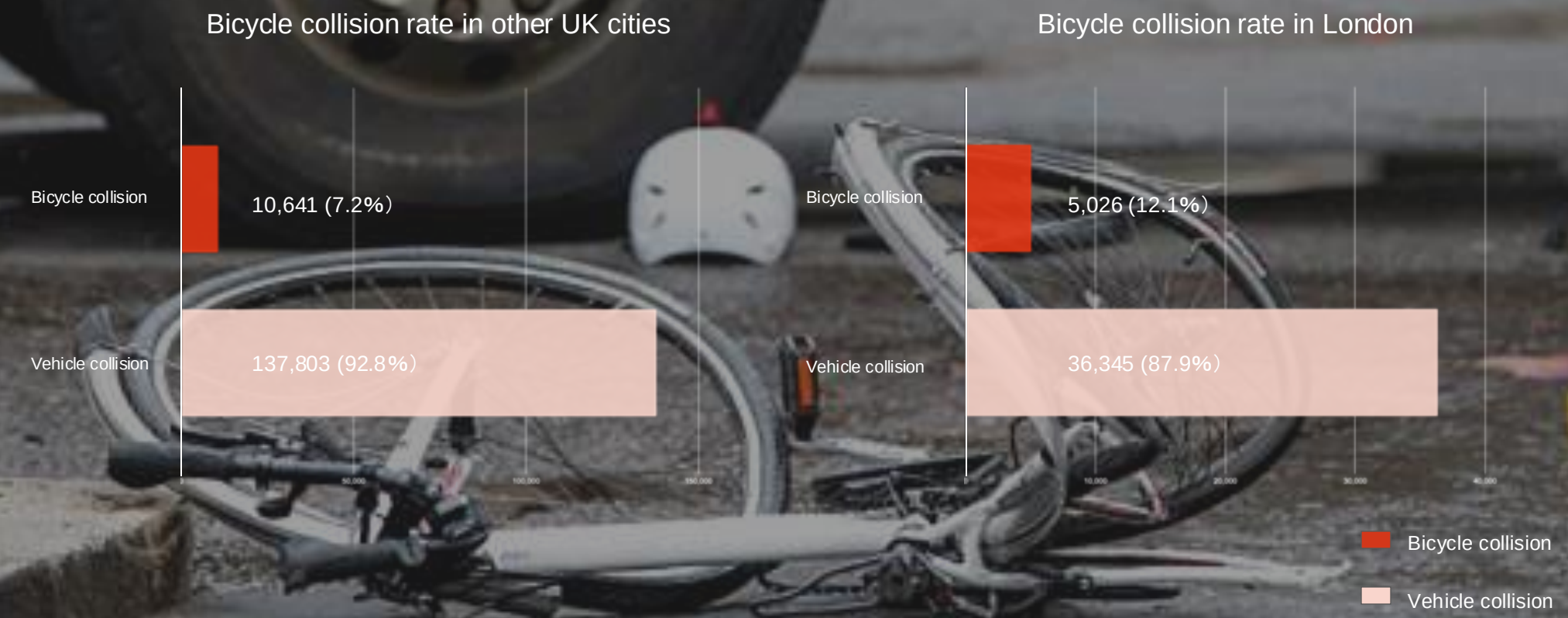
GROUP 10

Question 3

Does Cycle Lane Density Impact Bicycle Collision Rates in London?

Why Are Bicycle Collisions a Critical Issue in London?

In 2023, London’s bicycle collision rate was **1.68 times** higher than that of other UK cities.



We aim to analyse the **impact of cycle lane density** by comparing it across **different MSOAs** in London.

STEP 1: Spatial join collisions of bike and Bike way polyline into MSOA

Cycle lane length by each MSOA

Bicycle collision by each MSOA

STEP 2 : Calculate the matrix for K-means clustering

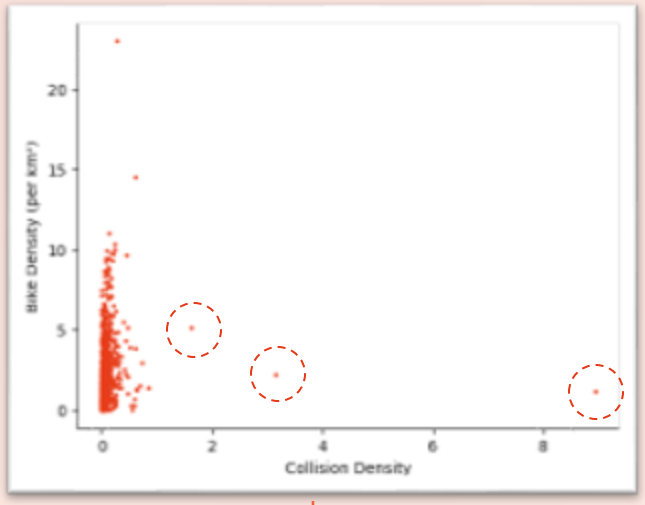
Collision density = Number of bicycle collision/ Population density
Cycle lane density = Cycle lane length/ Area_km2

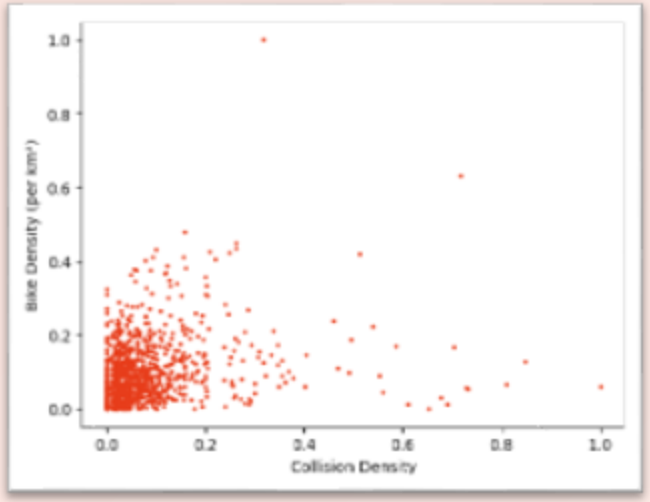
Data description of k-means clustering

Name	Type	Meaning
MSOA_ID	object	The unique MSOA ID for join and spatial join.
Population density	float64	An estimate of the probability that people may use bicycles within each MSOA.
Area_km^2	float64	The geographical size of each MSOA measured in square kilometers.
Number of bicycle collision	integer	The total number of reported bicycle collisions within each MSOA.
Cycle lane length	float64	The total length of cycle lanes within each MSOA.
Collision density	float64	The ratio of the number of bicycle collisions to the population density in each MSOA.
Cycle lane density	float64	The length of cycle lanes per square kilometer of area in each MSOA.

STEP 3: Removing outliers

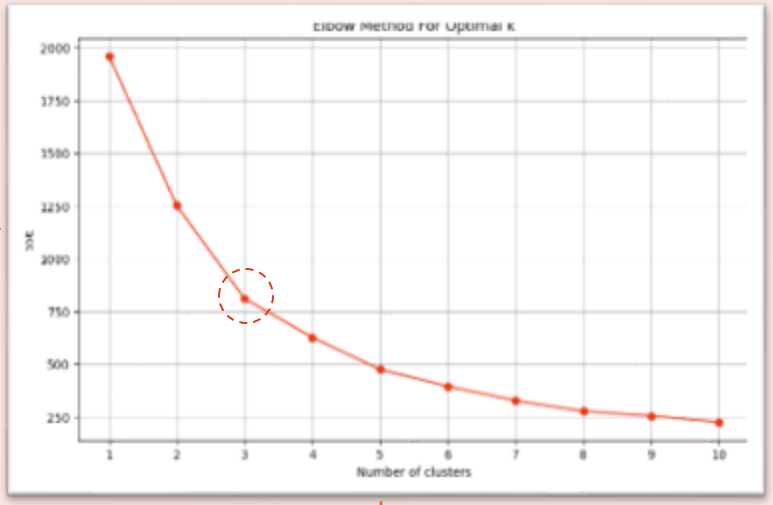
1% and 99% quantiles for both Collision and Bike Density extending 1.5 * IQR beyond these quantiles.

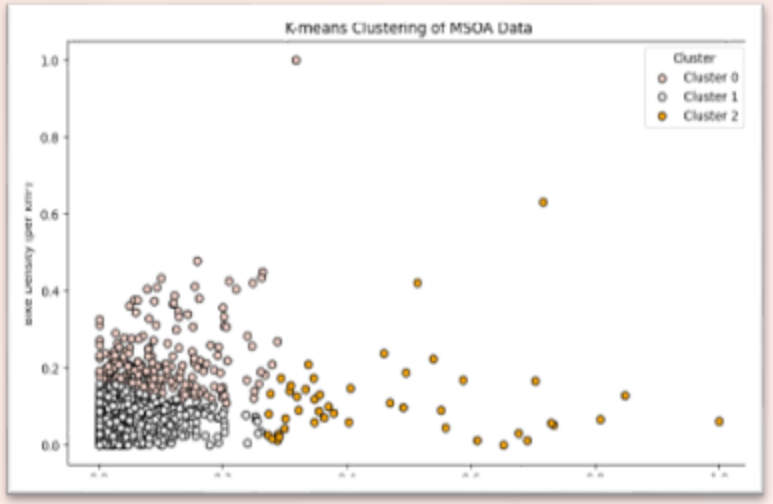




STEP 4: Elbow Diagram & Clustering

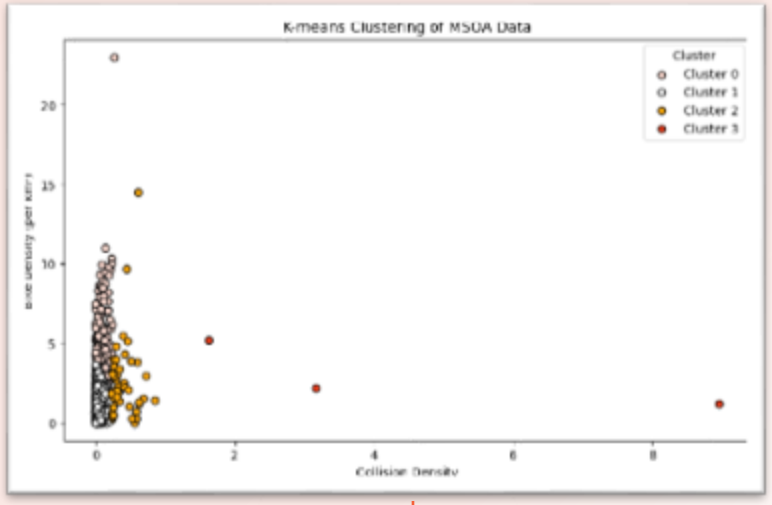
After testing K= 3 and 4, With K=3, the resulting clusters are more meaningful and easier to interpret in the context of the analysis.

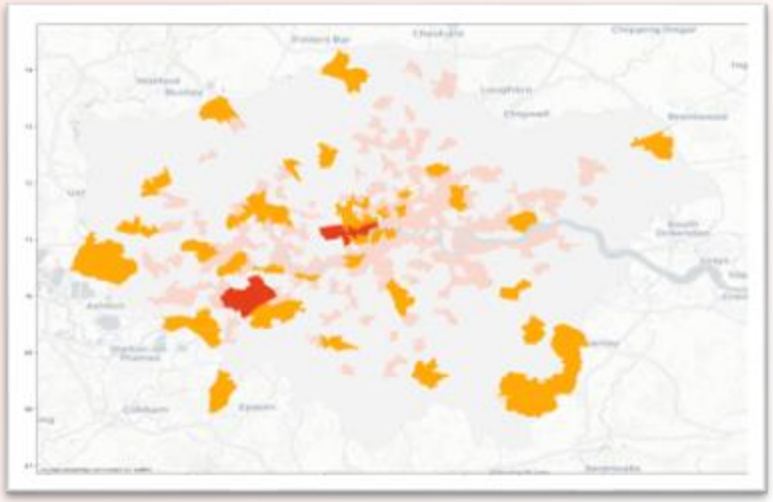




STEP 5: Reintegrate the outliers & Mapping

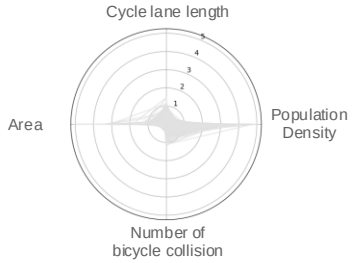
Due to the potential importance of outliers, I reintegrated them into the analysis and assigned them to Cluster 3.



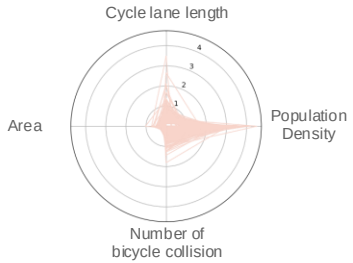


Most of the bicycle collisions in MSOAs are not directly influenced by cycle lane density. However, the London government should prioritize addressing the **5% of areas classified as risky and dangerous**.

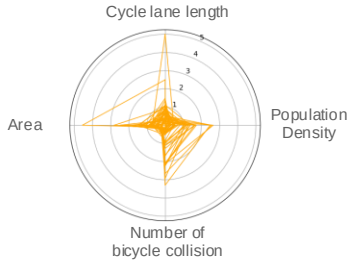
Very Safe : (719)
These areas are characterized by large land coverage and high population density. Despite having few cycle lanes, they experience minimal bicycle collisions. This suggests that bicycle usage in these areas may be relatively low.



Safe : (215)
These are smaller areas with moderate to high population density. Most of these areas have much better network of cycle lanes, which likely contributes to the low incidence of bicycle collisions.



Risky : (46)
Areas in this category vary in size and typically have medium to low population density. They tend to have fewer cycle lanes and experience a significantly higher number of bicycle collisions. These areas highlight the need for targeted improvements in cycling infrastructure.



Dangerous: (3)
These are outlier areas with low population density but have a high rate of bicycle collisions. They represent priority zones where urgent improvements are required, such as the addition of cycling signage, dedicated cycle lanes, and enhanced safety measures to mitigate collision risks.