# Mapping Vehicle-Related Casualties in Egypt 2022

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## Introduction

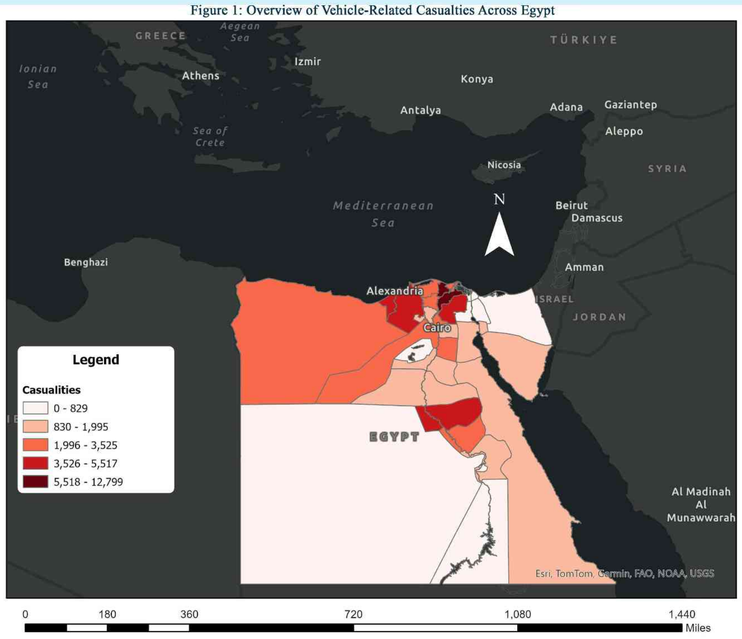
Road traffic accidents represent one of the most significant public health and safety challenges in Egypt, contributing to substantial mortality, injuries, and economic losses. In 2022 alone, 7,762 people lost their lives in road accidents, resulting in a national death rate of 7.36 deaths per 100,000 population.This alarming statistic, calculated against Egypt's population of 105.46 million highlights the urgent need for effective policy interventions and resource allocation.Egypt's rapidly growing urban centers, such as Cairo, Alexandria, Ismailia, Suez, andGiza, face increasing traffic congestion and higher accident risks, exacerbated by dense populations and inadequate pedestrian safety measures. Meanwhile, rural regions, such as Dakahlia, Behera, Sharkia (north), and Suhag, Assiut (south), experience disproportionately high fatalities despite lower population densities. These disparities reflect systemic challenges, including insufficient road infrastructure, limited traffic law enforcement, and gaps in emergency response systems.

Through geospatial analysis, this research investigates the distribution of vehicle-related casualties across Egypt's 27 governorates. The study aims to identify high-risk areas, uncover systemic inefficiencies, and provide evidence-based recommendations to reduce fatalities and injuries, ultimately improving road safety and emergency response nationwide

## Research Question

**How do disparities in ambulance point distribution and road safety conditions across rural and urban areas influence vehicle-related casualty rates in Egypt?**

Figure 1: Overview of Vehicle-Related Casualties Across Egypt




Source: Egypt's Central Agency For Statistics and National Mobilization

## Methodology

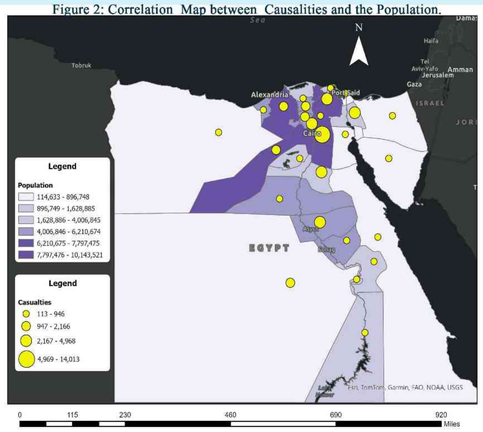
-Data Sources: Egypt's Central Agency for Statistics and National Mobilization.

-Variables: Included total casualties, total fatalities, population, ambulance points,and derived variables (death per capita, ambulance points per capita).

Spatial Analysis: Casualty distribution and population was mapped using graduated colors, while ambulance points and pedestrian casualties were displayed using graduated symbols.

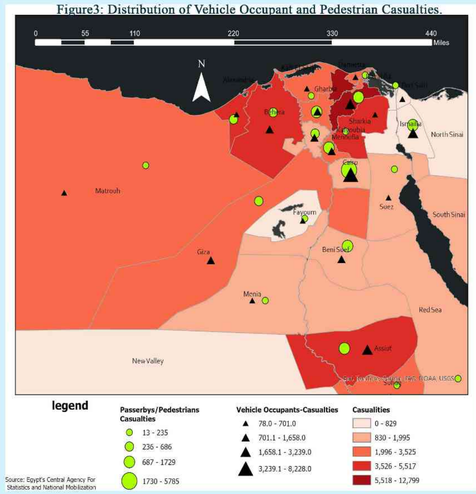
-Correlation Analysis: A scatter plot was used to evaluate the relationship between deaths per capita and ambulance points per capita, with the results highlighting trends and outliers such as Aswan.

Figure 2: Correlation Map between Causalities and the Population.



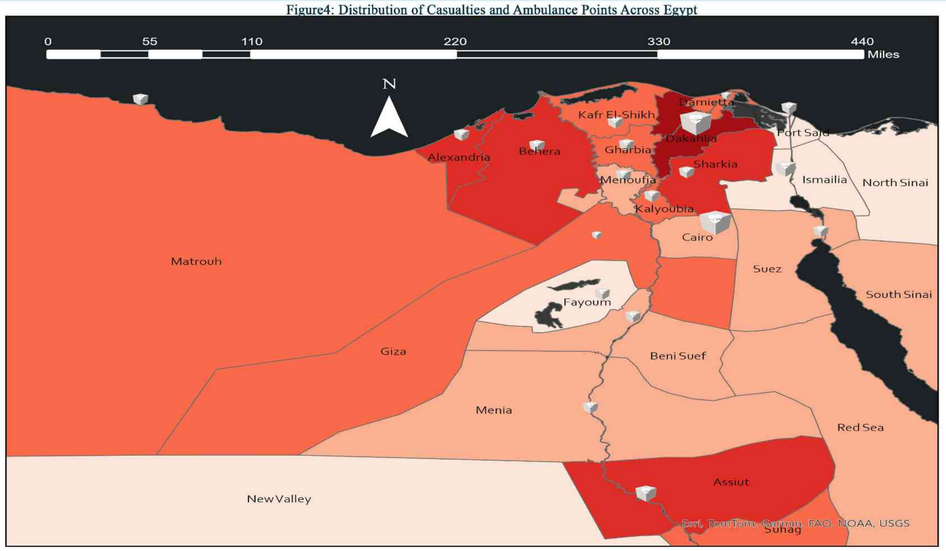

Source: Egypt's Central Agency For Statistics and National Mobilization

Figure3: Distribution of Vehicle Occupant and Pedestrian Casualties.



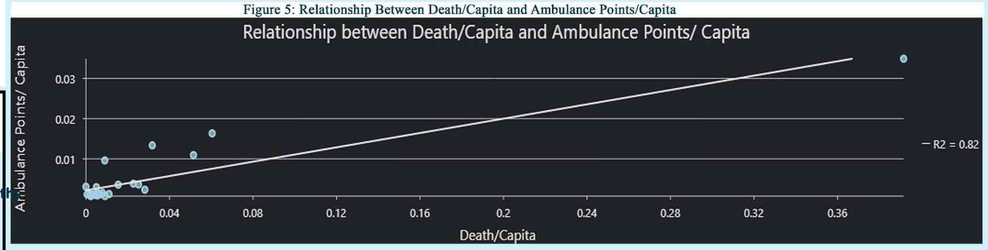

Source: Egypt's Central Agency For Statistics and National Mobilization

Figure4: Distribution of Casualties and Ambulance Points Across Egypt




Source: Egypt's Central Agency For Statistics and National Mobilization

Figure 5: Relationship Between Death/Capita and Ambulance Points/Capita




## Findings

The analysis reveals significant geographic disparities in vehicle-related casualties and ambulance point allocation across Egypt:

1- Casualty Trends by Governorate

A- High Casualty Rural Governorates: Governorates such as Assiut, Sohag, Behera, and Sharkia exhibit high fatality rates despite moderate populations. These regions suffer from poor road infrastructure, high-speed travel, and limited emergency services.

B- Urbanized Regions: Highly urbanized governorates like Cairo, Giza, and Alexandria report high pedestrian casualty rates due to traffic density, inadequate pedestrian crossings, and frequent congestion. While ambulance points are more concentrated in these areas, inefficiencies in deployment (e.g., slow response times) may contribute to persistently high fatality rates.

C- Sparse Coverage in Remote Areas: Governorates such as Matrouh, New Valley, and South Sinai report low casualty rates but suffer from critical shortages in ambulance points, leaving them vulnerable to future risks.

2. Ambulance Distribution and Fatality Rates

A- The correlation ($R^2 = 0.82$) between deaths per capita and ambulance points per capita highlights a reactive allocation of emergency resources based on historical fatality rates.

B- Outliers like Aswan (high death per capita: 0.39, high ambulance points per capita: 0.0349) suggest inefficiencies in reducing fatalities, even with substantial ambulance coverage. This could indicate slow response times, challenges with road accessibility, or systemic issues beyond ambulance availability.Conversely, regions like Sohag and Behera, with high deaths but fewer ambulance points, emphasize the need for more equitable and proactive allocation strategies.

## Recommendations

1. Proactive Ambulance Deployment: Shift from reactive allocation to proactive strategies based on risk assessments, addressing the high in-vehicle casualties in rural areas like Assiutand Sohag, where poor road conditions and high-speed travel prevail.

2.Enhanced Urban Safety: Mitigate high pedestrian casualties in urbanized areas like Cairo and Alexandria by improving pedestrian crossings, enforcing speed limits, and optimizing ambulance dispatch to reduce response times in congested traffic.

3. Expand Rural Coverage: Strengthen ambulance infrastructure in underserved rural areas ensuring timely response for remote incidents.

4. Efficiency Improvements: Use route optimization and training programs to improve ambulance response performance in high- casualty areas.

5. Preventive Interventions: Implement public awareness campaigns, road safety improvements, and stricter traffic law enforcement tailored to the unique needs of rural and urban contexts.

6. Data Transparency and Collaboration: The government is encourged to publish detailed, geocoded traffic accident data to facilitate collaboration with independent researchers and organizations in analyzing and addressing road safety challenges.

## Limitations

This study faced limitations due to the lack of comprehensive data, including the total number of accidents per governorate, which restricted the depth of analysis. Additionally, the absence of shapefiles and precise coordinate data hindered the ability to perform more detailed geospatial analyses and create nuanced visualizations.

## Reference

Central Agency for Public Mobilization and Statistics (CAPMAS). (2022). The Annual Bulletin: Results of Car & Train Accidents in 2022. Cairo, Egypt. https://censusinfo.capmas.gov.eg/ metadata-ar-v4.2/index.php/catalog/1854/study-description