

# **Spatial Analysis of WebGIS for Mapping the Potential Spread of HIV Based on the Distribution of Key Populations Using the K-Means Clustering Method**

Dia Bitari Mei Yuana, S. ST., M. Tr. Kom as a Supervisor

**Lubna Jamila**

Study Program of Informatics Engineering

Majoring in Information Technology

## ***ABSTRACT***

Jember Regency ranks third in the highest number of HIV cases in East Java with a total of 7,834 PLHIV from 2006 to 2023. Female Sex Workers (FSWs) are the main contributors to the spread of HIV, but spatial risk group mapping is not yet available, making it difficult for targeted interventions. This study builds a WebGIS system based on K-Means Clustering to group areas based on the potential risk of HIV spread in Jember Regency. FSW data from the Laskar Pelangi Petung Foundation is processed into four ratio variables: FSWs per 1,000 residents, Hotspots per 1,000 residents, Test Rate, and Positive Rate, then normalized with Z-Score. The optimal cluster is determined using the Elbow Method and validated by the Silhouette Coefficient. The system is built with the Laravel framework and the Waterfall method. The results show an optimal cluster of  $K = 4$  with a Silhouette Score of 0.620. Four clusters were formed from 31 sub-districts: High (Kaliwates and Sumbersari), Medium (14 sub-districts), Low/Special (Panti), and Very Low (14 sub-districts). Interactive GIS map visualizations helped NGO partners and the health department determine priority areas for intervention.

**Keywords :** *K-Means Clustering, WebGIS, HIV, Female Sex Workers (FSW), Jember Regency.*