Department of Management
Division of Data, Planning, and Improvement

Traffic Convictions and Crashes for Calendar Years 2023-2024: A Pilot Study

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Executive Summary

The proposed project was aimed to enhance traffic safety analysis by integrating traffic conviction records with crash data in Iowa from calendar years 2023 and 2024.

By aligning traffic-related convictions with crash variables (e.g. day of the week, county size, demographics) this project connected previously siloed information to reveal new insights. This pilot integration will provide the following:

Improve Insights: Identify conditions that tend to be present when the crash occurs, thereby enabling proactive safety measures.

Enhance Resource Allocation: Help agencies prioritize interventions in counties with elevated risk profiles.

Support Data-Driven Policy: Provide decision-makers with actionable data to refine enforcement strategies and educational campaign details.

The breakdowns provide the total counts for these specific incidents, categorized by key metrics.

- A total of 88,535 crash-related convictions were analyzed across calendar years 2023 and 2024.
- Crash-related convictions decreased by 6.1% (N = 2,767) from 2023 to 2024.
- In both years, the 10 most common ages of drivers with crash-related convictions are all between 16 and 25 years old. Males were overrepresented, and white drivers comprised approximately two-thirds of the drivers.
- In 2023, the per capita rate of crash-related convictions in small counties (0.64) was twice the rate compared to large counties (0.32).
- In both years, Friday was the most common day for crashes which resulted in a conviction, followed by Thursday.
- 44.6% of crashes which resulted in a conviction occurred in the afternoon, making it the riskiest time of day.
- Overwhelmingly, daylight and dry conditions were reported at the time of the crash which resulted in a conviction.

Introduction

Background

Studying traffic safety is crucial given that crashes can lead to economic losses, injury, and even death. In fact, vehicle crashes are a leading cause of death in the United States.[1] The National Highway Traffic Safety Administration (NHTSA) estimated that nearly all (94%) of these crashes are caused by human factors (e.g. speeding, distracted driving, or driving under the influence)[2].

A persistent challenge in traffic safety is the fragmentation of data across agencies and systems. Traditional approaches often use compartmentalized data sources, which limits the ability to develop a comprehensive understanding of the causes of crashes and effective interventions. While crash data is the foundation for understanding and addressing traffic safety issues, a more complete picture emerges when this data is analyzed alongside data on traffic citations and convictions.

Currently, these two datasets often exist in separate silos, limiting their collective power. However, by linking these datasets we can more directly tie specific dangerous driving behaviors, which lead to convictions, to the crashes to which they contribute. Further, by linking these datasets a more data-driven approach to traffic safety can be achieved potentially leading to policy changes and the more effective use of resources.

Scope

The current pilot project integrates and analyzes traffic convictions with crash data across calendar years 2023 and 2024 for the state of Iowa. The primary objective is to investigate the relationship between traffic-related convictions and vehicle crashes. This analysis aims to provide a basic view of traffic safety by integrating two previously separate datasets.

More specifically, the scope of this project includes the following key areas:

Data Integration: Linking traffic conviction records from the Iowa Justice Data Warehouse (JDW) with crash data from the Iowa Department of Transportation (DOT) using unique identifiers such as Case ID and Citation Number.

Demographic, Environmental, and Temporal Factors: Analyzing how various factors, including demographics (e.g. age, sex, and race), environmental conditions (e.g. light and surface conditions), and temporal data (e.g. day of the week, time of day), are associated with crash-related convictions.

[1] https://www.cdc.gov/transportation-safety/about/index.html
[2] https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115

County Size: Exploring per capita crash-related conviction rates across counties of different sizes.

Methodology

Data Sources

Data from the two primary sources were linked by matching the Court Case ID and Citation Number to DOT Customer Number for Iowa drivers.

- **Iowa Justice Data Warehouse (JDW):** The JDW is a central repository of key traffic, criminal, and juvenile justice information received from the Judicial Branch, Department of Corrections, and the Department of Health and Human Services[3]. The JDW provided traffic conviction data for calendar years 2023 and 2024.
- **Iowa Department of Transportation (DOT):** The DOT provided corresponding crash data for the same period.

During the analysis period, a full integration was not possible as DOT was unable to provide an ongoing update of crash data due to a department-wide upgrade of their data systems. Thus, a smaller dataset was analyzed. Though a smaller dataset, it still enabled a more comprehensive understanding of crash-related convictions which could become a powerful tool for targeted intervention and policy development.

Variables

The analysis incorporated the following variables.

- **Demographics:** Age, sex, and race of drivers involved.
- **Geographic Data:** County size. Counties were categorized as small if the population was 15,000 or less, medium if the population was between 15,001 and 30,000, and large if the population was greater than 30,000.
- **Temporal Data:** Day of the week and time of the incident.
- **Environmental Data:** Light conditions and surface conditions at the time of the crash.

[3] https://dom.iowa.gov/state-government/data-analytics

Data Analysis and Findings

An analysis of crash-related convictions was conducted for calendar years 2023 and 2024. The breakdowns provide the total counts for these specific incidents, categorized by key metrics.

Overall Results

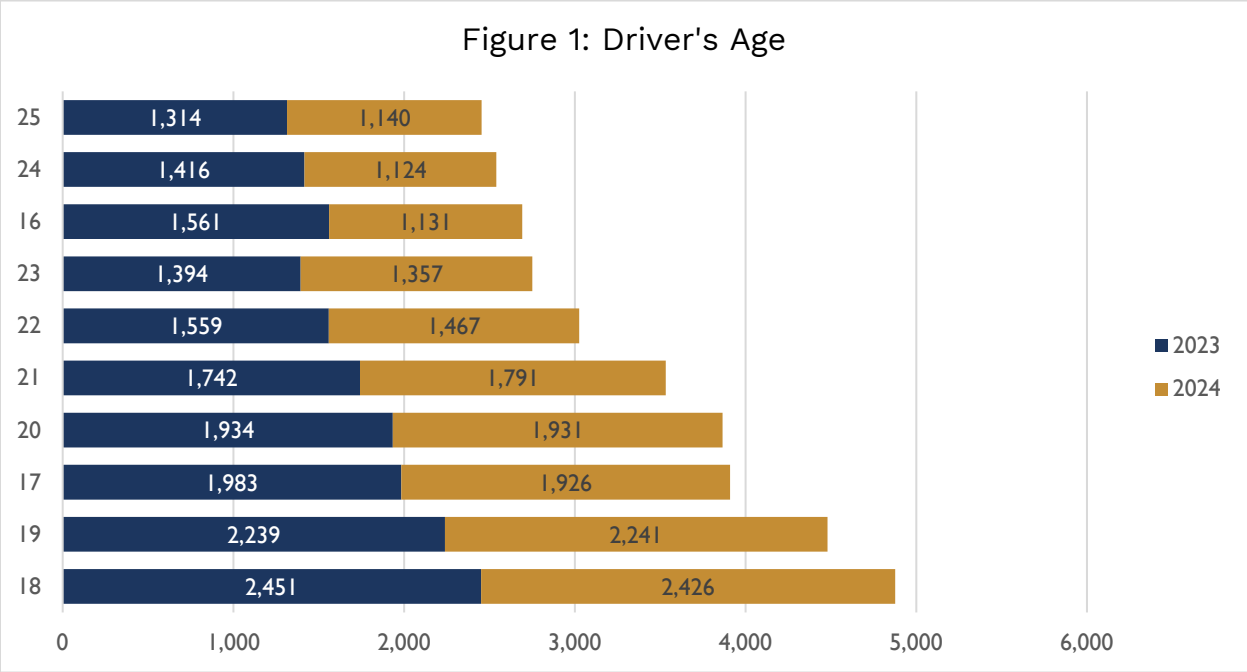
- A total of 88,535 crash-related convictions were analyzed across calendar years 2023 and 2024.
- There was an overall decrease of crash-related convictions of 6.1% (N = 2,767) from 2023 to 2024.

Demographic Analysis

Age

Figure 1 displays the 10 most common ages of drivers who had a crash-related conviction.

Figure 1: Driver's Age



	16	17	18	19	20	21	22	23	24	25
2023	1,561	1,983	2,451	2,239	1,934	1,742	1,559	1,394	1,416	1,314
2024	1,131	1,926	2,426	2,241	1,931	1,791	1,467	1,357	1,124	1,140

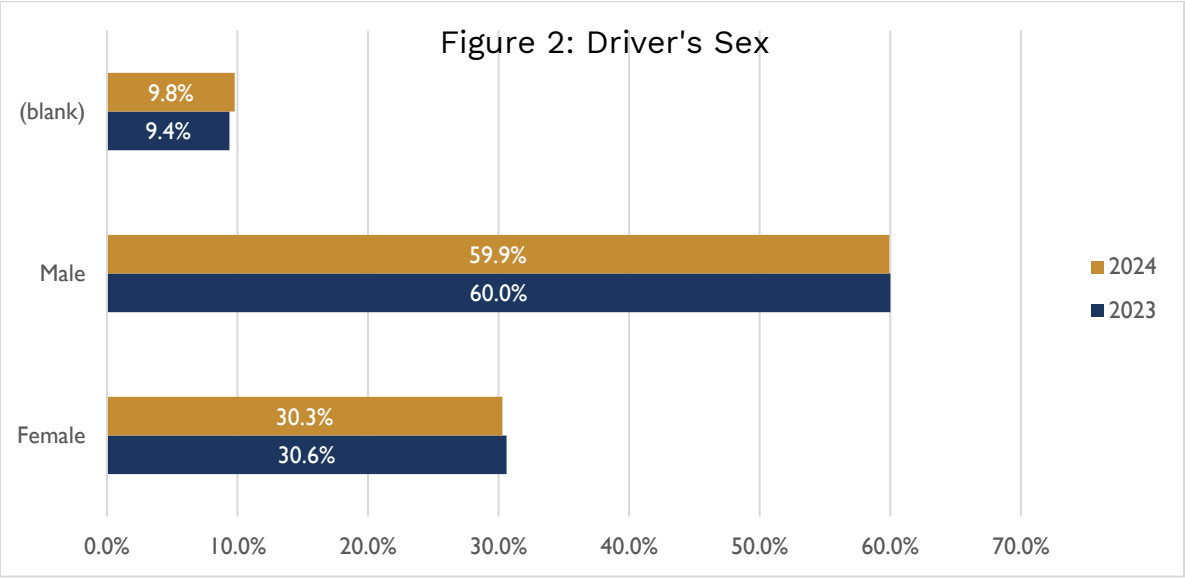
Remarks:

- The most common age of these drivers was 18.

- All of the most common ages were between 16 and 25 years old.

Sex

Figure 2 displays the proportion of males compared to females for drivers who had a crash-related conviction. Also shown are the proportion for those whose sex was not listed.



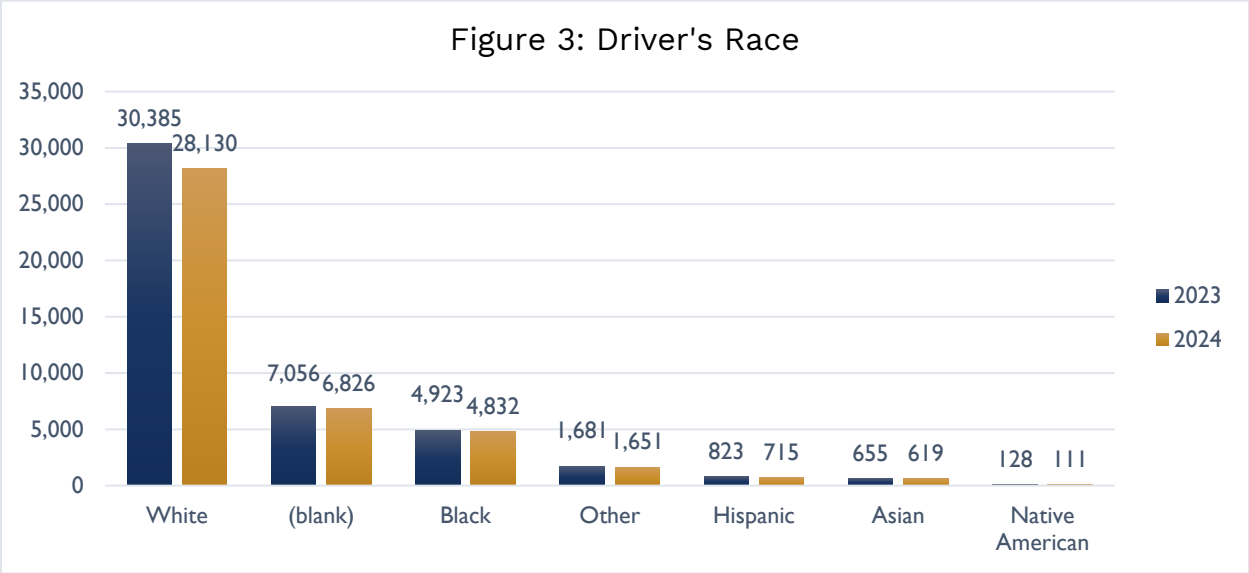
	Female	Male	(blank)
2024	30.3%	59.9%	9.8%
2023	30.6%	60.0%	9.4%

Remarks:

- Males were overrepresented in both 2023 (N = 27,474) and 2024 (N = 25,786).
- Between 2023 and 2024, rates stayed nearly the same for males, females, and when the driver's sex is unknown.

Race

Figure 3 displays the race of the drivers who had a crash-related conviction.



	White	(blank)	Black	Other	Hispanic	Asian	Native American
2023	30,385	7,056	4,923	1,681	823	655	128
2024	28,130	6,826	4,832	1,651	715	619	111

Remarks:

- White drivers comprised approximately two-thirds of these drivers in both years.
- All races showed a decline from 2023 to 2024 for number of crash-related convictions.

Geographic Analysis

County Size

Small counties are defined as those with 15,000 or fewer residents, medium counties as those with populations between 15,001 and 30,000, and large counties as those with populations exceeding 30,000.

Table 1 displays the per capita crash-related conviction rates across counties of different sizes. For example, in 2023 there were 640 crash-related convictions per 1,000 residents (0.64 x 1,000) in small counties. In the same year, medium counties had 370 and large counties had 320 crash-related convictions per 1,000

residents.

These figures were calculated using the average population for each county size: large (Average = 100,605), medium (Average = 19,425), and small (Average = 9,883). See the Appendix for a detailed view of county population and classification of the county size.

Table 1: Crashes Per Capita by County Size and Year

County Size	2023	2024
Small	0.64	0.57
Medium	0.37	0.35
Large	0.32	0.30

Remarks:

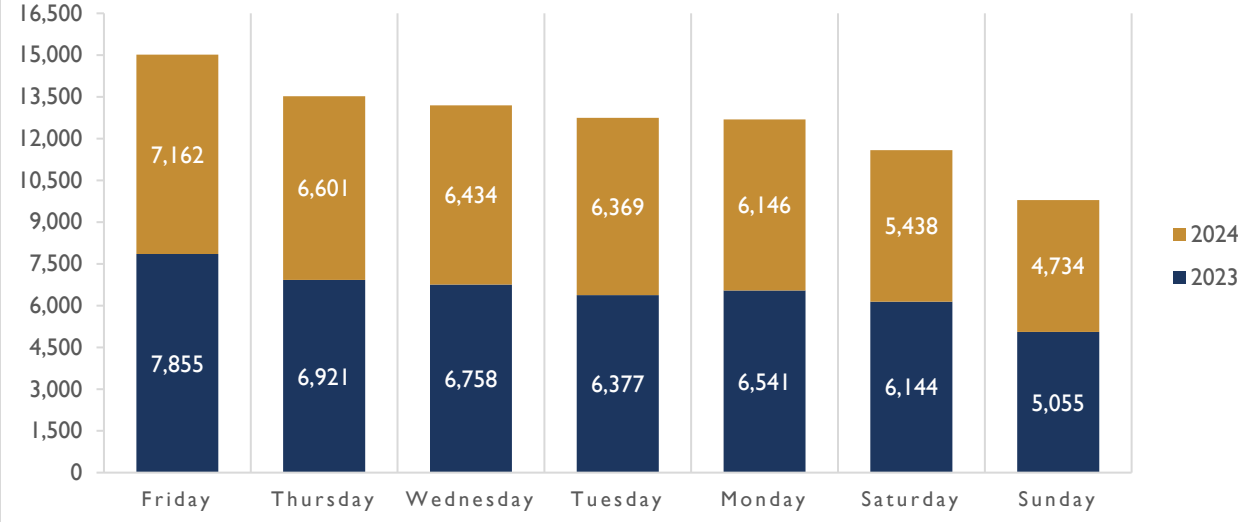
- In 2023, the rate of crash-related convictions in small counties (0.64) was twice the rate of large counties (0.32).
- The crash-related convictions decreased for all county sizes from 2023 to 2024.
- In both years, per capita crash-related conviction rates were similar between medium (0.37 and 0.35) and large counties (0.32 and 0.30).

Temporal Analysis

Day of the Week

Figure 4 displays the day of the week the crash occurred which resulted in a conviction.

Figure 4: Day of the Week



	Friday	Thursday	Wednesday	Tuesday	Monday	Saturday	Sunday
2024	7,162	6,601	6,434	6,369	6,146	5,438	4,734
2023	7,855	6,921	6,758	6,377	6,541	6,144	5,055

Remarks:

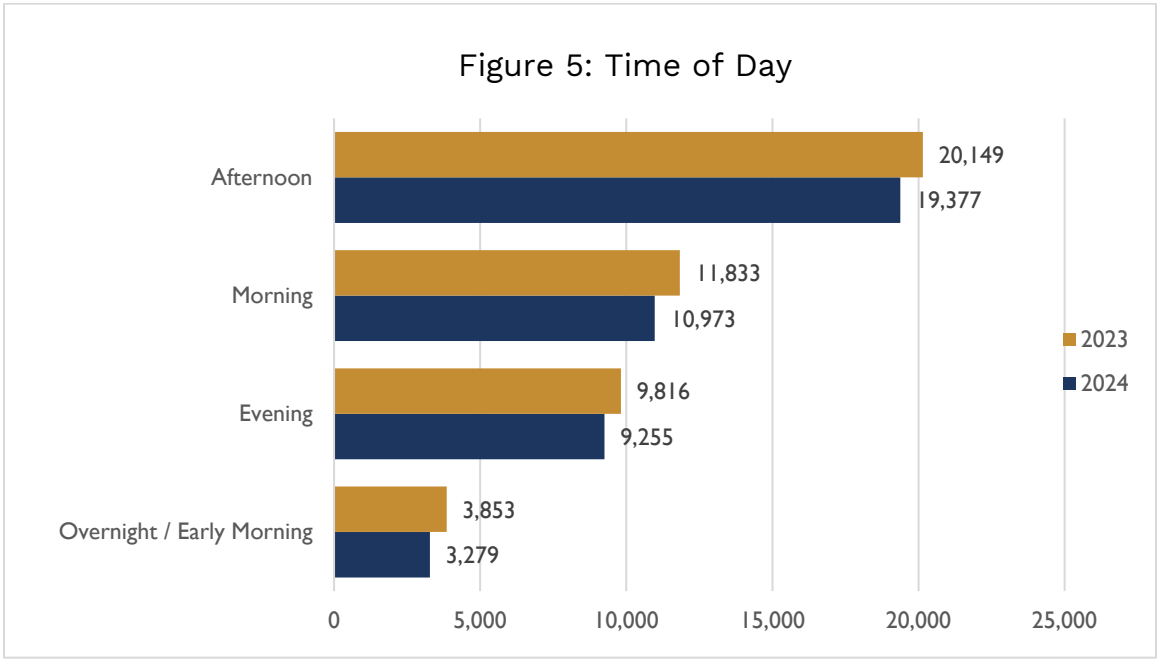
- In both years, Friday was the day with the most crashes, followed by Thursday.
- In both years, Sunday was the day with the fewest crashes.

Time of Day

Figure 5 displays the time of day the crash occurred which resulted in a conviction. The time of the crash was grouped into 4 categories. They are as follows:

- 12:01 AM - 6:00 AM Overnight/Early Morning
- 6:01 AM - 12:00 PM Morning
- 12:01 PM - 6:00 PM Afternoon
- 6:01 PM - 12:00 AM Evening

Figure 5: Time of Day



	Overnight/Early Morning	Evening	Morning	Afternoon
2023	3,853	9,816	11,833	20,149
2024	3,279	9,255	10,973	19,377

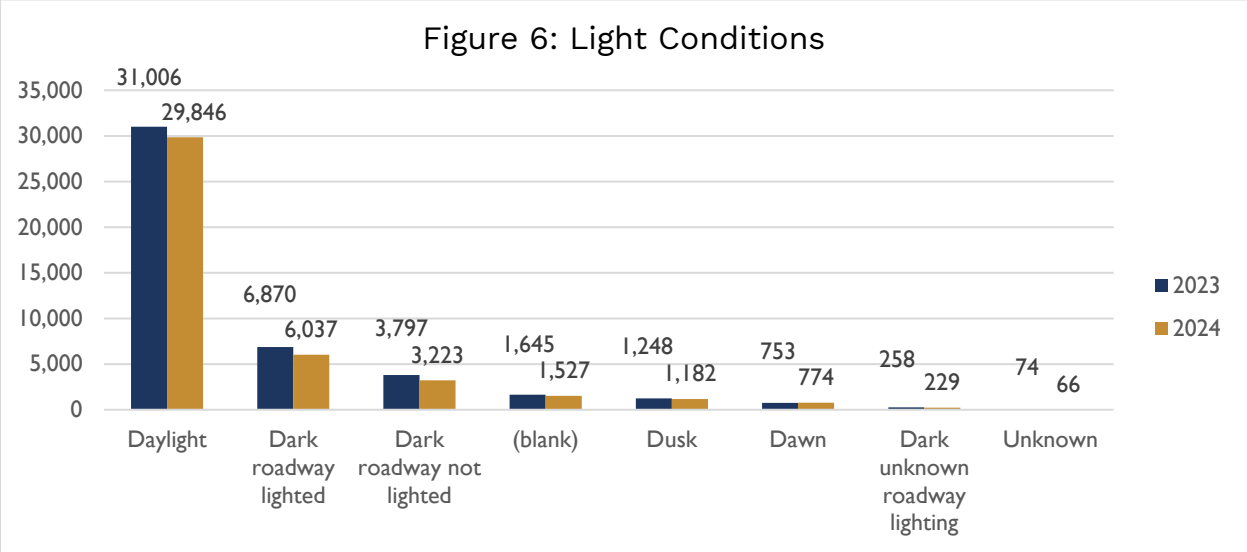
Remarks:

- 44.6% of crashes occurred in the afternoon, making it the riskiest time of day for driving.
- Overnight/Early Morning has the lowest number of crashes, about one-fifth of the afternoon total.

Environmental Analysis

Light Conditions

Figures 6 and 7 display the light and surface conditions that were present when the crash occurred.

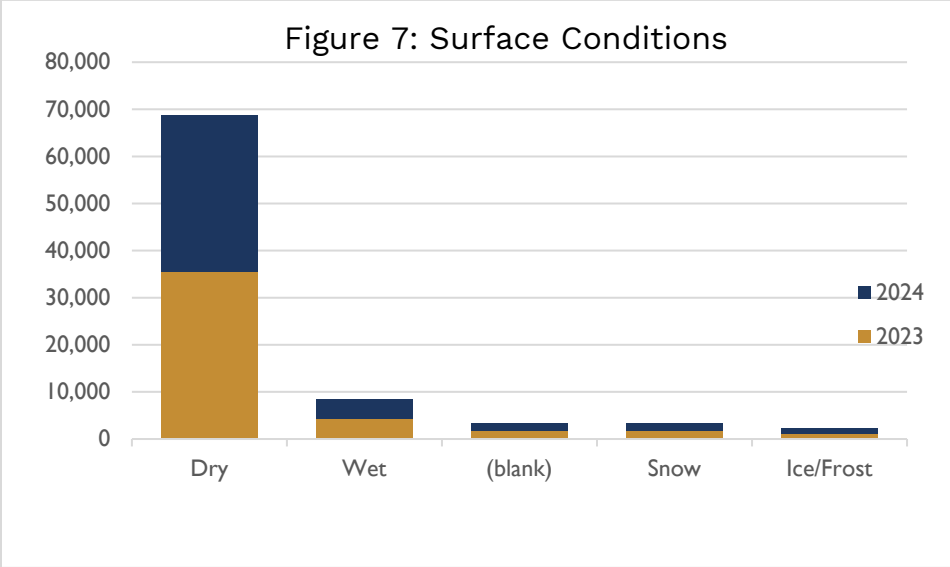


	Daylight	Dark Roadway Lightened	Dark Roadway Not Lightened	(Blank)	Dusk	Dawn	Dark Unknown Roadway Lighting	Unknown
2023	31,006	6,870	3,797	1,645	1,248	753	258	74
2024	29,846	6,037	3,223	1,527	1,182	774	229	66

Remarks:

- Daylight conditions were reported in 67.9% of crashes in 2023 and 69.6% in 2024.

Surface Conditions



	Dry	Wet	(Blank)	Snow	Ice/Frost
2024	33,146	4,171	1,563	1,595	1,126
2023	35,519	4,250	1,689	1,650	1,221

Remarks:

- Across 2023 and 2024, dry conditions were reported 79.9% of the time.

Conclusion

Integrating traffic convictions and crash data creates opportunities for improving traffic safety. By examining this data, partners can gain a more complete understanding of the factors that contribute to crashes.

- **Identifying High-Risk Drivers**
  - Analysis of an individual's citation and conviction history alongside their crash records can help identify patterns of risky behavior. For example, a driver with multiple speeding tickets may be at a higher risk of future crashes.
- **Evaluating Law Enforcement Effectiveness/Outcomes**
  - Integration of this data enables the ability of agencies to measure the impact of enforcement efforts. By adopting a data-driven approach, safety initiatives are grounded in evidence ensuring optimal resource allocation.
- **Data-Driven Decisions**

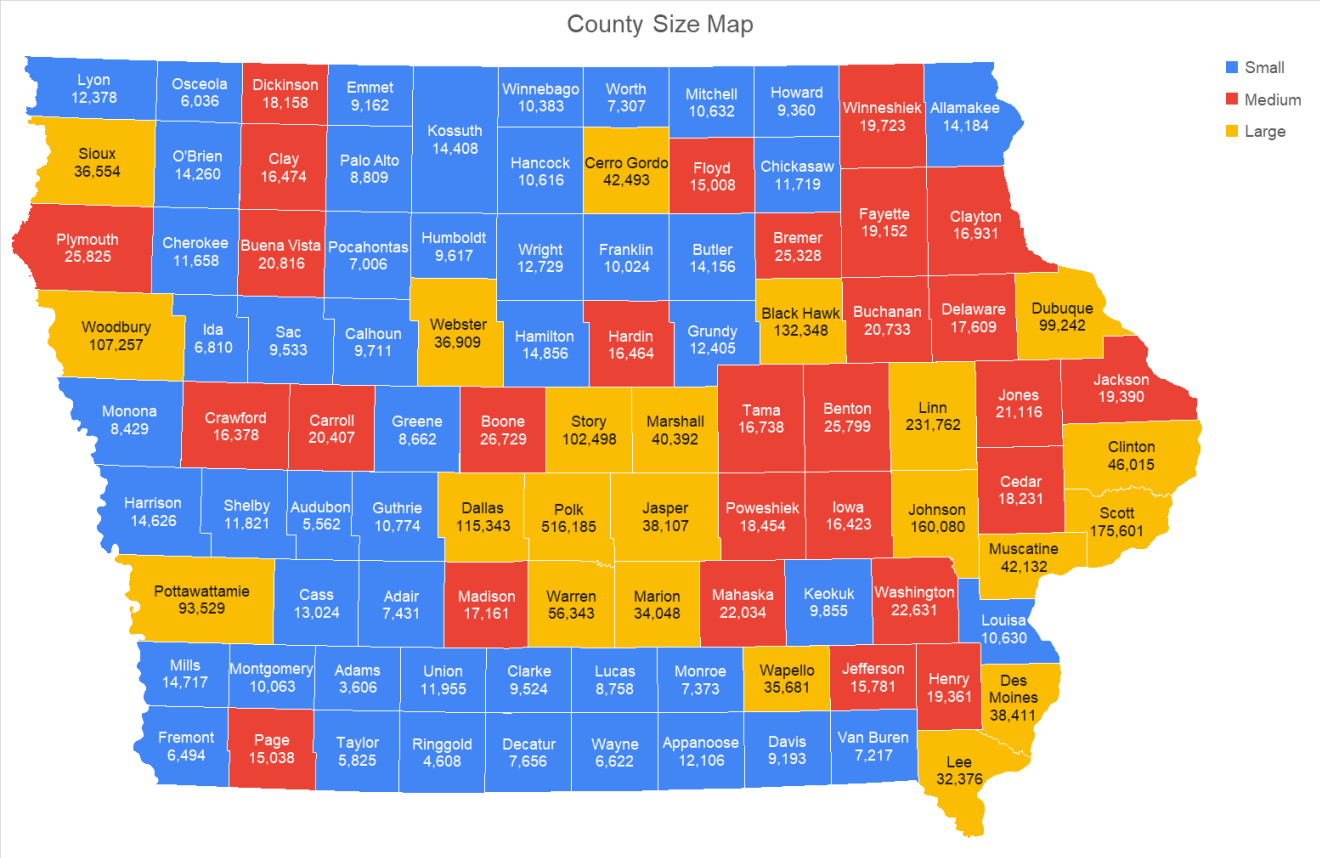
    - Utilization and understanding of traffic safety data (e.g. roadway characteristics) may help agencies shift to a more timely and forward-thinking approach.
- **Additional benefits for integrating and analyzing crashes and convictions**
    - Provide data for federal, state, or local safety grants/funding.
    - Analyze whether convictions in a specific area correlate with a decrease in related crashes over time.
    - Identify peak locations, times, or other factors for crashes tied to specific violations.

Future Efforts

- Ensure demographic information as well as environmental information (e.g. light and surface conditions) are included in crash reports. This will result in a more comprehensive analysis allowing for more valid and reliable results.
- While external factors such as surface conditions and day of the week are important on their own, driver behavior is a necessary link between these external factors and crashes. Thus, investigating problematic driver behavior may be an avenue for future research.
- Focusing on chronic offenders, those who are repeatedly involved in crashes resulting in a conviction, could also provide invaluable information. It could reveal factors that differentiate chronic offenders from other drivers.

Appendix

Map of Iowa counties categorized as small, medium, or large. Small counties are those with populations of 15,000 or less, medium counties are those with populations between 15,001 and 30,000, and large counties are those with populations greater than 30,000. County populations were obtained from the Iowa Data Hub[4].



Average population:

- small counties (N = 49): 9,883
- medium counties (N = 28): 19,425
- large counties (N = 22): 100,605

[4] https://data.iowa.gov/Community-Demographics/Iowa-Population-by-County-ACS-5-Year-Estimates-/wp3b-5sbd/about_data