



Google Data Studio Implementation for Visualizing West Java Province Toddler Stunting Data

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Abstract—One of the world's most critical nutritional issues, stunting is particularly prevalent in impoverished and emerging nations, including Indonesia. West Java is one of the provinces having a relatively high proportion of children with stunted growth. This study intends to conduct data visualization about the number of stunted children under the age of five in each West Java city or district. The data visualization is an interactive dashboard with several interconnected charts that was created using Google Data Studio. This is intended to aid the analysis of the distribution of stunting among children under the age of five in West Java by city and district from 2014 to 2021. Open Data Jabar is the source of the data used to create the visualization of data on toddlers with stunting in West Java. The result of this research is a dashboard that can be facilitate data analysis process. From the dashboard, we can determine that the total number of cases of toddler stunting in West Java reduced between 2014 and 2021. Despite an increase in the number of instances between 2019 and 2020, the number of cases has reduced again in 2021.

Keywords: Stunting; Data Visualization; Dashboard; Google Data Studio; West Java

1. INTRODUCTION

Stunting is caused by poor nutrition, frequent infections, and lack psychological stimulation. Stunted children have height-for-age more than two standard deviations below the WHO median. Stunting in early life, especially in the first one thousand days from conception to age two, has negative functional effects for the kid. These implications include poor cognitive and school performance, low adult income, lost productivity, and an increased risk of nutrition-related chronic illnesses in adulthood when coupled by excessive weight gain in later childhood. [1] Reduction of child stunting is the first of six Global Nutrition Targets for 2025 objectives and a crucial indicator for the second Sustainable Development Goal of Zero Hunger [2].

Indonesia is one of the nations with stunting issues. Based on the findings of the Studi Status Gizi Indonesia (SSGI), the national stunting rate was 24,4% in 2021. Meanwhile, the RPJMN 2024 objective for stunting prevalence is 14%. One of the provinces in Indonesia that has a significant number of cases of stunting in children under the age of five is West Java, which has a percentage of 24.5% [3]. This paper describes how to visualize West Java stunting statistics for the years 2014 to 2021. The data visualization is a dashboard with several connected charts that is interactive. This is intended to support the analysis of the distribution of stunting in West Java by city and district for children under the age of five. The results of the analysis are supposed to benefit local governments in West Java in determining ways to minimize the prevalence of under-five stunting. Open Data Jabar (<https://opendata.jabarprov.go.id/id>) is the source of the data used to create the visualization of the data on West Java toddlers with stunting. In the meanwhile, Google Data Studio is used for the data visualization process.

Visualization is becoming as the most frequent tool for examining and extracting information from datasets by novice and professional researchers alike. The ability to see patterns, insights, and outliers in the data may be gleaned usefully through the process of data visualization [4]. Based on the actuality, data visualization attempts to show data in various formats and on bilateral or trilateral coordinates. The concept of Data Visualization provides a positive outlook on dealing with large amounts of data and aids in constructing an institutional framework that allows specialists to explore new trends and attempt to develop creative solutions and link relationships that cannot be easily captured via tables, in addition to persuading decision-makers and easily utilizing bigdata information [5].

Dashboard is an information system application model that is offered to managers in order to display performance quality data from a business or organization [6]. A dashboard is a display or visualization that provides vital information using graphs, tables, photos, and other media in such a way that it is engaging and easy for all parties to comprehend [7]. The use of a dashboard to analyze essentials will make it easier to make intelligent decisions [8]. To identify what makes dashboard visuals effective, we must know who uses them and why. By identifying the intended receiver, we may estimate the amount of cash necessary and the sorts of measurements or categories pertinent to the position [9]. One of the applications of dashboard research is to visualize data on research funding at Universitas Multimedia Nusantara such that the information is easily discernible and facilitates decision-making [10].

Google data studio is a new data visualization application developed as a user-friendly tool for aesthetically and clearly portraying complicated data sets. The objective of Data Studio is to assist users in "creating dynamic, visually attractive reports and dashboards" by integrating external data sources into an easily navigable platform, hence enabling the production and distribution of data-based reports. Data Studio specializes at developing aesthetically pleasing and easily digestible data visualizations [11]. Data Studio is cloud-based, can be used from anywhere for free, and can exchange reports with those who have an interest [12]. Google Data Studio has been deployed for business and

organizational goals, one of which is to assess the quality of students in the Information Systems Department at FMIPA Universitas Tanjungpura Pontianak and determine future student development plans [6].

The visualization of sales data that is integrated with the data source, Google Sheet, is another area of study related to the construction of dashboards as a way of data visualization [12]. In addition, the research illustrates the procedure for distributing the developed dashboard. In moreover, there is research on the development of a dashboard for COVID-19 data visualization in the city of Yogyakarta [13]. In moreover, research is conducted on the development of a dashboard for the viewing of COVID-19 data in Yogyakarta. In this study, a dashboard presenting a graph of confirmed cases, deaths, and recoveries was built using time series, maps, bar charts, and scorecards as diagrams. It may be inferred from past research that Google Data Studio can be deployed easily to develop dashboards for data visualization, allowing for improved data analysis. Accordingly, we will utilize Google Data Studio to develop a dashboard to visualize data on toddler stunting in West Java from 2014 to 2021.

2. RESEARCH METHODOLOGY

Figure 1 illustrates research methods. It involves literature research, data collection, data processing, data visualization and analysis of visualization results.

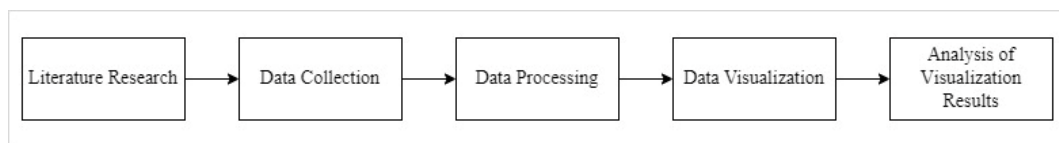


Figure 1. Google Data Studio initial screen after login

2.1 Literature Research

In the process of conducting literature research, various significant pieces of information are gathered from older journals or other kinds of written material that relevant to the case studies under research. The objective of this is to provide support for the completed study and aid in the growth of this journal. Research literature on data visualization and dashboard development using Google Data Studio.

2.2 Data Collection

Collecting data from the West Java Provincial Government using the website Open Data Jabar is how data is collected.

2.3 Data Processing

The data processing procedure includes the following stages:

- The first step is to obtain data on cases of stunting in children under five in the province of West Java from a data source, particularly the government of West Java's official data provider website. The data is then downloaded as CSV, Excel, or API.
- The second step is the data preparation and cleaning process. At this point, it is important to ensure that the data are in an appropriate state for visualization. The consistency of the data attribute format, the completeness of the data attribute content, and the lack of redundant data attributes must be ensured.

2.4 Data Visualization

At this point, the previously processed data will be visualized. Visualization process utilizing Google Data studio. The dashboard contains multiple interconnected charts, including filled map charts, line charts, tables with bars, and control filters.

2.5 Analysis of Visualization Results

Analyze the processed and visualized data, then explain the findings of the research to support the government in making decisions regarding initiatives to minimize the prevalence of stunting in children under the age of five in West Java.

3. RESULT AND DISCUSSION

Data visualization facilitates the comprehension of large and heterogeneous datasets. Reliable data visualization is also dependent on good data sources. Therefore, it is essential to ensure that the input is accurate in order to obtain accurate insights. A data visualization method is implemented to accomplish effective data visualization. The stages of the data visualization process are outlined in the presentation that follows.

3.1 Preparation

Google Data Studio can be accessed at <https://datastudio.google.com/>. Sign in to Google Data Studio using your Google account. Figure 2 displays the initial screen that appears after login. Figure 3 represents a description of the data that will be applied in the visualization procedure. The table includes the attributes id of type data number, jumlah_balita_stunting of type data number, kode_kabupaten_kota of type data number, kode_provinsi of type data number, nama_provinsi of text data type, nama_kabupaten_kota with text data type, satuan of text data type, and tahun of type data number. At this step of preparation, there are attributes whose data types are modified, specifically nama_kabupaten_kota. The data type is changed from text to Geo Country subdivision (2nd level), which is what is needed for the distribution map to be shown.

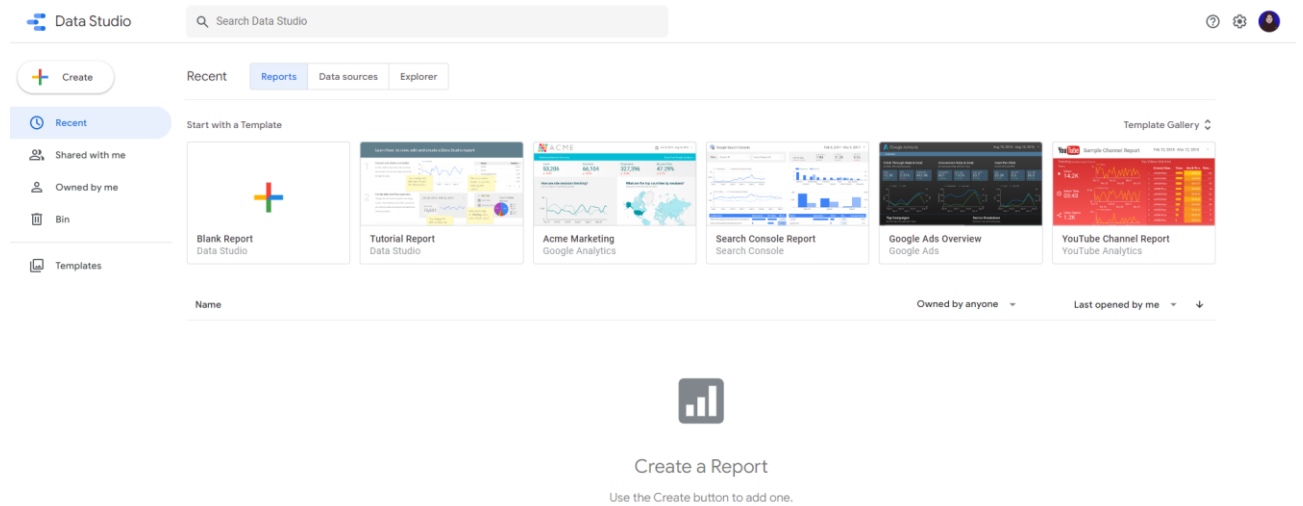


Figure 2. Google Data Studio initial screen after login

dinkes-od_17147_jumlah_balita_stunting_berdasarkan_kabupatenkota_data.csv

Data credentials: Firas A.

← EDIT CONNECTION | FILTER BY EMAIL

Data source editors can now refresh fields, edit connections and edit custom SQL.

Field ↓	Type ↓	Default Aggregation ↓	Description
DIMENSIONS (8)			
id	123 Number	Sum	
jumlah_balita_stunting	123 Number	Sum	
kode_kabupaten_kota	123 Number	Sum	
kode_provinsi	123 Number	Sum	
nama_kabupaten_kota	RBC Text	None	
nama_provinsi	RBC Text	None	
satuan	RBC Text	None	
tahun	123 Number	Sum	
METRICS (1)			
Record Count	123 Number	Auto	

Figure 3. Description of data for use in visualization

3.2 Visualization process

a. Create a new report

Select a blank report on the main page of Google Data Studio. Then, an interface similar to Figure 4 will emerge. The "add data to report" menu will display when creating a new report. There are numerous alternatives for data connectors, such as Google Analytics, Google Sheets, file uploads, etc. Then click upload file and choose the previously generated data for toddlers with stunting in West Java (Figure 5). After that, a work screen for designing a dashboard, as depicted in Figure 6, will appear. By default, a table with the record count will appear on the dashboard page. On the available work screens, we can offer data visualizations using a variety of charts and presentations, including fill map charts, time series charts, bar charts, score cards, etc.

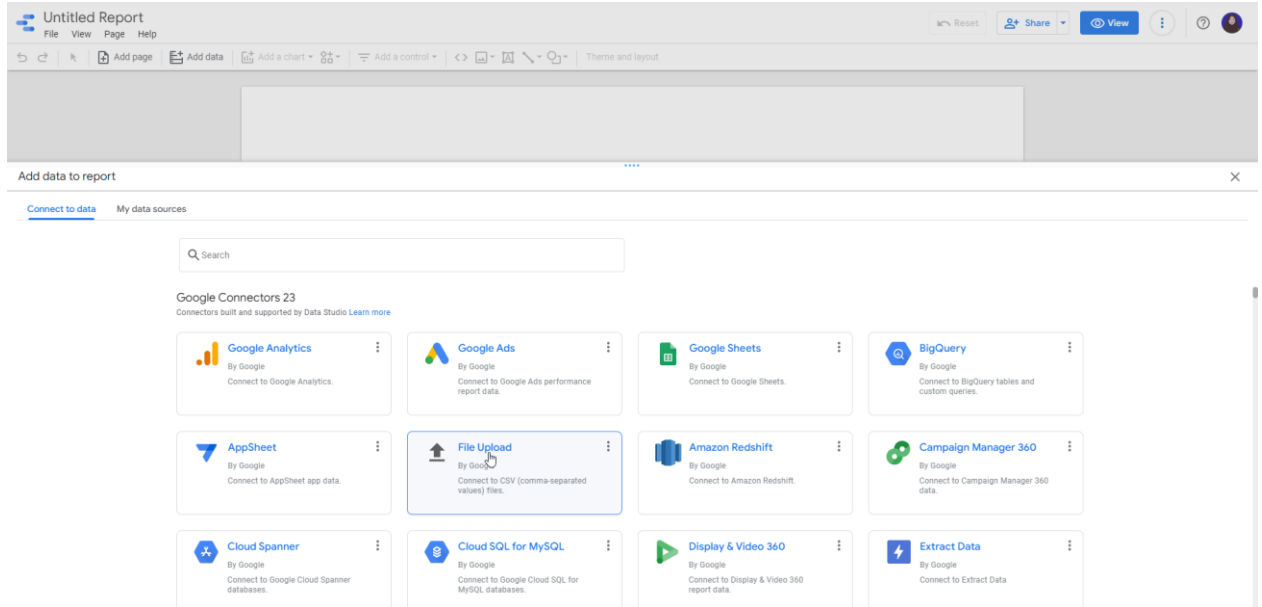


Figure 4. Data Studio blank report page when first created

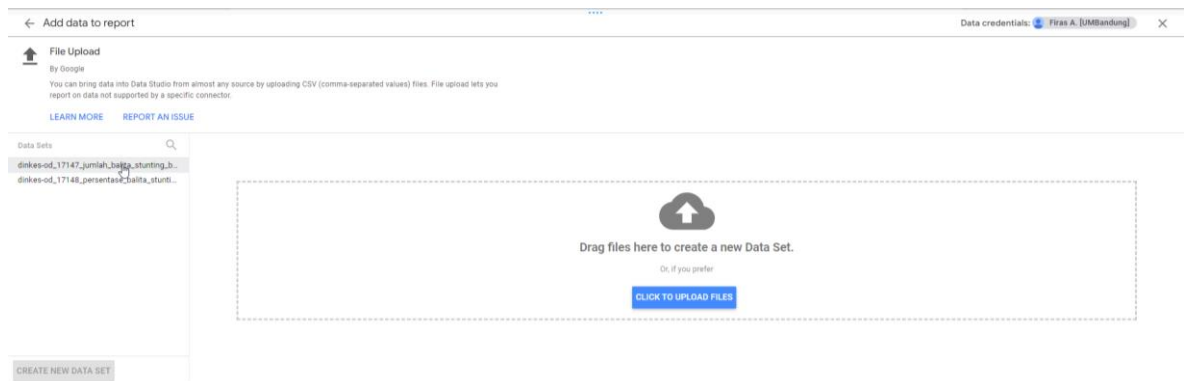


Figure 5. Data selection for processing

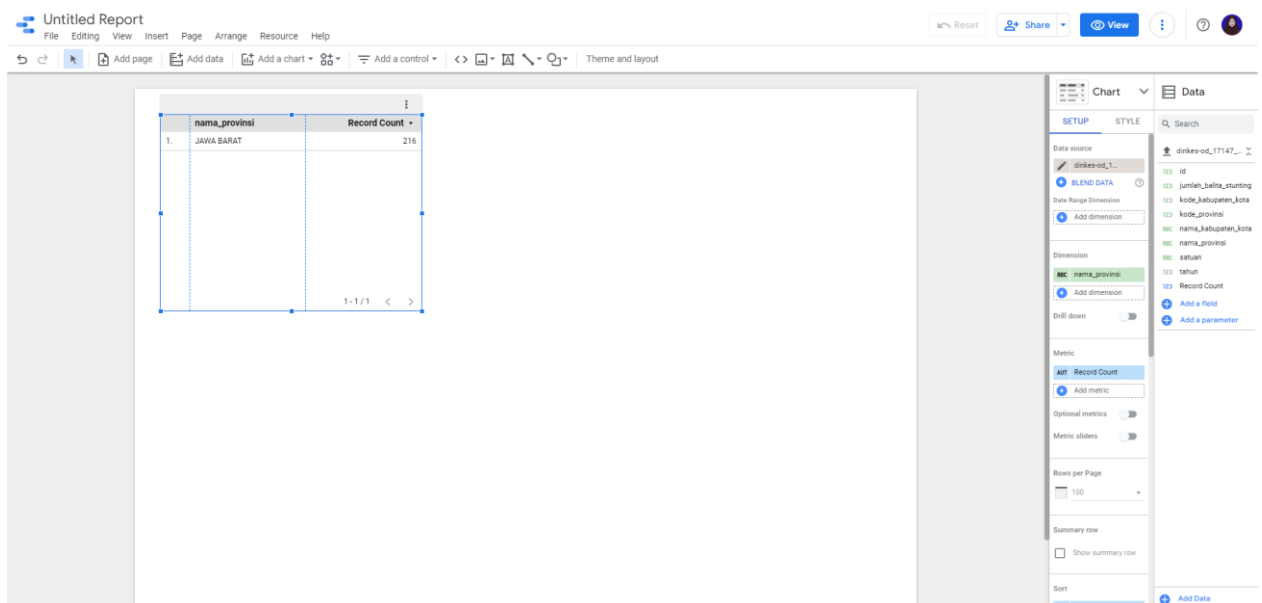


Figure 6. Work screen display to create dashboard

b. Select a display theme

Click on theme and layout in the toolbar at the top of the editor, and numerous dashboard themes will display, as depicted in Figure 7. The theme used in the visualization process this time is "edge".

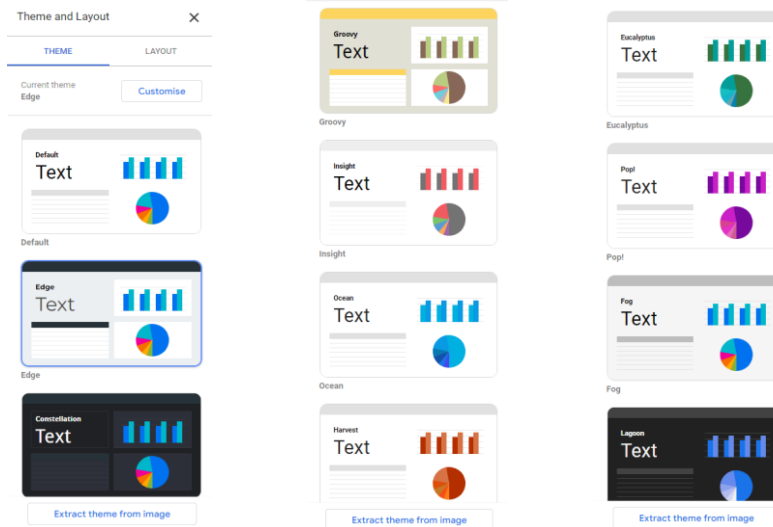


Figure 7. Dashboard theme selection

- c. Create the appropriate graphic elements and control filter
 - 1. Filled map graphic

The purpose of using filled maps in this study is to identify the spread of stunting in West Java. The darker the hue on the map, the greater the number of instances in the city or district indicated. Click on add a chart in the toolbar at the top of the editor, and then select filled map. Configure the field location and color metric setting in the properties panel. The location is set with the nama_kabupaten_kota attribute which has the data type Geo Country subdivision (2nd level). Then the color metric is set with the attribute jumlah_balita_stunting. Figure 8 shows the display of a filled map and its properties panel.

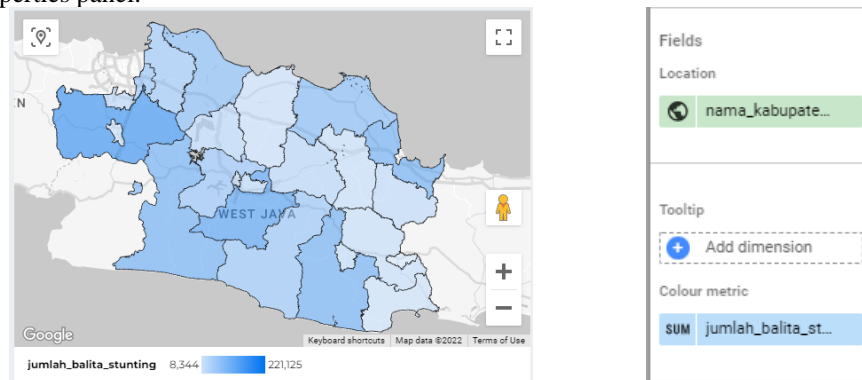


Figure 8. Filled map and its properties panel

- 2. Line chart

In this study, line chart is used to visualize annual data changes from 2014 to 2021. Click on add a chart in the toolbar at the top of the editor, and then select line chart. Configure dimension, metric, and sort in the property panel. The dimension and sort are set with the tahun attribute, while the metric is set with the attribute jumlah_balita_stunting. Figure 9 shows the display of a line chart and its properties panel.

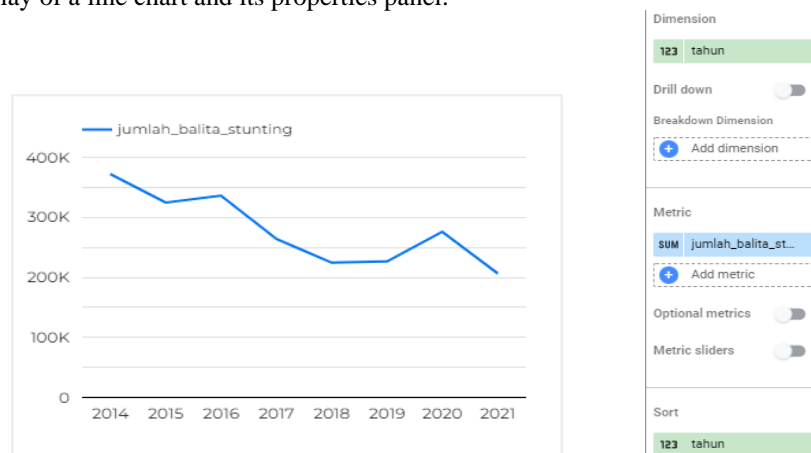


Figure 9. Line chart and its properties panel

3. Table with bars

This study uses bar tables to provide specific statistics on occurrences of stunting in cities or districts from 2014 to 2021. Click on add a chart in the toolbar at the top of the editor, and then select table with bars. Configure dimension and metric in the property panel. The dimension is set with nama_kabupaten_kota and tahun attributes, while the metric is set with the attribute jumlah_balita_stunting. Figure 10 shows the display of a line chart and its properties panel.

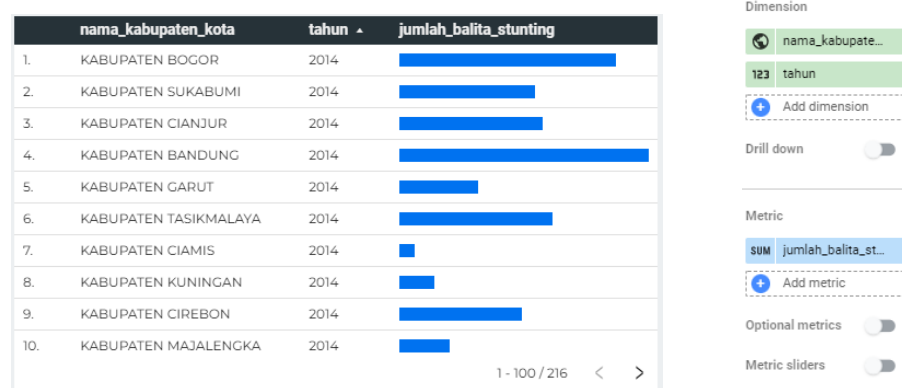


Figure 10. Line chart and its properties panel

4. Control filter

Filter controls are utilized to interact with the data during the analytic process in this study. The dashboard contains two filters: a filter by year and a filter by district or city. Click on add a control in the toolbar at the top of the editor, and then select drop-down list. Set the control field to tahun and the metric to jumlah_balita_stunting within the properties panel of the first control filter. Then, in the second control's properties panel, filter by nama_kabupaten_kota and set the metric to jumlah_balita_stunting.

d. The final display of the stunting toddler case dashboard in West Java

After all the required graphic and control elements have been developed, the location of each piece is adjusted to ensure that the dashboard appears organized. Other modifications, such as color and labeling modifications, are also made. Figure 11 is a graphical representation of toddler cases of stunting in West Java. The dashboard can be accessed at <https://datastudio.google.com/reporting/306cf18c-1195-4e6a-baf7-db727d416586>.

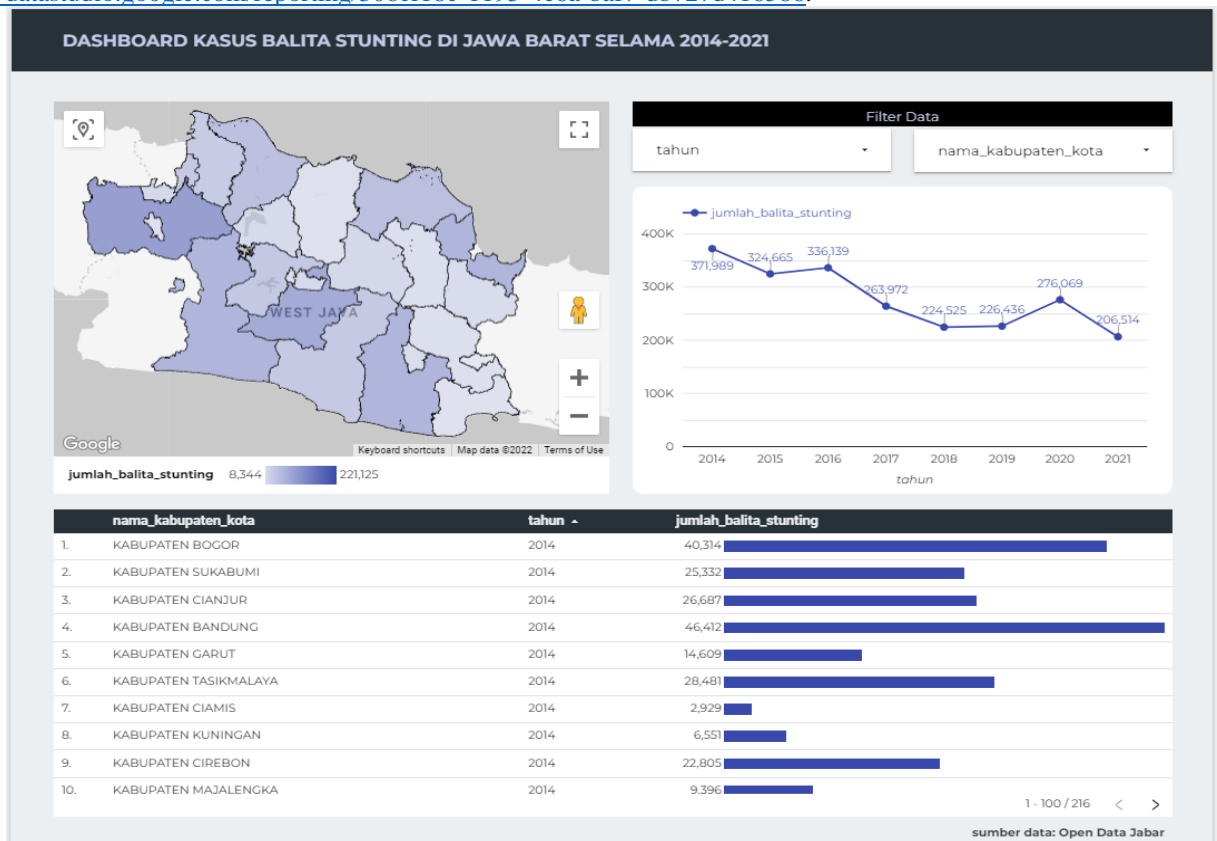


Figure 11. Dashboard of stunting toddler cases in West Java

3.3 Analysis process

From 2014 to 2021, the number of cases of stunting among children under the age of five has reduced in West Java, as represented by the line chart. Focusing on the statistics for the last three years (2019-2021), it is evident that the number of instances increased from 2019 to 2020, but then declined in 2021, as seen in Figure 12. From 2019 to 2020, the number of cases increased by 49,633. The number of cases then declined by 69,555 in 2021.

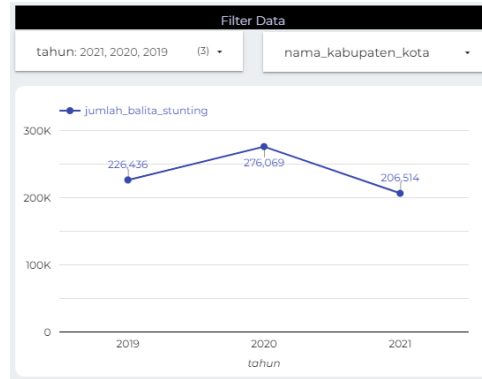


Figure 12. Line chart on cases of stunting in West Java during the past three years

Although in the last three years the number of stunting cases in West Java in general had increased, it turned out that there were seven districts and cities that consistently experienced a decrease in the number of stunting under-five cases. The seven regencies and cities are Sukabumi City, Pangandaran Regency, Majalengka Regency, Kuningan Regency, Karawang Regency, Indramayu Regency, and Cianjur Regency.

	nama_kabupaten_kota	tahun	jumlah_balita_stunting
1.	KABUPATEN BOGOR	2021	30,844
2.	KABUPATEN BANDUNG	2021	20,461
3.	KABUPATEN CIREBON	2021	15,220
4.	KABUPATEN TASIKMALAYA	2021	15,183
5.	KABUPATEN SUKABUMI	2021	14,347
6.	KABUPATEN BANDUNG BARAT	2021	12,488
7.	KABUPATEN GARUT	2021	10,027
8.	KOTA BEKASI	2021	9,820
9.	KABUPATEN BEKASI	2021	8,755
10.	KABUPATEN SUMEDANG	2021	8,117
11.	KABUPATEN CIANJUR	2021	7,768
12.	KOTA BANDUNG	2021	6,312
13.	KOTA TASIKMALAYA	2021	6,194
14.	KABUPATEN INDRAMAYU	2021	5,208
15.	KOTA BOGOR	2021	3,950
16.	KOTA DEPOK	2021	3,726
17.	KABUPATEN KARAWANG	2021	3,715
18.	KABUPATEN PURWAKARTA	2021	3,709
19.	KABUPATEN KUNINGAN	2021	3,665
20.	KABUPATEN CIAMIS	2021	3,303
21.	KOTA CIMAHI	2021	3,161
22.	KABUPATEN MAJALENGA	2021	2,934
23.	KOTA CIREBON	2021	2,411
24.	KABUPATEN SUBANG	2021	2,088
25.	KOTA SUKABUMI	2021	1,180
26.	KABUPATEN PANGANDARAN	2021	999
27.	KOTA BANJAR	2021	929

Figure 13. Table with bars on cases of stunting in West Java per 2021

The number of cases of stunting each district and city in West Java in 2021 is represented in Figure 13. It reveals that the district of Bogor has the greatest incidence of children under the age of five suffering from stunting, with 30,844

cases, followed by Bandung Regency (20,461 instances) and Cirebon Regency (15,220 cases). With 929 cases, the city of Banjar had the fewest number of stunting cases.

4. CONCLUSION

In this study, information on incidences of child stunting in West Java from 2014 to 2021 have been visualized using a dashboard. The dashboard contains line chart, filled maps, tables, and two control filters. The line chart shows fluctuations in the number of incidents between 2014 and 2021. The distribution of stunting in West Java is identified using filled maps. From 2014 to 2021, particular statistics on the incidence of stunting in cities and districts are shown using bar charts. During the analytical phase, control filters also play an important role. One of the results of the analysis indicates that the number of cases of stunting grew from 2019 to 2020 throughout the past three years (2019-2021). However, the number of cases eventually recovered to 2021. This indicates that the government of West Java is working diligently to reduce the number of occurrences of toddler stunting. According to data from 2021, Bogor Regency has the greatest number of cases of stunting in West Java. Meanwhile, the city of Banjar has the lowest incidence of children under five suffering from stunting. This dashboard is meant to provide easy-to-understand data on the number of under-five stunting cases in West Java in order to aid the West Java Provincial Government in formulating more appropriate policies on the handling of stunting cases.

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