

# GENERAL AVIATION SAFETY STUDY

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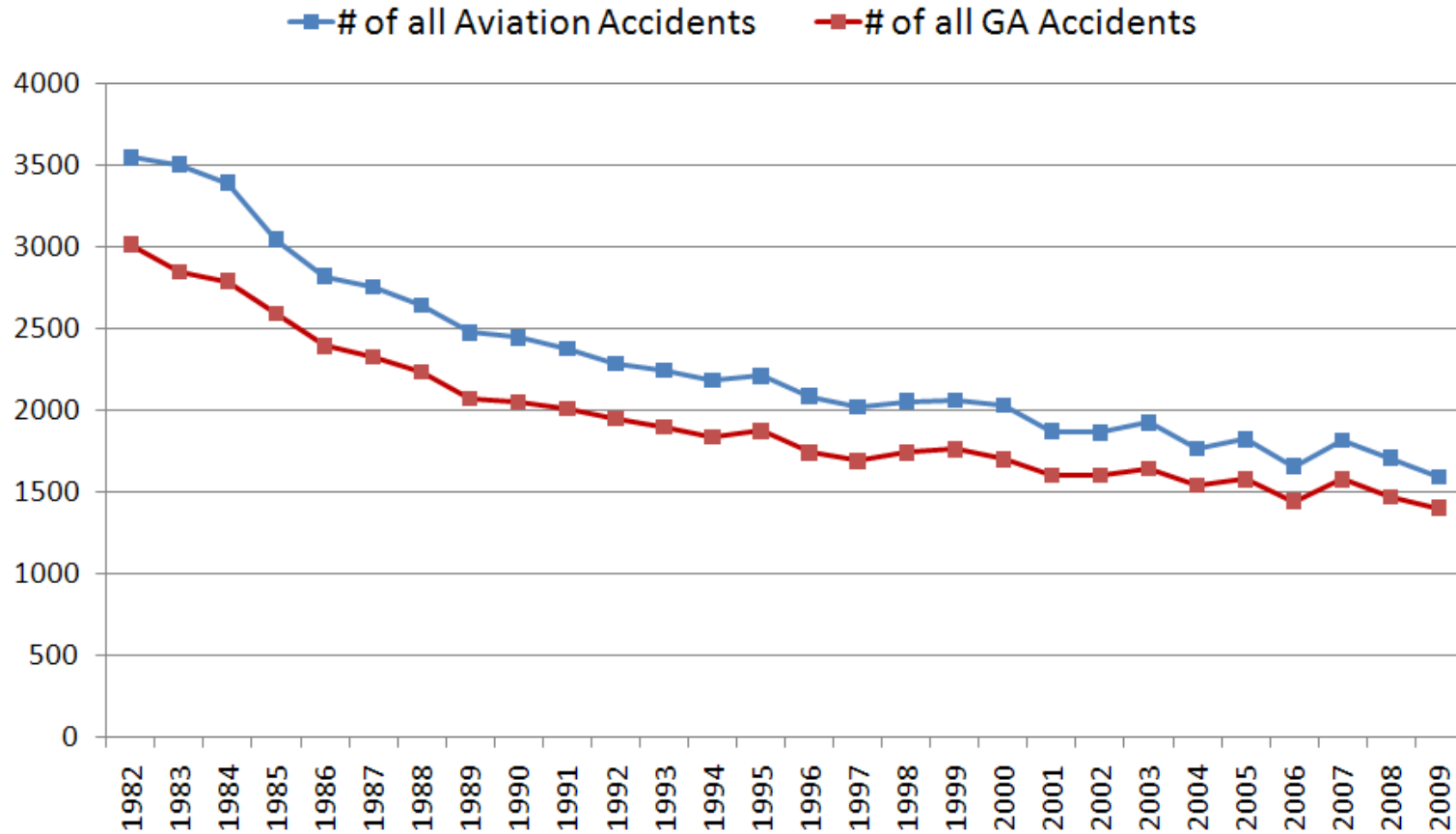
## Scope of Work

- Analysis of primary ten causes leading to fatal and non-fatal GA accidents by region.
- Conduct statistical analyses to identify associations and patterns between flight elements and risk factors.
- Perform data mining to identify the fatal accident patterns and provide recommendations to prevent fatal accidents.

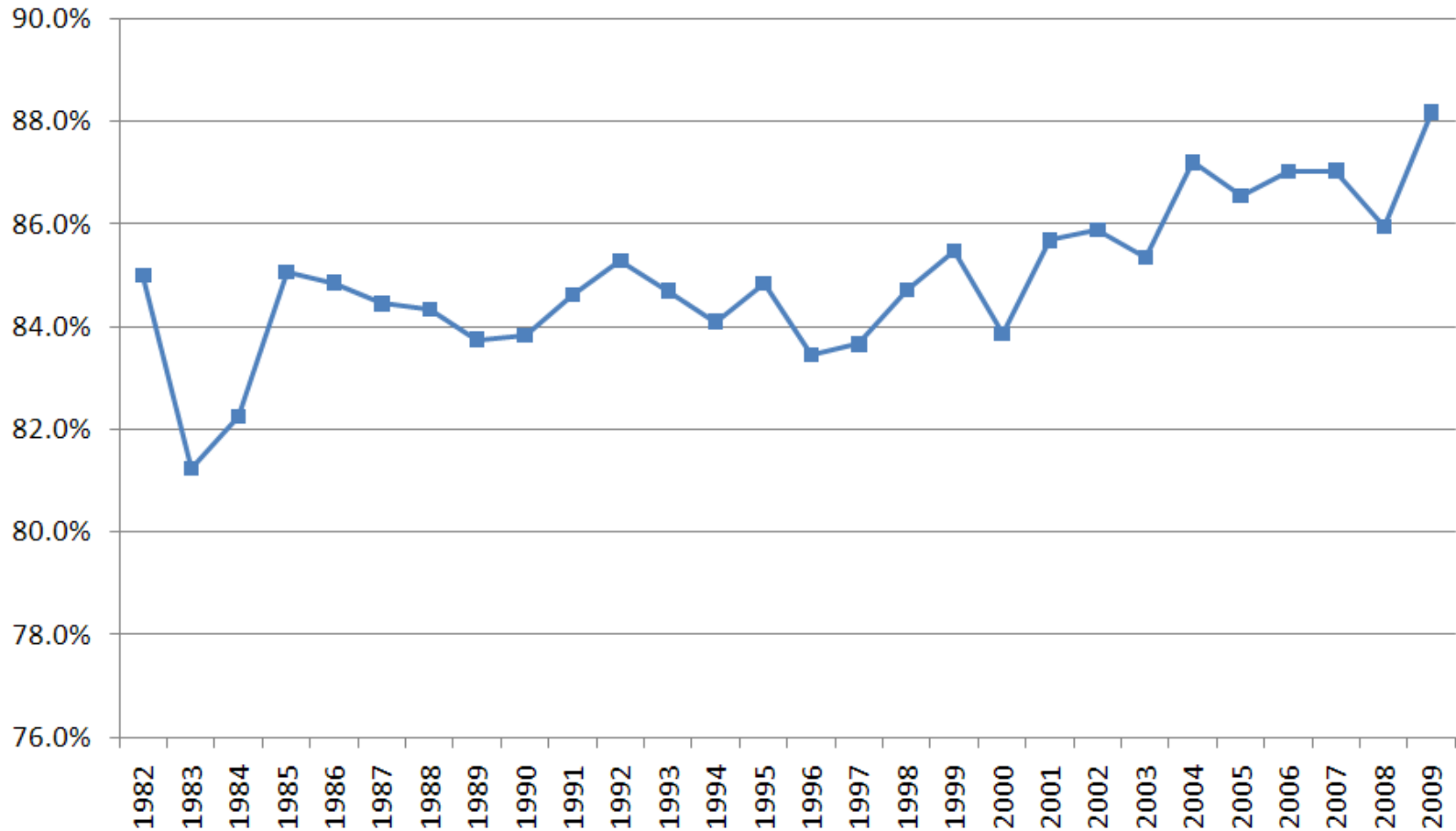
## NTSB Database

- Every accidents/incidents receives a record (event ID). Each NTSB accident report receives an NTSB report number.
- Around 63,736 events accidents/incidents were reported nation wide from 1982-2009.
  - Out of which 54,127 events were related to General Aviation (GA - Part 91), which is almost 85% of overall accidents.
  - Out of all GA accidents, 10,423 events were fatal GA accidents (19.3% of total GA events).

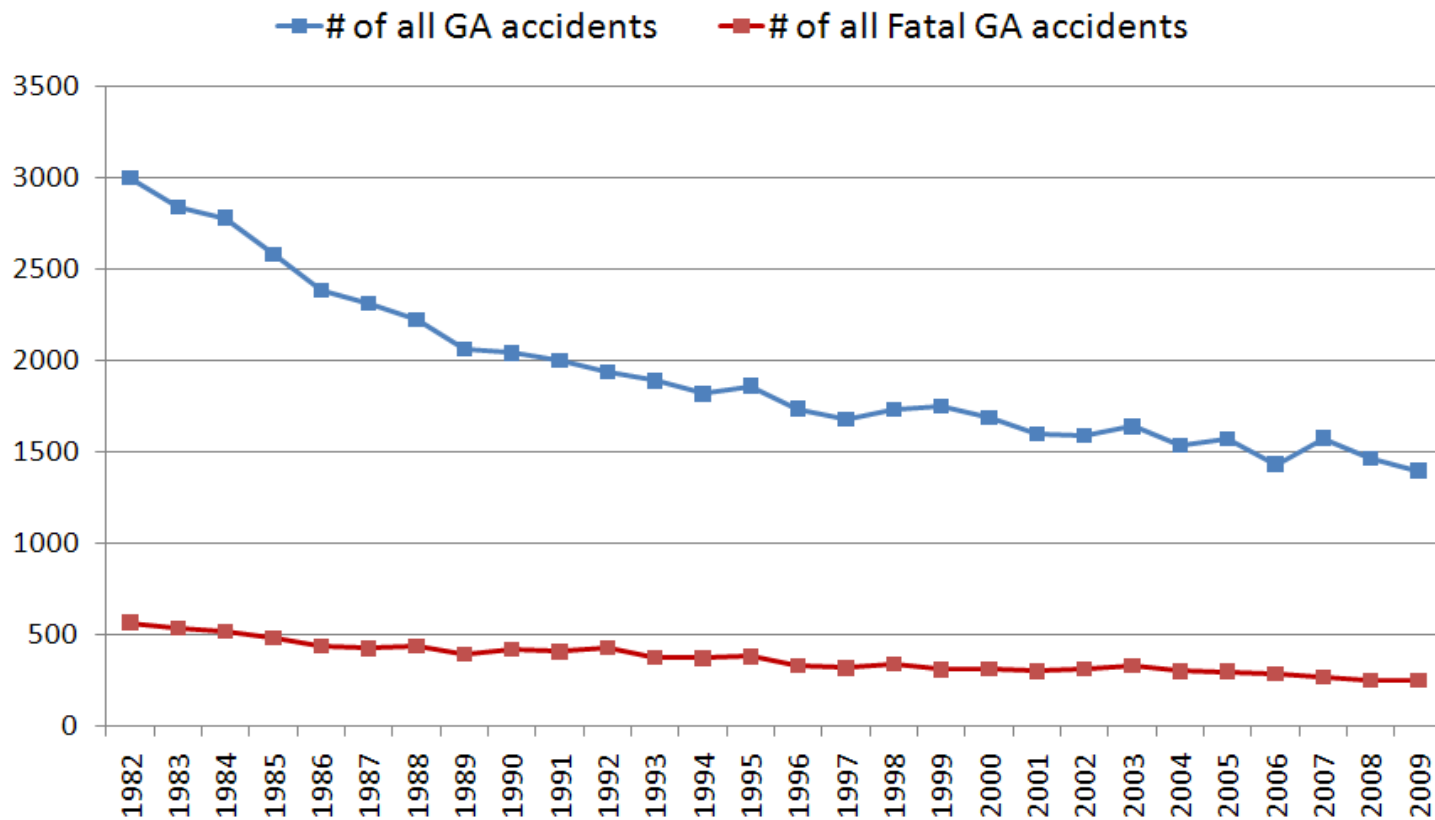
# Number of accidents in the U.S.



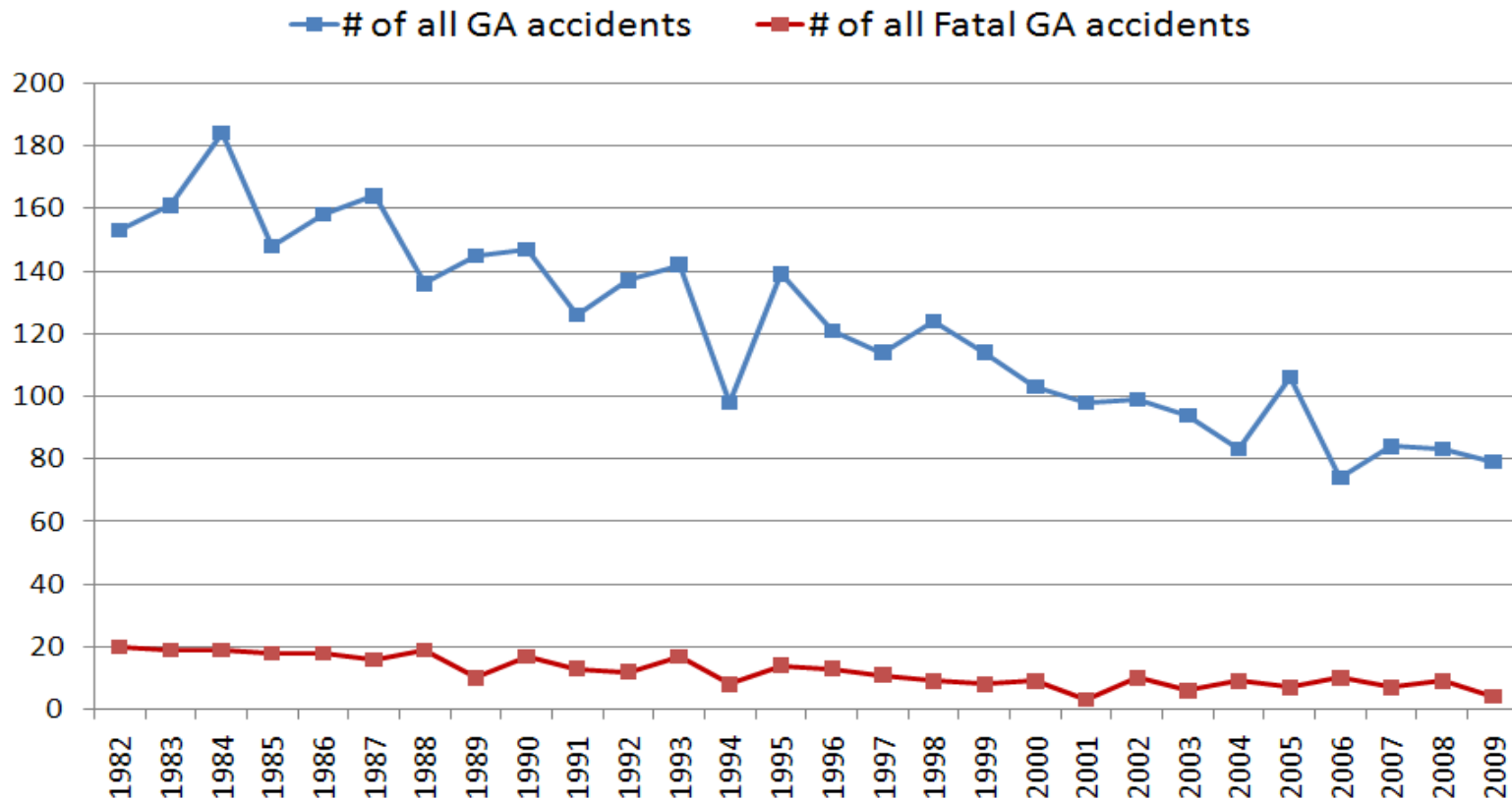
# Percentage of GA accidents in all Aviation accidents



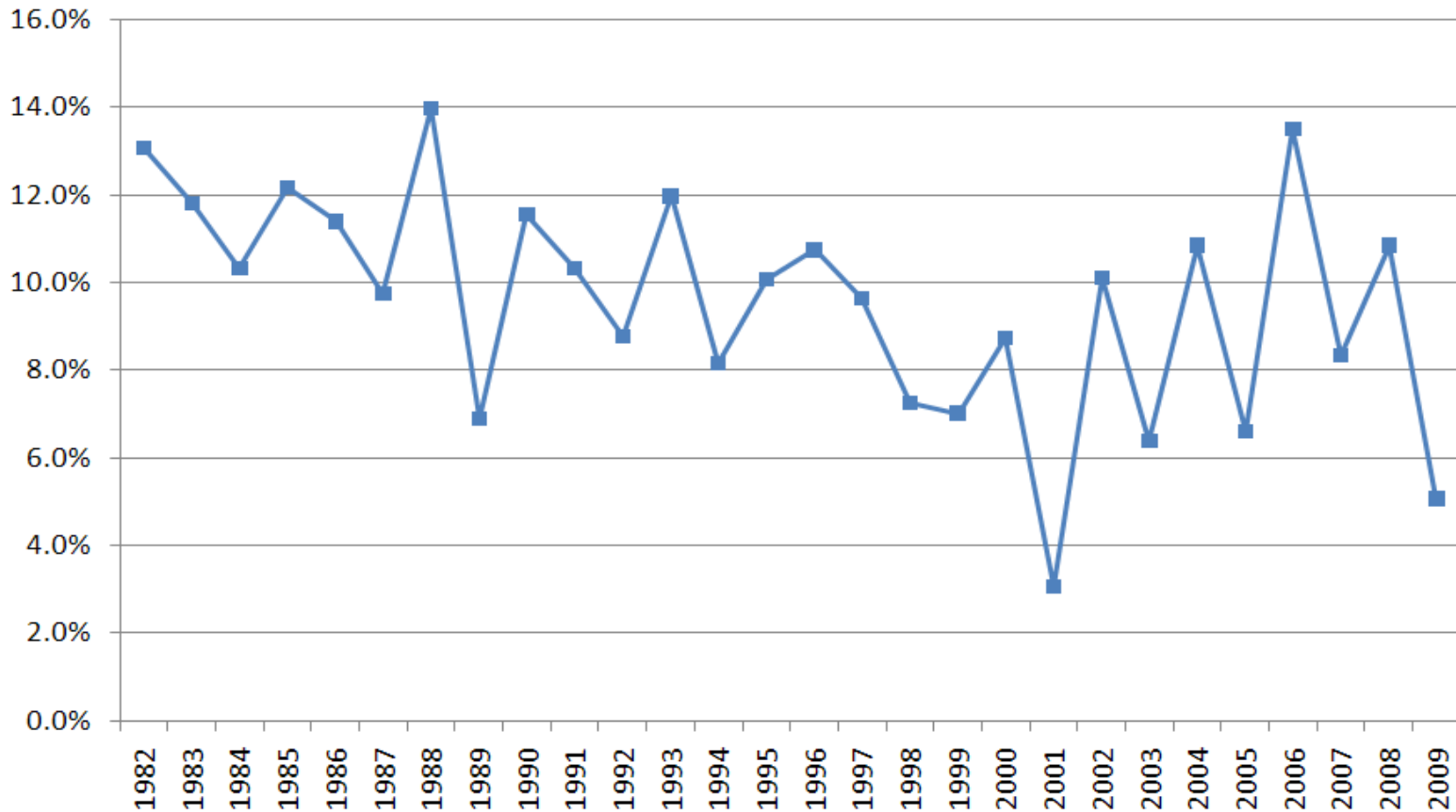
# Number of Fatal GA accidents in all GA accidents – U.S.



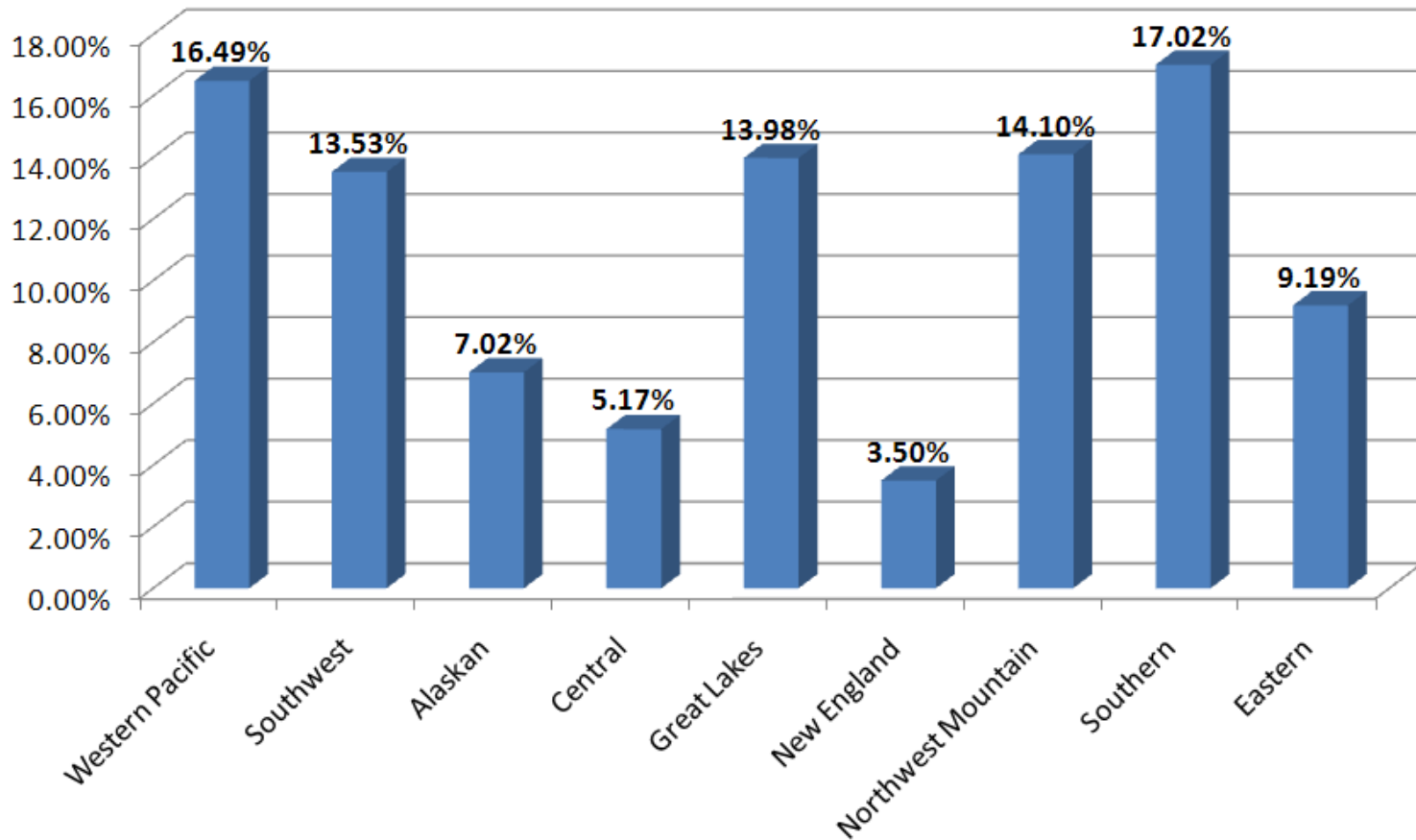
# Number of Fatal GA accidents in all GA accidents – Alaska



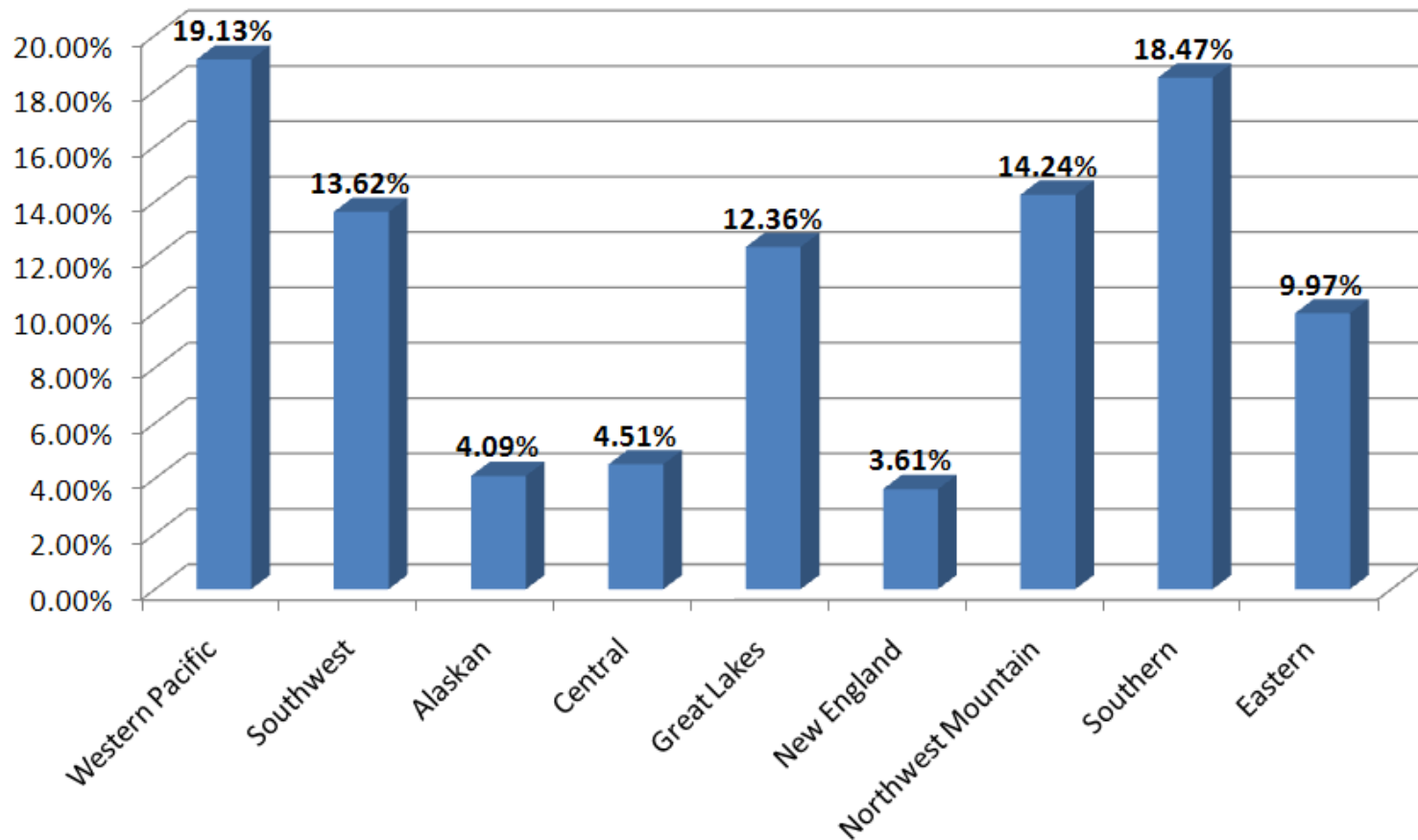
# Percentage of Fatal GA accidents in all GA accidents – Alaska



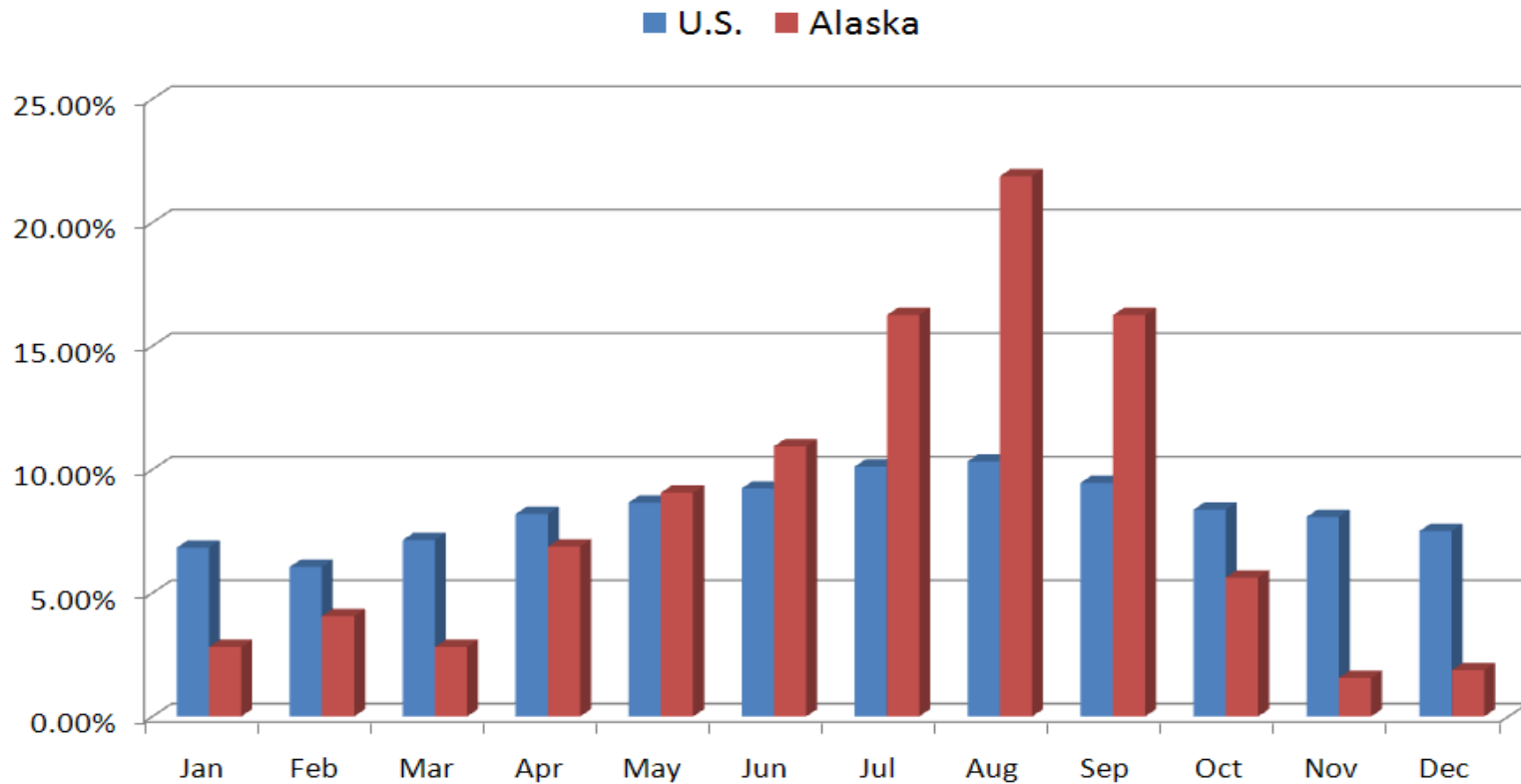
# Percentage of accidents in each regions



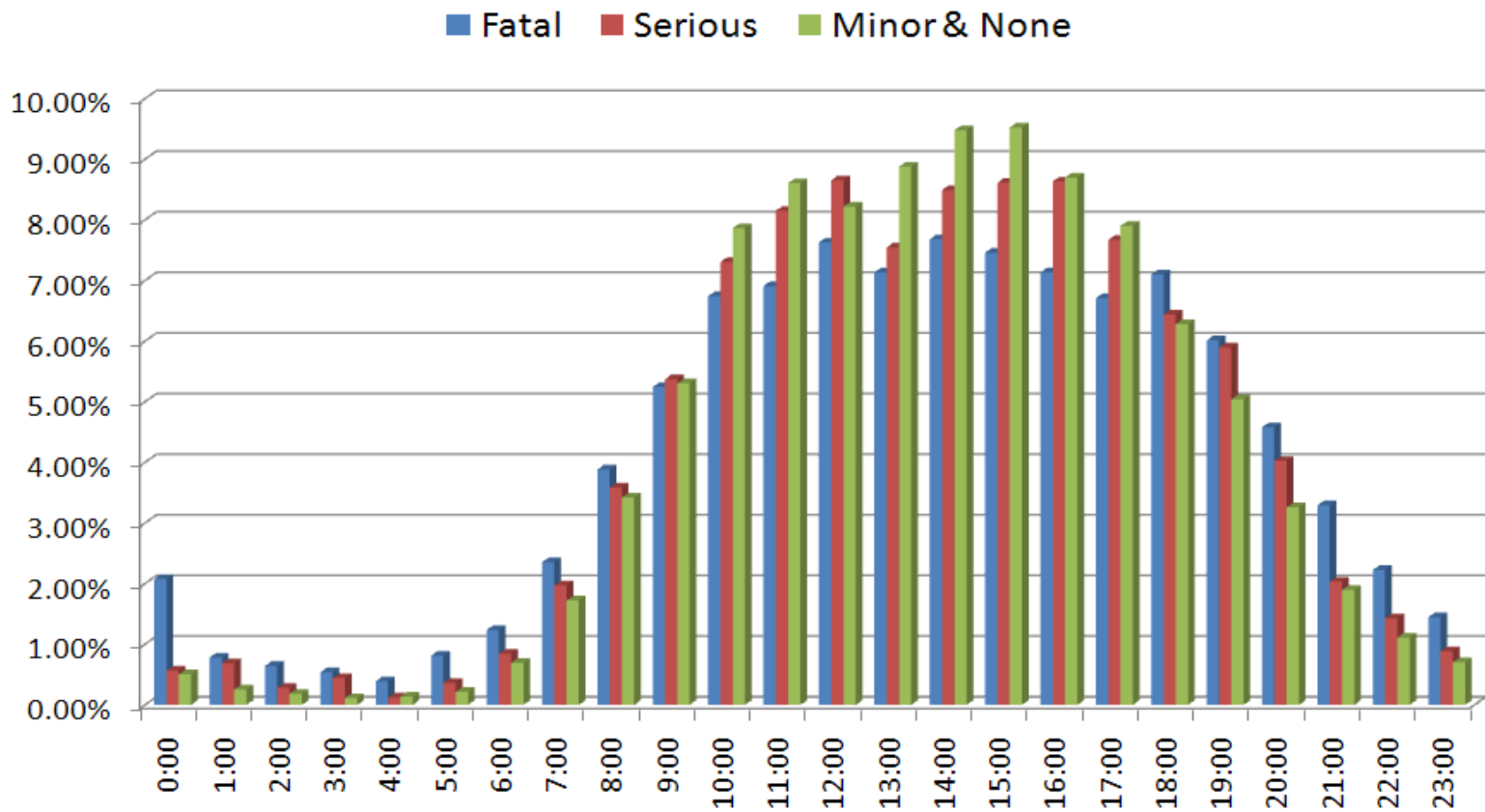
# Percentage of Fatal accidents in each regions



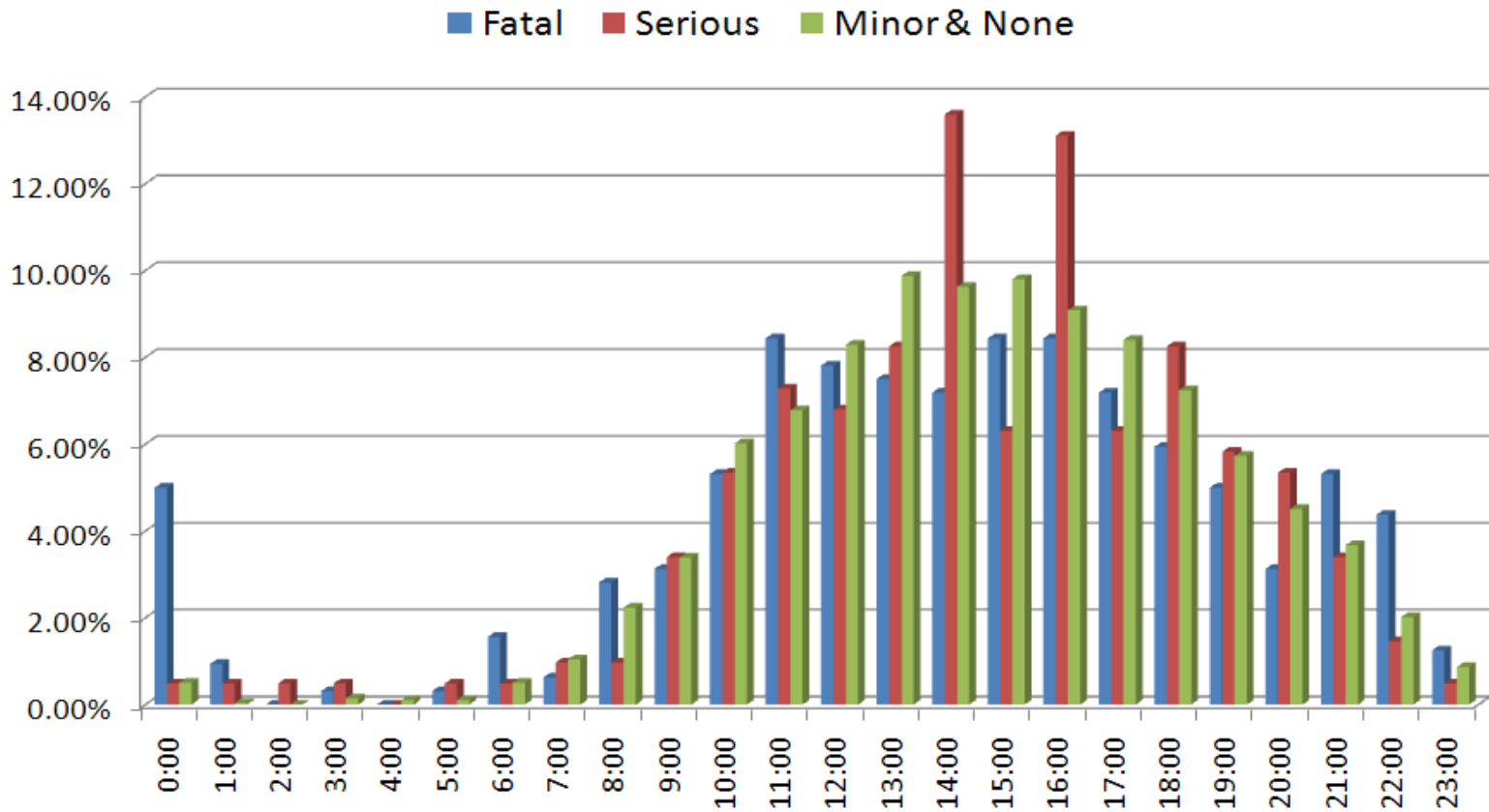
# Percentage of Fatal GA Accidents by Month in U.S. & Alaska (1982-2009)



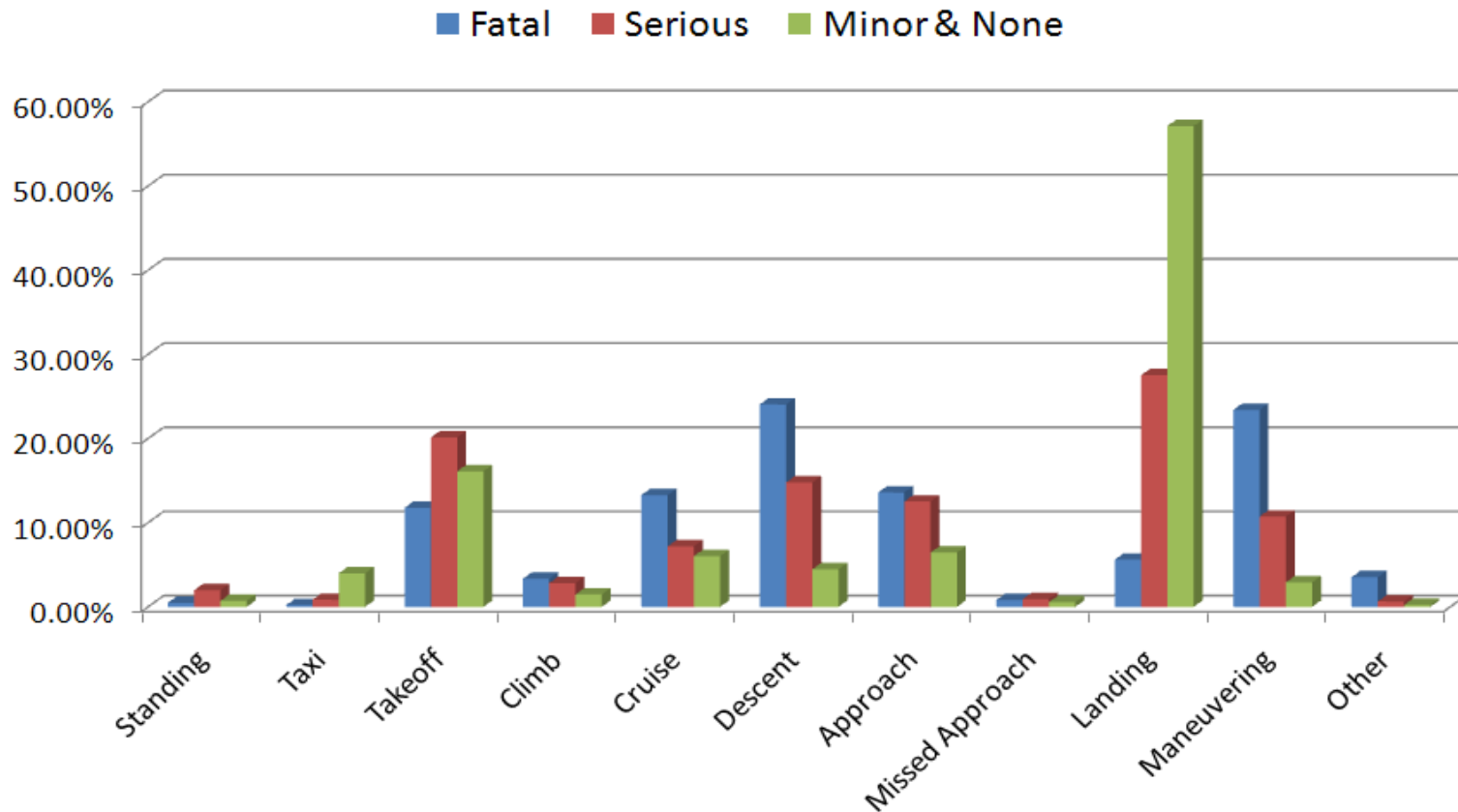
# Percentage of Fatal, Serious, and Minor & None GA Accidents by Time of the Day in U.S. (1982-2009)



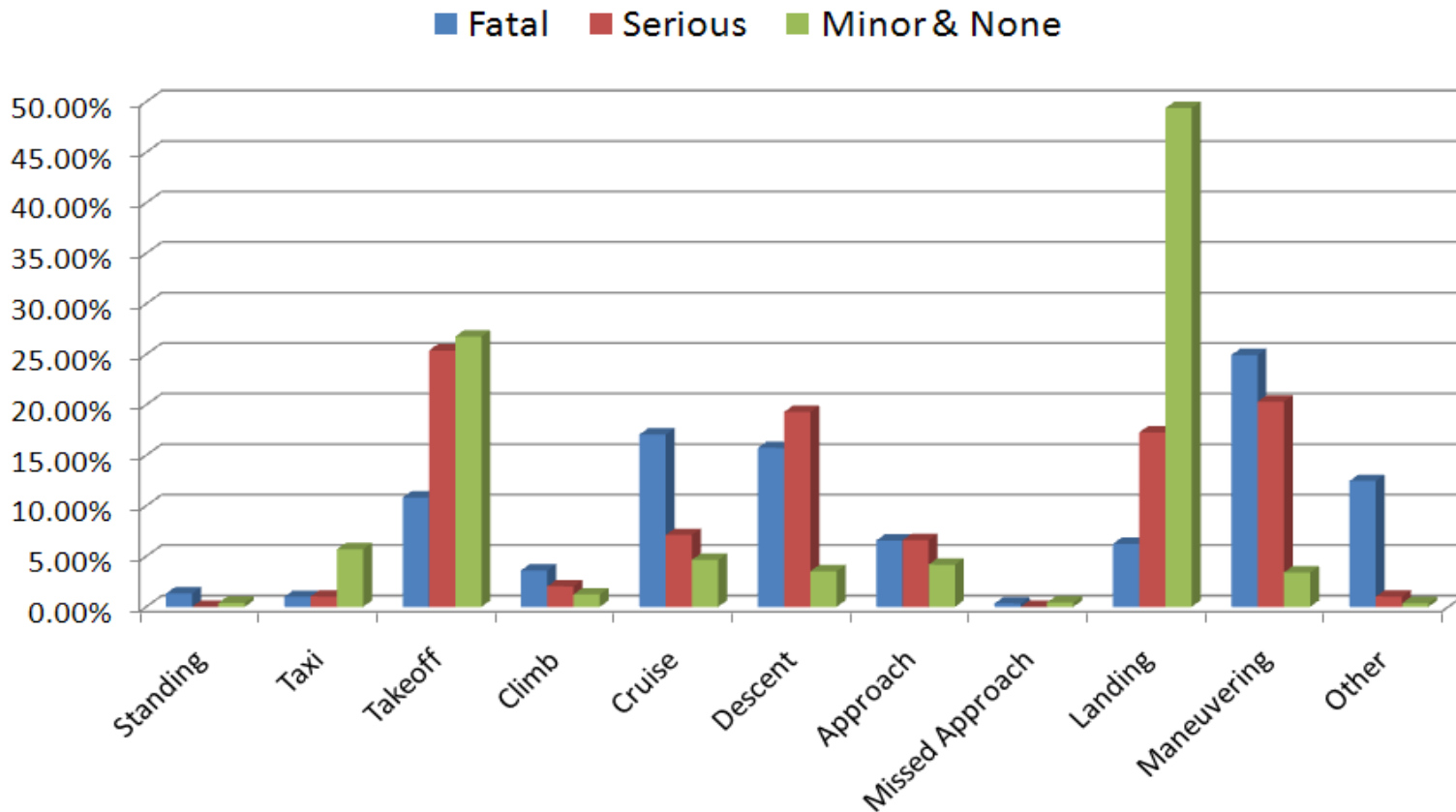
# Percentage of Fatal, Serious, and Minor & None GA Accidents by Time of the Day in Alaska(1982-2009)



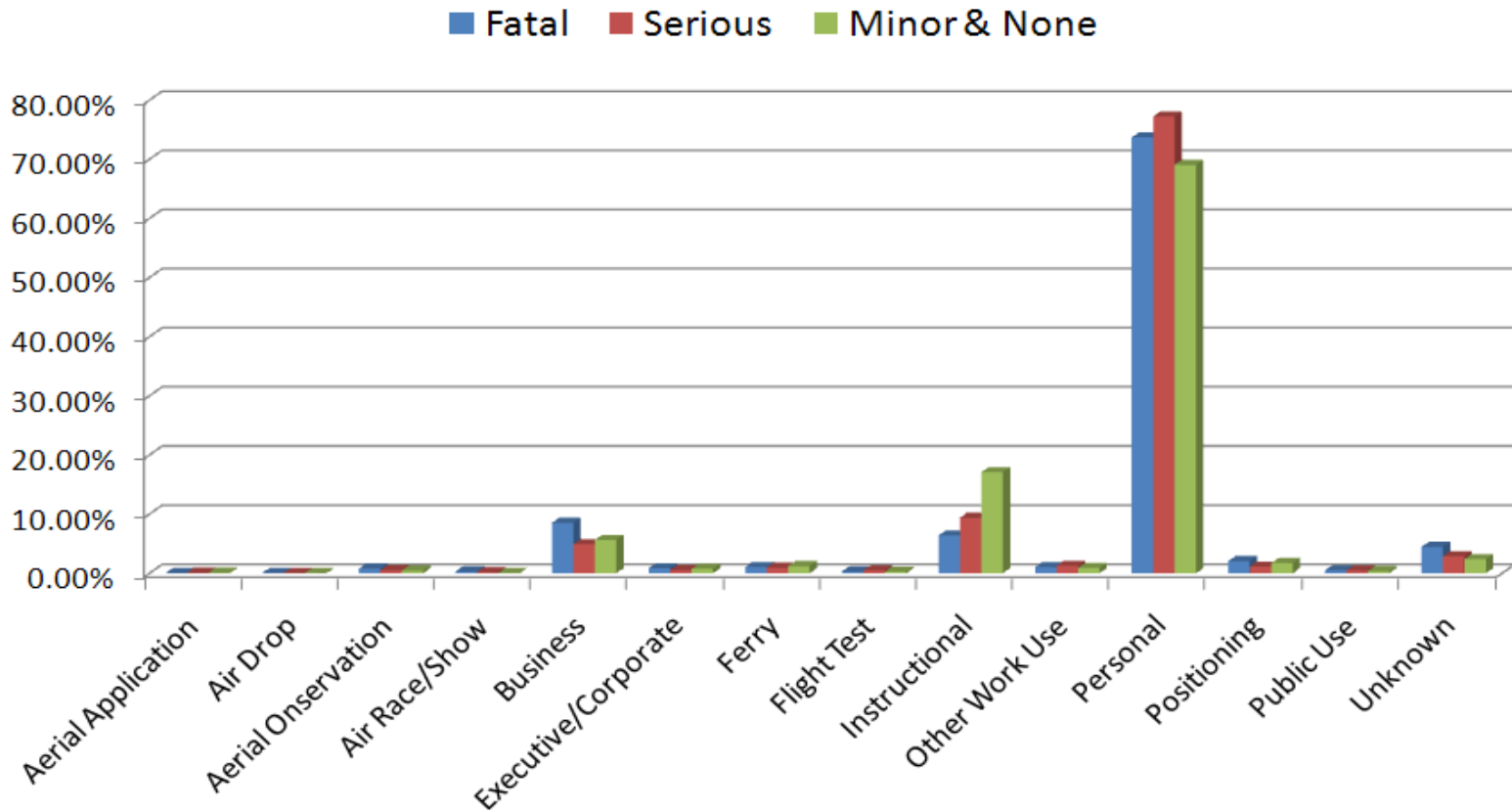
# Percentage of Fatal, Serious, and Minor & None GA Accidents by phase of flights in U.S.(1982-2009)



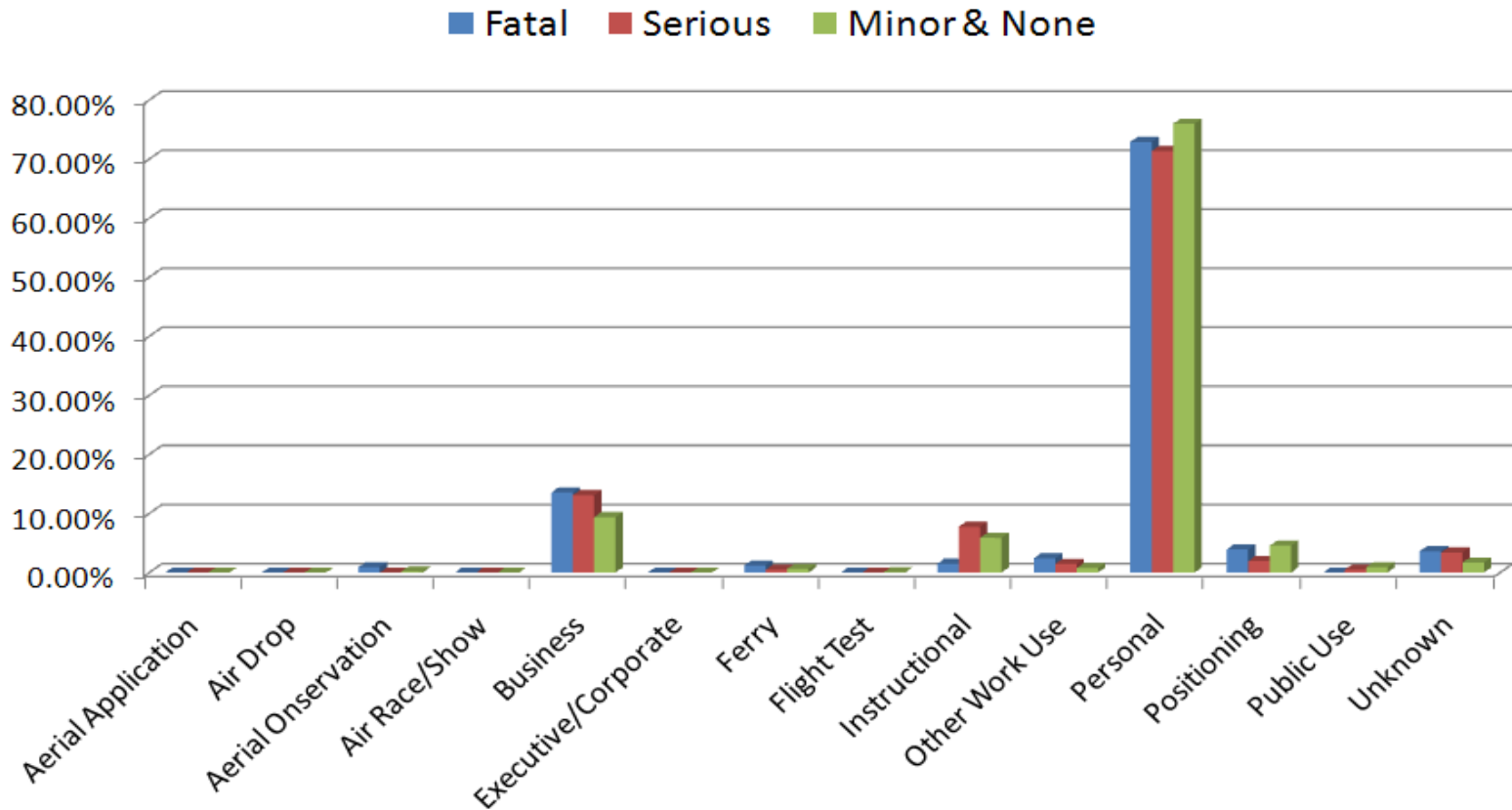
# Percentage of Fatal, Serious, and Minor & None GA Accidents by phase of flights in Alaska(1982-2009)



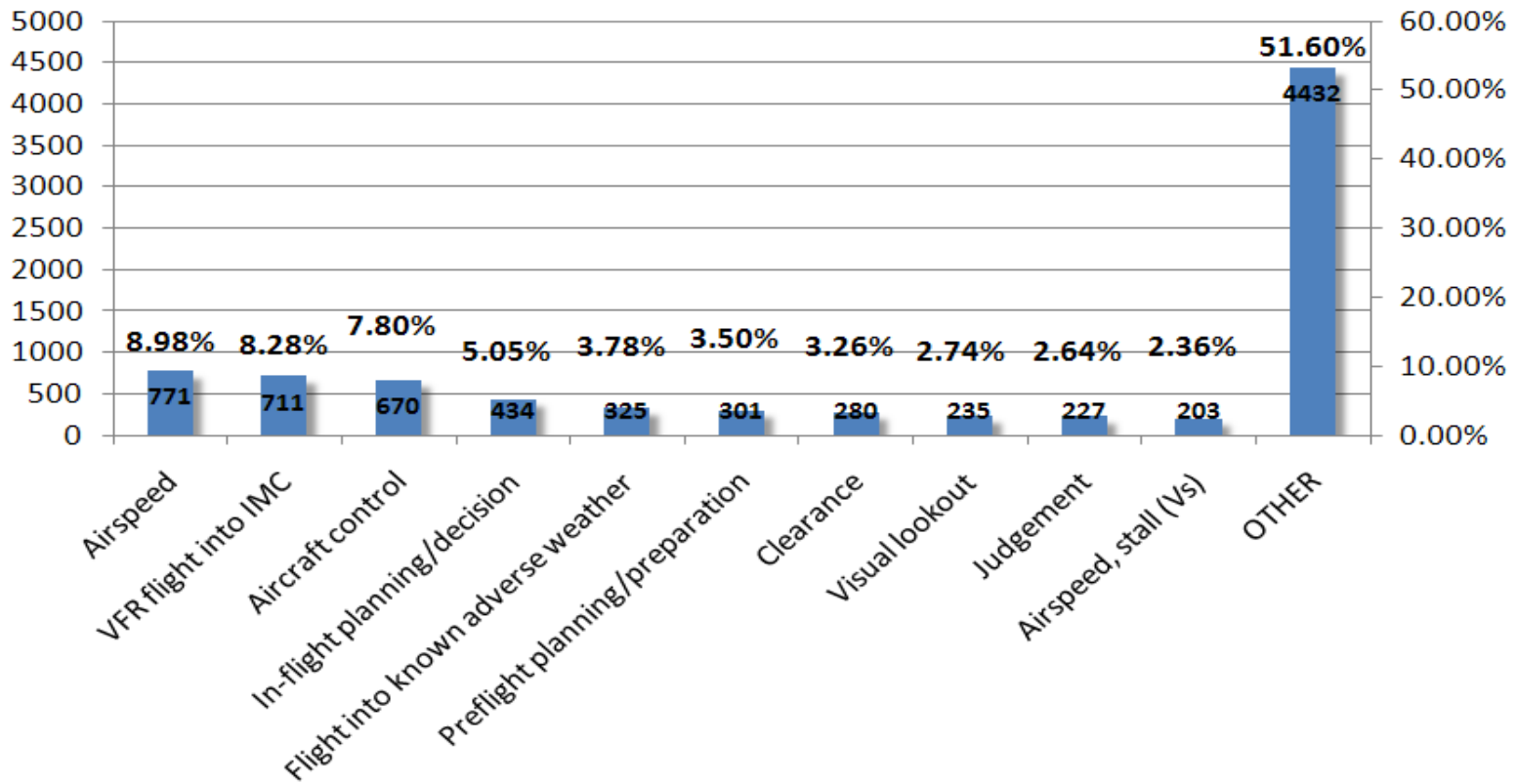
# Percentage of Fatal GA Accidents by Flight Operation in U.S. (1982-2009)



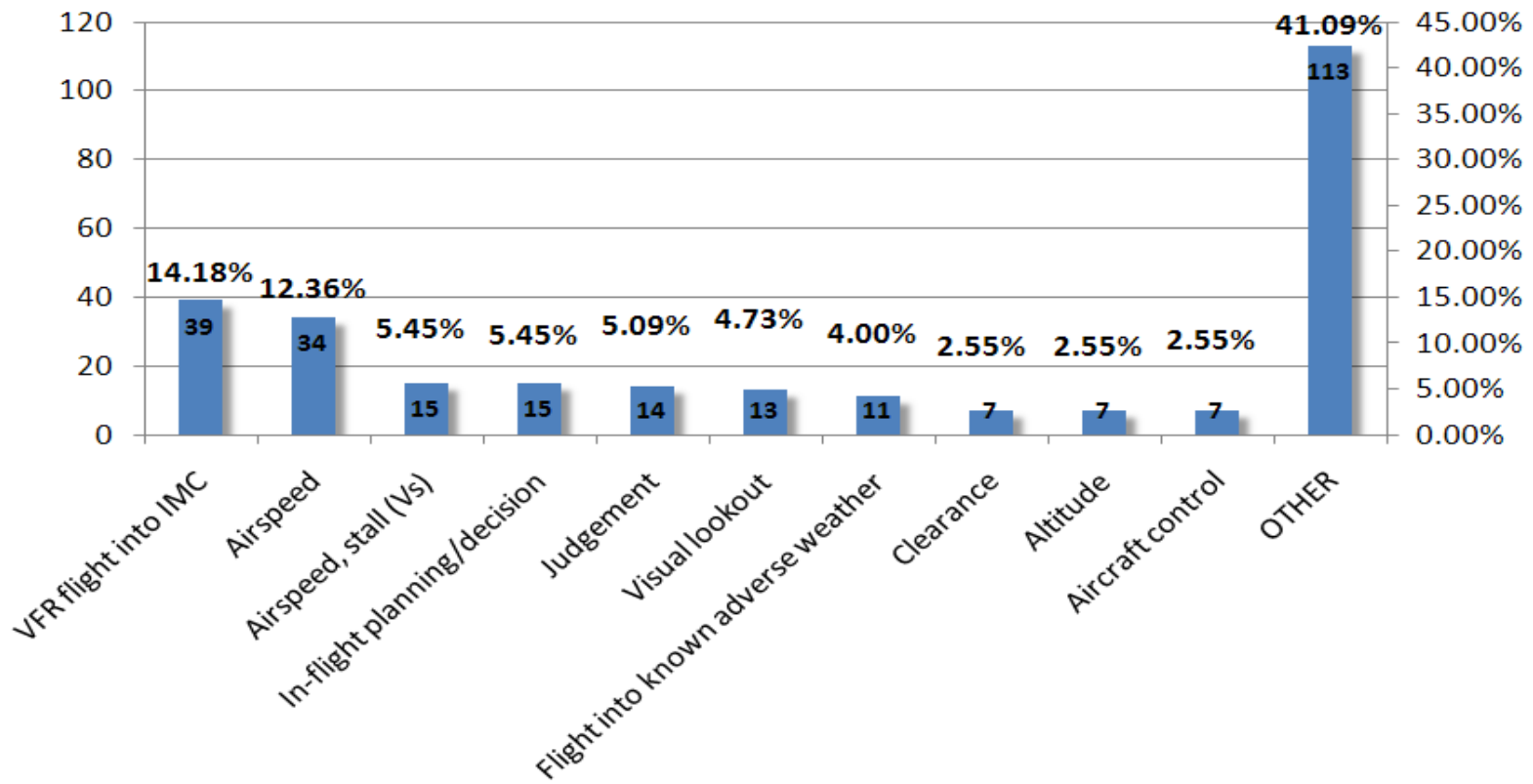
# Percentage of Fatal GA Accidents by Flight Operation in Alaska(1982-2009)



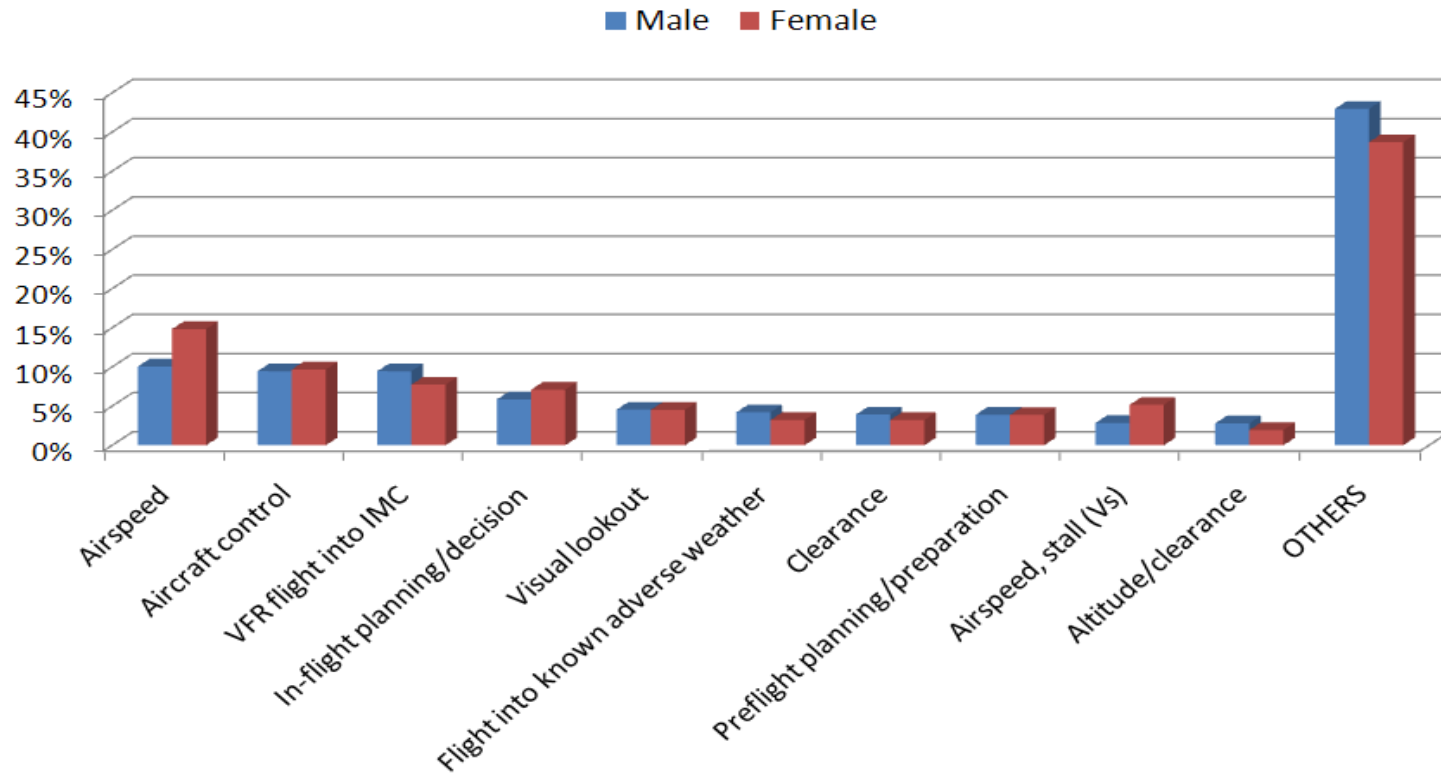
# Percentage of Primary Causes of Fatal GA Accidents in U.S.(1982-2009)



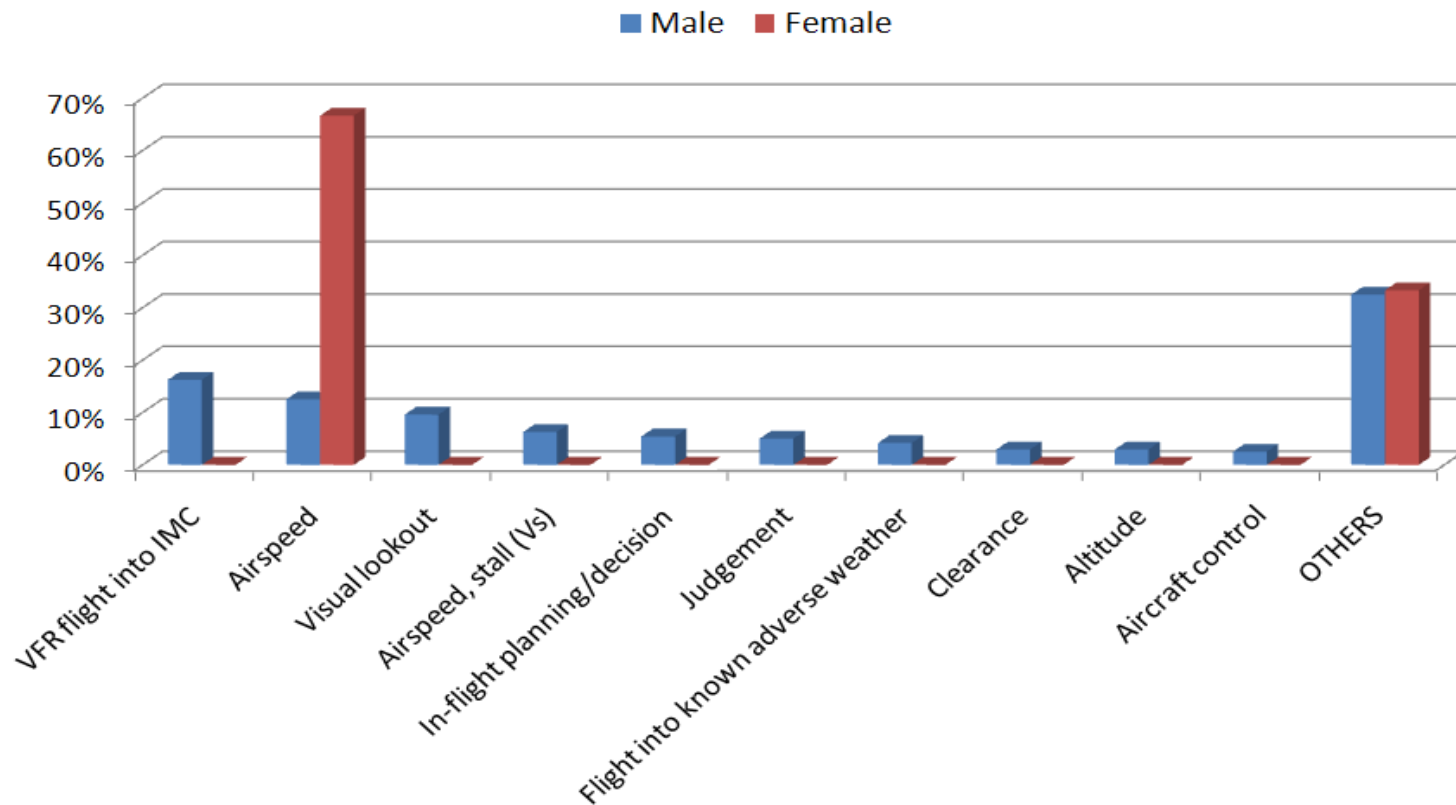
# Percentage of Primary Causes of Fatal GA Accidents in Alaska(1982-2009)



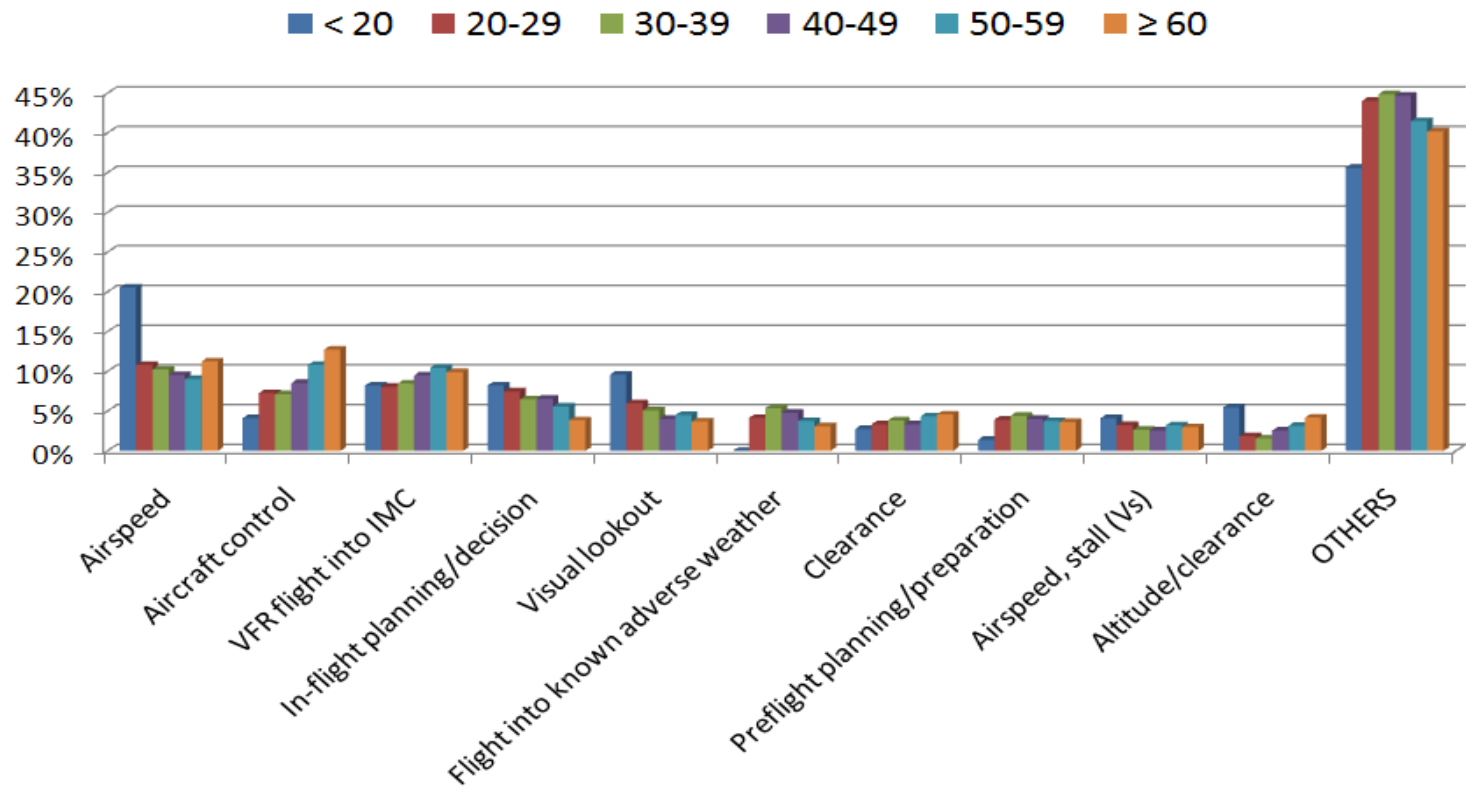
# Percentage of Primary Causes of Fatal GA Accidents by Pilot's Gender in U.S.(1982–2009)



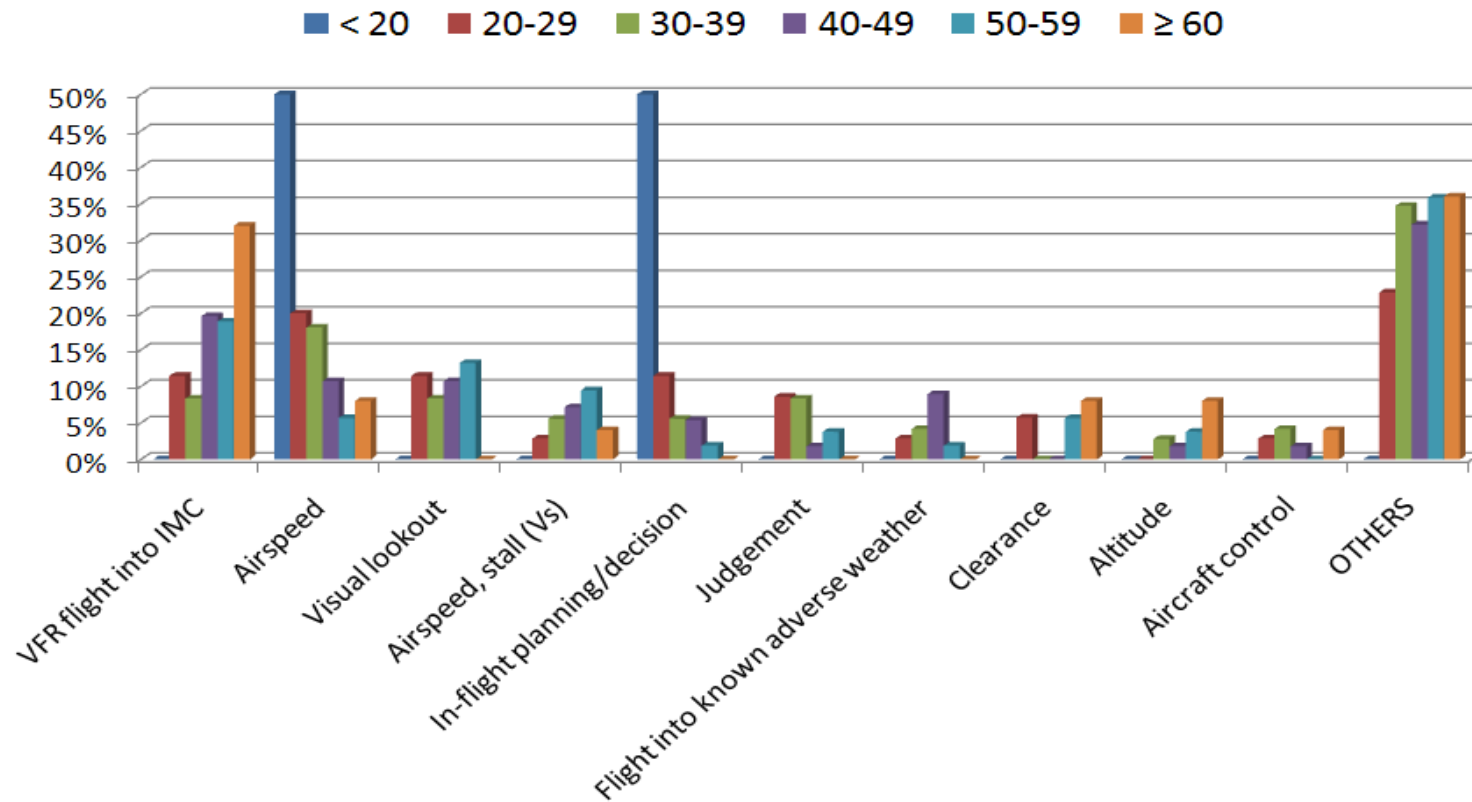
# Percentage of Primary Causes of Fatal GA Accidents by Pilot's Gender in Alaska(1982–2009)



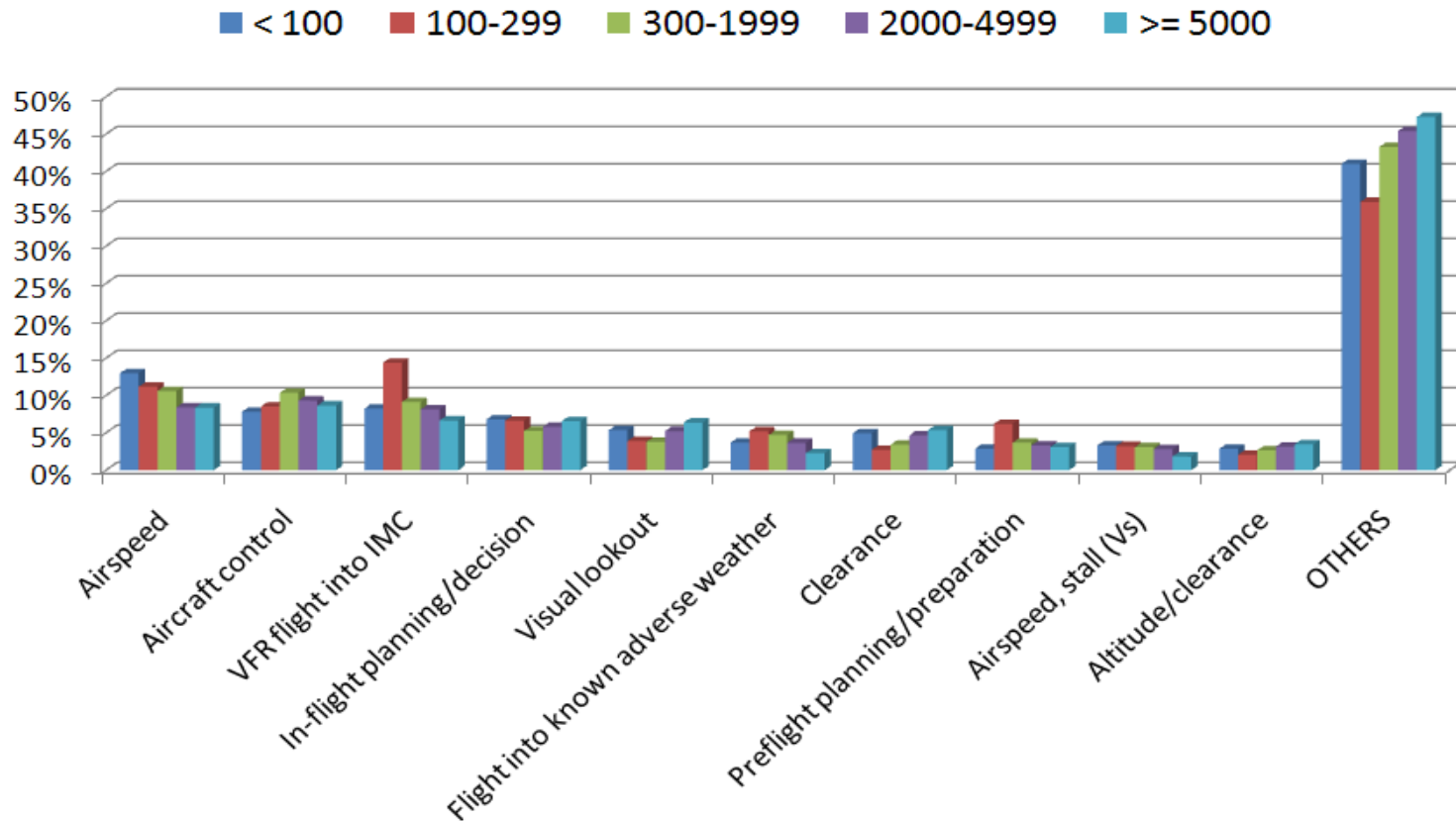
# Percentage of Primary Causes of Fatal GA Accidents by Pilot's Age in U.S.(1982–2009)



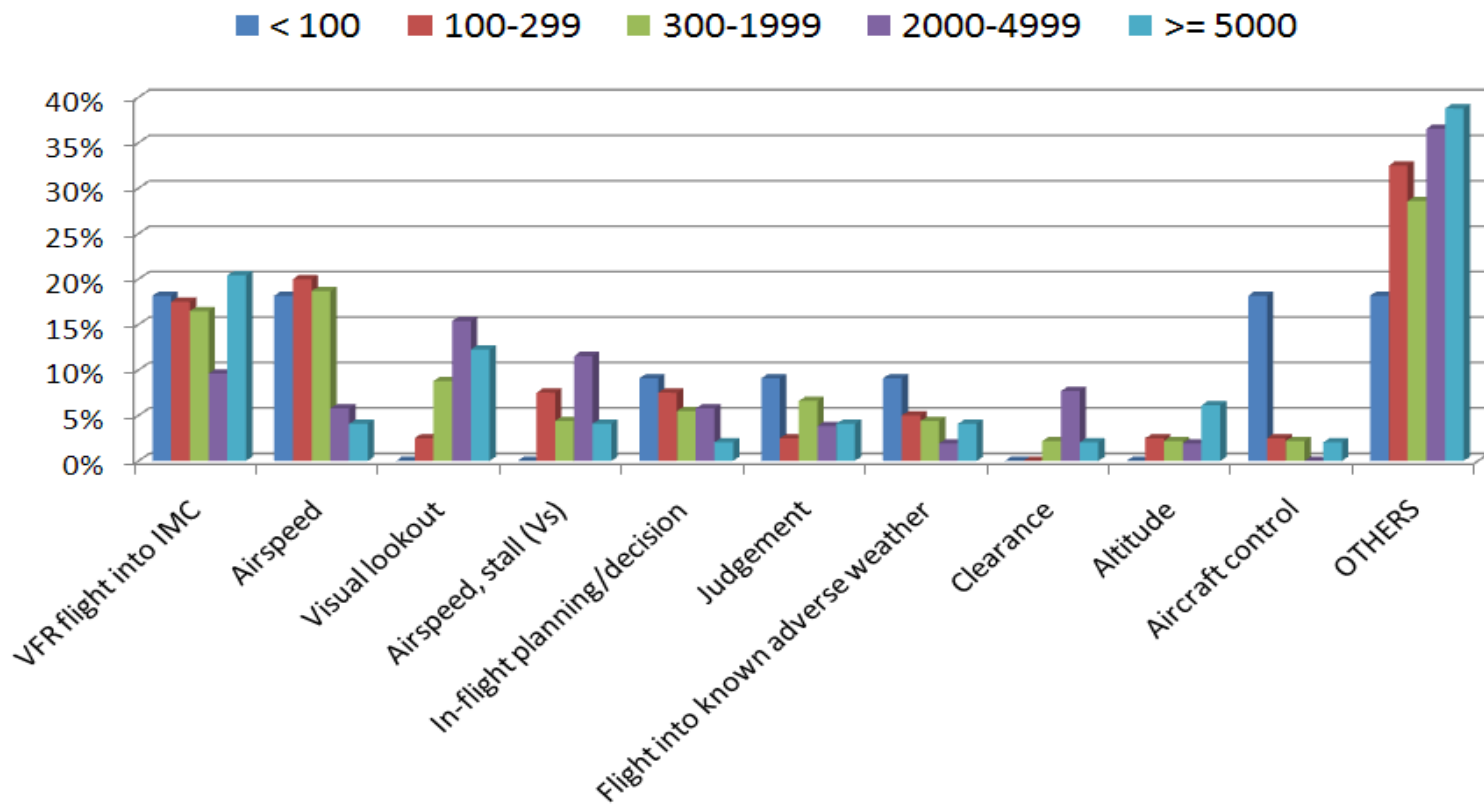
# Percentage of Primary Causes of Fatal GA Accidents by Pilot's Age in Alaska(1982–2009)



# Percentage of Primary Causes of Fatal GA Accidents by Pilot's Hours of Experience in U.S. (1982–2009)



# Percentage of Primary Causes of Fatal GA Accidents by Pilot's Hours of Experience in Alaska(1982–2009)

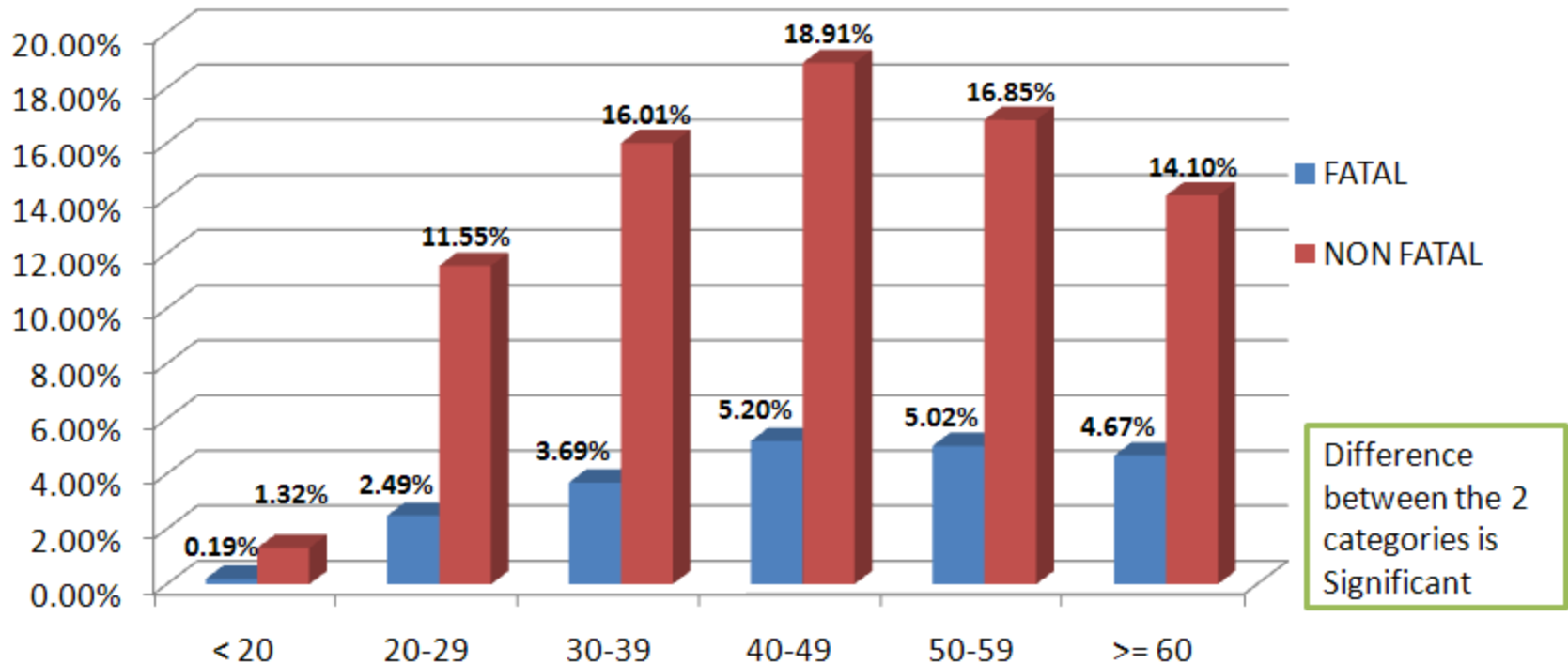


# Statistical Analyses

- Statistical analysis is carried out to increase the clarity and objectivity with which results presented in earlier slides are presented and interpreted.
- For this analyses we included data from GA Accidents Nationwide.

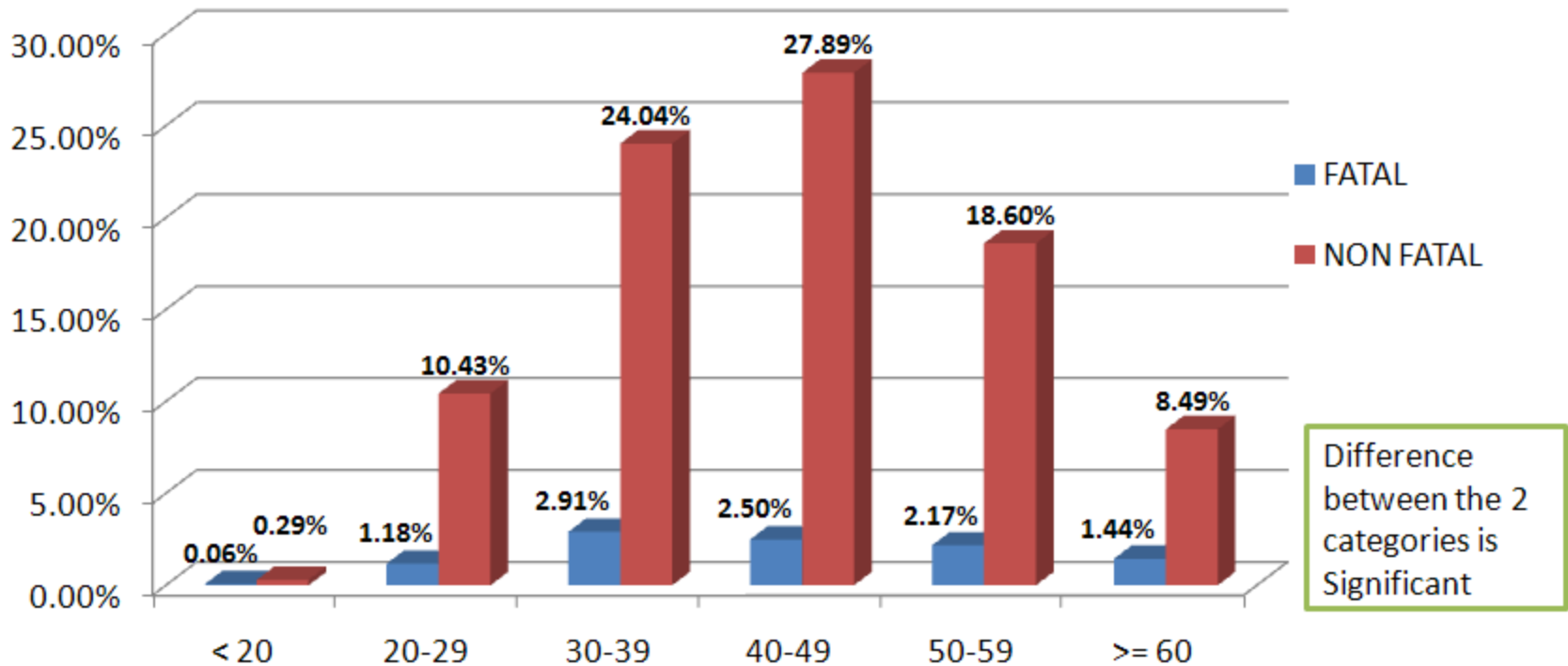
# Statistical Test – U.S. (1982-2009)

## Degree of Injury vs. Pilot's Age



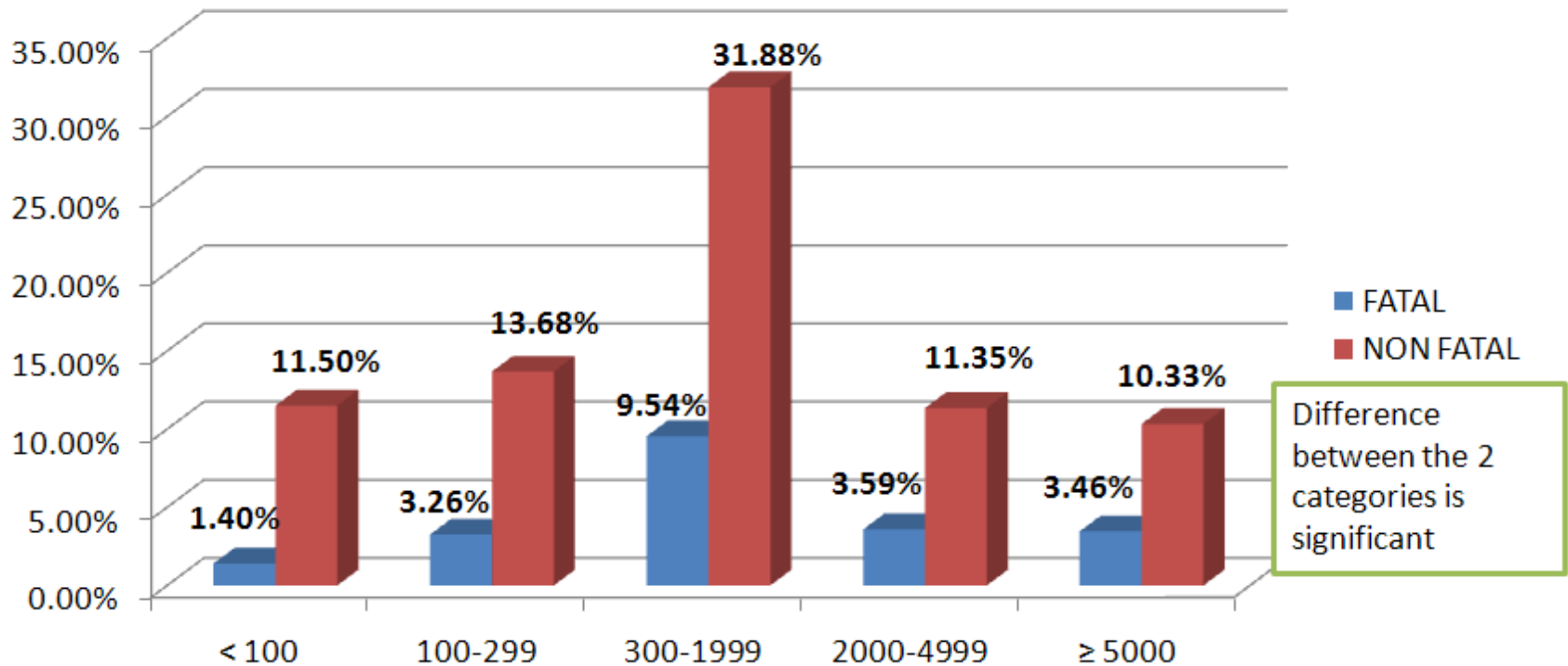
# Statistical Test – Alaska (1982-2009)

## Degree of Injury vs. Pilot's Age



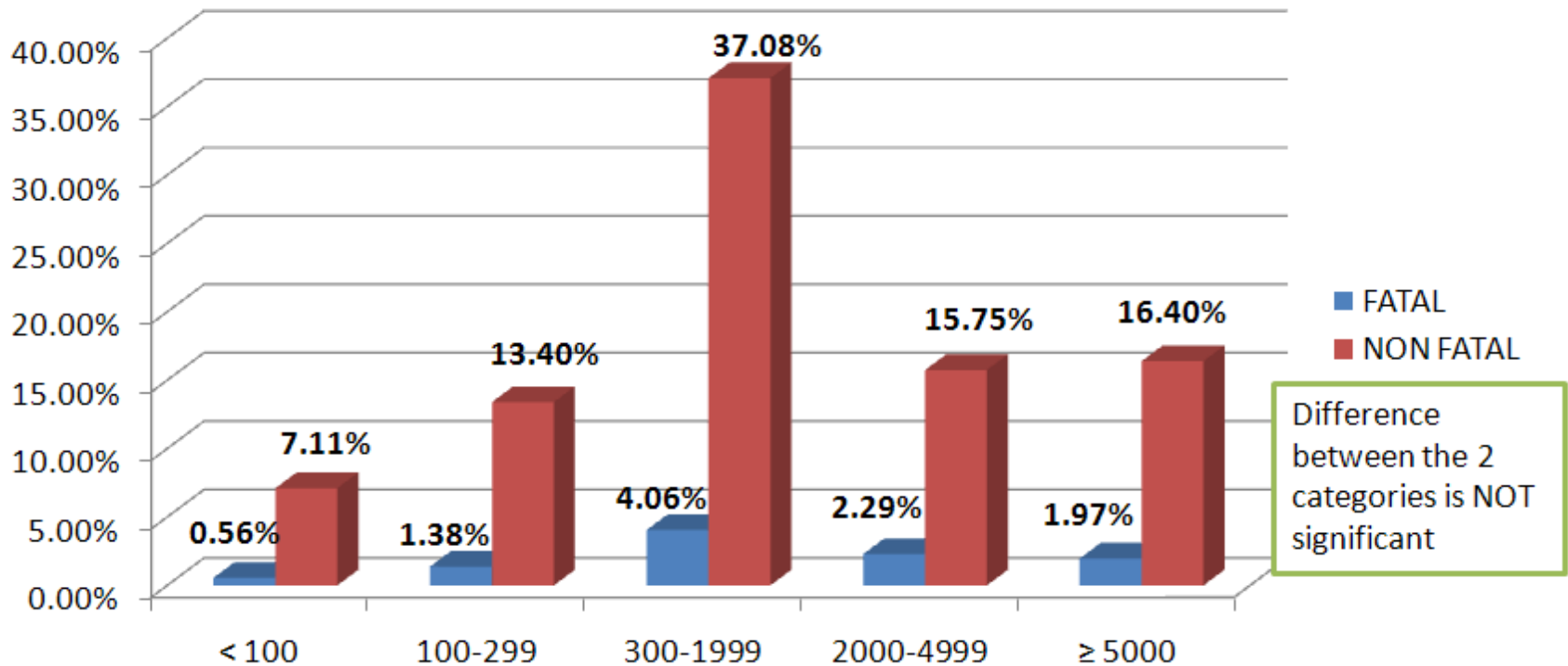
# Statistical Test – U.S. (1982-2009)

## Degree of Injury vs. Pilot Experience (in Hours)



# Statistical Test – Alaska (1982-2009)

## Degree of Injury vs. Pilot Experience (in Hours)



## Statistical Analyses – National. (Pilot's Gender, Age, & Experience)

- Female pilots are less likely to be involved in fatal accidents than their male counterparts.
- Older (>60) and more experienced pilots are more at risk of fatal accidents if an accident occurs.

# National Analyses variables included

- Selected 28 variables
- VFR flight plan;
- Light condition;
- Instrument meteorological condition;
- Cross-country flight;
- Wind velocity in the area;
- Retractable landing gear;

# National Analyses variables included

- # engines;
- Pilot's type rating variable;
- Second pilot on board;
- Seat belt;
- Shoulder harness;
- Medical certificate;

# National Analyses variables included

- Gender;
- Age;
- Pilot's total flight experience;
- *Phase of the flight (taxi, takeoff, climb, descent, ..)*
- *YEAR* of the accident

# National Analyses

## Only those significant

- Only 10 variables found to be significant (combined).
- *Lighting Condition*: positive and significant, indicating that darker environment - increased probability of an accident to be fatal
- *Instrument Meteorological Condition (IMC)*: significant, highest odds ratio.

## National Analyses

- *Cross Country Flight* : positive and significant;
- *Wind Condition* : negative and significant - higher wind velocity - decreases the probability of the accident to be fatal !!

## National Analyses

- *Retractable Landing Gear* : positive, significant.
- *Second Pilot Onboard: Positive, significant (?!!!).*
- *More than 13 percent of the accident airplanes in the sample had a second pilot on board and.*

## National Analyses

- A typical GA pilot has never taken a CRM course. Our results imply that such a course would decrease the number of fatal GA accidents.

## National Analyses

- *Seatbelts* : significant
- *Phase of flight*: CLIMB and DESCENT: significant
- *Pilot's flight time over the last 30 days*
  - less than 5 hours (rusty!): significant
  - More than 100 hours (tired!): significant
- *Year* – Negative and significant

## Work in Progress

- Finalizing the reports for primary causes for 9 regions
- Interpreting and preparing reports for these statistical analyses.
- On-going research to identify the fatal accident pattern using Data mining.

## Potential Future Research

- In the recent NALL Report a brief review of the following classifications are presented. We propose to conduct a study for each region
- Fixed wings and non-fixed wings
- Single and multi engines
- Type of operations
- Fuel management system
- Weather related accidents
- Any other?



Thank You

Q&A