Indians were at 32.2.

2) A study for the Hawaii State Department of Health [10] that focused on fatality analysis on the Island of Hawaii (also referred to as County of Hawaii or the Big Island) found that Hawaiians and part-Hawaiians had the highest fatality rate on the island at 8 per 10,000 deaths; Japanese were at 4, Whites at 5, and Filipino at 6.

More recent statistics from the State of Hawaii Data Book [11], depicted in Table 22, shows these numbers clearly: In Hawaii, the proportion of Hawaiians in the population was steady at about 21%, but their proportion in FARS data was at 28% and rising.

TABLE 22 Population and Traffic Fatalities of Hawaiians in Hawaii

Race/Year	2010	2011	2012	2013	2014	2015	2016	Average
% Hawaiian Population	20.3	21.5	21.3	21.2	20.9	21.7	21.2	21.2
% Hawaiian fatalities	26.5	24.0	28.0	27.5	23.2	35.5	31.7	28.1

Before presenting more detailed accident statistics, several relevant statistics of the State of Hawaii were included because they provide a useful background of this unique (island) state.

Table 23[2] shows the increasing trend of motor vehicle registrations.

Table 24[3] shows the increasing trend of driver licenses in force, and a comparison of the two reveals that there are far more registered vehicles than licensed drivers to drive them, suggesting a high rate of vehicle availability for Hawaii's drivers.

The State of Hawaii comprises Oahu and the neighbor islands. The major difference between the islands is the heavy urbanization of Oahu where Honolulu is located and the low density rural environment on all the neighbor islands, which includes from west-to-east Kauai, Molokai, Maui, Lanai and the Big Island of Hawaii. Kahoolawe is uninhabited. Niihau is under private ownership and has a tiny population. The large difference in density is depicted in Table 25.

[2] 2016 State of Hawaii Data Book, section-18, table-18.07.
[3] 2016 State of Hawaii Data Book, section-18, table-18.15.

TABLE 23 Motor Vehicles Registered by County					
Year	State Total	Honolulu	Hawaii	Kauai	Maui
2000	941,242	614,985	132,305	61,316	132,636
2001	967,146	631,232	136,786	62,655	136,473
2002	987,598	643,810	142,150	63,580	138,058
2003	1,030,845	667,565	150,983	67,312	144,985
2004	1,072,211	688,163	159,627	71,517	152,904
2005	1,119,838	714,604	169,396	75,561	160,277
2006	1,127,467	719,606	173,786	74,734	159,341
2007	1,134,542	722,486	176,386	75,594	160,076
2008	1,127,567	719,640	175,166	74,344	158,417
2009	1,117,790	718,253	172,209	73,847	153,481
2010	1,120,080	720,267	171,974	73,563	154,276
2011	1,181,148	755,425	181,931	78,373	165,419
2012	1,278,233	814,361	197,273	85,292	181,307
2013	1,341,152	848,567	208,624	90,351	193,610
2014	1,284,193	816,738	199,336	85,652	182,467
2015	1,233,523	780,909	194,633	81,947	176,034

TABLE 24 Drivers Licenses in Force by County				
Year	Honolulu	Hawaii	Kauai	Maui
2000	529,890	104,058	44,471	90,964
2001	542,244	106,557	45,424	93,595
2002	560,222	110,561	46,840	97,045
2003	572,665	113,760	48,047	99,716
2004	577,507	116,486	48,967	100,916
2005	584,492	119,741	49,880	102,050
2006	590,975	122,087	50,539	103,402
2007	600,264	125,063	51,504	105,635
2008	607,747	127,456	52,479	108,259
2009	614,783	128,692	52,925	109,304
2010	618,975	129,041	52,981	110,420
2011	621,769	129,087	53,184	110,993
2012	618,492	128,423	52,683	110,666
2013	612,380	128,537	52,998	110,585
2014	607,823	129,753	53,350	111,664
2015	617,293	132,461	54,445	114,569

TABLE 25 Population Density (per mile^2) by County				
Year	Honolulu	Hawaii	Kauai	Maui
2000	1,458	37	94	109
2001	1,469	38	95	113
2002	1,482	38	97	115
2003	1,489	39	98	117
2004	1,511	40	100	120
2005	1,528	42	101	122
2006	1,543	43	102	124
2007	1,540	44	104	126
2008	1,554	45	106	129
2009	1,570	46	107	131
2010	1,587	46	108	132
2011	1,608	46	109	134
2012	1,625	47	111	135
2013	1,639	47	112	137
2014	1,646	48	114	139
2015	1,653	49	115	140

Table 26[4] shows that, as expected, vehicle miles traveled (VMT) per person are much higher in the three rural counties compared with the urban county of Honolulu. Note that the island of Oahu and the City and County of Honolulu are geographically identical. Kauai is roughly on par with average VMT in the U.S. Honolulu is roughly one-half the national average, largely due to the shorter distances and substantial traffic congestion. Nearly all public centerline miles of roads are paved in Hawaii, as shown in Figure 9,[5] but this varies by county: 99.5% on Oahu, 96% on Hawaii, 95% on Kauai, 91% on Maui and 71% on Lanai (2016 data).

[4] 2002 and 2016 State of Hawaii Data Book, section-18, table-18.17.
[5] 2002 and 2016 State of Hawaii Data Book, section-18, table-18.02 and 18.04.

TABLE 26 VMT Per Person By County				
Year	Honolulu	Hawaii	Kauai	Maui
2001	6,291	8,774	10,921	9,230
2002	6,356	8,951	10,910	9,189
2003	6,556	9,268	11,392	9,433
2004	6,663	9,536	11,848	9,722
2005	6,688	10,112	12,099	10,011
2006	6,722	9,844	12,250	9,662
2007	6,972	9,456	12,689	9,753
2008	6,819	9,044	11,938	9,404
2009	6,654	9,129	11,630	8,926
2010	6,600	9,040	11,499	8,876
2011	6,822	9,462	12,125	9,381
2012	7,282	10,135	12,810	10,199
2013	7,502	10,596	13,625	10,661
2014	6,265	8,669	11,522	9,082
2015	6,859	9,640	12,084	9,512

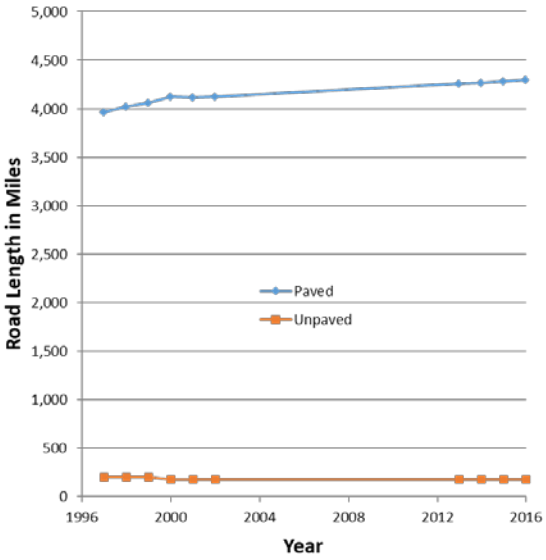


Figure 9. Paved and unpaved roads in Hawaii

A major sector of Hawaii's economy is tourism. Visitor arrivals in Hawaii are in the millions and growing, as detailed in Table 27. Since the turn of the millennium, domestic visitor arrivals grew by 40%, while international visitor arrivals grew by 33%. Many of these visitors rent vehicles and drive on the islands. The contribution of tourism to the accident rates in Hawaii is unknown, and exploration of this subject is beyond the scope of our analysis. Anecdotal evidence suggests that the involvement of tourists themselves in crashes is not a major contributor to the crash rates in Hawaii, but there have been notable accidents involving vehicles for hire (e.g., tour buses, trolleys and transportation network providers, all of which involve local drivers). Also, there has been no notable mention of tourists and visitors being overrepresented in 2-wheeler and pedestrian accidents.

TABLE 27 Domestic and International Visitor Arrivals in Hawaii		
Year	Domestic	International
2001	4,224,321	2,079,470
2002	4,358,850	2,030,208
2003	4,531,289	1,849,150
2004	4,892,960	2,019,134
2005	5,313,281	2,103,293
2006	5,495,813	1,965,486
2007	5,582,530	1,914,290
2008	4,901,893	1,811,543
2009	4,672,001	1,748,447
2010	5,022,883	1,959,542
2011	5,127,291	2,047,106
2012	5,403,025	2,464,118
2013	5,405,300	2,598,174
2014	5,473,388	2,710,283
2015	5,782,140	2,780,878

A three-year moving average was used to smooth the annual FARS data, controlled for VMT, for each county in Hawaii, as shown in Figure 10. There is a clear downward trend for Honolulu County and Hawaii County.

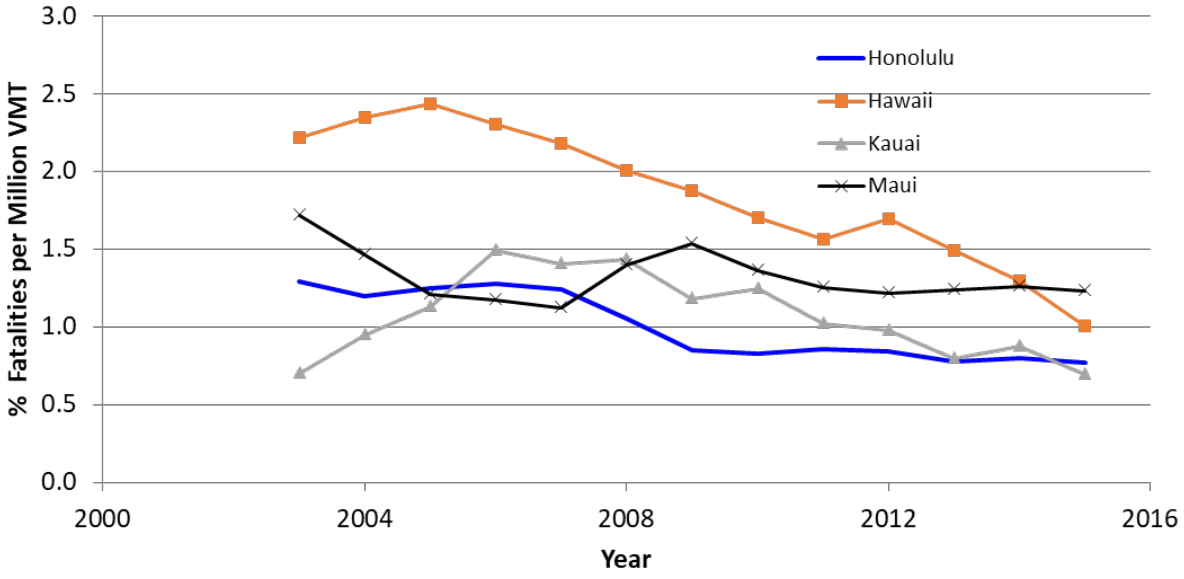


Figure 10. Three-year moving average of fatalities per 100 million VMT by county.

Annual FARS data indicate that for the seven years depicted in Table 28, Hawaiians consisted of over 28% of the fatalities in Hawaii. This proportion grows to over 30% if other Pacific Islanders are included with the Hawaiians. Years 2012 and 2016 had a high number of total fatalities in Hawaii. Year 2017 had 107 fatalities, which matches the average of 107. Year 2018 had no official traffic fatality numbers posted as of this writing, but it was the year of pedestrian fatalities: "Statewide pedestrian fatalities up 525% this year,"[6] with 43 pedestrian fatalities recorded. The trend continued in January 2019, with six pedestrian fatalities compared with four in January 2018.[7]

TABLE 28 Total Fatalities by Race

Race/Year	2010	2011	2012	2013	2014	2015	2016	Average
Hawaiian	30	24	35	28	22	33	38	30
Samoan	3	1	2	1	0	0	4	2
Guamanian	1	0	0	0	0	0	0	0
Total Fatalities	113	100	125	102	95	93	120	107
% Hawaiian	26.5	24.0	28.0	27.5	23.2	35.5	31.7	28.1

Results from FARS data analysis for Hawaiians and Pacific Islanders were presented in the previous chapter. The focus of Tables 7, 11, 15, and 19 is State of Hawaii data; the tables contain a column labelled CSET

[6] Honolulu Star Advertiser, Statewide Pedestrian Fatalities Up 525% This Year, September 21, 2018, https://www.staradvertiser.com/2018/09/14/breaking-news/statewide-pedestrian-fatalities-up-84-percent-this-year/

[7] Honolulu Star Advertiser, Fatal Crash Highlights Pedestrians' Vulnerability, https://www.staradvertiser.com/2019/01/30/hawaii-news/fatal-crash-highlights-pedestrians-vulnerability/#googDisableSync

January 2019 Pedestrian fatalities [Type of location in brackets]

>> A 24-year-old man was driving a 2013 Jaguar sedan north on Hawaii Kai Drive around 6:45 p.m. Jan. 7 when he hit an 86-year-old man who was crossing the street outside of a marked crosswalk. [Suburban]

>> A 72-year-old man was traveling west on Farrington Highway in a Pontiac sedan around 6:38 p.m. Jan. 18 when he struck two pedestrians, a 19-year-old woman and a 29-year-old man, who were in a marked crosswalk at the Linakola Street intersection in Maili. The male victim was thrown into the oncoming lane, where he was hit by a second car. Police said speed may have been a factor. [Exurban, semi-rural]

>> A 58-year-old man was driving on the H-2 freeway prior to the Ka Uka off-ramp around 4:40 a.m. Jan. 20 when he struck a male pedestrian who was in the roadway. [Suburban freeway]

>> A 27-year-old man was speeding west on Ala Moana Boulevard in a Ford F150 pickup truck, weaving in and out of traffic, when he suddenly veered from the far left lane across three lanes to the right at the Kamakee Street intersection at about 6:10 p.m. Jan. 28, striking six pedestrians and a traffic signal pole before slamming into another Ford F-150 that was stopped at the light, waiting to make a right turn. Three of the pedestrians were pronounced dead at the scene, and three were hospitalized. Speed and alcohol may have been factors. [Urban]

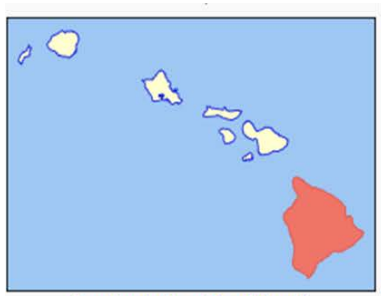
Source: Honolulu Police Department

Minorities, which for Hawaii are Hawaiians and Pacific Islanders. These tables also indicate in their last column whether the difference between CSET Minorities and All Others is statistically significant. The statistically significant results for CSET Minorities in Hawaii are summarized below.

- Table 7 presents an analysis of total fatalities in Hawaii between 2007 and 2016. Hawaiians and Pacific Islanders are overrepresented in the fatality sample for ages 16 to 24, for pedestrians and for motorcyclists.
- Table 11 presents an analysis of fatalities in Hawaii due to alcohol between 2007 and 2016. Hawaiians and Pacific Islanders are overrepresented in the fatality sample for ages 16 to 24, for ages over 49, and for motorcyclists.
- Table 15 presents an analysis of fatalities in Hawaii due to speeding between 2007 and 2016. Hawaiians and Pacific Islanders are overrepresented in the overall sample and for most of the categories analyzed. Only ages over 35 and urban/rural do not yield statistically significant differences.
- Table 19 presents analysis of fatalities in Hawaii due to non-use of seat belts between 2007 and 2016. Hawaiians and Pacific Islanders are overrepresented in the fatality sample for ages 16 to 24 for both male and female compared with All Others.

In addition, aggregate data analysis of traffic fatalities was conducted for three RITI communities in Hawaii, the entire Big Island of Hawaii, and the rural communities of Waianae and Waimanalo on the island of Oahu, as shown in Figures 11, 12 and 13, respectively.

All three locations are known for their large number of Hawaiians and part-Hawaiians. In Table 22, we noted that the percentage of Hawaiians in traffic fatalities in the state of Hawaii between 2010 and 2016 is 28%. However, this proportion was 32% on the Big Island, 50% in Waianae, and 78% in Waimanalo. Indeed, these RITI locations in Hawaii are major traffic safety black spots and will be the focus of detailed future studies as part of CSET.



Location in the state of Hawaii

Geography	
Location	19°34′N 155°30′W
Archipelago	Hawaiian Islands
Area	4,028 sq mi (10,430 km^2)
Area rank	75th, largest island in the United States - 1st
Highest elevation	13,803 ft (4,207.2 m)[1]
Highest point	Mauna Kea
Demographics	
Population	185,079 (2010)
Pop. density	46 /sq mi (17.8 /km^2)

Big Island (County Code: 001)								
Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Average**
Fatal Crashes	29	23	34	21	13	17	27	**23.4**
Fatalities	31	23	38	26	13	21	32	**26.3**
Gender	23M, 8F	19M, 4F	30M, 8F	19M, 7F	10M, 3F	14M, 7F	16M, 16F	…
Male (%)	74.2%	82.6%	78.9%	73.1%	76.9%	66.7%	50%	**71.2%**
Type	24D, 5Pa, 2P	18D, 2Pa, 3P	25D, 8Pa, 3P, 2O	11D, 8Pa, 7O	10D, 2Pa, 1O	12D, 8Pa, 1O	18D, 9Pa, 5P	…
Minority	9H	7H, 1AI	12H	5H, 1AI	4H	9H	10H, 1S	…
Minority (%)	**29.0%**	**34.8%**	**31.6%**	**23.1%**	**30.8%**	**42.9%**	**34.4%**	**32.1%**

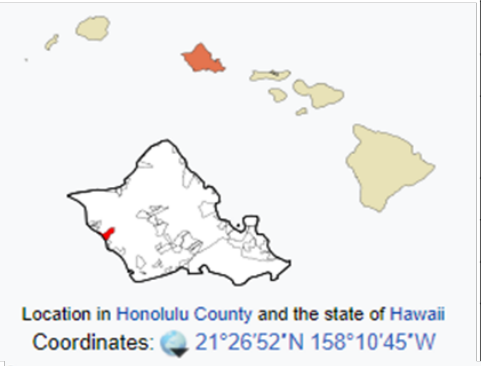
KEY

Gender – M: Male, F: Female

Type – D: Driver, P: Pedestrian, Pa: Passenger, O: Other

Minority – AI: American Indian includes Aleuts & Eskimos, H: Hawaiian, G: Guamanian, S: Samoan

Figure 11. 2010–2016 fatal crashes on the Island of Hawaii (Big Island)



Waianae (City Code: 9200)								
Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Average**
Fatal Crashes	4	2	1	4	3	4	10	**4**
Fatalities	4	2	1	4	3	4	10	**4**
Gender	3M, 1F	1M, 1F	1M	4M	3M	1M, 3F	7M, 3F	**…**
Male (%)	75.0%	50.0%	100.0%	100.0%	100.0%	25.0%	70.0%	**71.4%**
Type	2D, 2P	1D, 1P	1P	2D, 1Pa, 1P	2D, 1P	2D, 2P	4D, 6P	**….**
Minority	2H	1H	0	4H	2H	3H	3H+1S	**….**
Minority (%)	**50.0%**	**50.0%**	**0.0%**	**100.0%**	**66.7%**	**75.0%**	**40.0%**	**50.0%**

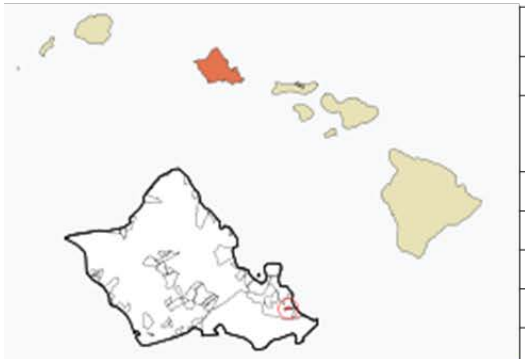
KEY

Gender – M: Male, F: Female

Type – D: Driver, P: Pedestrian, Pa: Passenger, O: Other

Minority – AI: American Indian includes Aleuts & Eskimos, H: Hawaiian, G: Guamanian, S: Samoan

Figure 12. 2010–2016 fatal crashes in Waianae (Island of Oahu)



Location in Honolulu County and the state of Hawaii

Area	
• Total	4.4 sq mi (11.3 km^2)
• Land	4.4 sq mi (11.3 km^2)
• Water	0 sq mi (0 km^2)
Elevation	30 ft (9 m)
Population (2010)	
• Total	5,451
• Density	1,200/sq mi (480/km^2)

Waimanalo (City Code:9400)								
Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Average**
Fatal Crashes	1	3	0	1	0	1	3	**1.29**
Fatalities	1	3	0	1	0	1	3	**1.29**
Gender	1 M	3F	…	1F	…	1F	2M, 1F	**…**
Male (%)	100.0%	0.0%	…	0.0%	…	0.0%	66.7%	**33.3%**
Type	1P	3D	…	1P	…	1Pa	2P, 1O	**…**
Minority	1H	1AI	…	1AI	…	1H	3H	**…**
Minority (%)	**100.0%**	**33.3%**	**…**	**100.0%**	**…**	**100.0%**	**100.0%**	**77.8%**

KEY

Gender – M: Male, F: Female

Type – D: Driver, P: Pedestrian, Pa: Passenger, O: Other

Minority – AI: American Indian includes Aleuts & Eskimos, H: Hawaiian, G: Guamanian, S: Samoan

Figure 13. 2010–2016 fatal crashes in Waimanalo (Island of Oahu)

CHAPTER 7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Major Findings

The major statistically significant findings from this study are summarized below for each of the CSET states. Fatality data for 10 years were collected for the CSET states of Alaska, Hawaii, Idaho, and Washington. Rural, indigenous, tribal, and isolated (RITI) communities in these four states were the focus of this research. Based on the data available in FARS, American Indians (which includes Aleuts and Eskimos), Native Hawaiians (which includes part-Hawaiians), and Guamanian and Samoans were considered a RITI group and were referred to as "CSET Minorities." All other races were referred to as "All Others."

ALASKA

- ✓ Lower CSET Minority fatalities for the age group 49+ (24%) compared with 38% for All Others.
- ✓ Lower CSET Minority fatalities for age group 49+ were speeding (10%) compared with 23% for All Others.
- ✓ Much higher CSET Minority fatalities were pedestrians (38%) compared with 7% for All Others.
- ✓ Higher CSET Minority fatalities due to speeding in rural areas (80%) compared with 60% for All Others.

HAWAII

- ✓ Almost 60% of the CSET Minority fatalities were younger than 35 years of age and 40% were younger than 25 years of age. These percentages are significantly higher than that of fatalities in the same age group for All Others. Only 18% were below the age of 25, and 38% were below the age of 35.
- ✓ Higher CSET Minority fatalities (69%) involving alcohol for those younger than 35 compared with 54% for All Others.
- ✓ Higher CSET Minority fatalities involving non-usage of restraint (50%) were below the age of 25 compared with 25% for All Others.
- ✓ Higher CSET Minority fatalities involving non-usage of restraint (29%) for females compared with only 16% for female All Others.
- ✓ Lower CSET Minority fatalities for age group 49+ (20%) compared with 43% for All Others.
- ✓ Lower CSET Minority fatalities involving alcohol for age group 49+ (10%) compared with 21% for All Others.
- ✓ Lower CSET Minority fatalities (22%) on motorcycles involving speeding compared with 48% for All Others.

IDAHO

- ✓ Higher CSET Minority fatalities younger than 35 (68%) and younger than 25 (45%) compared with 42% and 27%, respectively, for All Others.
- ✓ Higher CSET Minority fatalities involving non-usage of restraint (73%) compared with 55% for All Others.
- ✓ Lower CSET Minority fatalities for age group 49+ (12%) compared with 38% for All Others.
- ✓ Lower CSET Minority fatalities on motorcycles (2%) compared with 13% for All Others.

WASHINGTON

- ✓ Higher CSET Minority fatalities (70%) in rural areas compared with 54% for All Others.
- ✓ Lower CSET Minority fatalities on motorcycles (only 4%) compared with 16% for All Others; only 3% involving alcohol compared with 15% for All Others.
- ✓ Higher CSET Minority fatalities involving alcohol (53%) compared with 38% for All Others.
- ✓ Higher CSET Minority female fatalities involving alcohol (35%) compared with 20% for All Others.
- ✓ Higher CSET Minority female fatalities involving speeding (40%) compared with 19% for All Others.
- ✓ The percentage of motorcyclist fatalities was 7% for CSET Minorities and 23% for All Others.
- ✓ Higher CSET Minority fatalities involving the non-usage of restraint (56%) compared with 34% for All Others; in rural areas the portions were 86% and 64%, respectively.

7.2 Notable Similarities and Differences

All four CSET states vary considerably in terms of total population, CSET Minority population, VMT, and traffic fatalities. The traffic fatality analysis completed in this study showed that most of the major findings for each state are largely different. However, there are some similarities.

In all four states, CSET Minority fatalities in the age group 49+ were significantly lower in number compared with the fatalities for All Others. Similarly, for all four CSET states, alcohol-impaired CSET Minority fatalities for age group 49+ were significantly lower in number compared with All Others. Another common finding for all four CSET states was that CSET Minority motorcyclist fatalities were significantly lower in number compared with motorcyclist fatalities for All Others. Also, motorcyclist fatalities involving speeding for CSET Minorities were significantly lower in number compared with All Others.

Some findings were common to two or three states. Alaska and Washington: Female fatalities involving alcohol for CSET Minorities were significantly higher in number than female fatalities for All Others, and in rural areas, fatalities involving alcohol, speeding, and non-usage of restraint for CSET Minorities were significantly higher in number compared with All Others. One common finding between Hawaii and Idaho was that CSET Minority fatalities of age group 16–24 were significantly higher in number compared with All Others.

There were also a few large dissimilarities in the findings among CSET states. Of all the CSET Minority fatalities in Alaska, 36% were pedestrians. However, Idaho had only 10% CSET Minority pedestrian fatalities. Similarly, Alaska had only 1% CSET Minority motorcyclist fatalities, but Hawaii had 20%. Moreover, CSET Minority fatalities in the rural areas of Idaho and Washington were 87% and 80%, respectively, but in Alaska and Hawaii, CSET Minority fatalities in rural areas were low at 68% and 45%, respectively.

7.3 Recommendations

Since the major findings for each state were different and each state itself as well as its minority population was different, it is necessary to make policy recommendations separately for each state. These recommendations were based on the significant differences between fatalities among CSET Minorities and All Others in the 10 years between 2007 to 2016.

ALASKA

- ✓ There was a significantly higher representation of CSET Minority pedestrian fatalities (36%) compared with All Others (7%). Detailed causality analysis leading to programs for pedestrian safety among CSET fatalities should be considered.
- ✓ There were significantly higher numbers of CSET Minority fatalities in rural areas involving speeding (80%) compared with fatalities for All Others (60%). Enforcement and educational programs relating to high-speed driving in rural areas should be considered.

HAWAII

- ✓ CSET Minority fatalities (35%) in the age group 16–24 were significantly higher compared with the fatalities of the same age group for All Others (17%). Moreover, CSET Minority fatalities involving alcohol, speeding and non-usage of restraint were significantly higher compared with fatalities in this age group for All Others. In addition to this age group, CSET Minority fatalities involving speeding and drivers younger than 16 years of age were significantly higher compared with fatalities due to speeding in the same age group for All Others. Special traffic safety programs targeted at CSET Minority youth drivers should be developed for high school students.
- ✓ Female CSET Minority fatalities involving speeding or non-usage of restraint were significantly higher compared with female fatalities for All Others. Detailed causality analysis is required.

IDAHO

- ✓ CSET Minority fatalities (36%) in the age group 16–24 were significantly higher in number compared with the fatalities of the same age group for All Others (21%). CSET Minority fatalities involving non-usage of restraint were significantly higher (38%) in number than fatalities for all Others (26%). Female CSET Minority fatalities involving speeding (52%) were significantly higher in number than female fatalities for All Others (28%). Detailed causality analysis leading to targeted programs should be considered.

WASHINGTON

- ✓ Washington had the best traffic safety parameters among the four CSET states, but was still well behind countries with top level traffic safety outcomes. Clearly there is room for improvement and for considering additional traffic safety initiatives.
- ✓ CSET Minority fatalities involving alcohol and non-usage of restraint were significantly higher in number compared with fatalities for All Others. Traffic safety programs targeting CSET Minorities for drunk driving and non-usage of restraint should be considered or expanded.
- ✓ There were significantly more CSET Minority fatalities in rural areas (70%) than fatalities for All Others (54%). Moreover, in rural areas, CSET Minority fatalities involving alcohol, speeding, and non-usage of restraint were significantly higher in number compared with fatalities for All Others in rural areas. Additional emphasis in rural area enforcement should be considered.

CHAPTER 8. REFERENCES

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APPENDIX

TABLE A.1 CSET Minority Fatalities, 2007–2016

Year	AK	HI	ID	WA
2007	27	49	5	39
2008	14	33	7	28
2009	16	37	13	35
2010	9	34	9	28
2011	8	28	7	23
2012	11	37	5	30
2013	9	32	10	19
2014	23	22	6	24
2015	16	33	5	35
2016	21	42	6	38
Average	15.4	34.7	7.3	29.9

TABLE A.2 Percentage CSET Minority Fatalities, 2007–2016

Year	AK	HI	ID	WA
2007	32.9	35.5	2.0	6.8
2008	22.6	30.8	3.0	5.4
2009	25.0	33.9	5.8	7.1
2010	16.1	30.1	4.3	6.1
2011	11.1	28.0	4.2	5.1
2012	18.6	29.6	2.7	6.8
2013	17.6	31.4	4.7	4.4
2014	31.5	23.2	3.2	5.2
2015	24.6	35.5	2.3	6.4
2016	25.0	35.0	2.4	7.1
Average	22.5	31.3	3.5	6.0

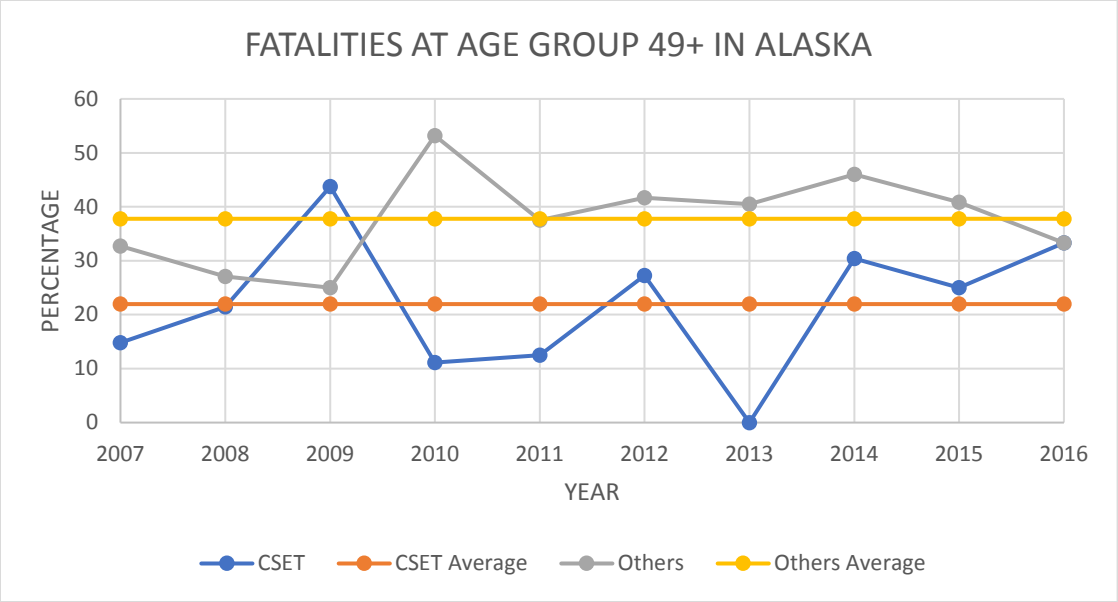


FIGURE A.1.1.1

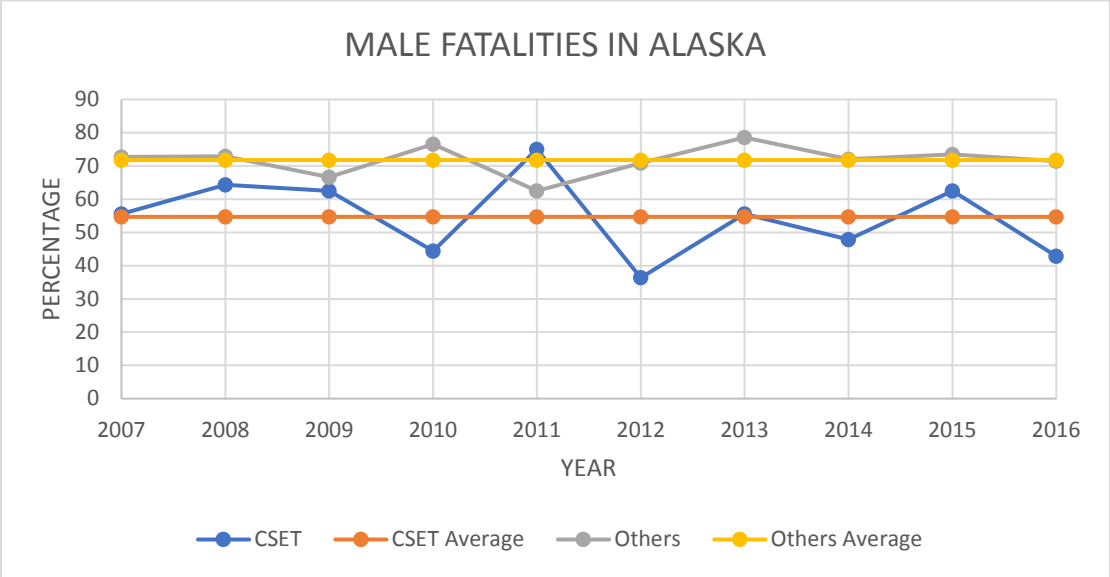
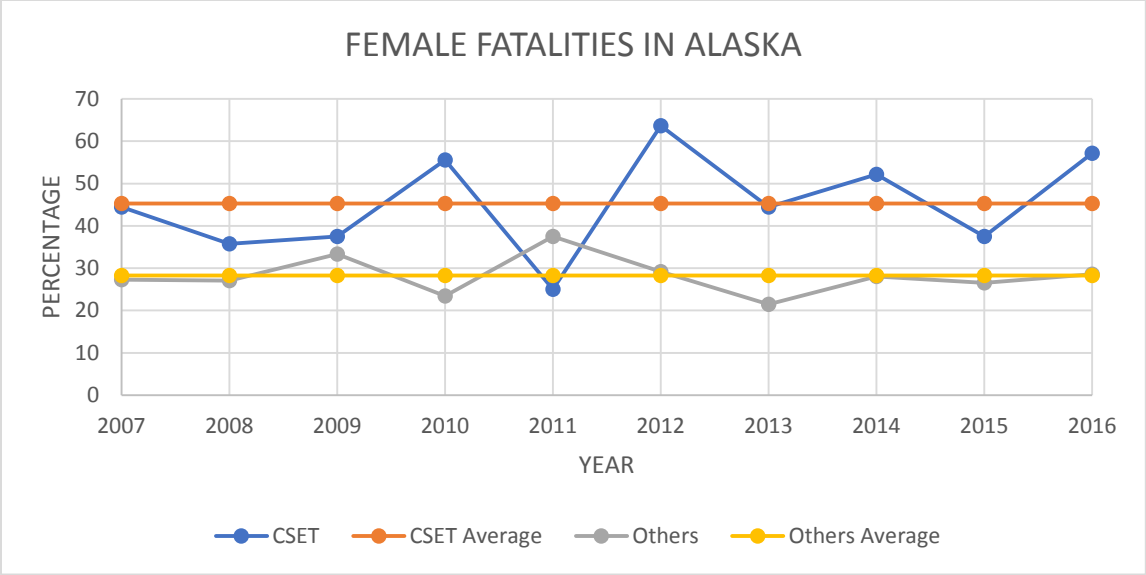


FIGURE A.1.1.2



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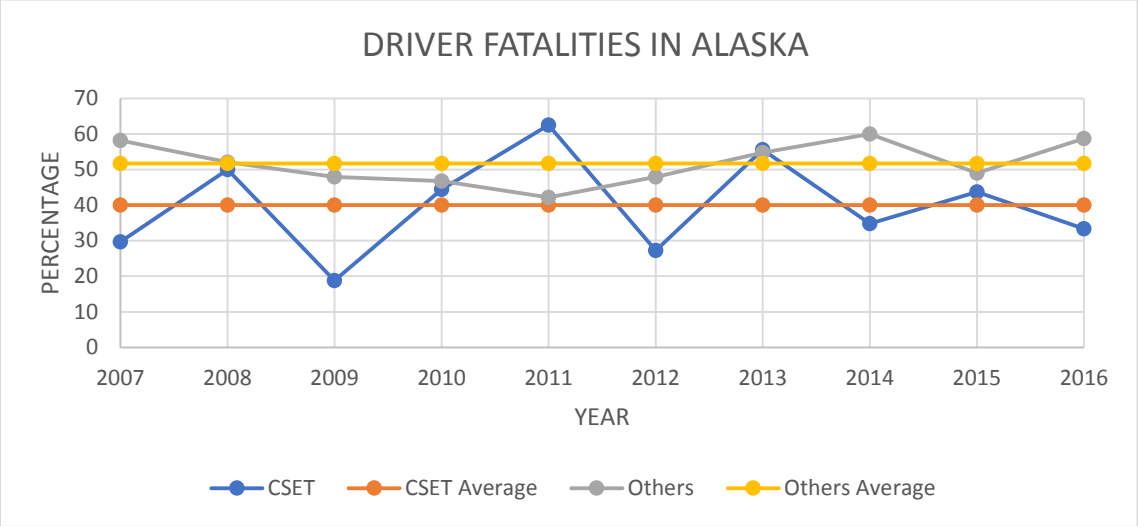

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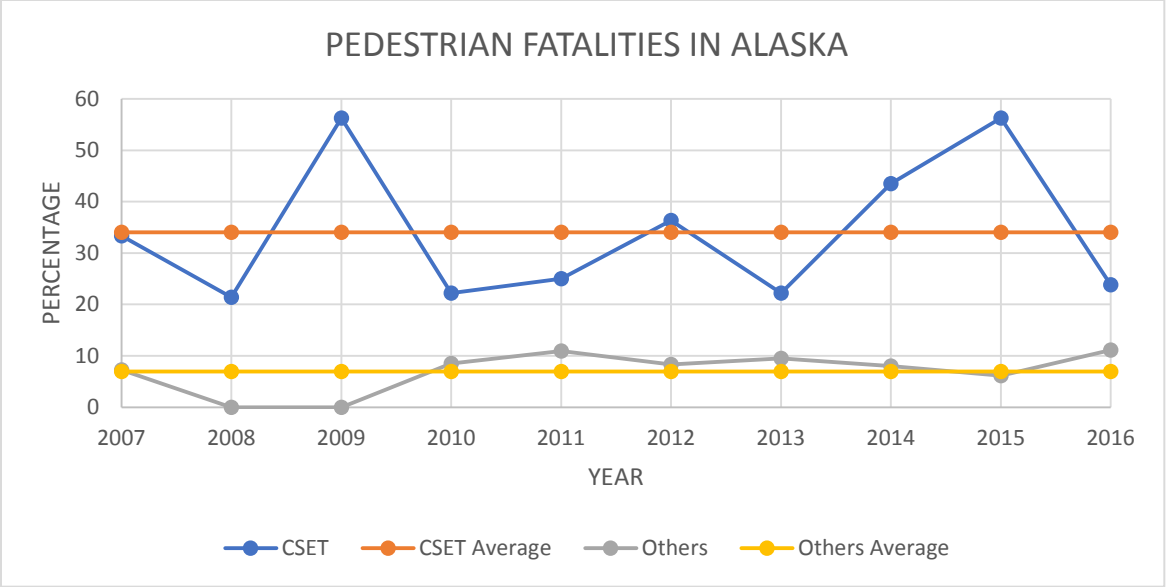

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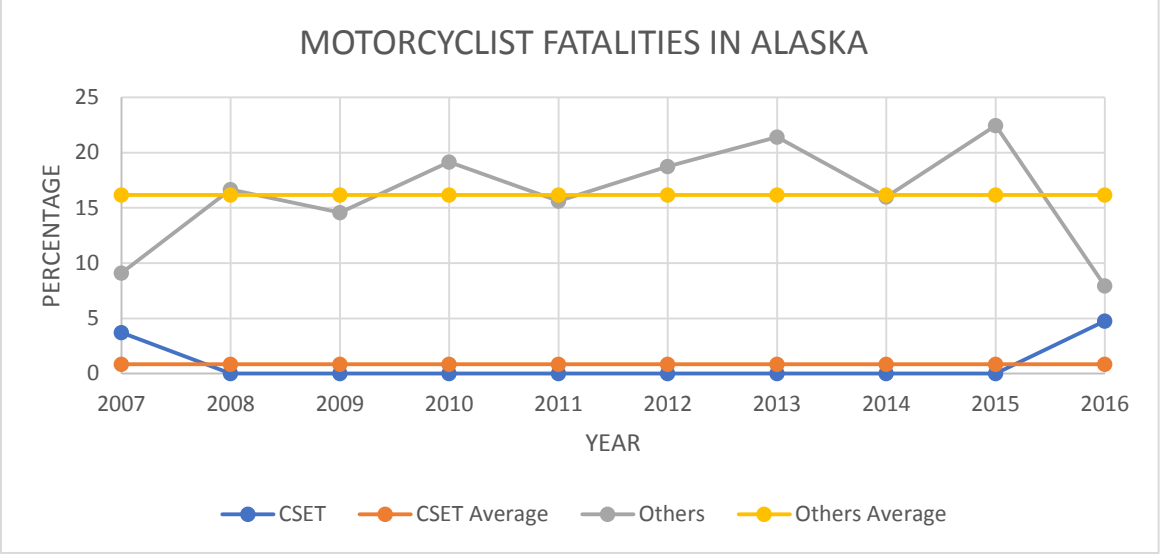

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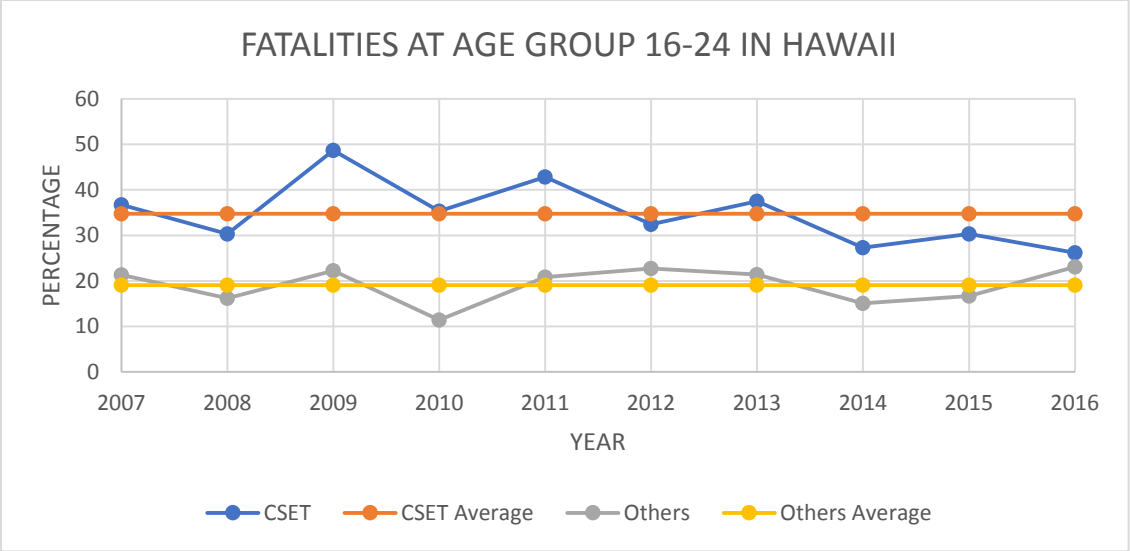

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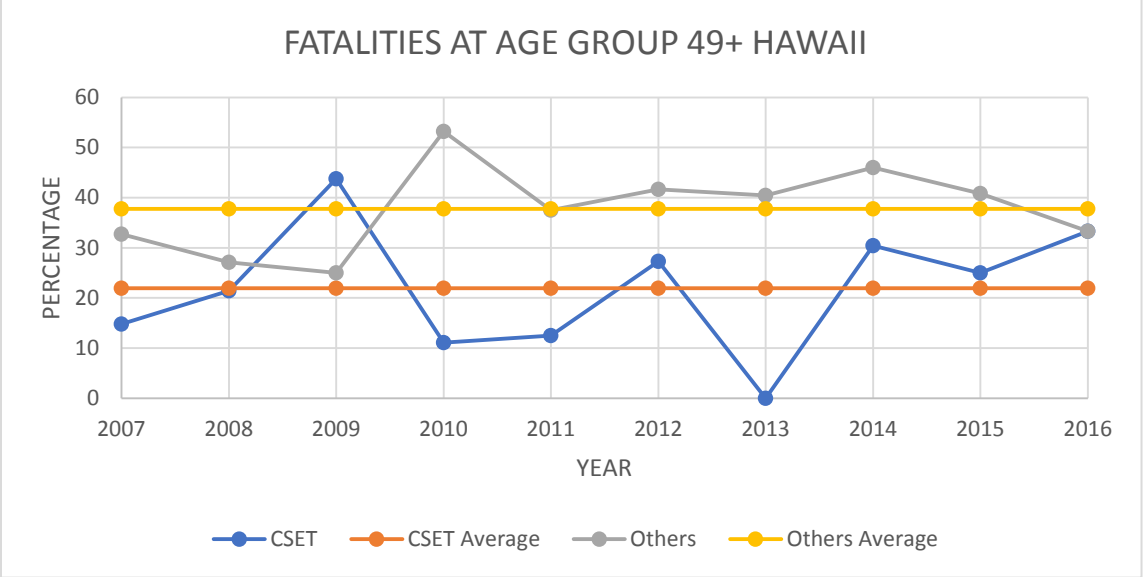
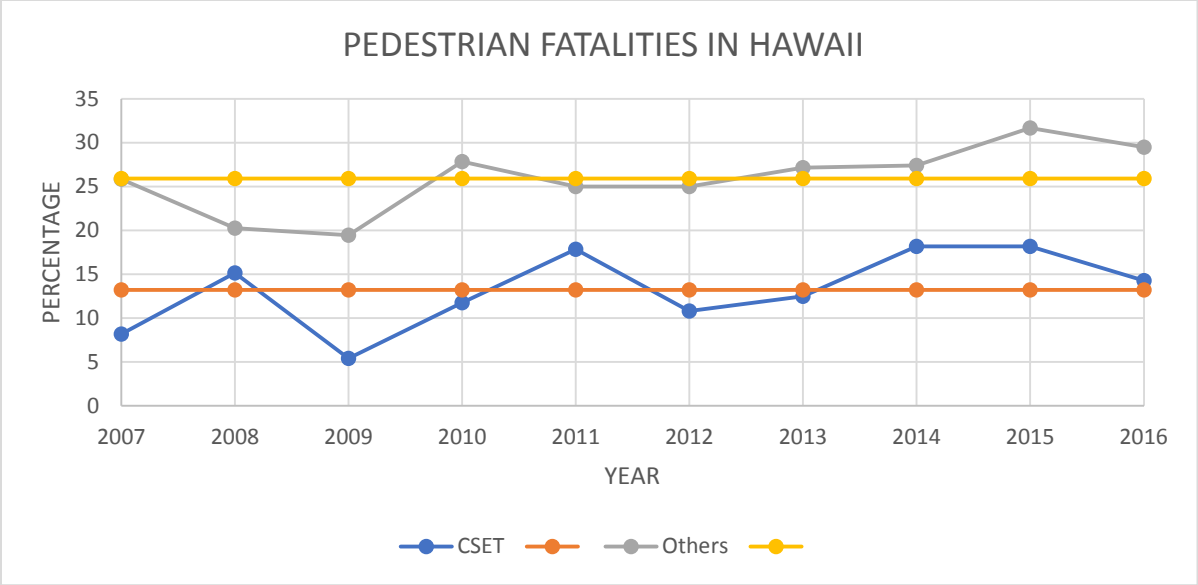


FIGURE A.2.1.2



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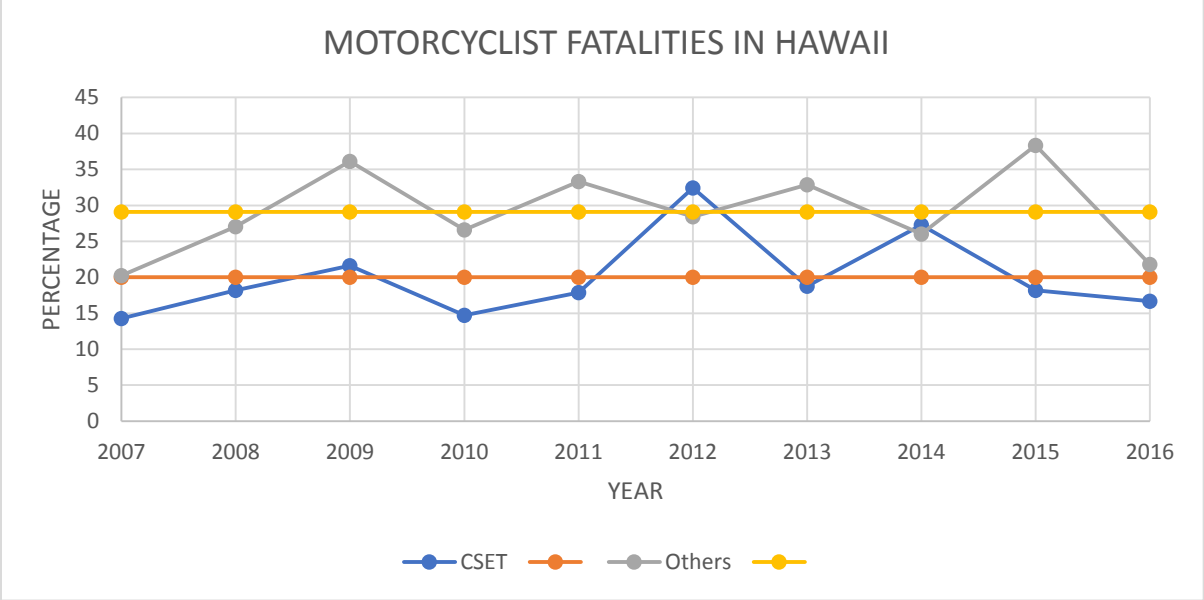

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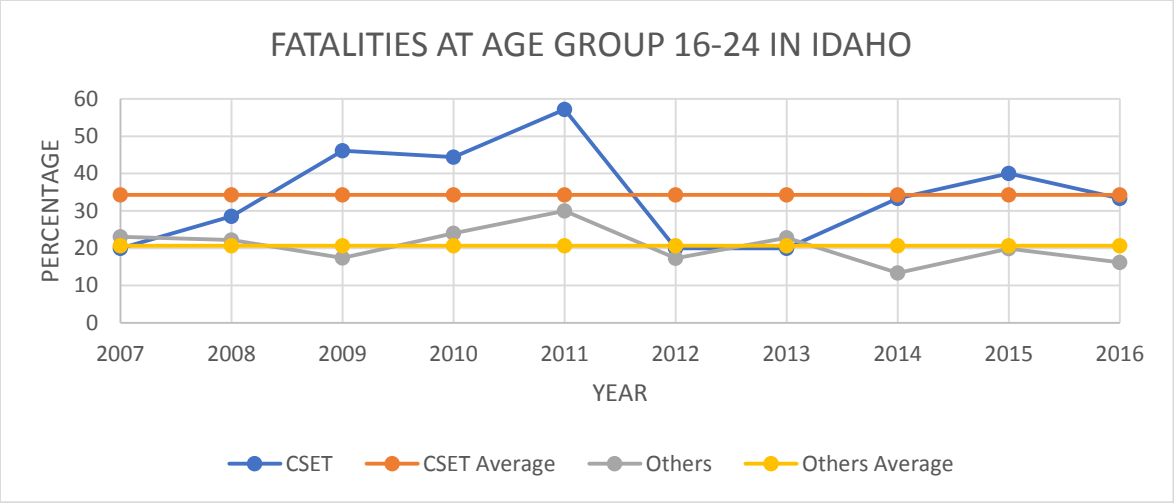

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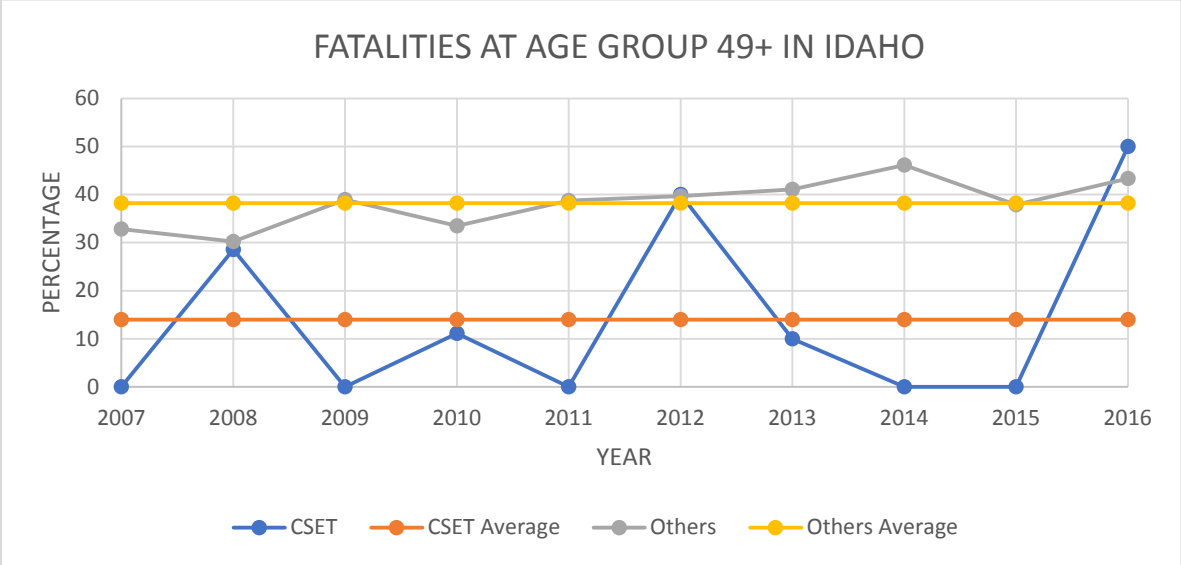

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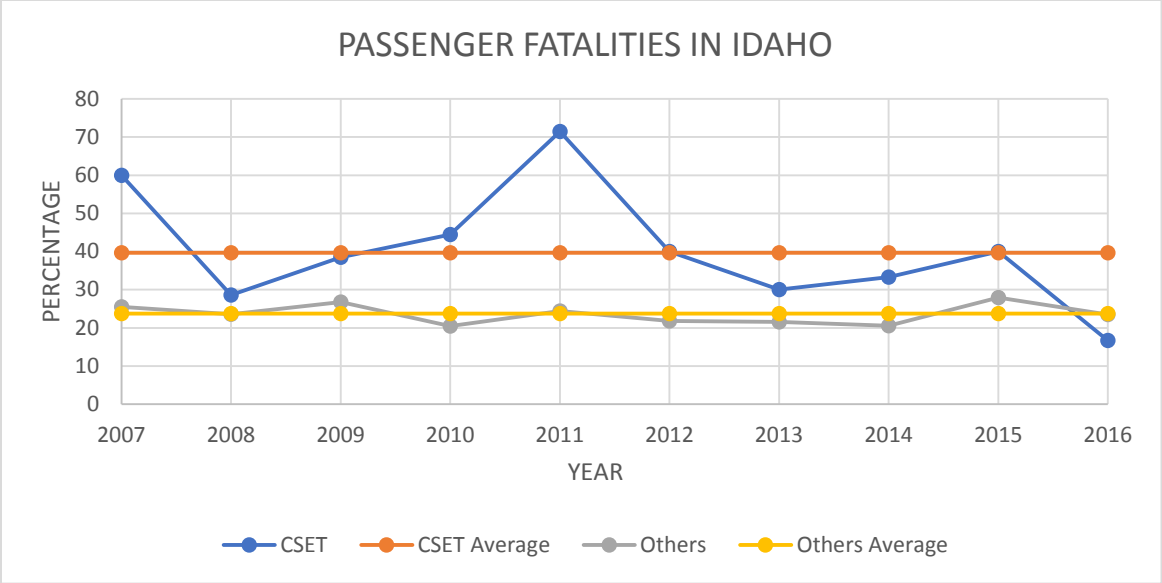

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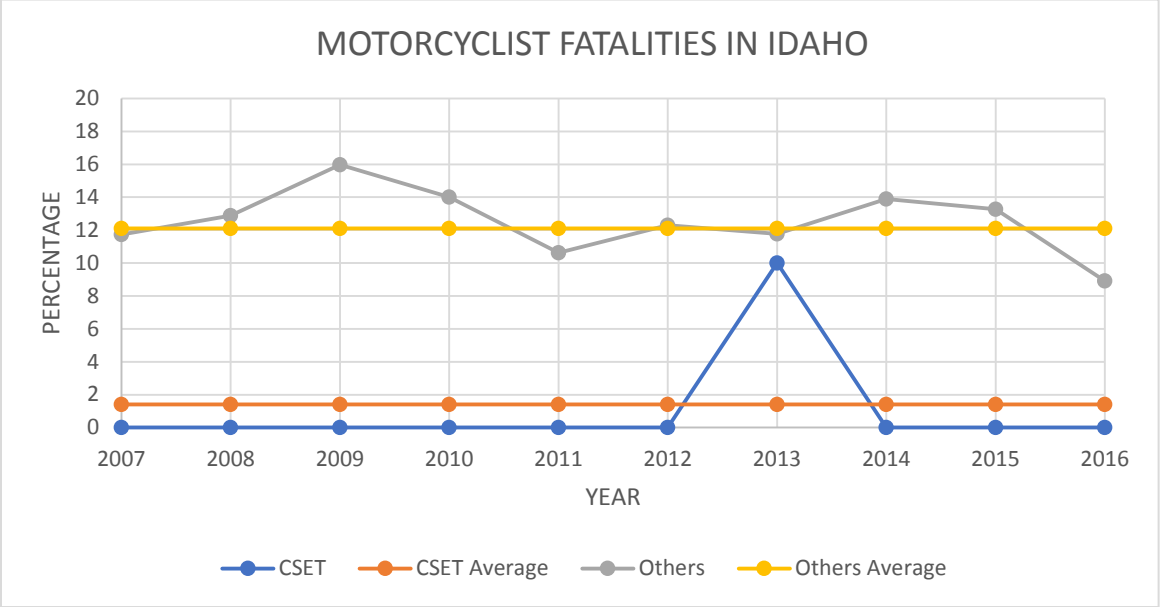

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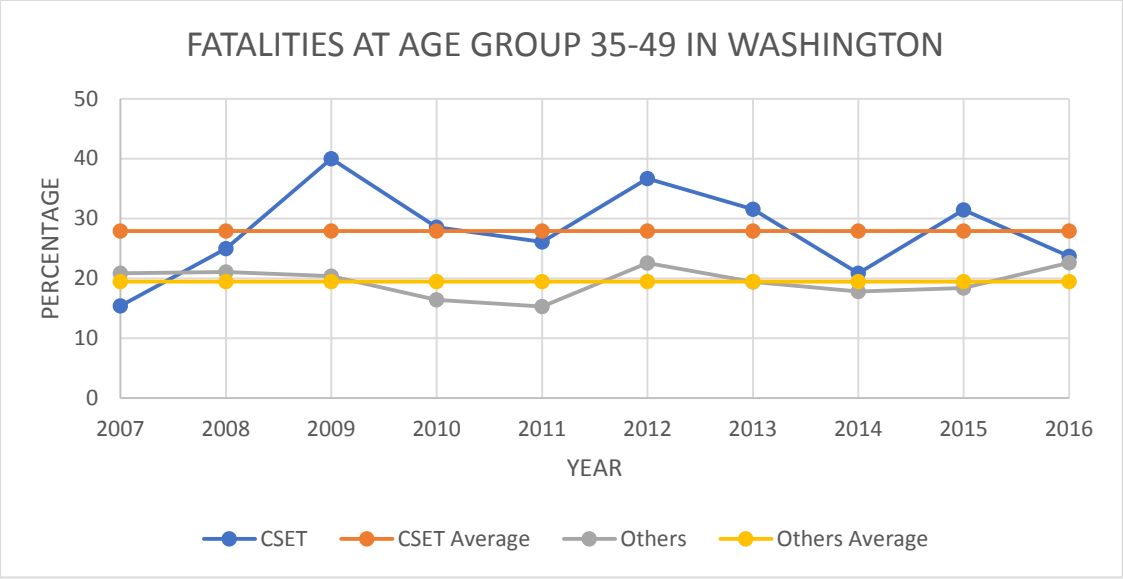

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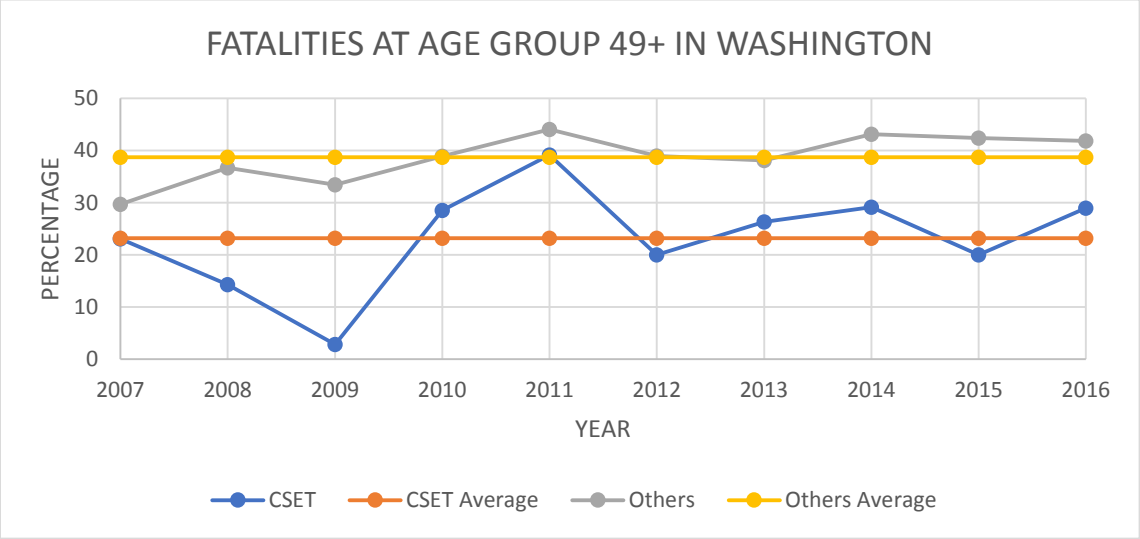

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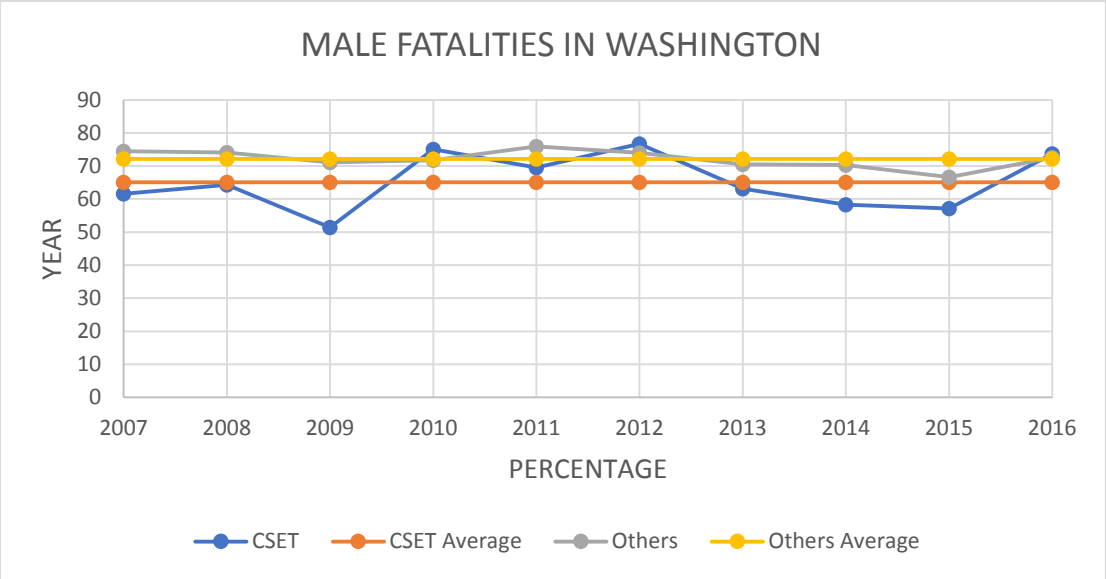

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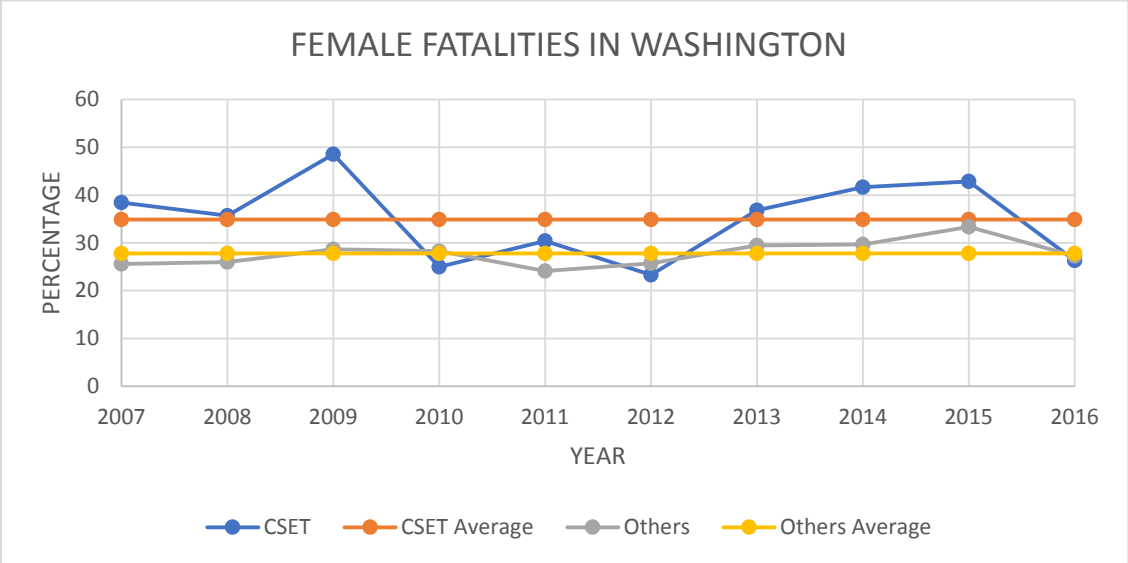

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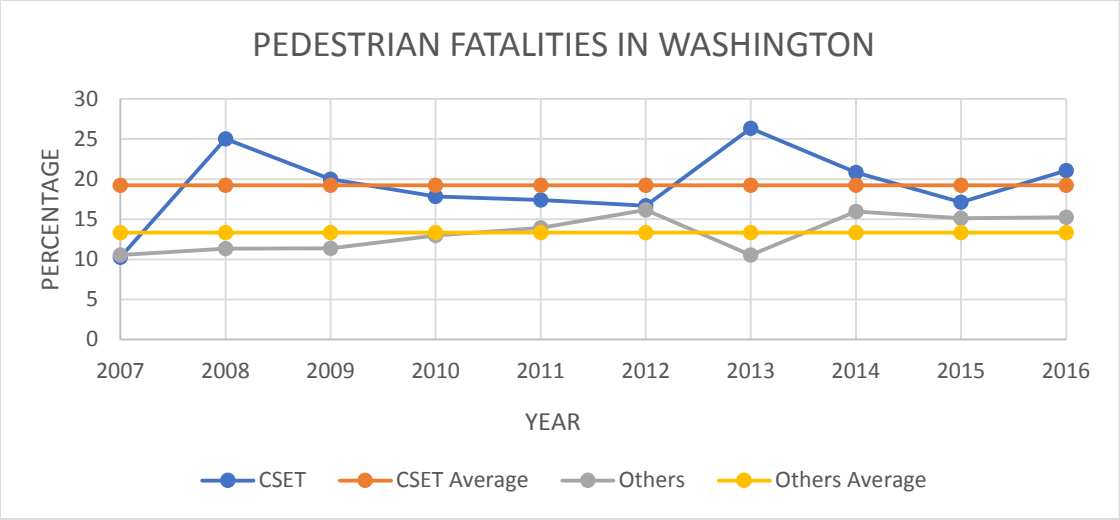

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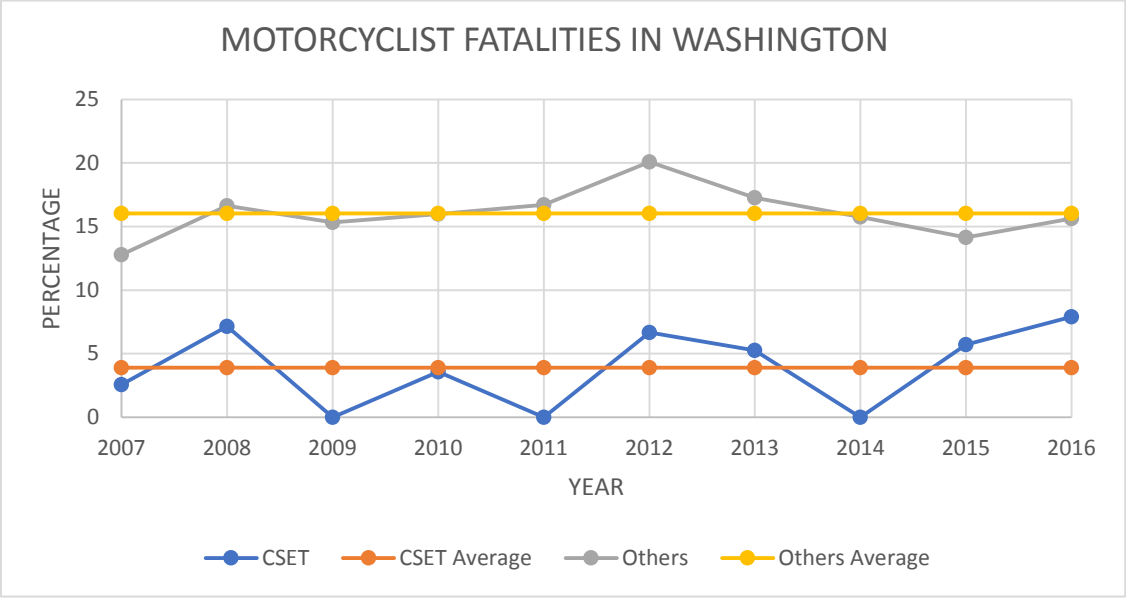

FIGURE A.4.1.6

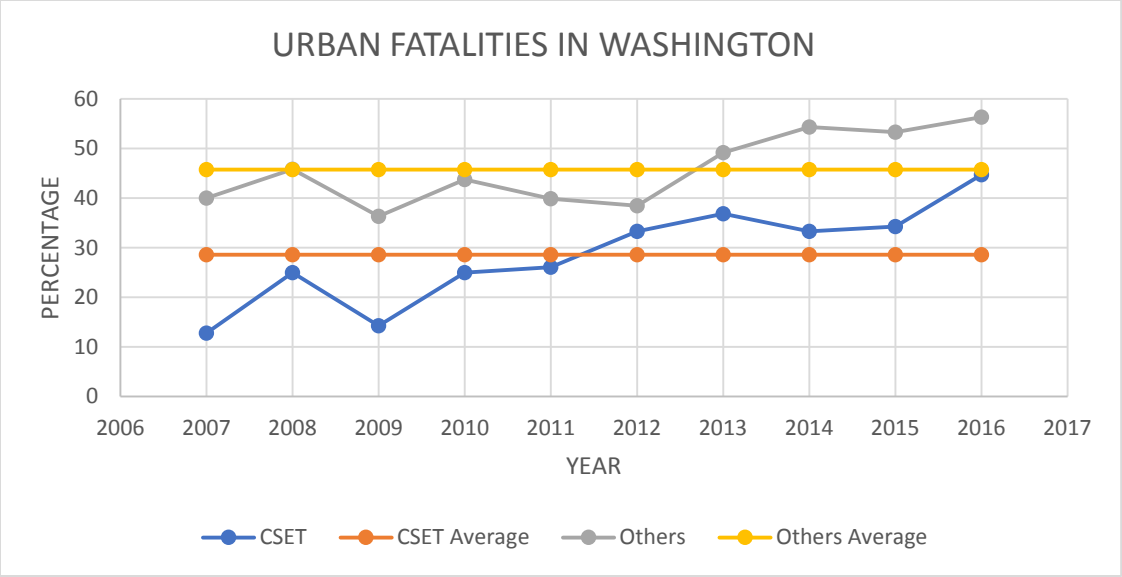

FIGURE A.4.1.7

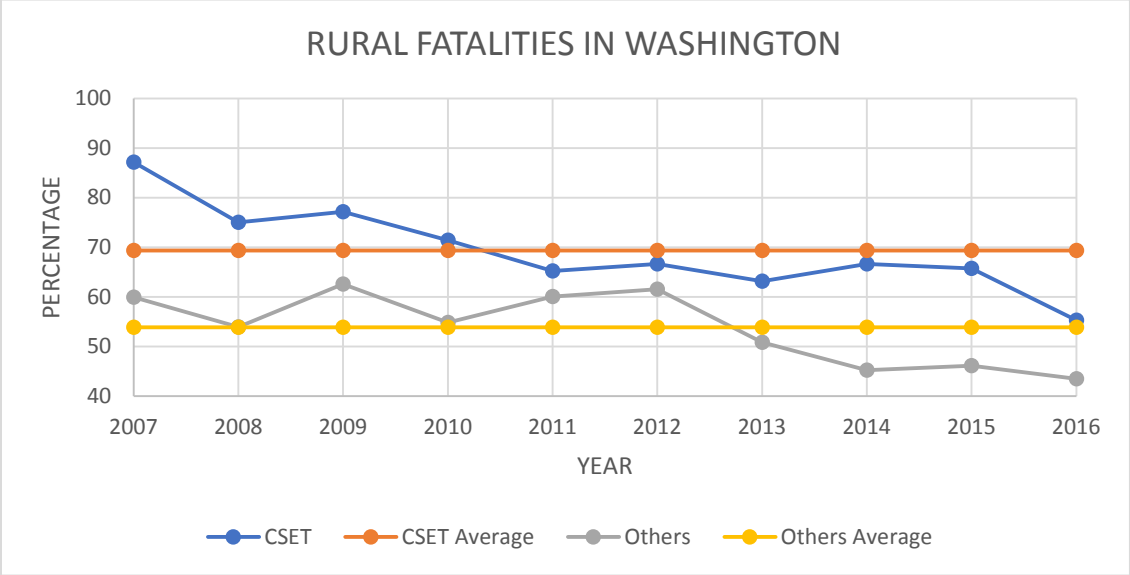

FIGURE A.4.1.8

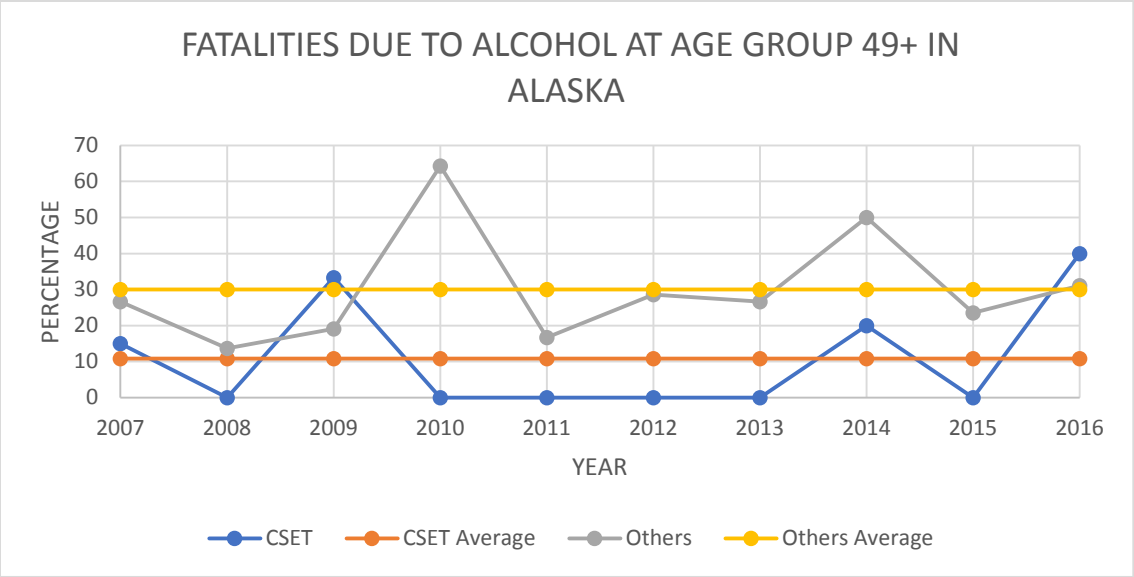

FIGURE A.2.1.1

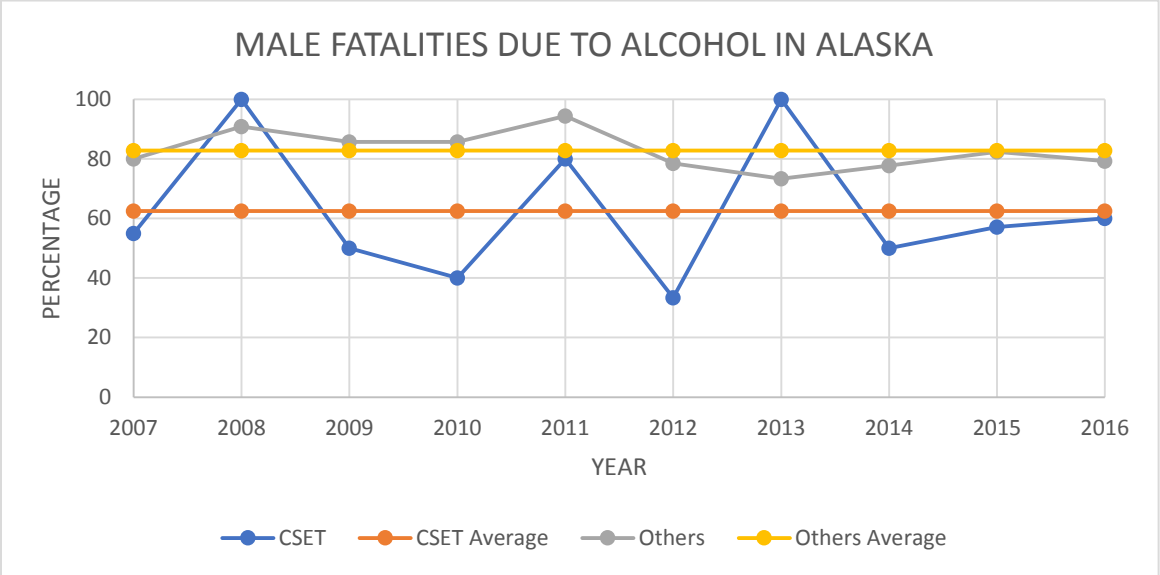

FIGURE A.2.1.2

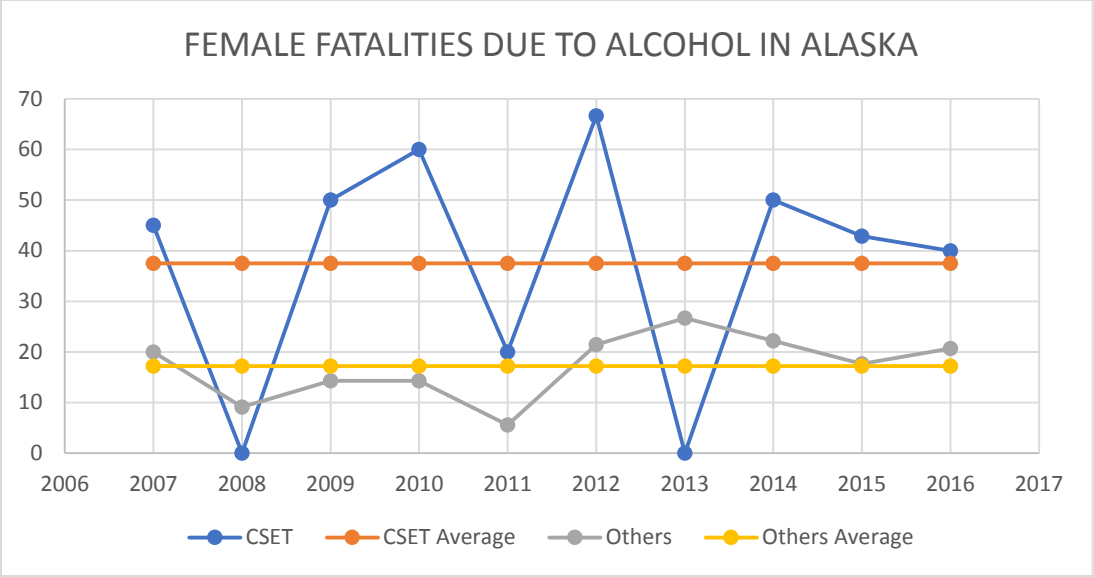

FIGURE A.2.1.3

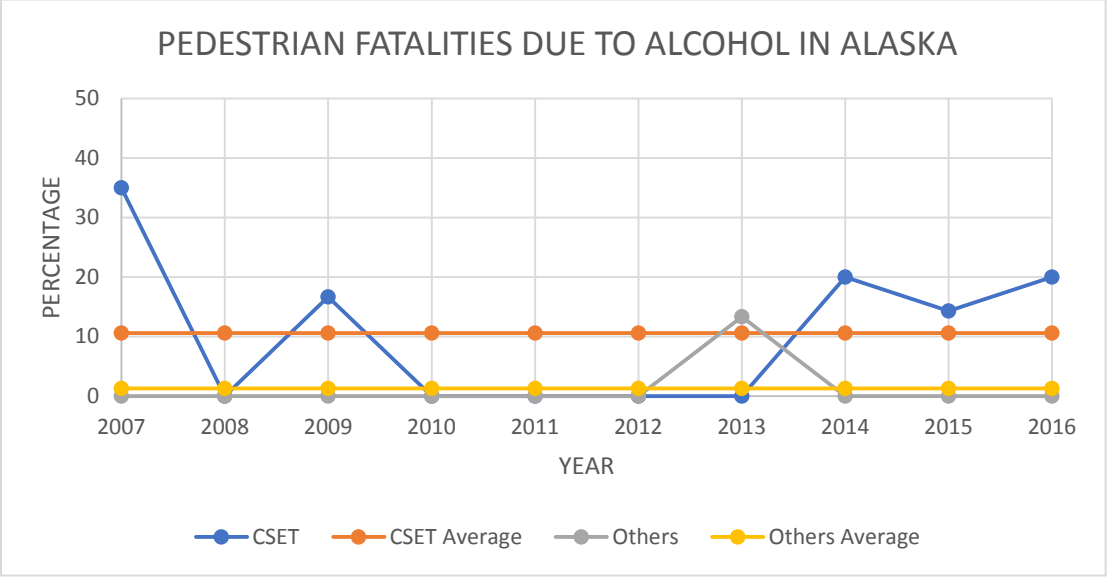

FIGURE A.2.1.4

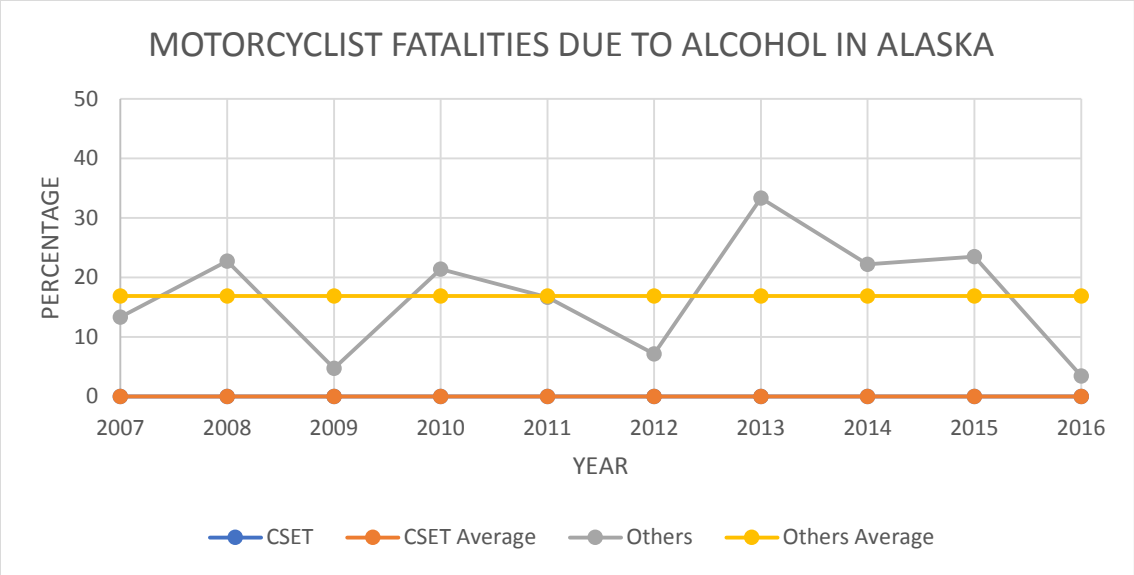

FIGURE A.2.1.5

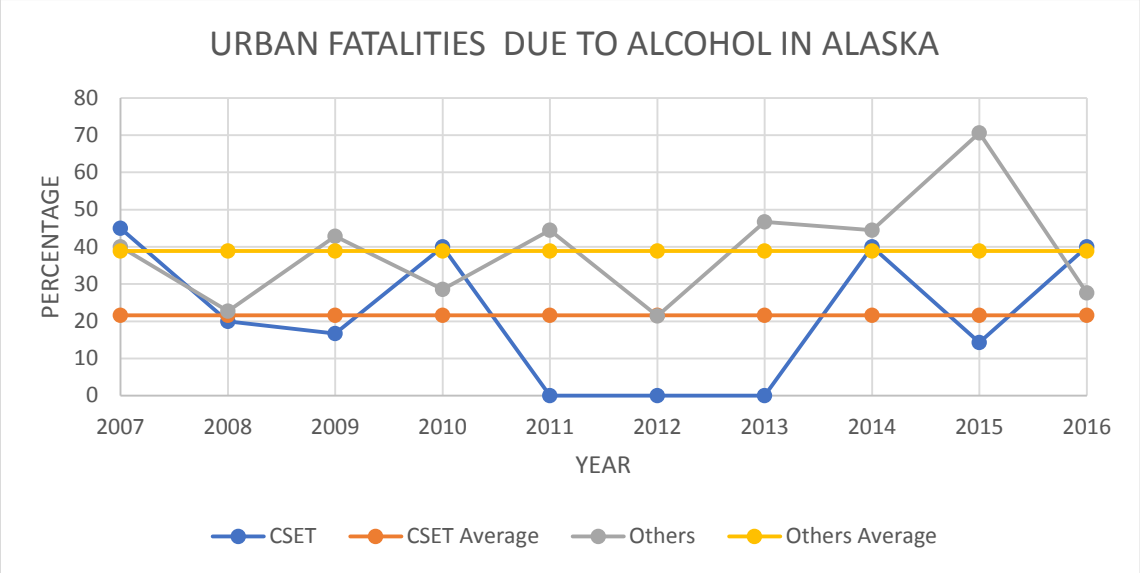

FIGURE A.2.1.6

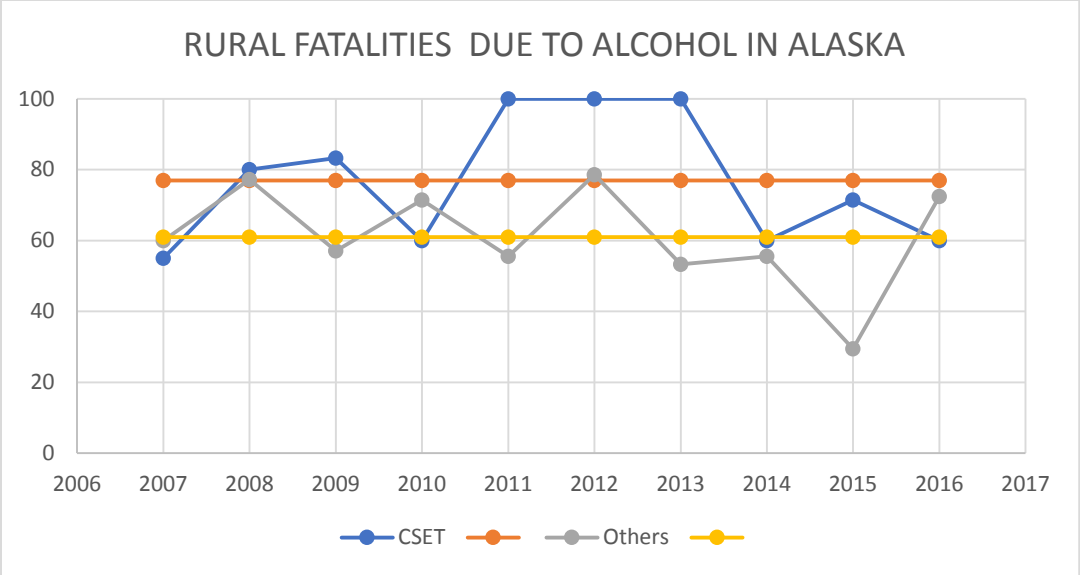

FIGURE A.2.1.7

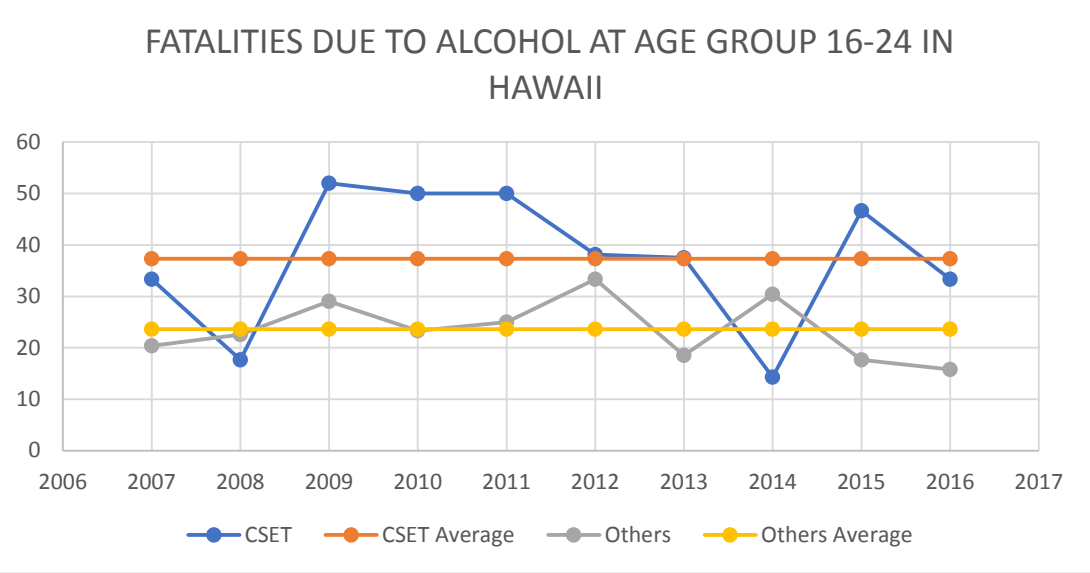

FIGURE A.2.2.1

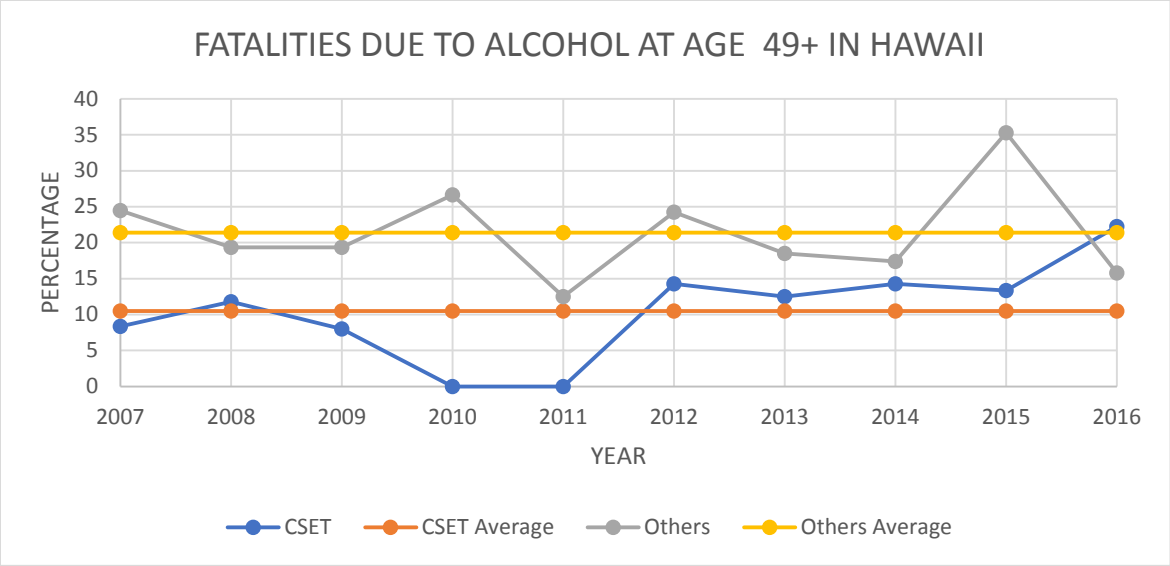

FIGURE A.2.2.2

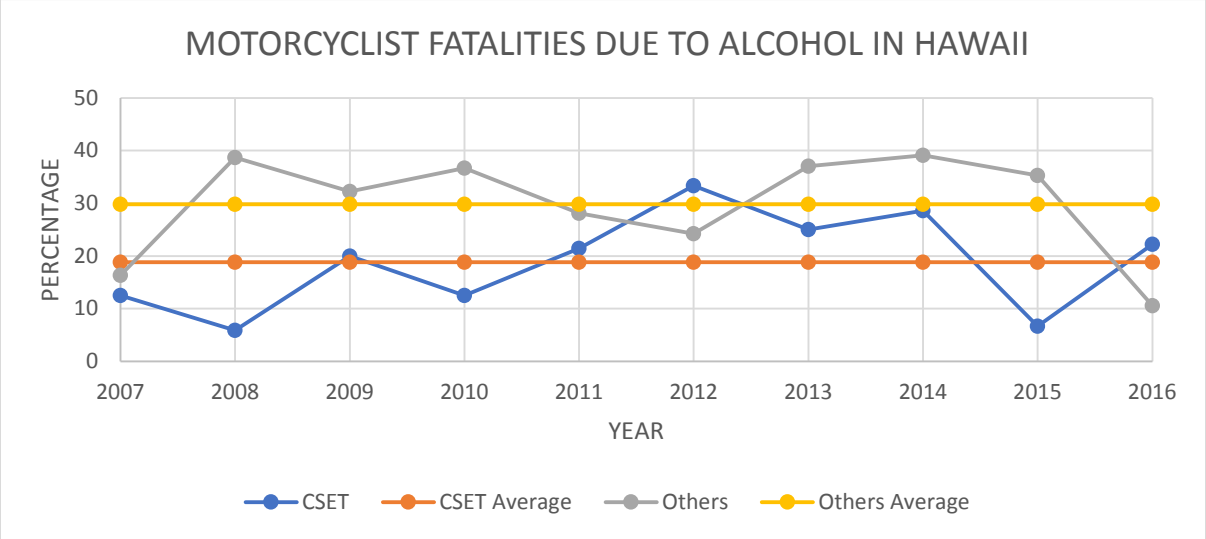

FIGURE A.2.2.3

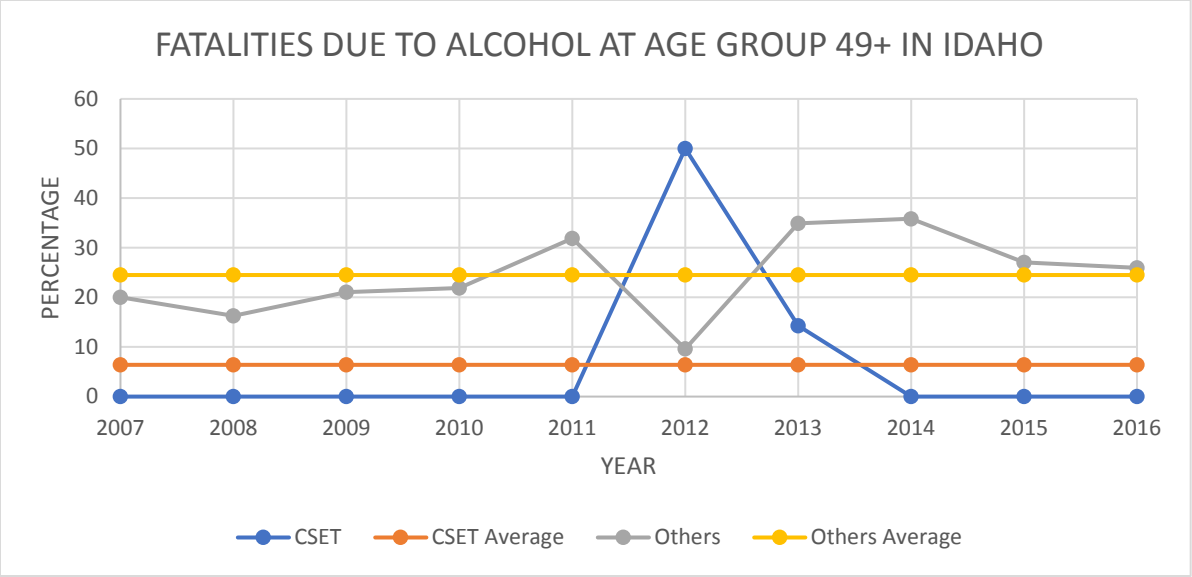

FIGURE A.3.2.1

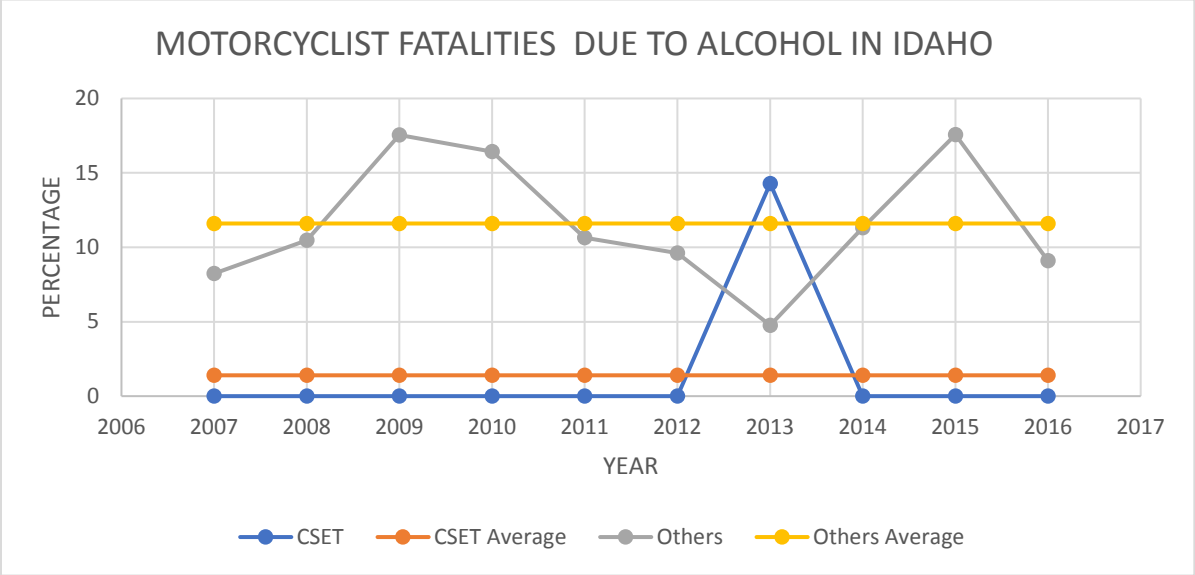

FIGURE A.3.2.2

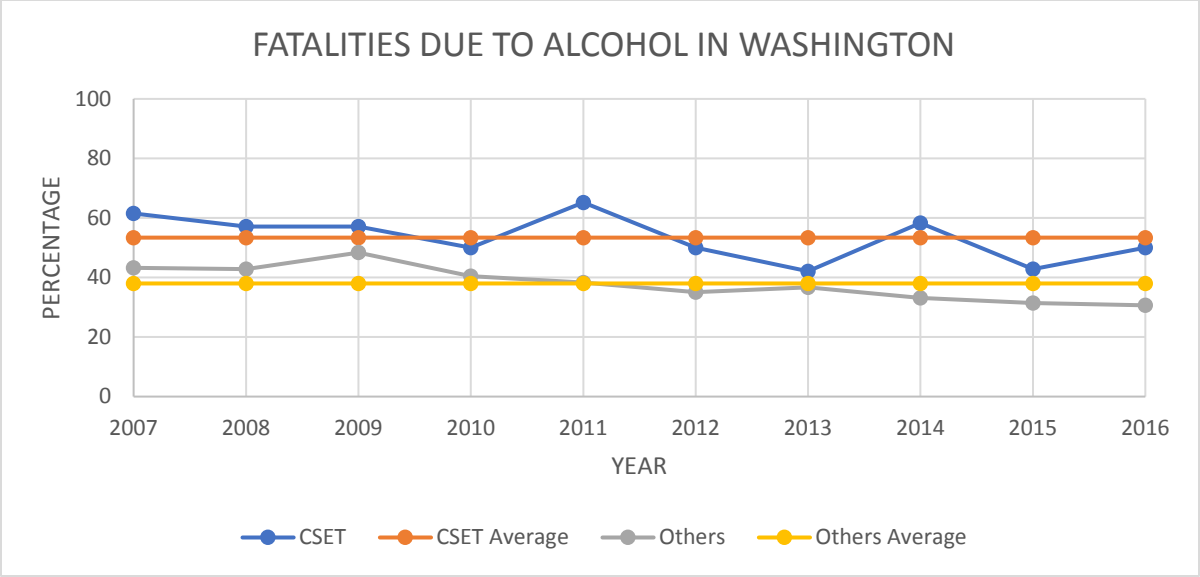

FIGURE A.4.2.1

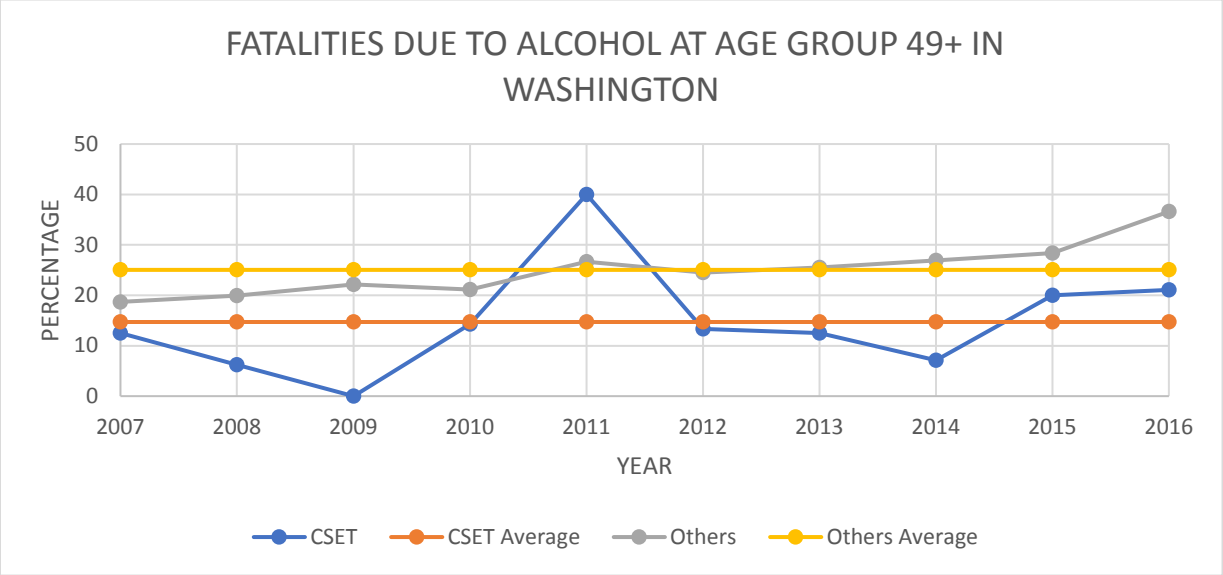

FIGURE A.4.2.2

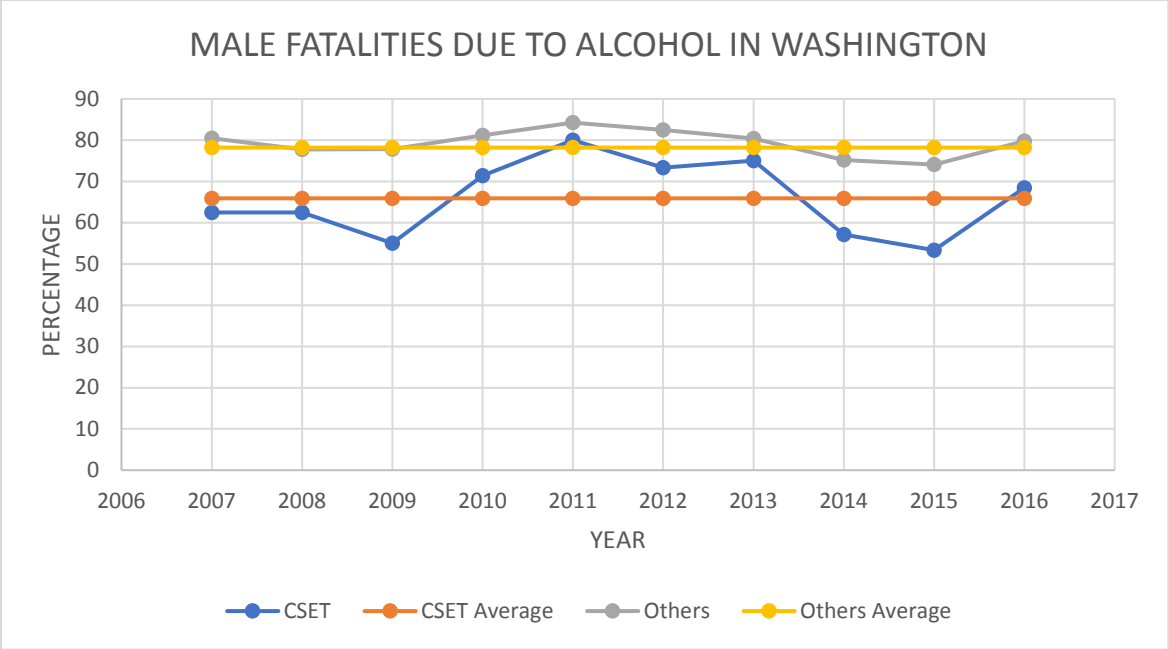

FIGURE A.4.2.3

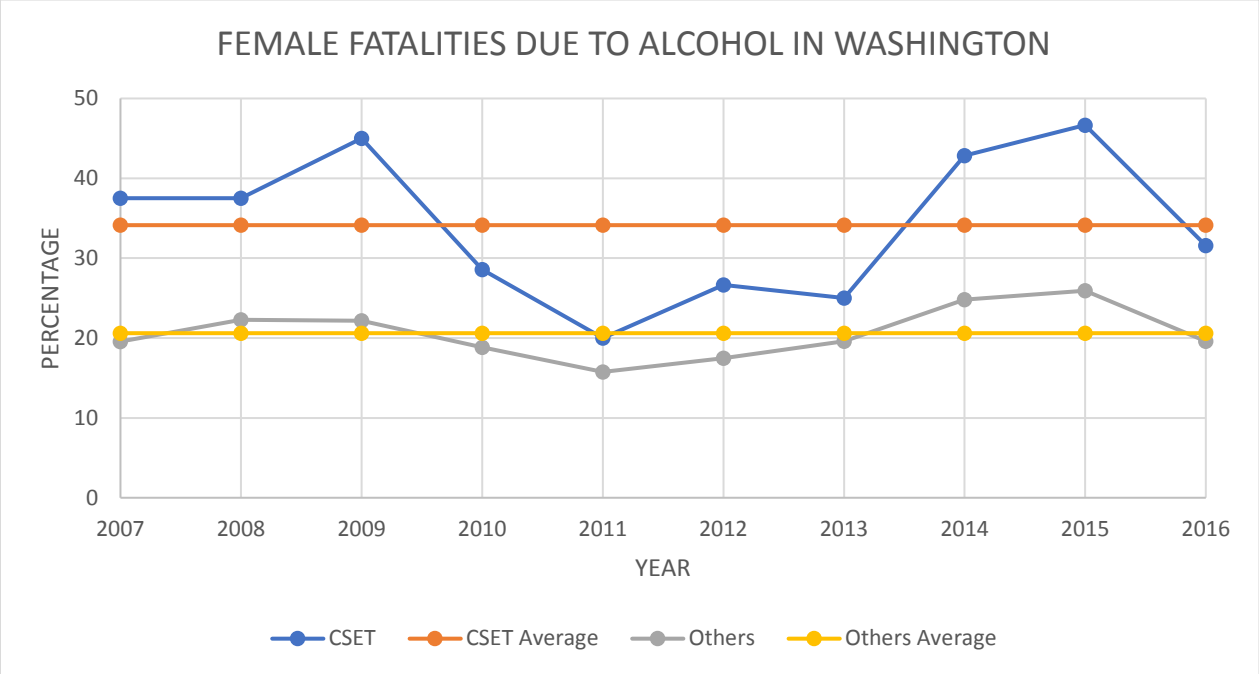

FIGURE A.4.2.4

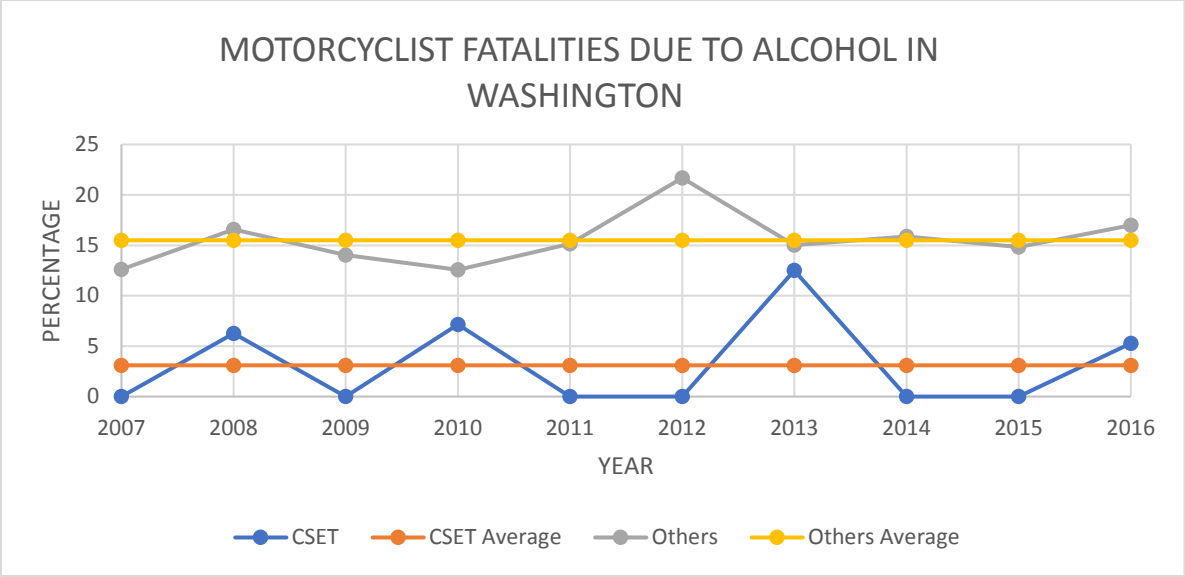

FIGURE A.4.2.5

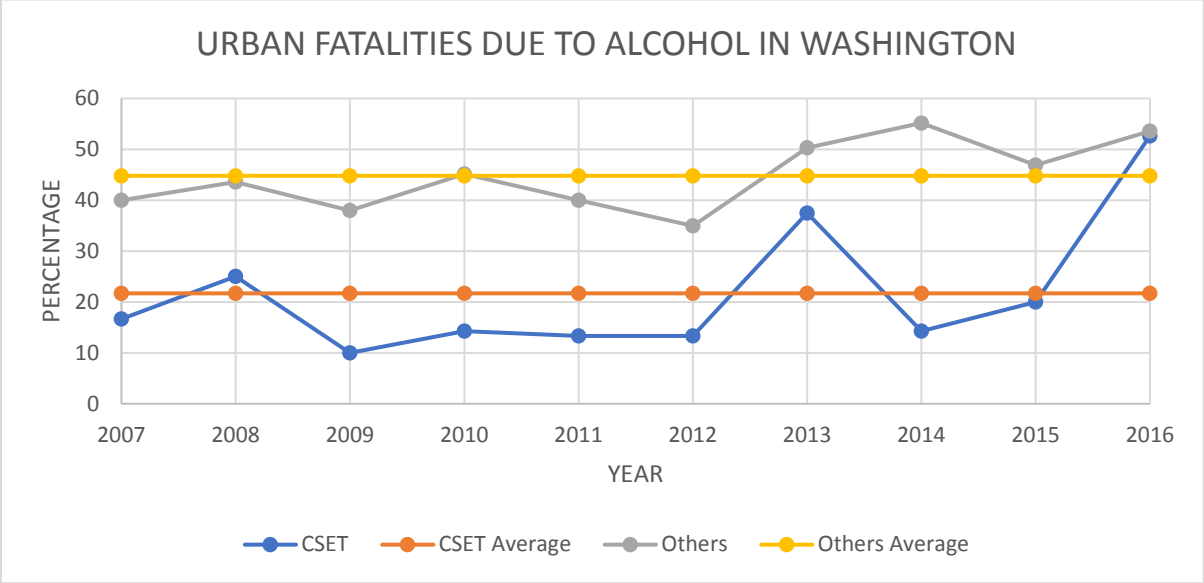

FIGURE A.4.2.6

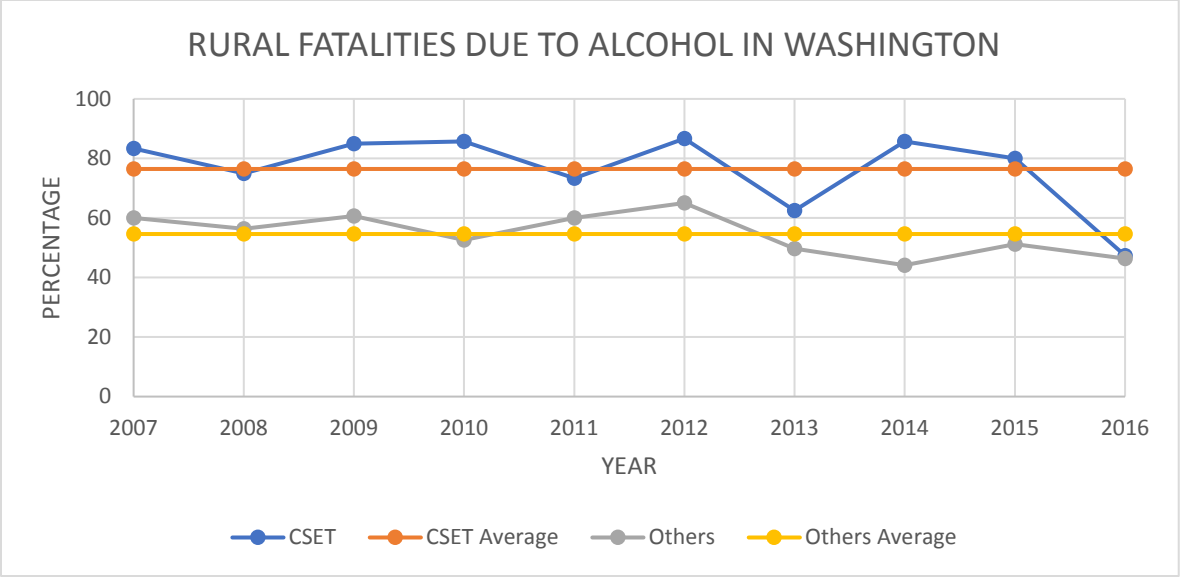

FIGURE A.4.2.7

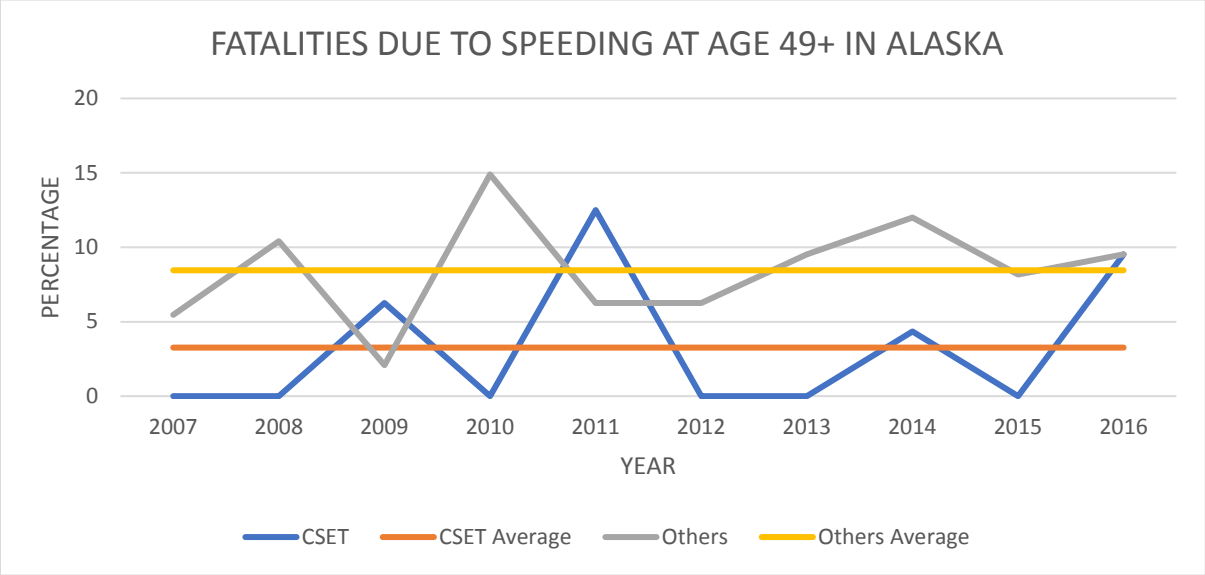

FIGURE A.1.3.1

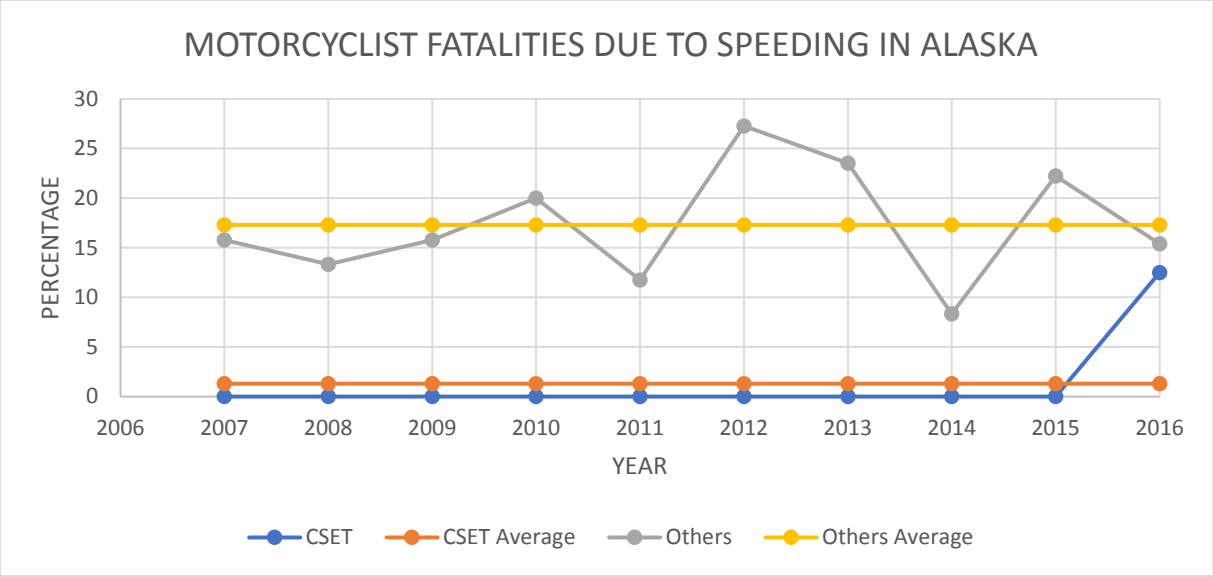

FIGURE A.1.3.2

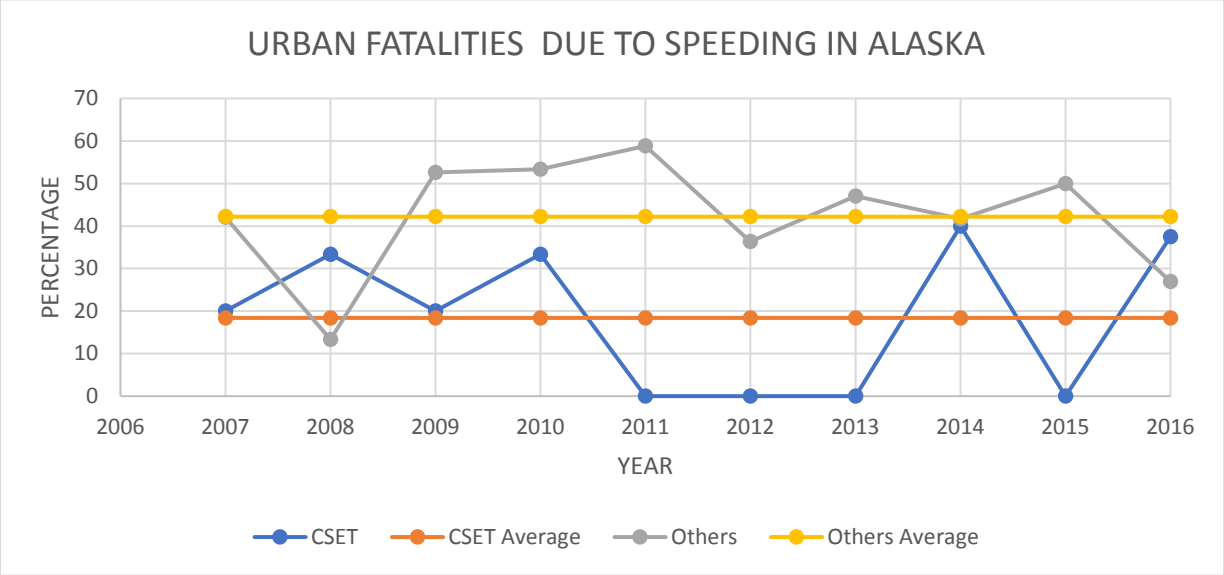

FIGURE A.1.3.3

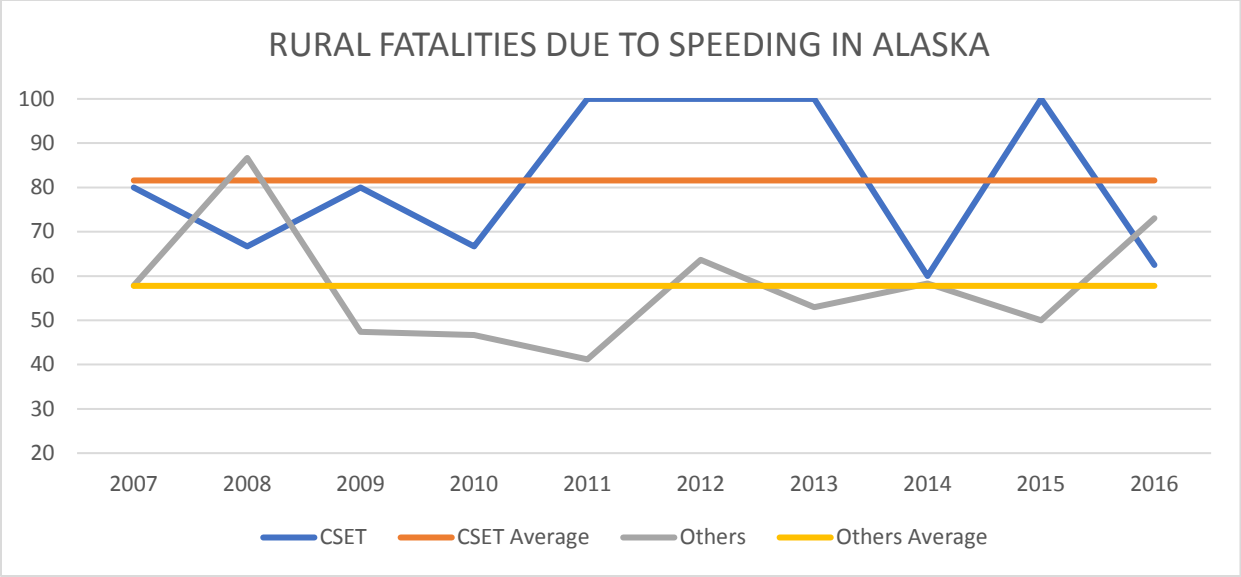

FIGURE A.1.3.4

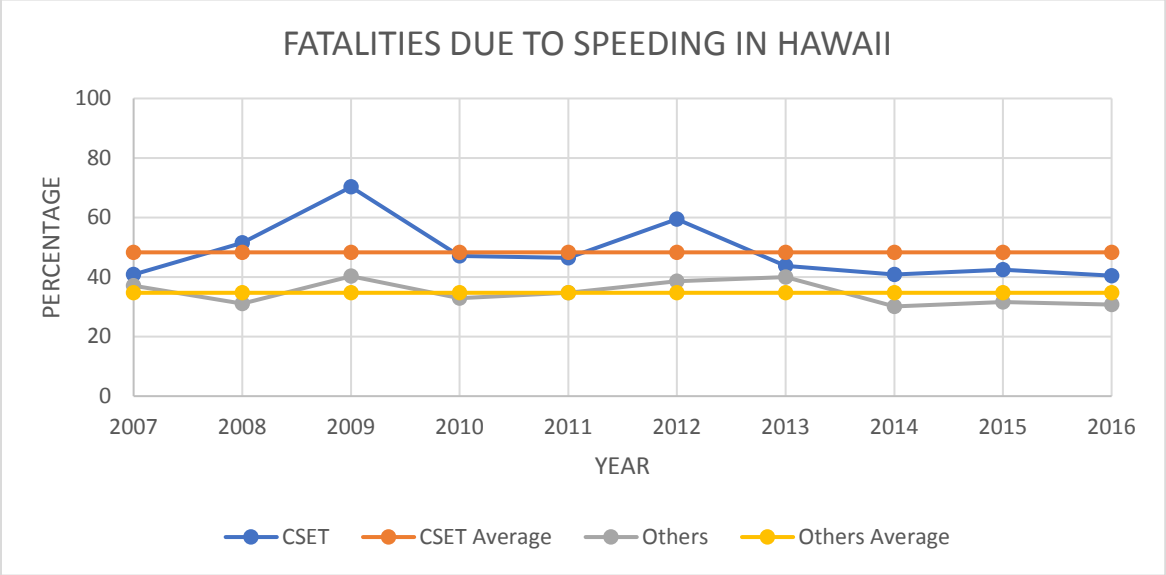

FIGURE A.2.3.1

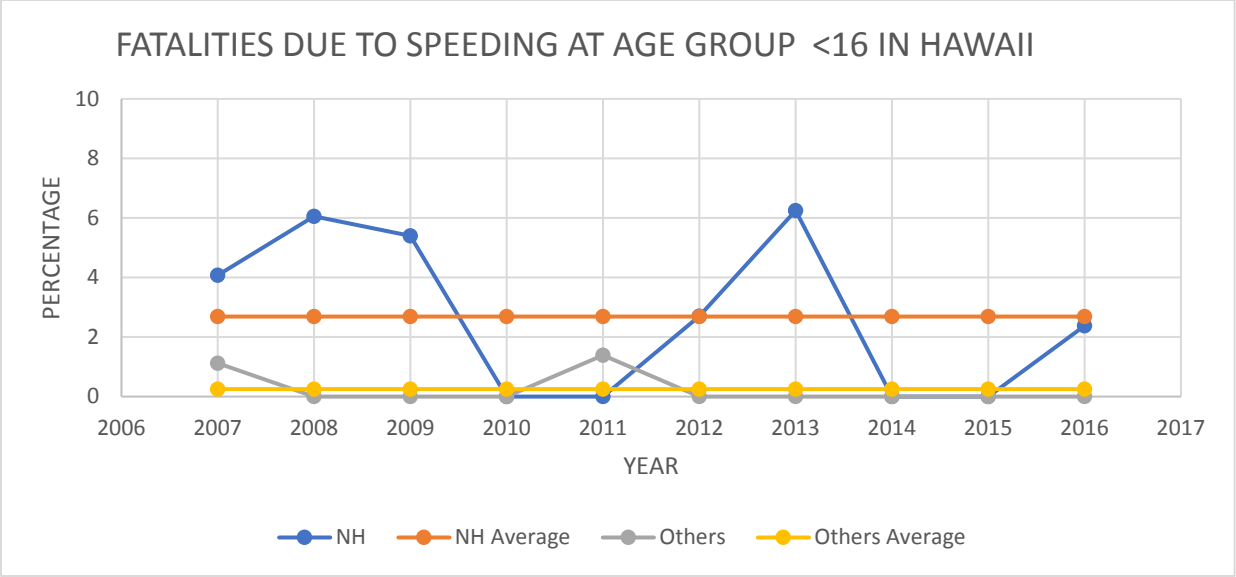

FIGURE A.2.3.2

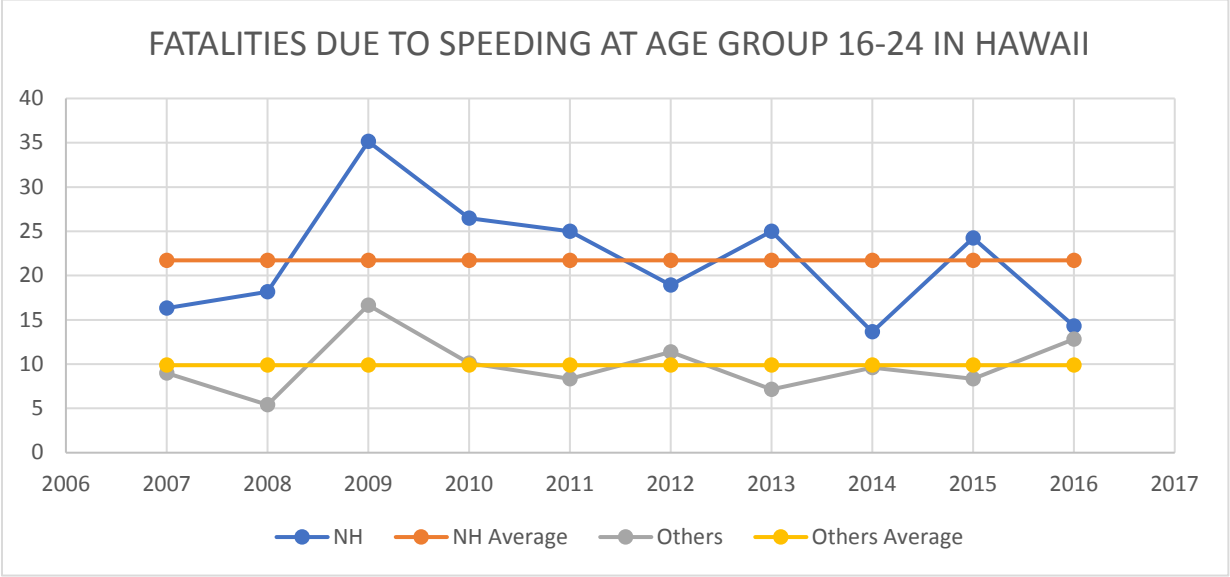

FIGURE A.2.3.3

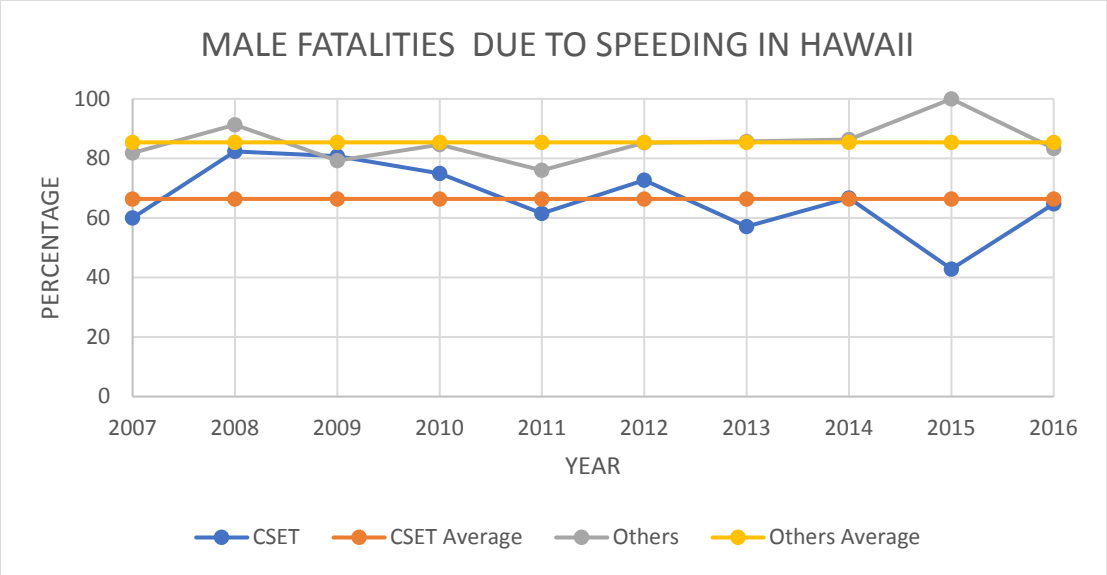

FIGURE A.2.3.4

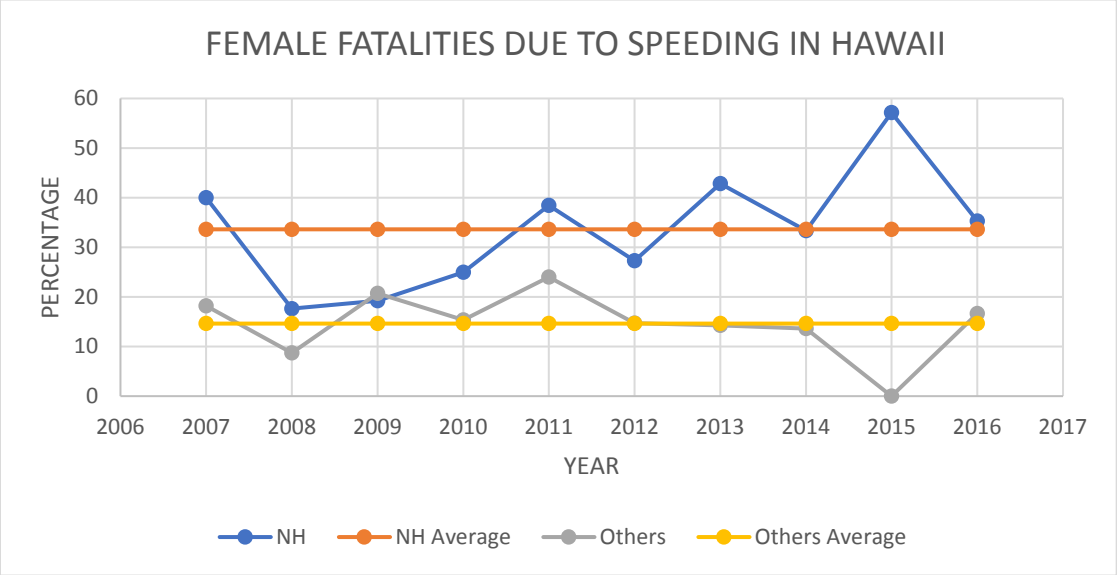

FIGURE A.2.3.5

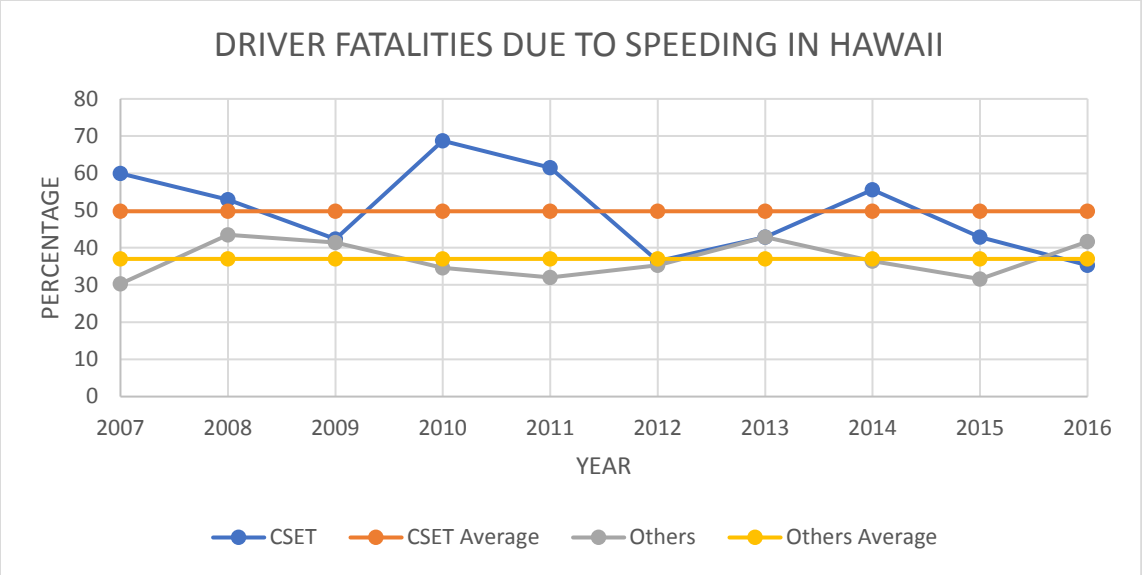

FIGURE A.2.3.6

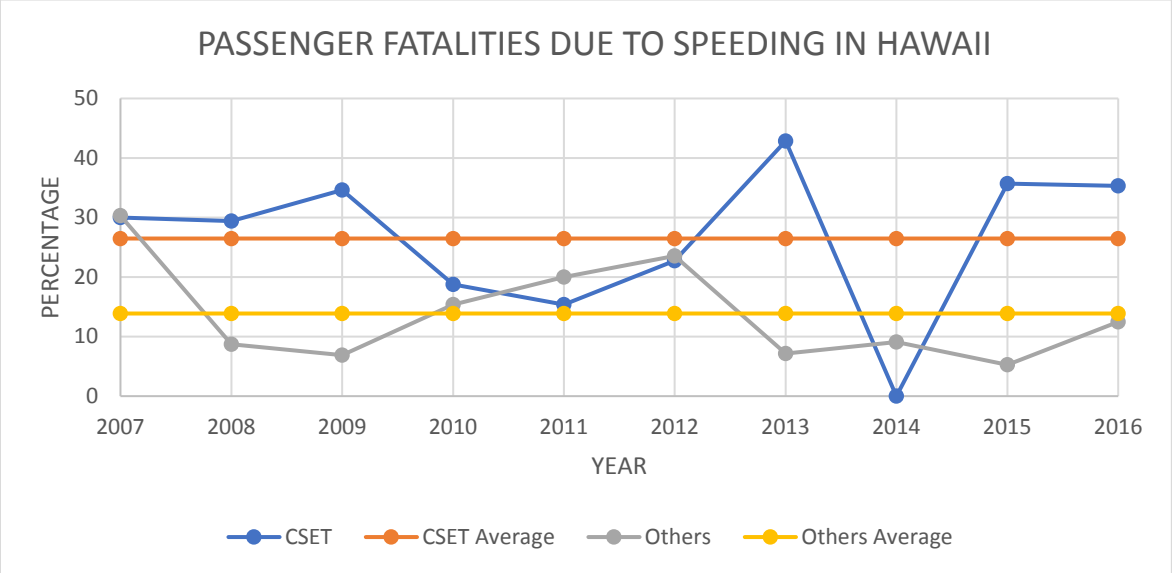

FIGURE A.2.3.7

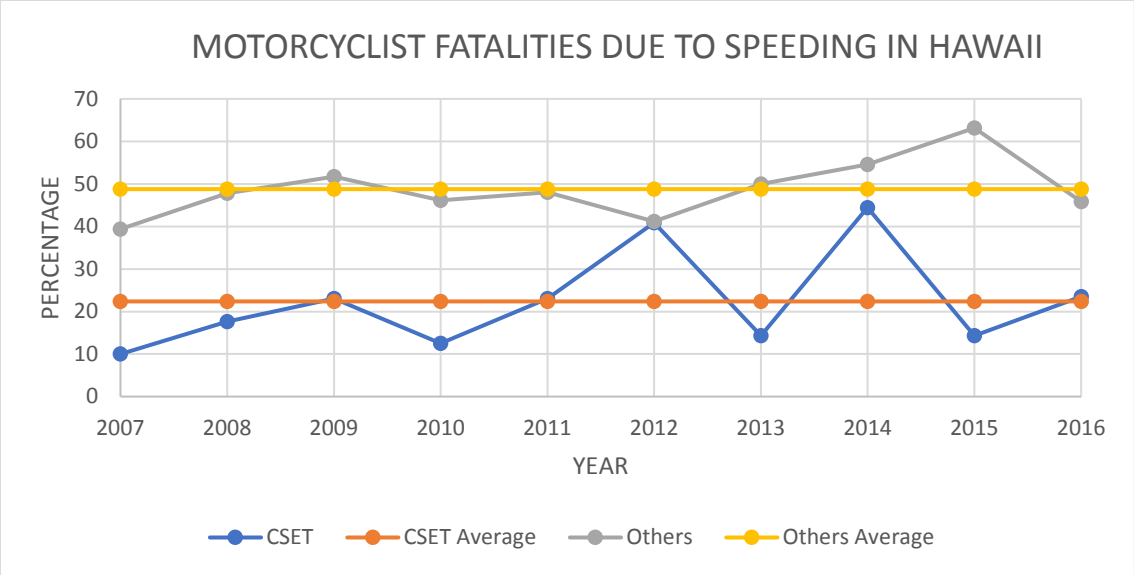

FIGURE A.2.3.8

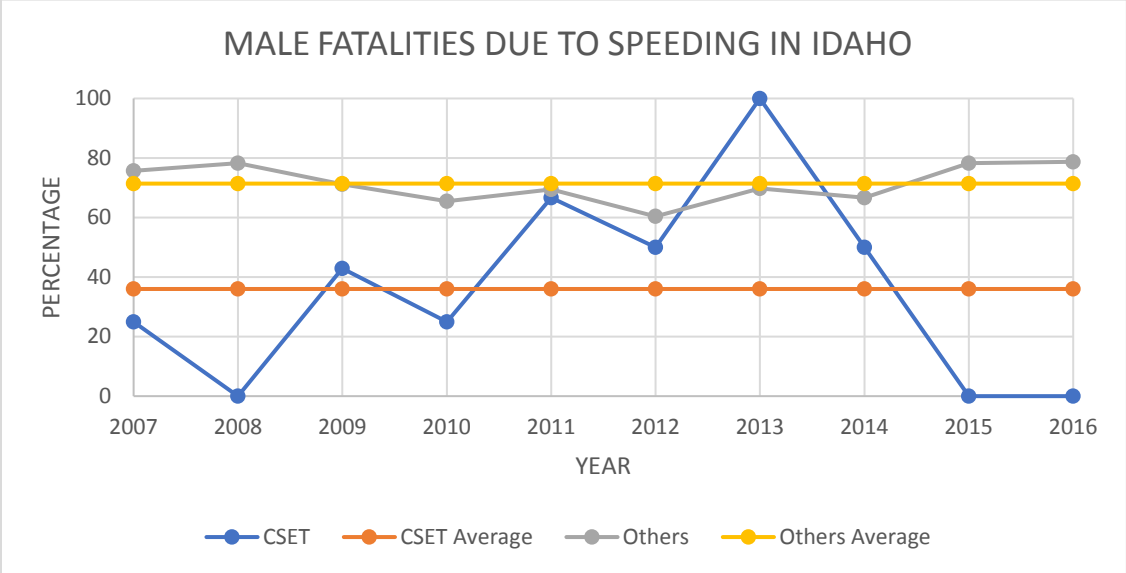

FIGURE A.3.3.1

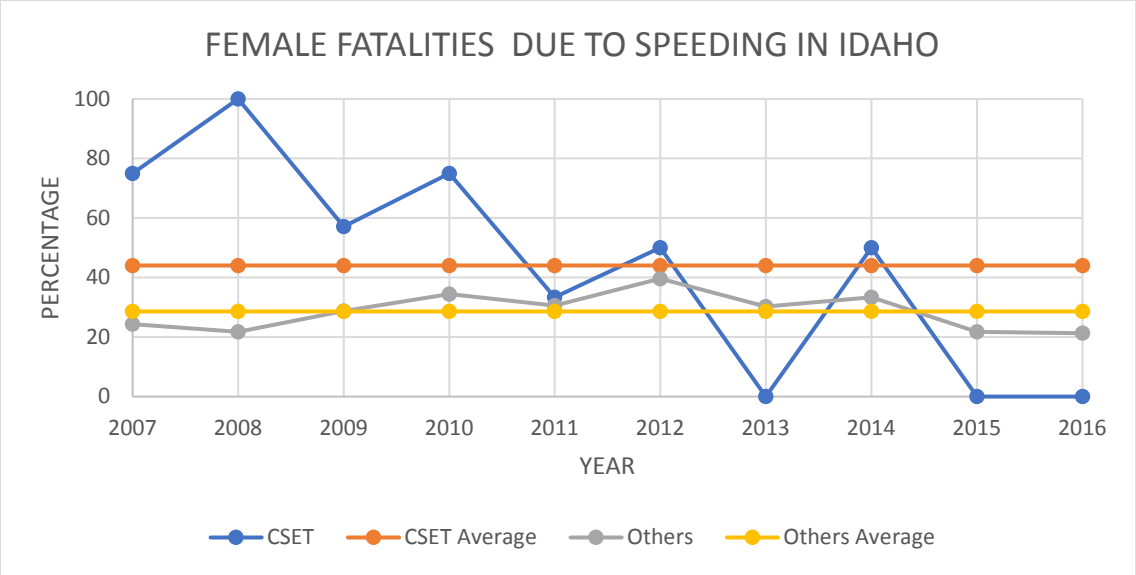

FIGURE A.3.3.2

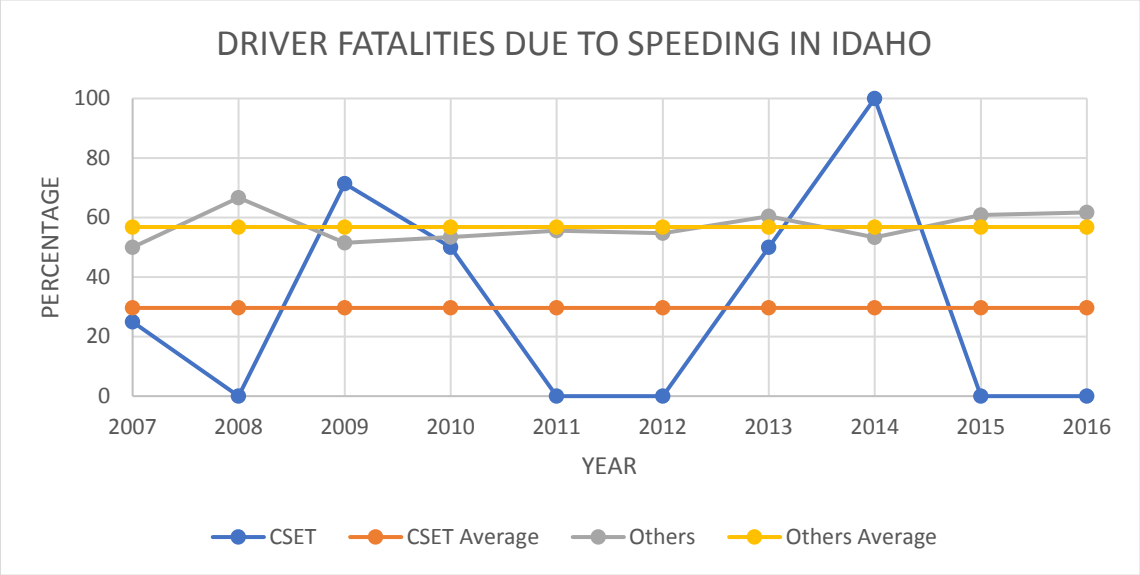

FIGURE A.3.3.3

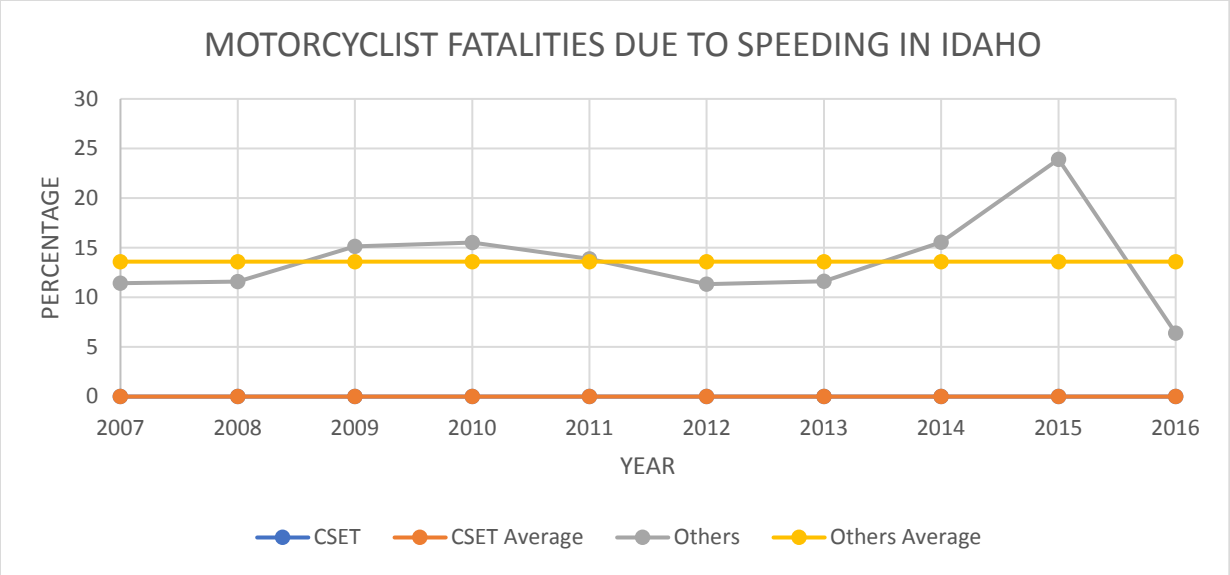

FIGURE A.3.3.4

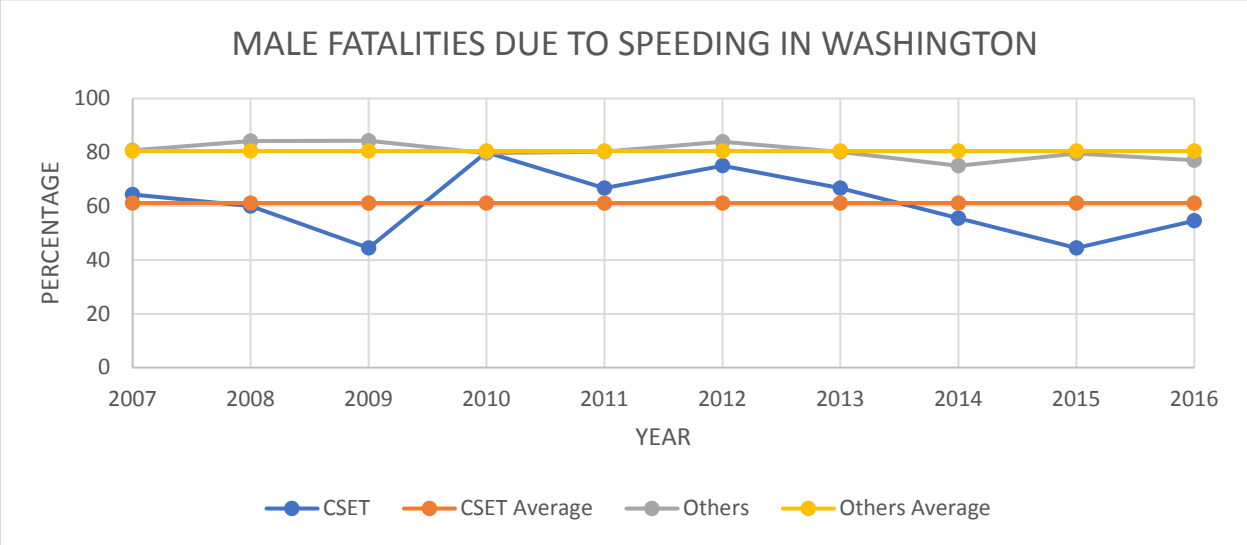

FIGURE A.4.3.1

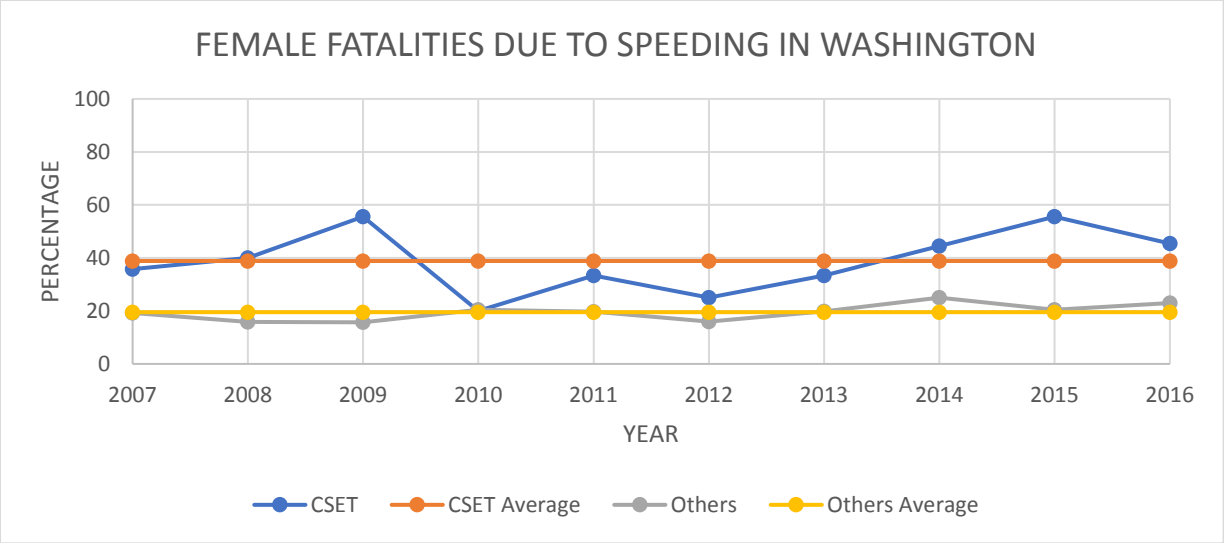

FIGURE A.4.3.2

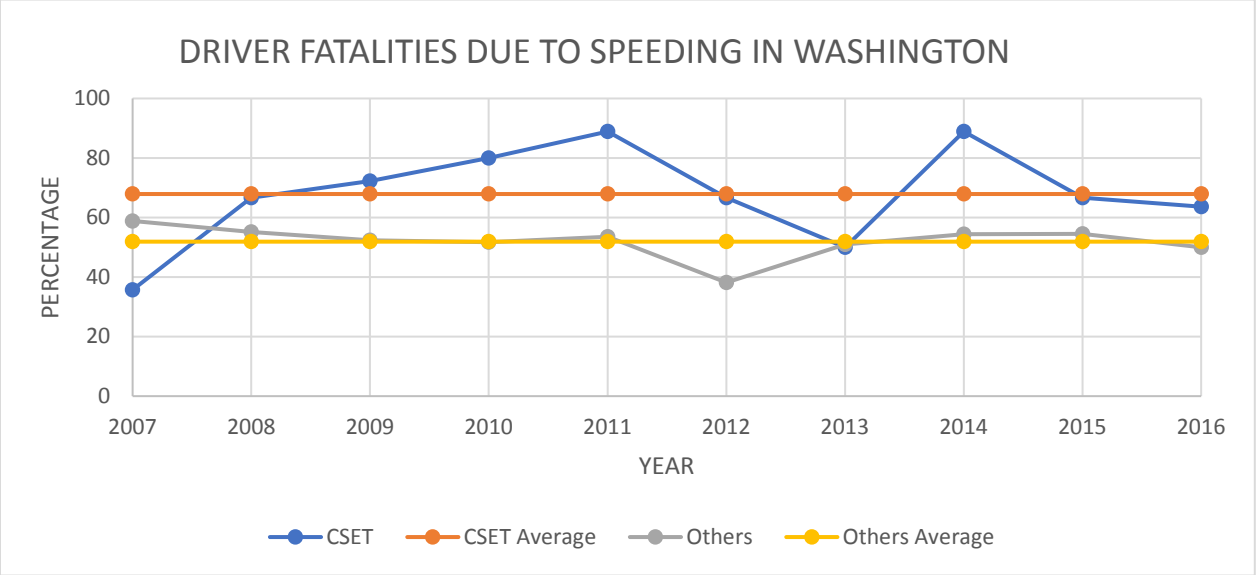

FIGURE A.4.3.3

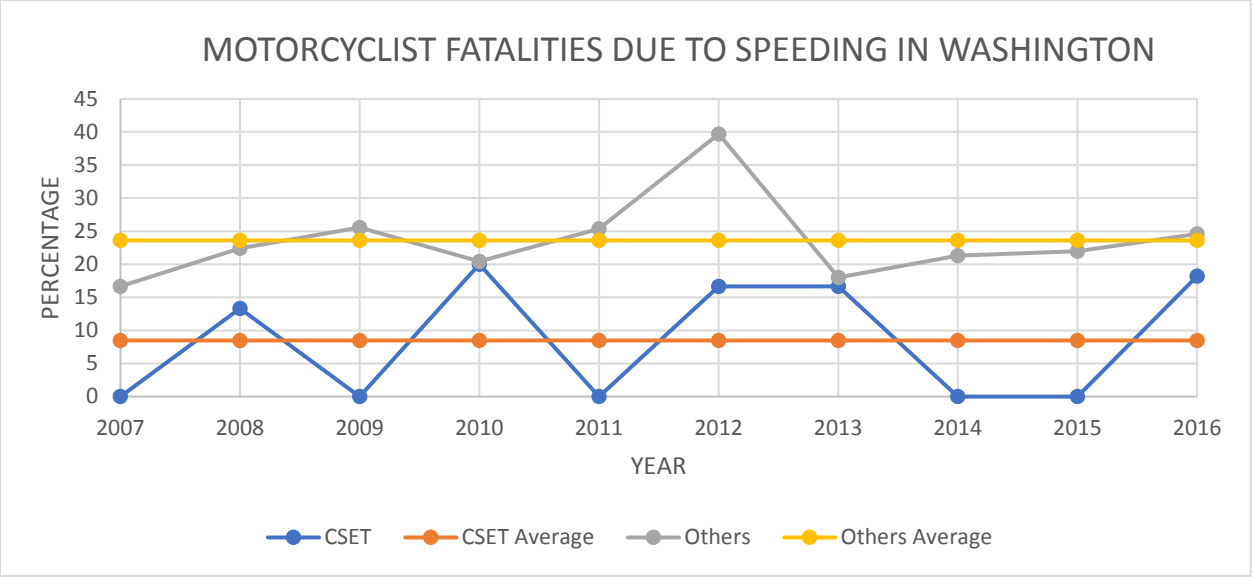

FIGURE A.4.3.4

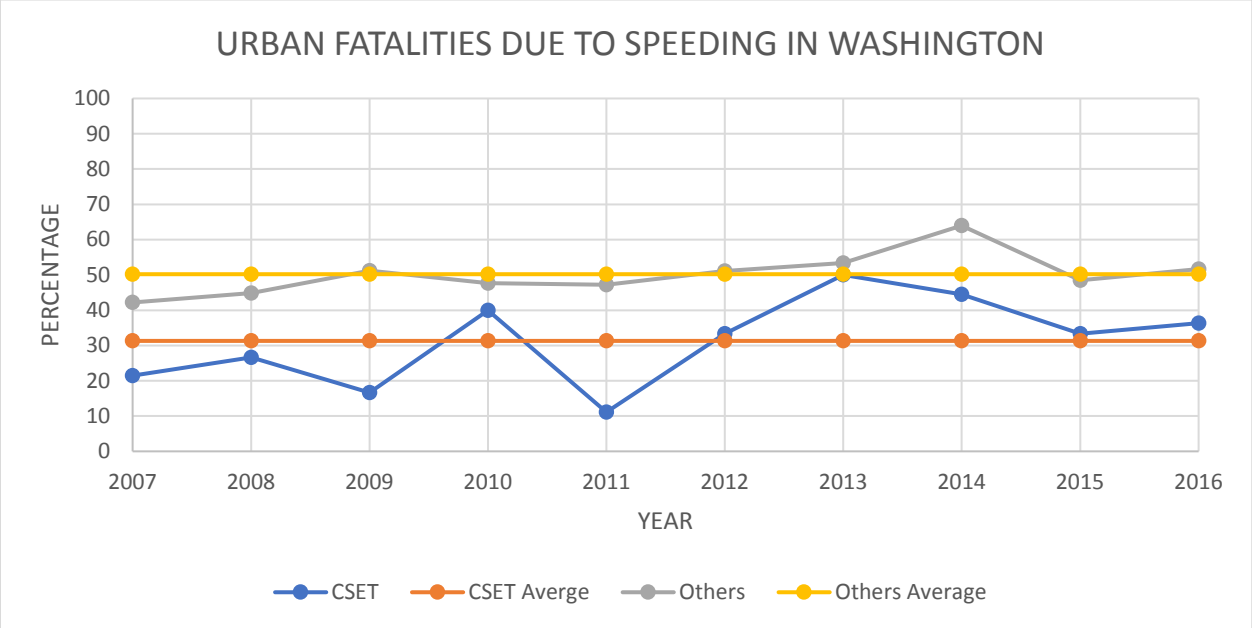

FIGURE A.4.3.5

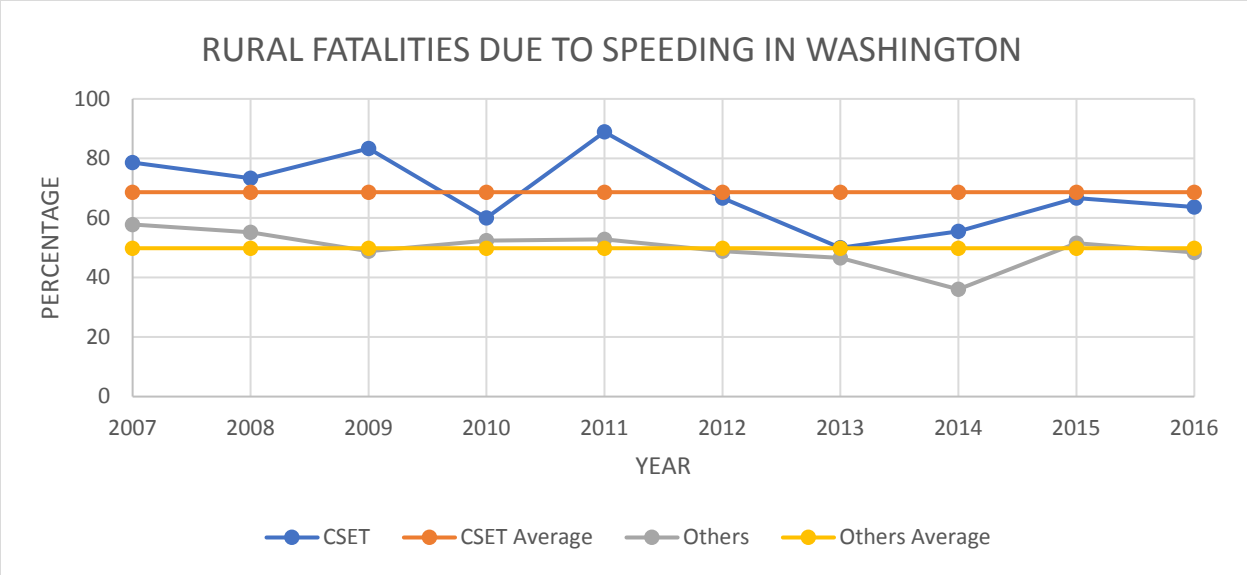

FIGURE A.4.3.6

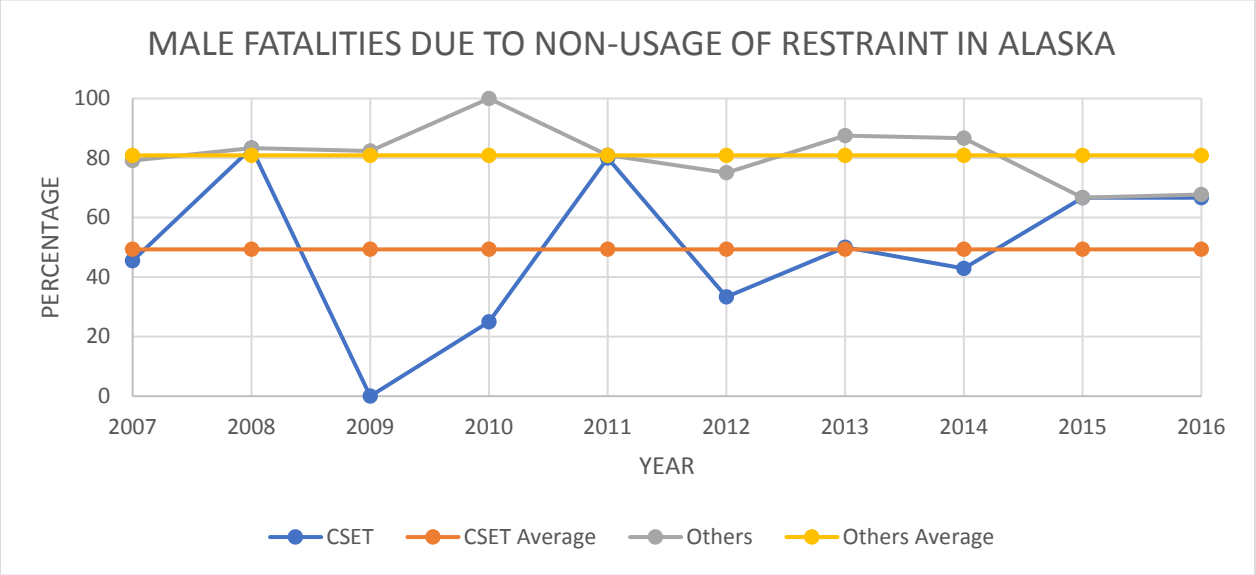

FIGURE A.1.4.1

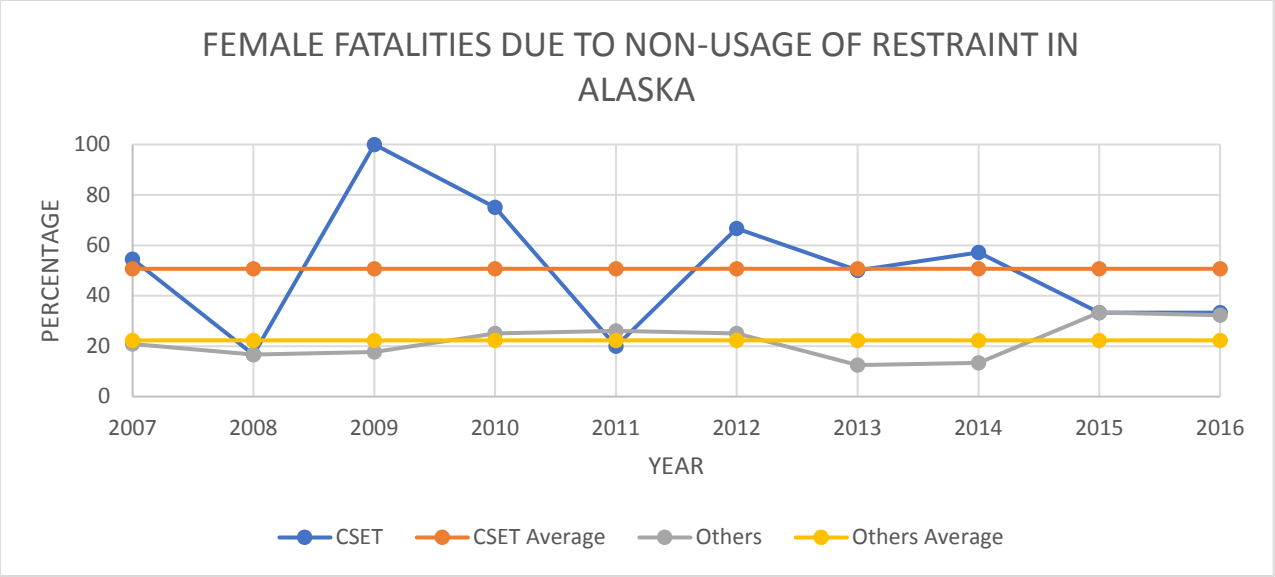

FIGURE A.1.4.2

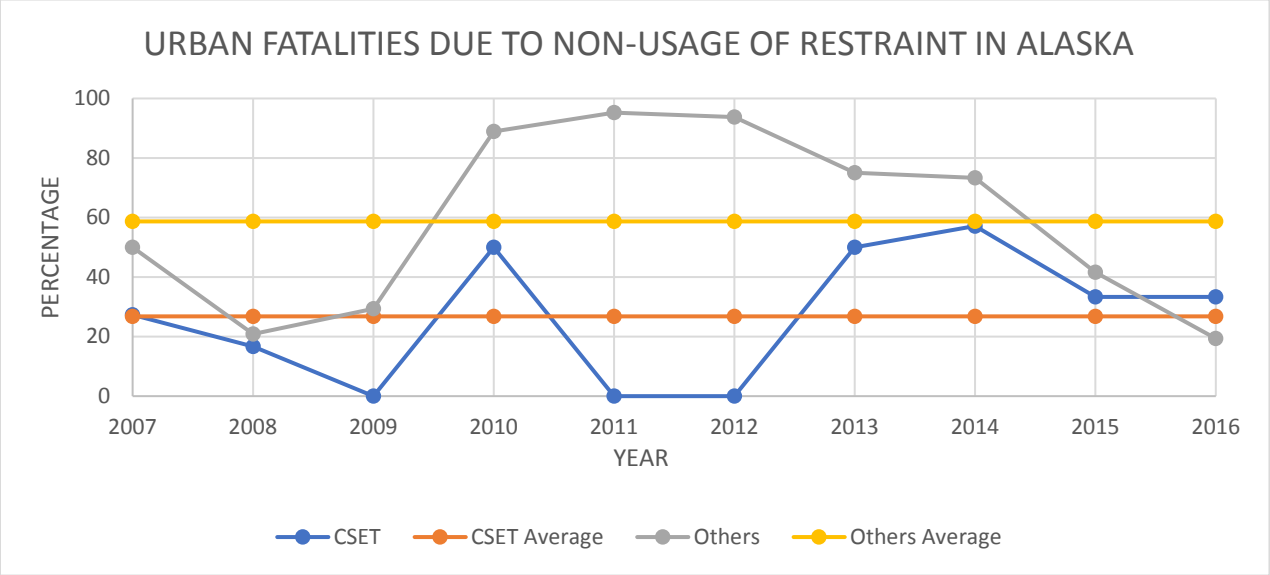

FIGURE A.1.4.3

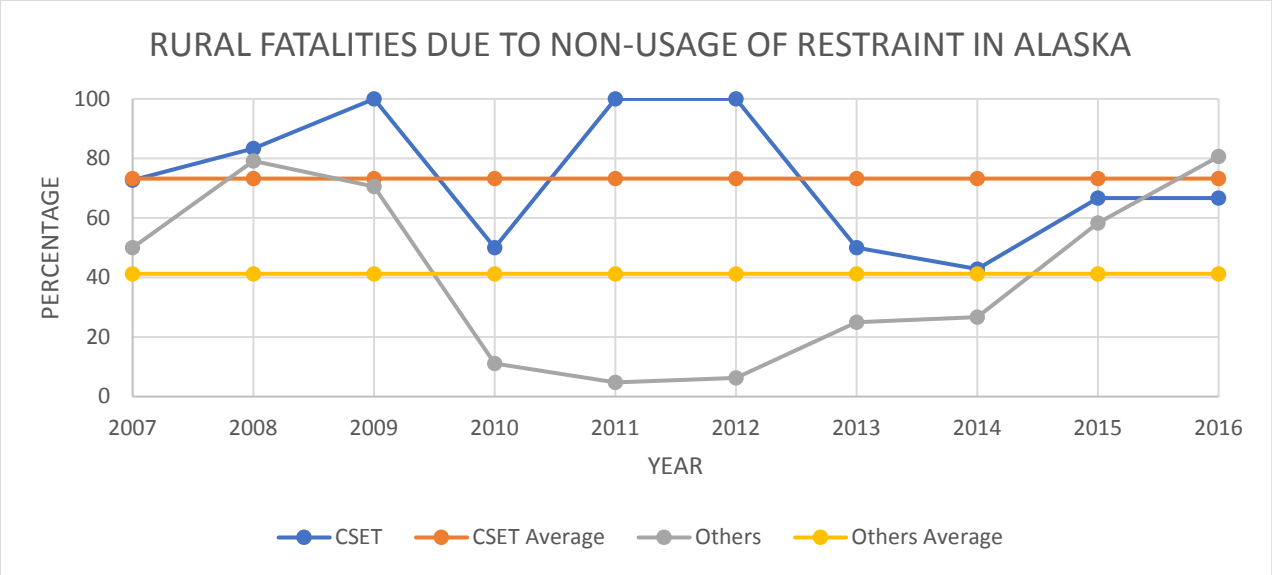

FIGURE A.1.4.4

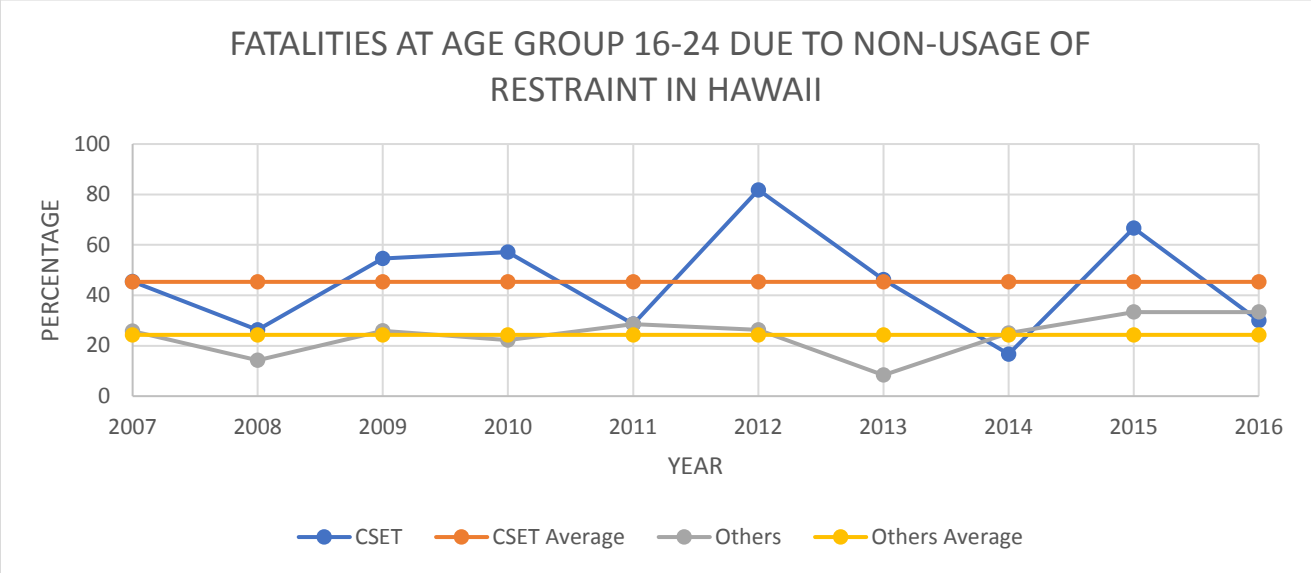

FIGURE A.2.4.1

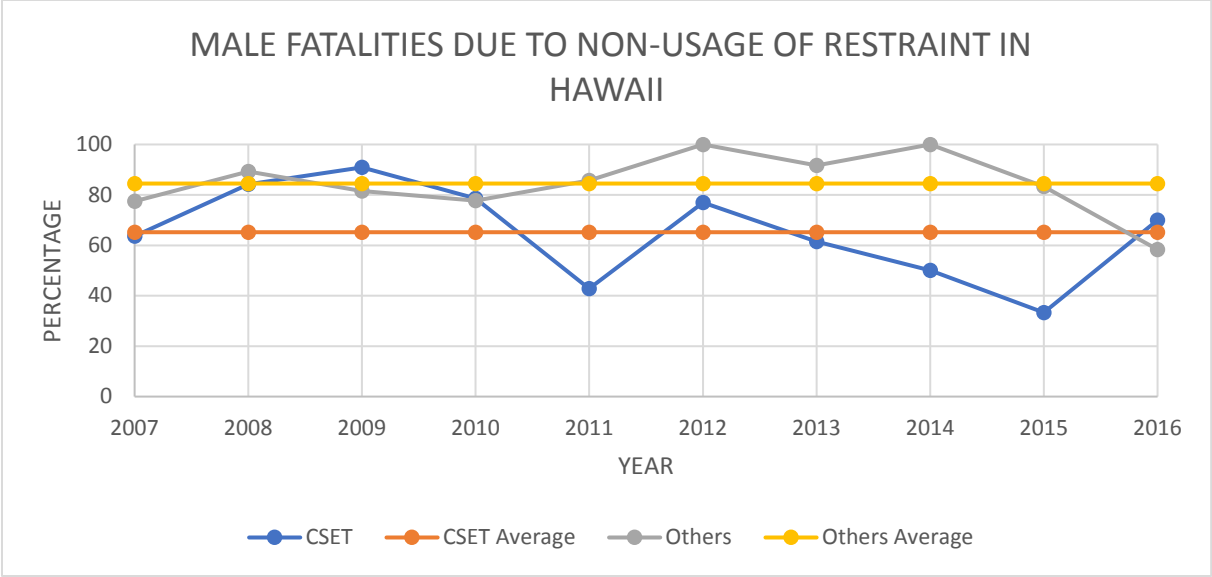

FIGURE A.2.4.2

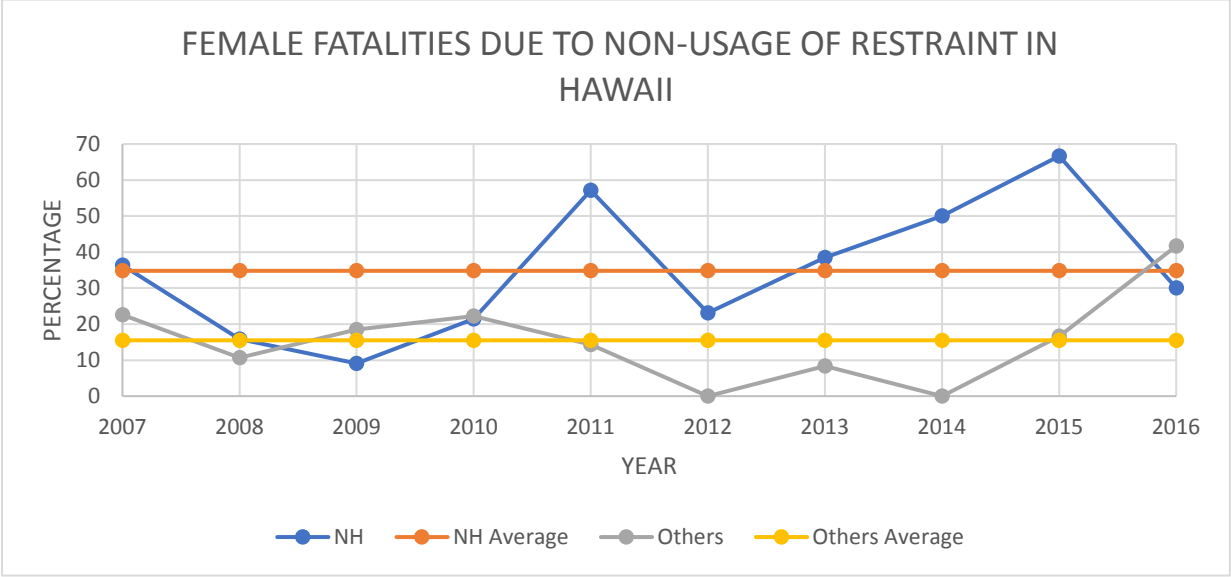

FIGURE A.2.4.3

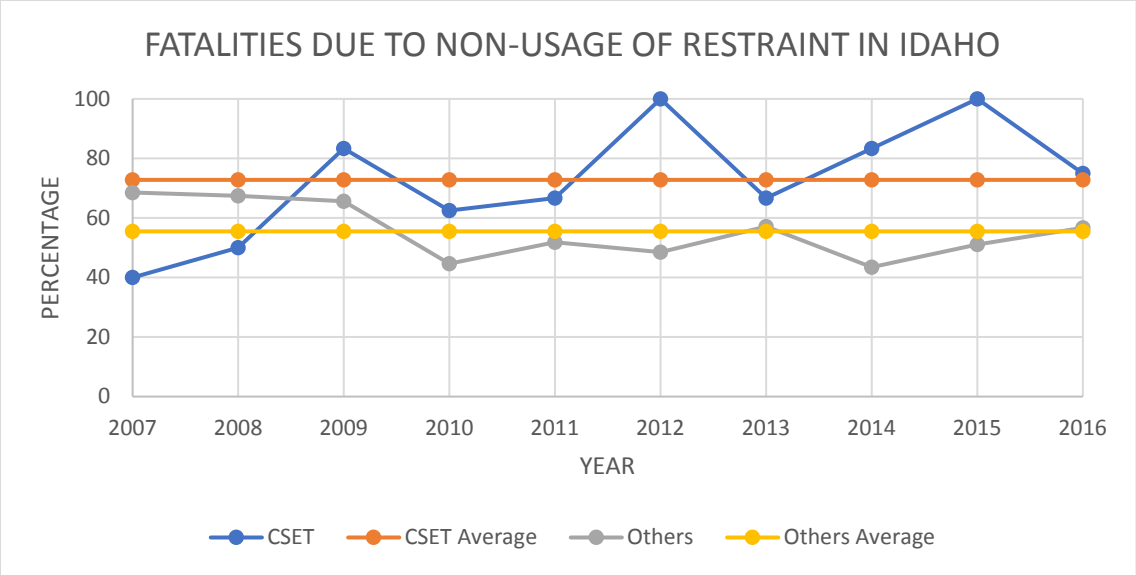

FIGURE A.3.4.1

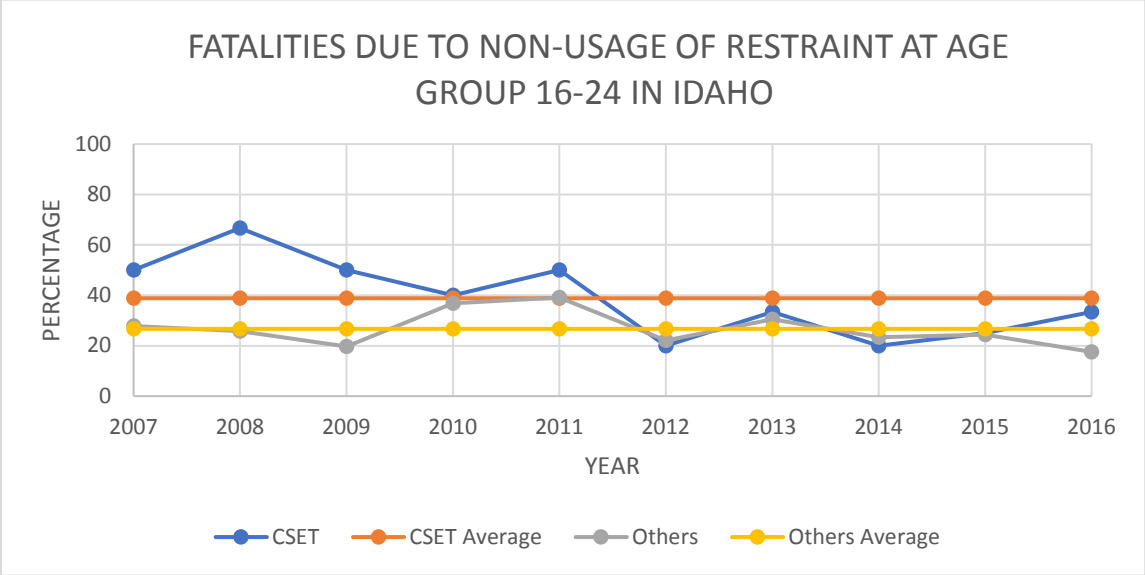

FIGURE A.3.4.2

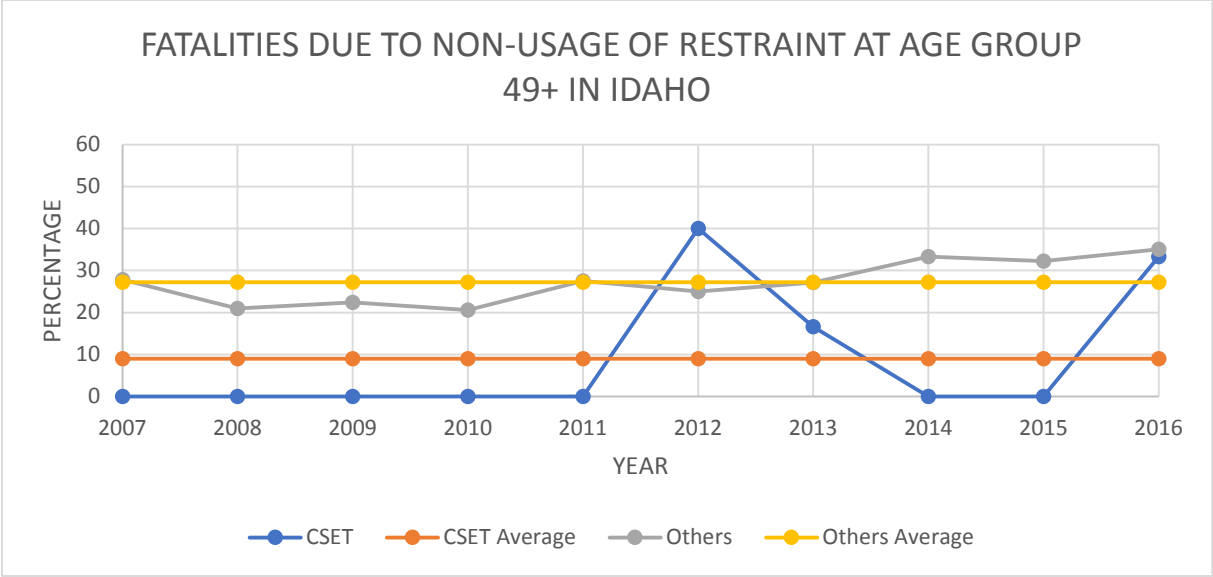

FIGURE A.3.4.3

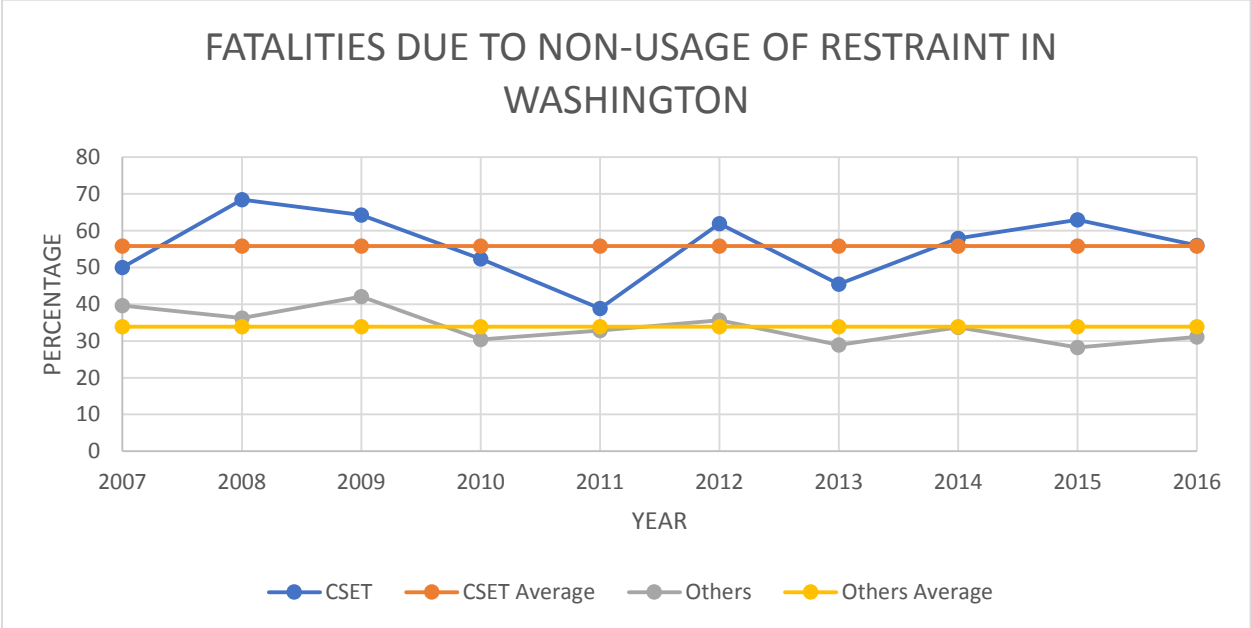

FIGURE A.4.4.1

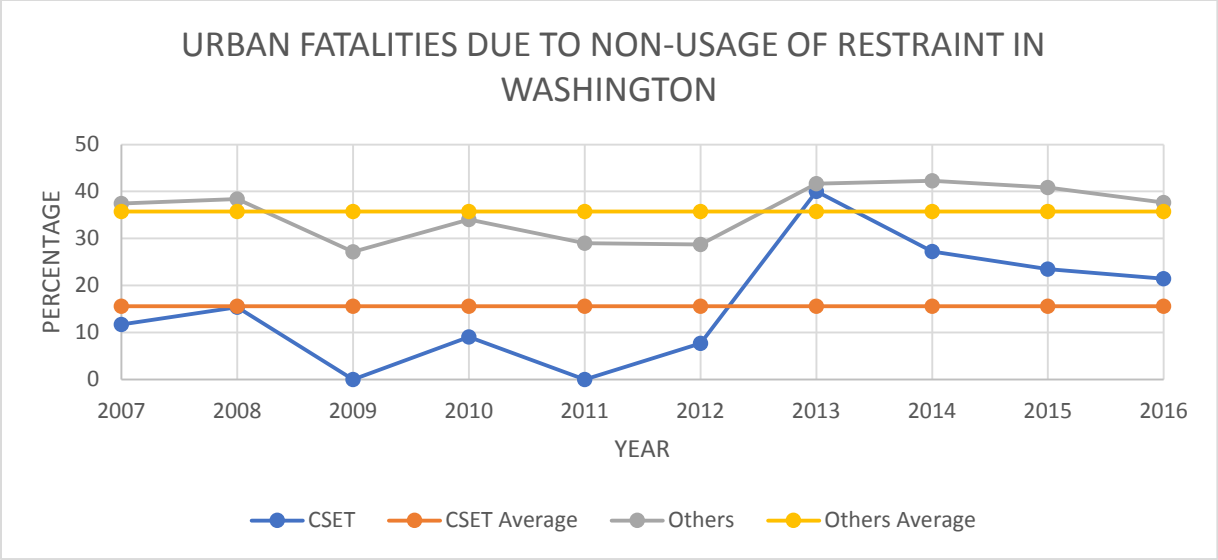

FIGURE A.4.4.2

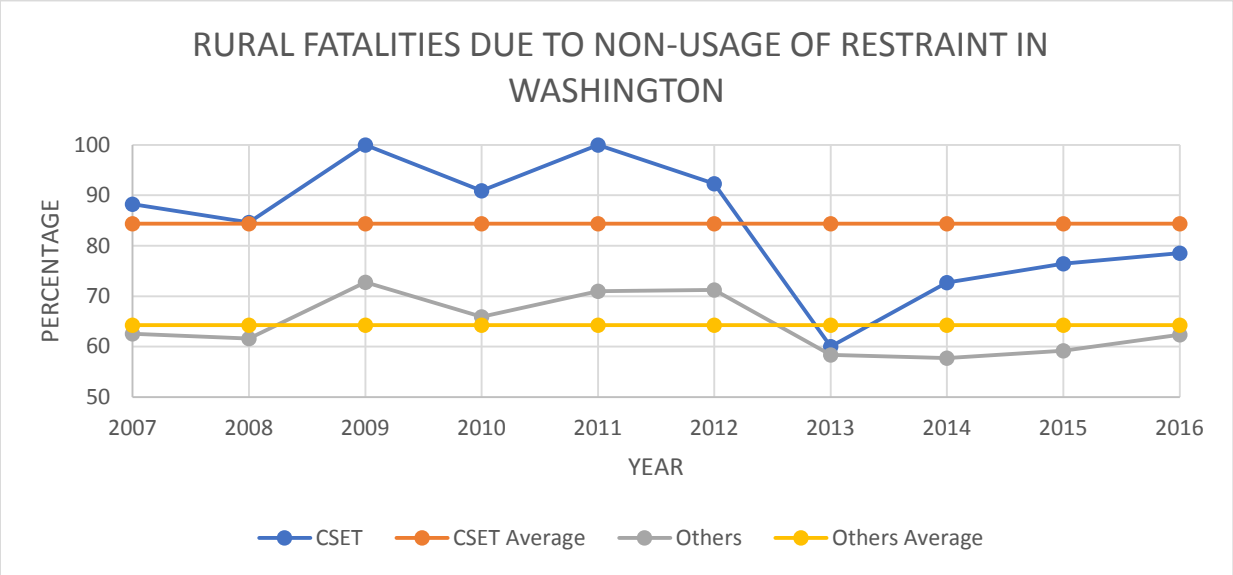

FIGURE A.4.4.3