

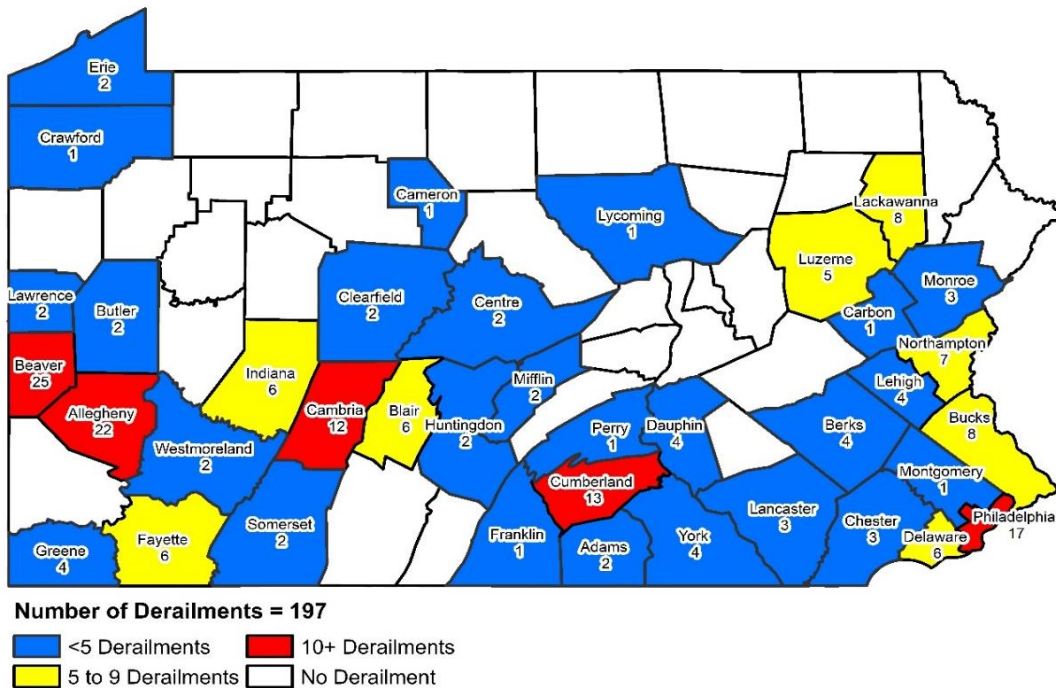
Introduction

The recent train derailment along the Ohio/Pennsylvania border has once again shown how devastating these accidents can be to surrounding communities. To provide more information about the frequency of this type of train accident, the Center for Rural Pennsylvania analyzed the number of derailments in Pennsylvania and the U.S. from 2018 to November 30, 2022. The Center used data from the Federal Railroad Administration’s Office of Safety Analysis (see Methods on Page 7).

Key Findings:

- There were 197 train derailments in Pennsylvania from 2018 to 2022: 30 percent occurred in a rural county and 70 percent occurred in an urban county.
- Only two of the 197 derailments in Pennsylvania from 2018 to 2022 involved passenger trains.
- On average, 4.1 rail cars derailed per incident.
- Twenty-three percent of all Pennsylvania derailments involved train cars carrying hazardous materials.
- Equipment damage from derailments totaled \$33.5 million; the median loss was \$33,477 per derailment.
- Twenty-one percent of rural and 33 percent of urban Pennsylvanians live within one-half mile of a train track.

Train Derailments, by County, 2018 to 2022

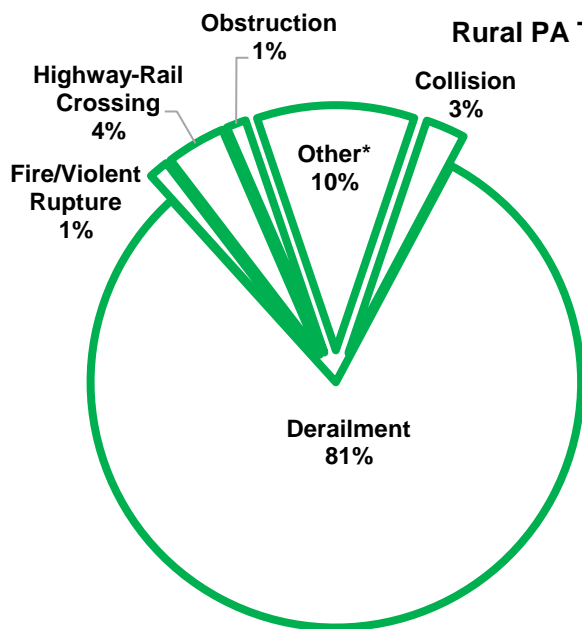


Types of Train Accidents

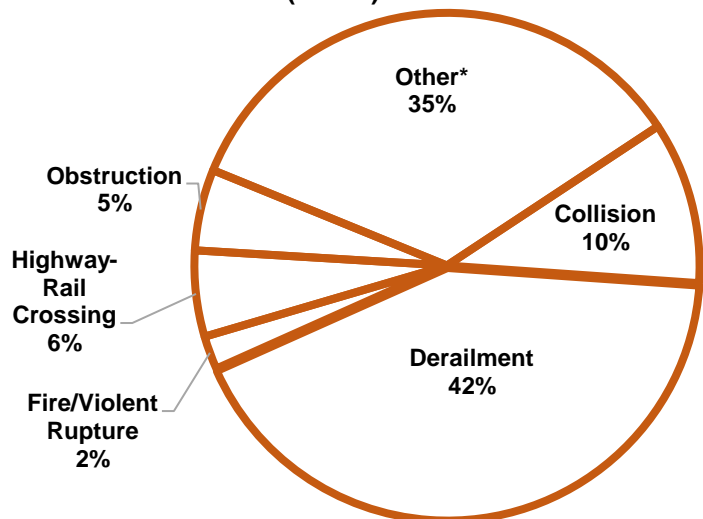
From 2018 to 2022, there were 358 reported train accidents in Pennsylvania. In rural counties, most of these accidents (81 percent) were derailments. Other types of accidents included highway-rail crossing (4 percent), fire/violent rupture (1 percent), collision with other trains (3 percent), obstruction (1 percent) and other (10 percent). In urban counties, derailments accounted for 42 percent of the accidents and other incidents accounted for 58 percent of accidents. While there were no fatalities or injuries in Pennsylvania because of train derailments from 2018 to 2022, there were six fatalities and 24 injuries from other types of train accidents, most commonly highway-rail crossings (66 percent).

Nationwide, there were 10,698 reported train accidents, 54 percent of which were derailments.

Types of Train Accidents in Rural and Urban Pennsylvania, 2018-2022
Note: Other includes mud/snow slides, running through stop signals, and other.*



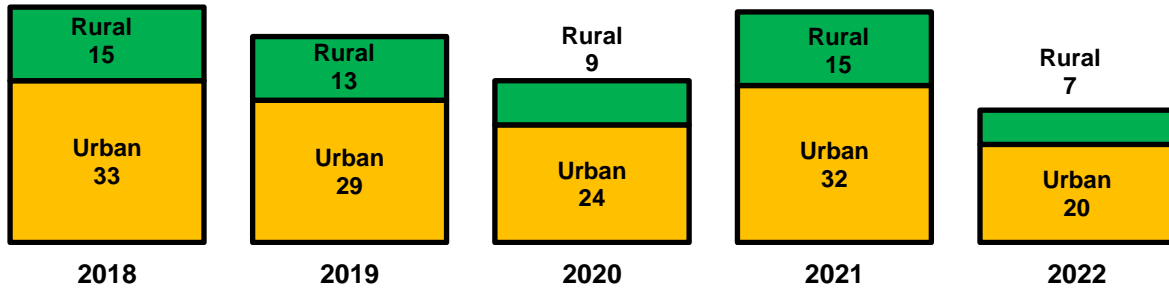
Urban PA Train Accidents (n=286)



Number of Derailments

From 2018 to 2022, 30 percent of the 197 derailments occurred in a rural county and 70 percent occurred in an urban county.

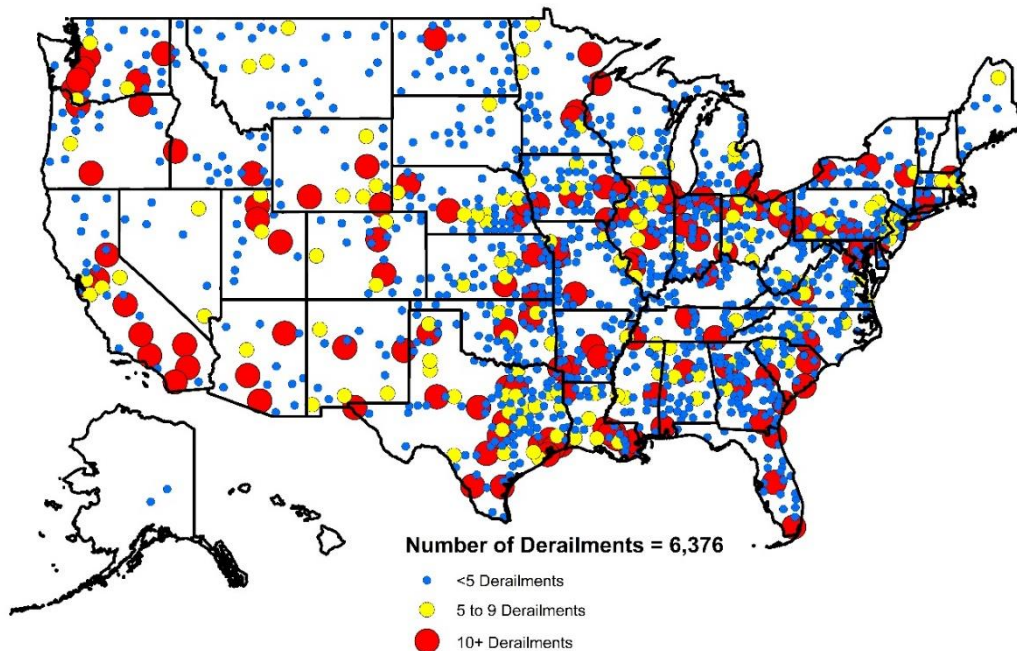
Number of Derailments in Rural and Urban Pennsylvania Counties, 2018 to 2022



The counties with the highest number of derailments during this period were Beaver (25), Allegheny (22), and Philadelphia (17). Twenty-nine of Pennsylvania’s 67 counties had no reported derailments.

Across the nation, there were 6,376 train derailments from 2018 to 2022. Unlike Pennsylvania, the percent of derailments was more evenly divided between rural (47 percent) and urban (53 percent) areas. Among all 50 states, Pennsylvania ranked 10th in the number of derailments, with 197. Texas (786), Illinois (552), and California (428) had the highest number of derailments. Vermont and Alaska each had fewer than seven derailments and Hawaii had no reported derailments.

Number of Train Derailments in the U.S., 2018 to 2022



Type of Track

In Pennsylvania, there was a significant difference in the type of track where derailments occurred. In rural counties, 59 percent of derailments occurred on the main track, or the track between cities or stations. In urban counties, 23 percent of derailments occurred on the main track.

Urban derailments most frequently occurred (77 percent of the time) in train yard tracks, industrial tracks, or sidings. Sidings are tracks used to load trains, switch train cars, and that allow one train to pass another. In rural counties, 41 percent of derailments occurred along these types of tracks.

Across the nation, 26 percent of derailments were on main tracks and 74 percent were on train yard tracks, industrial tracks, or sidings.

Fatalities and Injuries

From 2018 to 2022, there were no reported fatalities or injuries from a train derailment in Pennsylvania. Across the U.S., there were four fatalities (three in Montana and one in Texas), and 179 injuries. Montana (76) and Georgia (14) had the most injuries.

Damages

From 2018 to 2022, train derailments caused more than \$33.4 million in damages to both equipment and rails in Pennsylvania. Rural county derailments were fewer but more costly than those in urban counties. Across the U.S., the total costs for derailment damages were nearly \$1.24 billion, with a median damage cost of \$44,456.

Median Equipment and Rail Damage Costs in Rural and Urban Pennsylvania, 2018 to 2022 (Inflation adjusted)



Passenger Rail

In Pennsylvania, from 2018 to 2022, there were two passenger train derailments. One occurred in Bucks County and the other in Philadelphia County. Across the U.S., there were 101 passenger train derailments, which accounted for less than 2 percent of all derailments.

Rail Cars/Locomotives Involved in Derailments

On average, rural Pennsylvania derailments involved 5.7 cars (includes both rail cars and locomotives.) In urban Pennsylvania, the average number of derailed cars was 3.9. Over the study period (2018 to 2022), the largest Pennsylvania derailment was in June 2021 in York County, with 34 cars and the locomotive leaving the tracks.

Hazardous Materials

Trains routinely transport hazardous materials from one place to another. From 2018 to 2022, there were 45 derailments (23 percent) involving train cars carrying hazardous materials in Pennsylvania. Of these derailments, 15 (33 percent) resulted in a train car being damaged. However, during this period, no hazardous materials were released and there were no residential evacuations.

Nationwide, from 2018 to 2022, there were 1,670 (26 percent) derailments involving cars carrying hazardous materials. Of these derailments, 756 (45 percent) resulted in hazardous material cars being damaged. In 72 incidents, hazardous materials were released, and in 17 incidents, residents were evacuated.

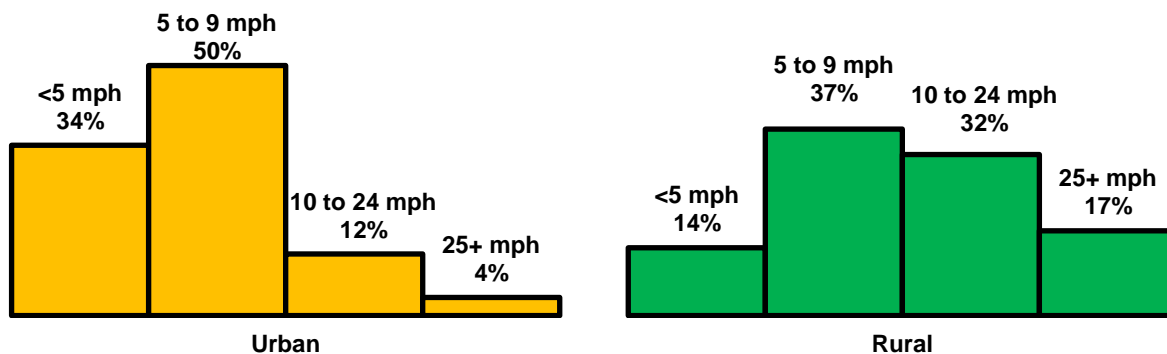
Derailments Involving Train Cars with Hazardous Materials, 2018 to 2022



Speed

Most derailments in rural and urban Pennsylvania occurred at relatively low speeds. In rural counties, the average derailment speed was 12.8 mph. In urban counties, the average speed was 6.8 mph. Not surprisingly, speed was positively correlated with the number of cars that derailed and the total damage costs. That is, the higher the speed, the more cars derailed and the higher the damage costs.

Derailment Train Speeds in Rural and Urban Pennsylvania, 2018-2022



Cause of the Derailments

In both rural and urban Pennsylvania, the top causes of derailments were structural factors such as problems with switches, track rails, and roadbeds (substructure on which the track is laid). These factors were the cause of 47 percent of the derailments in rural areas and 37 percent in urban areas.

The second leading cause of derailments was attributed to human factors, such as switches improperly lined, speed, and train handling. These factors were the cause of 31 percent of derailments in rural and 33 percent of derailments in urban areas.

The third leading cause was mechanical and electrical failures, such as failures with the axle and journal bearing, coupler and draft system, and brakes. These were the cause of 19 percent of rural derailments and 12 percent of urban derailments.

These three causes were also the top three causes of train derailments across the nation.

Population Living Near Railroad Tracks

The Center estimated that there are nearly 7,050 miles of active railroad tracks in Pennsylvania (both passenger and freight). Fifty-one percent of these track miles are in rural counties and 49 percent are in urban counties.

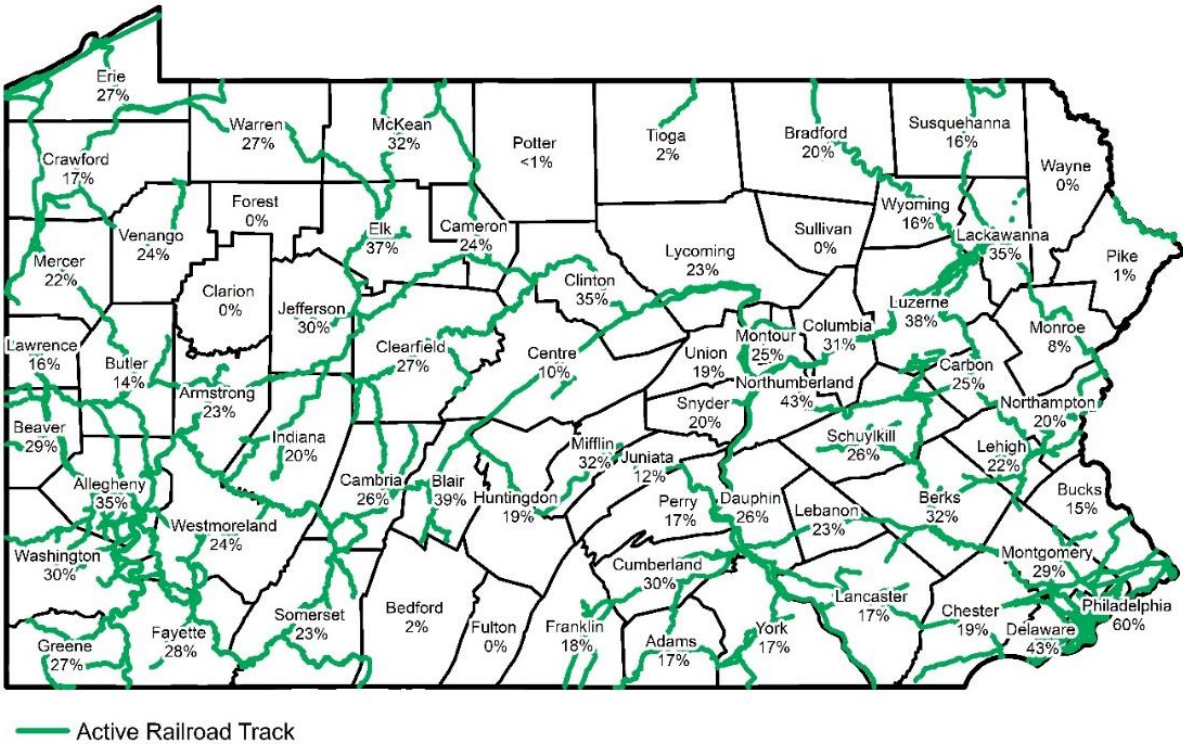
The three counties with the most miles of railroad track are Allegheny, Beaver, and Philadelphia, each with more than 220 miles. Five counties, each rural, have no active railroad: Clarion, Forest, Fulton, Sullivan, and Wayne.

An estimated 706,400 rural residents live within one-half mile of a railroad track. This represents 21 percent of Pennsylvania's 3.38 million rural residents. In urban counties, it was estimated that 3.15 million residents live within one-half mile of a railroad track. This represents 33 percent of Pennsylvania's 9.61 million urban residents.

Statewide, 3.86 million Pennsylvanians live within one-half mile of a railroad track, or 30 percent of the state's population of 13.00 million.

The three counties with the highest percentage of people living within one-half mile of a railroad track are Northumberland (43 percent), Delaware (43 percent), and Philadelphia (60 percent).

Percent of County Population Living Within One-half Mile of a Railroad Track, 2020



Conclusion

Trains have always played a vital role in Pennsylvania’s infrastructure and economy. And while train derailments are rare, they do happen. In Pennsylvania, there were 197 derailments between 2018 to 2022. Fortunately, during this period, none of the train derailments resulted in injuries or fatalities. Equally as fortunate, none of the derailments during this period resulted in the release of hazardous materials.

The estimated 7,050 miles of railroad in Pennsylvania are almost evenly split between rural and urban. However, most derailments (70 percent) occurred in urban counties. Rural derailments accounted for 30 percent of the 196 derailments between 2018 to 2022.

Methods

The data on train derailments are from the Federal Railroad Administration’s (FRA) Office of Safety Analysis. This dataset contains information on derailment location, the cause of derailment, whether there were fatalities or injuries, the number of rail cars involved, and the monetary damages caused by the derailment. The data were from January 1, 2018, to November 30, 2022.

The FRA data identifies 13 different types of railroad accidents, with derailments being the most common. The FRA defines a derailment accident as a type of train accident where on-track equipment leaves the rail for a reason other than a collision, explosion, or highway-rail grade crossing impact.

The Center estimated the number of people living within a half-mile of active railroad using the Pennsylvania Department of Transportation’s mapping file and the U.S. Census Bureau 2020 Block data. Excluding abandoned tracks, rails-to-trails, and tourism/recreation lines, the Center calculated a one-half mile buffer around each railroad. The Center then overlaid the 2020 Census Blocks. If the geographic center of the Census Block was within the one-half mile buffer, then that Census Block was included in the analysis.

The Center for Rural Pennsylvania defined all counties as rural or urban based on population density. If a county has a population density below the statewide rate of 291 people per square mile, it was considered rural. Counties with a population density at or above 291 people were considered urban.

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