

Journal of Dinda

Data Science, Information Technology, and Data Analytics

Vol. 3 No. 1 (2023) 31 - 35

E-ISSN: 2809-8064

Utilization of *Google Trends* in Knowing *Public Attention* to Diabetes in Indonesia in 2018

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Abstract

Diabetes is one of the four non-communicable diseases that are prioritized because of the sufferer's number and the increasing prevalence rate. The results of the 2018 Basic Health Research shows an iceberg phenomenon where there are far more people living with diabetes who have not been diagnosed than those who live with diabetes and know their condition. The public's desire to find out in advance the disease that may be suffered on Google opens up opportunities of research in public concern about diabetes. This research with descriptive analysis aims to describe the public's attention to diabetes based on Google Trends data. The results show that the development of public attention in 2018 tends to fluctuate with the highest index on World Diabetes Day. Then there are provinces that need attention with high diabetes prevalence values but still have a low volume of diabetes-related searches. Most topics related to diabetes are about the drugs, causes, and symptoms of diabetes. So it is necessary to socialize diabetes literacy, especially in areas with low public attention.

Keywords: *diabetes, Google Trends, public attention*

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1. Pendahuluan

Diabetes is one of the four non-communicable diseases that are a priority due to the increasing number of sufferers and prevalence rates [1]. Globally, there were 425 million people with diabetes in 2017 [2]. In Indonesia, diabetes is one of the main health problems of concern since the early 1980s [3]. More than 20.4 million people in Indonesia live side by side with diabetes. This condition causes the prevalence rate of diabetes to reach 8.5 percent in 2018 [1]. This figure makes Indonesia ranked in the top ten countries in the world with a high number of people with diabetes in 2018 [1].

The results of Riskesdas 2018 show that the prevalence of diabetes in Indonesia based on the results of doctors' diagnoses in the adult age category or more than 15 years is at 2 percent. However, when viewed as a whole, the prevalence rate of diabetes according to the results of blood sugar tests was at a value of 8.5 percent in 2018 [1]. The findings indicate that nearly two-thirds of people are unaware they have diabetes. If analogous to the iceberg phenomenon, these findings suggest that the population living with diabetes and has not been

diagnosed with diabetes is much more numerous than the population living with diabetes and knowing this condition.

Health information about certain diseases is one of the most sought-after topics of the public[4]–[7]. Society is becoming more aware and has a tendency to find out in advance the diseases that may be suffered based on the symptoms they feel. According to research conducted by *the UK Digital Health Report* on 61 million google users and in 1013 adults showed that 11 percent preferred self-diagnosis through Google, while another 10.8 percent preferred *Google* over doctor's examinations. Self-diagnosis through *Google* information is preferred because it is faster to get information related to diseases that may be suffered [8]. The potential use of *Google* data in the health sector opens up research opportunities to understand patterns and *public attention* about various diseases, one of which is diabetes..

Research utilizing *Google Trends* has been done quite a lot. For example, a study using *Google Trends* for infectious disease risk management in the Covid-19 outbreak in Wuhan, where the results showed that searches on *Google* on this issue increased and the

correlation was high in search results on *google* with the original data [9]. Furthermore, other studies state that *Google Trends* can find global changes in topics raised such as yoga, *anxiety*, and depression over three time periods [10]. In addition, other studies on diabetes utilizing *Google Trends* can detect early signs of diabetes by monitoring combinations of keywords related to diabetes [11].

Based on the problems previously presented, this study aims to find out the picture of *public attention* to diabetes based on *Google Trends* data. In order to achieve this goal, researchers evaluate and analyze data sourced from *Google Trends* related to diabetes. In addition, research utilizing *Google Trends* related to the topic of diabetes is still rarely carried out, so researchers are interested in conducting this study. The results of this study are expected to help decision makers in planning and understanding *public attention* to diabetes through *Google Trends*. The results of this study are also expected to increase public awareness, especially those who are indicated to have diabetes.

2. Research Method

2.1. Diabetes

Diabetes is one of the chronic metabolic diseases or disorders with characteristic blood sugar levels that are above normal limits or hyperglycemia. Hyperglycemia can occur as a result of abnormalities in insulin secretion, insulin action, and both [12]. In grouping the types of diabetes used causes of hyperglycemia as a determining indicator. Diabetes type 1 occurs when the increase in sugar levels due to damage to pancreatic beta cells causes insulin to be little or cannot be produced [1]. Meanwhile, type 2 diabetes is a type of diabetes caused by insulin resistance in muscle cells and the liver and the failure of pancreatic beta cells in producing insulin [12] or simply this type of diabetes is known to be more dangerous where an imbalance between insulin levels and insulin sensitivity can cause a functional deficit of insulin [13]. The diagnosis of diabetes is established on the basis of checking blood sugar levels and HbA1c. Suspicion of the indication of a person with diabetes needs to be considered if complaints are found, such as (1) complaints of diabetic clique faction in the form of polyuria (frequent urination), polydipsia (frequent thirst), polyphagia (frequent hunger), and weight loss without apparent cause; and (2) other complaints, such as weakness, tingling, itching, blurred vision, and disorders of the genitalia organs in men and women [12].

2.2. Google Trends

Google Trends is an *open-source platform* that allows to analyze searches for certain *keywords* on *Google*. *Google Trends* allows access to search samples on *Google* with anonymized, *categorized*, and *aggregated*

data. Data on *Google Trends* is data that has been normalized in time and location based on the *keywords* used. Normalization data results in the form of numbers between 0-100 based on the proportion of a particular topic to searches on all topics [14].

Google Trends performs a partial analysis of Google's billions of searches *every day*. Through this analysis, results are obtained in the form of data on geographical and temporal patterns in accordance with predetermined *keywords* [15]. *Google Trends* is one of the search engines that has been widely used to identify trends regarding certain diseases or symptoms of diseases. A recent systematic review states that *Google Trends* began to be used frequently to study health phenomena across different topic domains in a variety of ways [16].

Google Trends uses a small percentage of searches for a particular keyword or term and then analyzes Google search results according to a specific geographic location and time period. *The Google Trends Index* or relative search volume is assigned to keywords, then standardized from 0 to 100, where 100 represents the highest share of a given term in a given time series [17].

This research begins by analyzing a number of literatures, journals, and reports from sources relevant to the research to be carried out. In this study, an analysis was used in the form of a descriptive analysis which is expected to show an overview of the condition of *public attention* about diabetes and its relationship with the prevalence rate in each province in Indonesia. The author uses *Google Trends* to explore *keyword* search activities related to diabetes from January 1, 2018 to December 31, 2018. The results of this study do not describe the condition of the attention of society as a whole. However, it only describes data obtained from *Google Trends* based on keywords in the research period. The author took data using Indonesian keywords related to diabetes. By using the keyword "diabetes", information *trends* are obtained that are sought by people in Indonesia. In addition, this research uses diabetes prevalence data based on doctors' diagnoses in Indonesia sourced from publications owned by the Indonesian Ministry of Health, namely Riskesdas in 2018 [18].

3. Result and Discussion

Developments about public attention on the results of *Google Trends* for diabetic disease are shown in Figure 1 The development of *public attention* in this study tends to fluctuate. In the period from the beginning of January to June 2018, there was an up-and-down pattern. Searches on the topic of diabetes experienced a sharp decline in June 2018. Then in the following months on average experienced the highest increase and increase in

November 2018. This is because in November, especially on November 14, 2018, world diabetes day is celebrated, so it can be said that people tend to search for information related to diabetes on *Google*.



Figure 1. Search Volume Development Related to "diabetes" Keywords in 2018

Furthermore, Figure 2 shows the distribution of searches for the keyword "diabetes" if it is based on provinces in Indonesia. Overall, people on the island of Java are looking for the most topics about diabetes. When viewed from each province, Gorontalo Province is the province that is most looking for information related to diabetes. Meanwhile, people in North Maluku are the provinces that are the least looking for information related to diabetes compared to other provinces in Indonesia.

Public attention to diabetes can be shown through how often people search for the keyword "diabetes" on *Google*. While the prevalence states the number of people with diabetes divided by the number of people [18]. Looking at the relationship between search volume and the prevalence of diabetes can provide an overview of the relationship between the number of people and *public attention* based on certain categories.

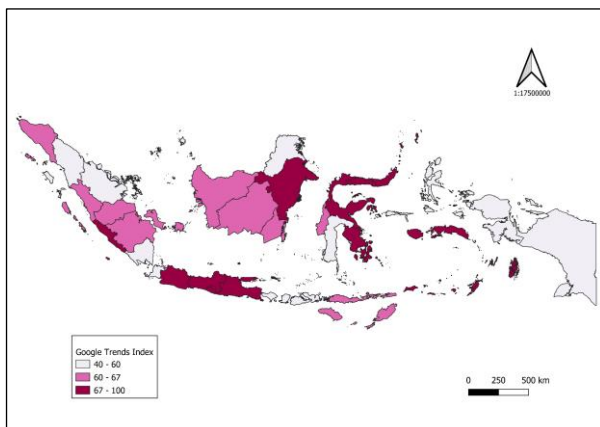


Figure 2. Distribution of "diabetes" Keyword Search on *Google Trends*

Figure 3 shows a *quadrant chart* between the search volume of the word "diabetes" on *Google Trends* and the prevalence of diabetes in 2018. Figure 3 divides each province into 4 quadrants based on the median value of each variable, as follows.

- Quadrant I: Provinces with prevalence values and search volume in *Google Trends* above the median.
- Quadrant II: Provinces with a prevalence value below the median but have *Google Trends* search volume above the median.
- Quadrant III: Provinces with a prevalence value above the median but have *Google Trends* search volume below the median data.
- Quadrant IV: Provinces with *Google Trends* prevalence and search volume values below the median.

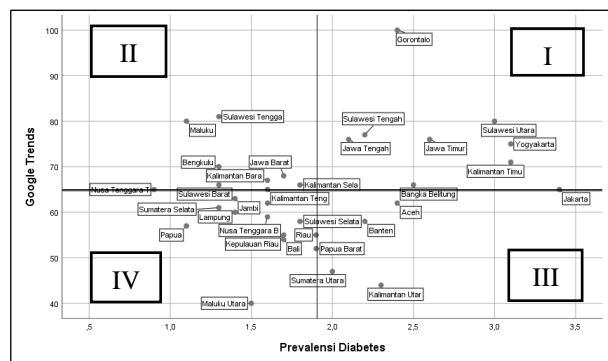


Figure 3. *Quadrant Chart* of Prevalence and *Google Trends* Related to Diabetes

Based on the quadrant analysis in Figure 3, it can be seen that provinces with high prevalence rates of diabetes do not necessarily have high *public attention* to diabetes. Most provinces are classified as having *Google Trends* prevalence values and search volume below the median. North Kalimantan is the province with the highest anomaly based on a fairly high prevalence rate (above the median) but still has a very low *Google Trends* search volume. This shows that the high number of people with diabetes in North Kalimantan is not directly proportional to the public's attention to this disease. North Sulawesi is the province that has the most ideal value with a prevalence rate and search volume for diabetes that is directly proportional. If only viewed based on search volume for diabetes, North Maluku has the lowest value compared to other provinces in Indonesia. This indicates that the search volume for the word "diabetes" in North Maluku has the lowest value when compared to all provinces in Indonesia.

The provinces that need attention are provinces in quadrant III with a high prevalence value of diabetes (above the median) but do not yet have a low search volume for diabetes. This shows that there is still a lack of *public attention* to diabetes. The provinces included

in quadrant III are Aceh, Banten, North Sumatra, and North Kalimantan. The lack of *public attention* in this province can be an indication of a lack of public awareness of diabetes. In general, *low public attention* can be one of the reasons for the high prevalence rate of diabetes in the provinces in quadrant III. In addition to quadrant III, provinces in quadrant IV also have *low public attention* to diabetes.

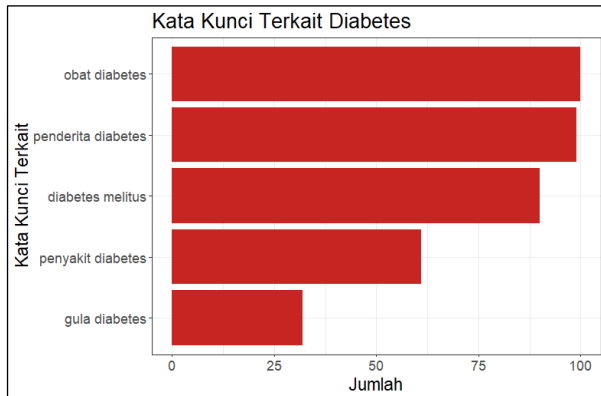


Figure 4. Diabetes-Related Keywords

Related keywords can describe the topics that people talk about when searching for the keyword "diabetes". This can illustrate the pattern of public attention when searching for information related to diabetes on *Google*. Figure 4 shows the *bar chart* of related keywords that appear the most when searching for diabetes on *Google*. It can be seen that searches related to diabetes drugs become the keywords with the highest search rate. This is an indication that most of the searches that people do on *Google* are closely related to the treatment of diabetes itself. In addition, there is also a high search for people with diabetes and diabetes mellitus. This search indicates that diabetes mellitus is the type of diabetes that has received the most attention from the public on *Google*. Searches related to sugar keywords also get high attention from the public. This is quite derived considering that the increase in blood sugar that exceeds normal limits is the main cause of diabetes [12].

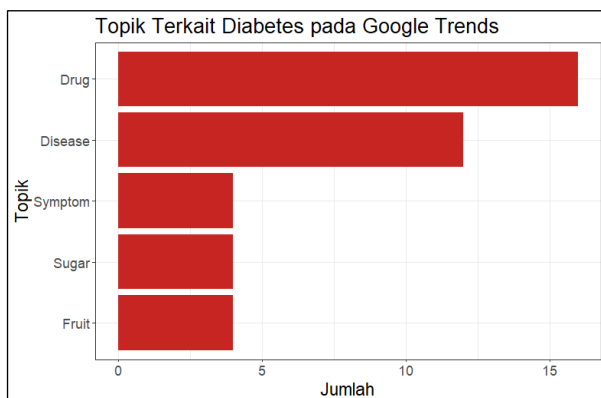


Figure 5. Diabetes Related Topics on *Google Trends*

In line with the keywords in Figure 4, Figure 5 shows the top topics that people talk about when searching for the keyword "diabetes" on *Google*. Discussion about *drugs* is the most sought-after topic when looking for information about diabetes. The topic of diseases and symptoms is also the most talked about topic when searching for the keyword "diabetes" on *Google*. This is in accordance with previous research which reported that *Google* is the best option chosen in knowing the symptoms of the disease experienced with ease and speed in obtaining information [8]. One of the interesting things is the discussion of topics regarding fruit on the top five topics. Fruit-related searches have a lot to do with fruits that are safe for consumption by diabetics. This topic is closely related to the obligation of diabetics to always pay attention to the intake consumed. In general, the conversation about the keyword "diabetes" is dominated by information about diabetes itself, such as the symptoms, causes, and drugs of diabetes.

4. Conclusion

Based on the results obtained in this study, several conclusions were obtained, namely:

1. The development of *public attention* in this study tends to fluctuate with an increase in highest in November 2018. This is because in November, especially on November 14, 2018, world diabetes day is celebrated.
2. People on the island of Java are the group of people who are most looking for topics about diabetes. Meanwhile, when viewed from each province, people in Gorontalo Province are the group of people who are most looking for topics about diabetes.
3. Most provinces are classified as having *Google Trends* prevalence values and search volume below the median. Provinces that need attention are provinces in quadrant III with a high prevalence value of diabetes (above the median) but still have a low search volume for diabetes.
4. Diabetes drug-related searches become the keywords with the highest search rate.
5. Most of the topics discussed related to diabetes are about the drugs, causes, and symptoms of diabetes.

Based on the conclusions that have been described, the suggestion that the researchers put forward is the need for socialization of diabetes literacy, especially areas that are in quadrant III, namely areas that have a high prevalence of diabetes but still have low *public attention*.

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