

***Clustering Analysis of Hypertension Patient Characteristics (I10) in
Outpatient Settings Using the K-Means Algorithm at Puskesmas
Gladag Banyuwangi***

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ABSTRACT

Primary hypertension (ICD-10: I10) is a non-communicable disease with a high prevalence, reaching 1,800 cases in 2025 at Puskesmas Gladag Banyuwangi. Undetected hypertension can cause serious complications in target organs such as the heart, kidneys, brain, and eyes, requiring data-driven patient characterization. This descriptive quantitative study clusters the characteristics of 527 outpatients with primary hypertension treated between October and December 2025 using the K-Means algorithm in RapidMiner, with 11 variables (systolic and diastolic blood pressure, gender, age, body mass index, headache, visual disturbance, shortness of breath, oedema, and nocturia), evaluating cluster quality using the Davies-Bouldin Index (DBI). Of the 527 initial records, 389 met the inclusion criteria and were used for clustering. The optimal number of clusters was nine ($K=9$) with a DBI of 0.791, classified as Good. Based on the 2021 National Medical Service Guidelines (PNPK) for Hypertension, the nine clusters showed complication tendencies toward the heart in clusters with shortness of breath and the highest blood pressure, toward the kidneys in clusters with a history of diabetes mellitus and nocturia, and toward the brain and eyes in clusters with headache and visual disturbance. This interpretation confirms that grouping primary hypertension patients cannot rely on blood pressure alone, but must also consider age, gender, body mass index, and co-occurring symptoms. These clustering results are expected to serve as a basis for healthcare workers to identify patients complication tendencies more quickly and objectively, enabling more targeted treatment and continuous improvement of healthcare quality at Puskesmas Gladag Banyuwangi.

Keywords: *Clustering, Data mining, K-Means, Primary Hypertension, RapidMiner*