

# CHAPTER 1 INTRODUCTION

## 1.1. Research Background

The definition of health established by the Indonesian government in Law No. 36 of 2009 on Health states that health encompasses physical, mental, spiritual, and social well-being, enabling individuals to live productively in a social and economic context. This definition is derived from the World Health Organization's (WHO) definition formulated between 1980 and 1998, which states: *"Health is a state of physical, mental, and social well-being and not merely the absence of disease or infirmity."* Based on the conditions above, mental health has become one of the social issues that attract the attention of the Indonesian public. Mental health refers to an individual's emotional, psychological, and social condition. Good mental health state is when an individual understands the purpose and meaning of life. Conversely, mental disorders are severe conditions that can affect a person's thoughts, mood, and behavior. Poor mental health often serves as a significant risk factor that makes individuals vulnerable to suicidal thoughts or behaviors.<sup>1</sup>

Suicide is an intentional act, thought, or attempt to end one's life, ranging from passive suicidal thoughts to fatal actions.<sup>2</sup> Death caused by suicide has been increasing worldwide, including in Indonesia. According to data presented by the Indonesian Suicide Prevention Association, there were 670 officially reported suicide cases in 2020. Meanwhile, data from the Databoks website shows that 971 suicide cases occurred in Indonesia from January to October 2023, reflecting a 45% increase<sup>3</sup>. Further data from Indonesia states that suicide is the second leading cause of death among individuals aged 15–29, considered the productive age group.<sup>4</sup>

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<sup>1</sup> Dyah Novita, "Kesehatan Mental - Penyebab, Gejala, Dan Cara Mengobati - KlikDokter," accessed May 18, 2024, <https://www.klikdokter.com/penyakit/masalah-mental/kesehatan-mental>.

<sup>2</sup> Afrina Zulaikha and Nining Febriyana, "Bunuh Diri pada Anak dan Remaja," *Jurnal Psikiatri Surabaya* 7, no. 2 (December 10, 2018): 62, <https://doi.org/10.20473/jps.v7i2.19466>.

<sup>3</sup> Nabilah Muhamad, "Ada 971 Kasus Bunuh Diri sampai Oktober 2023, Terbanyak di Jawa Tengah | Databoks," accessed May 18, 2024, <https://databoks.katadata.co.id/datapublish/2023/10/18/ada-971-kasus-bunuh-diri-sampai-oktober-2023-terbanyak-di-jawa-tengah>.

<sup>4</sup> "Setiap Jam, Satu Orang Bunuh Diri," accessed May 18, 2024, <https://health.kompas.com/read/2016/09/08/140000323/setiap.jam.satu.orang.bunuh.diri>.

The mortality rate from suicide is a key indicator of Sustainable Development Goal (SDG) 3.4, which aims to reduce premature mortality from non-communicable diseases by one-third through prevention and treatment, as well as promote mental health and well-being by 2050. Therefore, the phenomenon of suicide is closely related to a country's development goals<sup>5</sup>. Suicide cases in Indonesia continue to rise each year.

The reasons behind these acts vary, but fundamentally, victims often feel that there is no solution to their problems, and death becomes the only perceived way out.<sup>6</sup> Moreover, suicide raises critical questions about its underlying factors. Understanding these factors can help identify patterns and trends in the data, providing deeper insights into several attributes or aspects contributing to suicide incidents, such as age, methods used, and the location of occurrences. These attributes will serve as key benchmarks in this study's analysis. Suicide not only causes suffering for the individuals involved but also has far-reaching impacts on families, friends, and the surrounding community.

In Islam, taking a life (whether by killing others or oneself) is strictly prohibited. Allah SWT strongly condemns such actions, as stated in the Qur'an, Surah 4:29:

يَا أَيُّهَا الَّذِينَ ءَامَنُوا لَا تَأْكُلُوا أَمْوَالَكُمْ بَيْنَكُمْ بِالْبُطْلِ إِلَّا أَنْ تَكُونَ تِجَارَةً عَنْ تَرَاضٍ مِّنْكُمْ ۖ وَلَا تَقْتُلُوا  
أَنفُسَكُمْ ۚ إِنَّ اللَّهَ كَانَ بِكُمْ رَحِيمًا

*“O you who have believed, do not consume one another's wealth unjustly but only [in lawful] business by mutual consent. And do not kill yourselves [or one another]. Indeed, Allah is to you ever Merciful.”* (An-Nisa: 29). Imam As-Suyuti clearly explains the meaning of this verse: the prohibition of actions that lead to destruction, both in this world and the Hereafter. Therefore, this verse encompasses acts that take away life and sinful acts that result in suffering in the Hereafter.<sup>7</sup>

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<sup>5</sup> Intan Nisaaul Chusna Et Al., “Strategi Kebijakan Gender Analysis Pathway (Gap) Untuk Menyelesaikan Masalah Sosial Bunuh Diri Di Kabupaten Gunungkidul,” *Oisaa Journal Of Indonesia Emas* 5, No. 2 (July 6, 2022): 141–47, <https://doi.org/10.52162/Jie.2022.005.02.8>.

<sup>6</sup> Hermin Mallo And Daniel Ronda, “Analisis Faktor Penyebab Utama Kecenderungan Bunuh Diri Di Kalangan Remaja Yang Berusia 15-17 Tahun Di Makassar,” N.D.

<sup>7</sup> Ahmad Muntaha, “Tafsir Surat An-Nisa’ Ayat 29: Larangan Melakukan Tindak Kejahatan terhadap Harta dan Jiwa Orang Lain,” NU Online, accessed May 18, 2024,

Based on the verse explained above, every Muslim must prevent unlawful acts, which Allah SWT certainly dislikes. With the advancement of information and communication technology, it is now possible to classify suicide cases based on various attributes within Indonesian society. The development of technology today is growing rapidly. Data mining is one of the fields emerging due to the advancement of technology related to data analysis.

Data mining is extracting and analyzing large amounts of data to find patterns, trends, and helpful information that are not immediately visible. Its main objective is to gain insights that can be used for better decision-making in various fields. Data mining techniques have five methods: association, classification, clustering, estimation, and forecasting. The researcher identified the use of the clustering method for suicide cases occurring in several regions of Central Java. Clustering is the process of dividing data in a set into several groups with similarities. Clustering is categorized as unsupervised learning, which functions to partition data without labels into one group.<sup>8</sup> Therefore, the author used the clustering method in this study because suicide case data is usually unlabeled and falls under unsupervised learning. This method can help identify patterns and relationships between various attributes related to suicide cases. Similarities should be grouped into a more significant part of data that share standard features with other groups. Several algorithms can be used in clustering, including the K-Means algorithm.<sup>9</sup>

Calculating with K-Means Clustering is a repetitive process. In this study, clustering using the K-Means algorithm groups suicide case data in Indonesia with a sample size of 103 cases, which will result in 3 clusters based on several main attributes in the suicide case data from Central Java. Although the data used in this study was sourced from the Police Resorts in Semarang Regency and Boyolali Regency, it encompasses all reported suicide cases in Central Java. This is because all suicide cases from various regions in the province have been compiled and

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<https://islam.nu.or.id/tafsir/tafsir-surat-an-nisa-ayat-29-larangan-melakukan-tindak-kejahatan-terhadap-harta-dan-jiwa-orang-lain-pqi7o>.

<sup>8</sup> Sudi Suryadi, "Penerapan Metode Clustering K-Means Untuk Pengelompokan Kelulusan Mahasiswa Berbasis Kompetensi," *Jurnal Informatika* 6, No. 1 (October 26, 2019): 52–72, <https://doi.org/10.36987/Informatika.V6i1.738>.

<sup>9</sup> Putri Apriyani, Arif Rinaldi Dikananda, and Irfan Ali, "Penerapan Algoritma K-Means dalam Klasterisasi Kasus Stunting Balita Desa Tegalwangi," *Hello World Jurnal Ilmu Komputer* 2, no. 1 (March 3, 2023): 20–33, <https://doi.org/10.56211/helloworld.v2i1.230>.

reported to the Semarang Police Resort as the main data center. Therefore, even though the data coverage comes from two regencies, the analysis results can represent the pattern of suicide cases across Central Java.

Previous researchers have widely used the K-Means algorithm in the clustering method. One such study is by Putra May Chandra Abirianto, titled “Application of the K-Means Clustering Method for Grouping Liver Disease Patients.” This research discusses the clustering of liver disease patients. As demonstrated by testing the final results with an accuracy rate of 86% for comparison between the system’s calculation and manual calculations, this study’s findings indicate that the K-Means Clustering method can be applied to the system and operates well<sup>10</sup>. Based on the characteristics of suicide case data, the advantages of the K-Means algorithm, and the final results in similar research, using K-Means in this study is highly appropriate. K-Means can efficiently and accurately cluster data. This makes it an ideal choice for identifying and analyzing patterns in suicide cases in Indonesia.

The researcher’s data is sourced from several police stations in Central Java. The research data was taken from the police stations in Semarang and Boyolali regencies, as these sources are official and trusted institutions that provide accurate, consistent, and structured data on suicide cases in several regions of Central Java.

A similar previous study was written by Ismail Virgo, Sarjon Defit, and Yuhandri Yunus titled “Clustering Lecturer Attendance Levels Using the K-Means Clustering Algorithm,” which explains the clustering of lecturer attendance levels using the K-Means Clustering algorithm. In this study, the authors use the clustering method and K-Means algorithm to analyze lecturer attendance levels. The results of this study grouped lecturers into 3 clusters: 72 courses taught by non-PNS lecturers in the group of rare meetings (4.7650%), 69 courses taught by non-PNS lecturers in the moderate meeting group (4.5665%), and 1370 courses taught by non-PNS lecturers in the diligent meeting group (90.6684%)<sup>11</sup>.

Based on the abovementioned problems, this study will cluster suicide cases in Indonesia using the K-Means Clustering algorithm based on three main attributes

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<sup>10</sup> Putra May Chandra Abirianto, “Penerapan Metode K-Means Clustering Untuk Pengelompokan Pasien Penyakit Liver” 2, No. 2 (2018).

<sup>11</sup> Ismail Virgo, Sarjon Defit, and Y Yuhandri, “Klasterisasi Tingkat Kehadiran Dosen Menggunakan Algoritma K-Means Clustering,” *Jurnal Sistim Informasi dan Teknologi*, March 31, 2020, 23–28, <https://doi.org/10.37034/jsisfotek.v2i1.17>.

in the data. This study is expected to assist many people and also provide support for future researchers who will discuss suicide cases in Indonesia.

## **1.2. Research Problem**

Based on the issues presented in the background, the problem statement in this study is the increasing number of suicide cases in Central Java each year over the past five years, as well as the lack of categorization of suicide case patterns and characteristics. Therefore, further analysis is needed to understand the distribution and trends of these incidents using data mining techniques, specifically the K-Means Clustering algorithm.

## **1.3. Research Objectives**

Based on the abovementioned problem formulation, the study aims to conduct a clustering analysis of suicide cases in Central Java to identify high-risk groups based on pattern analysis results using one of the K-Means algorithms.

## **1.4. Problem Boundaries**

To ensure that the research objectives align with the title, the following problem boundaries are set:

- a. The data used is limited to suicide data from Central Java Province.
- b. This study only uses the Clustering method with the K-Means algorithm.
- c. The attributes being clustered are 3, namely Age, Suicide Method, and Location.

## **1.5. Research Benefits**

Based on the above research, it is expected to provide benefits to several parties as follows:

### **1.5.1. Students**

Provide a better understanding of mental health issues and suicide, as well as broaden knowledge about relevant data analysis methods.

### **1.5.2. Universities**

Provide a tangible contribution to developing knowledge and science in education and health and enhance the university's reputation in research relevant to societal needs.

### 1.5.3. Society

Increase public awareness about suicide issues, including ways to identify suicide risks. With a better understanding of this issue, society will be more prepared to recognize warning signs and support needy individuals.

## **1.6. Systematic Discussion**

The writing structure is created to facilitate the preparation of the report containing the description as follows:

### CHAPTER 1 INTRODUCTION

#### 1.1 Research Background

#### 1.2 Research Problem

#### 1.3 Research Objective

#### 1.4 Problem Limitations

#### 1.5 Research Benefits

### CHAPTER 2 LITERATURE REVIEW

#### 2.1 Previous Research

#### 2.2 Theoretical Study

### CHAPTER 3 RESEARCH METHODOLOGY

#### 3.1 Research Time and Location

#### 3.2 Research Materials and Tools

#### 3.3 Research Phases

### CHAPTER 4 RESULTS AND DISCUSSION

#### 4.1 Data Understanding

#### 4.2 Data Preparation

#### 4.3 Modelling

#### 4.4 Evaluation

#### 4.5 Deployment

### CHAPTER 5 CONCLUSION

#### 5.1 Conclusion

#### 5.2 Suggestions

### REFERENCES

### APPENDICES