

Stunting Risk Mapping System for Toddlers in Gempol Village Using the K-Nearest Neighbors (KNN) Algorithm

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ABSTRACT

This study develops a web-based stunting risk mapping system for toddlers by integrating the K-Nearest Neighbors (KNN) algorithm and Geographic Information System (GIS). The development of this system is motivated by the manual data recording process and the lack of region-based visualization, which makes monitoring stunting conditions difficult. The system utilizes several variables, including sex, age, height, weight, mid-upper arm circumference, head circumference, as well as height-for-age and weight-for-age z-scores, to automatically classify the nutritional status of toddlers. Classification testing was conducted using a confusion matrix by comparing $K = 3, 5, 7,$ and 9 with 500 training data and 261 testing data, where $K = 5$ achieved the best performance with an accuracy of 88.1%, precision of 37.0%, recall of 89.5%, specificity of 88.0%, and an F1-score of 52.3%. Although the precision value is relatively low, the high recall indicates that the system has a strong ability to detect toddlers at risk of stunting as an early detection tool. Therefore, this system can be utilized as a decision-support tool for monitoring stunting risk based on geographic areas. However, further improvements are needed to enhance precision and achieve better alignment between classification results and actual conditions in the field.

Keywords: *Stunting, K-Nearest Neighbors (KNN), Confusion Matrix, Classification, Risk Mapping, GIS*