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Development of a Data Visualization Dashboard for the Number of Male and Female Heads of Household by Age Group at BKKBN Bengkulu Province

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Abstract*— The development of information technology has driven transformation in the management of population data, which plays an important role in development planning and policy-making. However, conventional data presentation in the form of static tables has limitations in effectively supporting data analysis and exploration. This study aims to develop a data visualization dashboard at BKKBN Bengkulu Province to improve the quality of data presentation and support data-based decision-making. The data used are secondary data in the form of the number of heads of household by gender and age group in 2025. The method used is a data visualization process that includes stages of data collection, data cleaning, data transformation, data visualization, and data interpretation. The dashboard was developed using Looker Studio, displaying visualizations in the form of bar charts, pie charts, and scorecards. The results show that the developed dashboard is capable of presenting data interactively and informatively, making it easier for users to understand data distribution, identify patterns, and make comparisons between categories. Thus, this dashboard can improve the efficiency of data analysis and support more effective decision-making compared to conventional methods.

Keywords- Data Visualization, Dashboard, Population, Looker Studio, Data Analysis

I. INTRODUCTION

The rapid development of information technology in the digital era has transformed data management practices across various sectors, including transportation, healthcare, education, public services, and population administration. The utilization of dashboard technology and data visualization has significantly improved the efficiency of information management and reporting processes in various organizations [2], [6], [7], [10]. Population data play a strategic role in supporting development planning and public policy formulation. Therefore, the availability of accurate, up-to-date, and easily accessible information is essential for supporting evidence-based decision-making processes in government institutions [4], [12], [16].

Bengkulu Province has diverse demographic characteristics and varying population distributions across districts and sub-districts. Information regarding the number of household heads by gender and age group is important because it can serve as a basis for planning population, family development, and social welfare programs. Comprehensive demographic information enables policymakers to better understand population structures and formulate more effective strategies. Therefore, an information system capable of presenting demographic data in an informative and interactive manner is required [12].

As the institution responsible for managing population and family planning programs, BKKBN Bengkulu Province requires an effective mechanism for presenting and analyzing population data. However, population data are commonly presented in the form of static tables, which limit users in exploring information, identifying trends, and conducting comparisons across categories. Previous studies have shown that conventional data presentation methods are less effective in supporting information comprehension and analytical activities when compared to interactive dashboard-based approaches [3], [14], [15].

Data visualization dashboards have emerged as an effective solution for transforming complex datasets into meaningful visual information. Through graphical representations, users can more easily identify patterns, trends, and relationships among variables, thereby improving data interpretation and analysis efficiency [1], [5], [6], [8]. In addition, dashboards facilitate interactive exploration and enable users to access relevant information more efficiently than traditional reporting methods [7], [10], [15].

Several studies have demonstrated the successful implementation of dashboards in various domains. Dashboard-based systems have been utilized in healthcare data visualization [1], transportation monitoring [2], business intelligence applications [9], sales analysis [11], and organizational performance monitoring [13]. These implementations indicate that dashboards can improve information accessibility, support analytical processes, and assist organizations in making data-driven decisions [5], [9], [11].

In the context of government and population data management, interactive dashboards provide significant benefits by presenting demographic information in a concise, understandable, and real-time manner. Previous studies have shown that dashboard technology can support policy formulation and decision-making processes through improved

visualization and accessibility of population information [4], [12], [13].

Based on these considerations, this study aims to develop a data visualization dashboard for the Number of Male and Female Heads of Household by Age Group at BKKBN Bengkulu Province using Google Looker Studio. The proposed dashboard is expected to improve the effectiveness of demographic data presentation, facilitate data exploration and analysis, and support evidence-based decision-making in population and family planning programs.

II. RESEARCH METHOD

This study uses a quantitative approach aimed at processing and presenting population data in the form of dashboard visualizations. This approach was chosen because the research focuses on data analysis and visual information presentation to support decision-making.

A. Data Collection Techniques

Data collection techniques were carried out through observation, interviews, and documentation studies. The data used are secondary data obtained from BKKBN Bengkulu Province in the form of the number of heads of household by gender and age group.

B. Data Visualization Process

The data visualization process in this study is used as the main method to process and present population data in the form of an informative and interactive dashboard. This approach was chosen because the research focuses on data presentation without involving programming-based system development, so systematic stages are needed to transform raw data into easily understandable information. This process covers several stages, starting from data collection, data cleaning, data transformation, data visualization, to data interpretation.

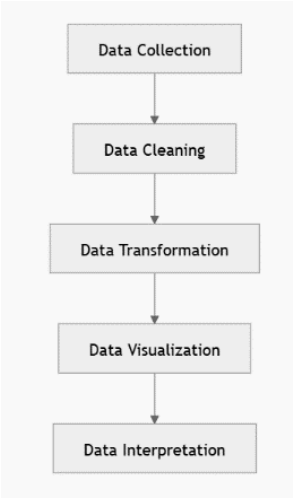


Fig 1. Data Visualization Process Flow

The following is the algorithm for presenting population data in the form of a dashboard.

Data Collection

Data collection is the initial stage of the process, where secondary data are obtained from BKKBN Bengkulu Province. The dataset includes information on the number of household heads categorized by gender and age group, which serves as the primary source for analysis. This stage involves identifying relevant variables, ensuring data completeness, and verifying that the dataset aligns with the objectives of the study. Proper data collection is crucial to ensure that the subsequent analysis is based on accurate and reliable information.

Data Cleaning

Data cleaning is performed to improve the quality and reliability of the dataset before analysis. This stage involves identifying and removing duplicate records, correcting inconsistencies or errors in the data, and handling missing or incomplete values. In addition, data validation is conducted to ensure consistency across different variables, such as matching categories of age groups and gender labels. This process ensures that the dataset is free from noise and inaccuracies, thereby enhancing the validity of the analysis results.

Data Transformation

Data transformation involves restructuring and organizing the cleaned data into a format suitable for visualization and analysis. This includes grouping the data into predefined age categories, classifying it by gender, and aggregating values where necessary to obtain summary statistics. The transformation process may also involve converting raw data into calculated fields, such as total counts or proportions, to support more meaningful analysis. This stage plays a critical role in preparing the dataset for effective visualization.

Data Visualization

In this stage, the transformed data are presented using Looker Studio in the form of various visual components, such as bar charts, pie charts, and scorecards. Each visualization is designed to represent specific aspects of the data, such as comparisons, distributions, and proportions. The use of interactive features allows users to explore the data dynamically, enabling a more intuitive understanding of complex information. Effective visualization enhances data readability and facilitates quicker insight generation.

Data Interpretation

The final stage is data interpretation, where the results of the visualizations are analyzed to extract meaningful insights. This involves identifying patterns, trends, and relationships within the data, such as the dominance of certain age groups or gender categories. The insights obtained from this stage are then used to support data-driven decision-making, particularly in the context of population planning and policy evaluation. Proper interpretation ensures that the visualized data can be translated into actionable information.

III. RESULT AND DISCUSSION

A. Dashboard Visualization Results

The result of this research is a population data visualization dashboard developed using Looker Studio. This dashboard is designed to present data on the number of household heads by gender and age group in an interactive and informative manner, enabling users to explore and interpret the data more effectively. The development of the dashboard follows the stages of the data visualization process, including

data collection, data cleaning, data transformation, and the presentation of data in visual form.

The dashboard aims to enhance the clarity and accessibility of population data by utilizing various visualization components such as bar charts, pie charts, and scorecards. These visual elements facilitate users in identifying patterns, analyzing trends, and comparing data across categories. In addition, the inclusion of interactive features allows users to perform flexible data exploration, thereby improving analytical efficiency and supporting more effective data-driven decision-making.

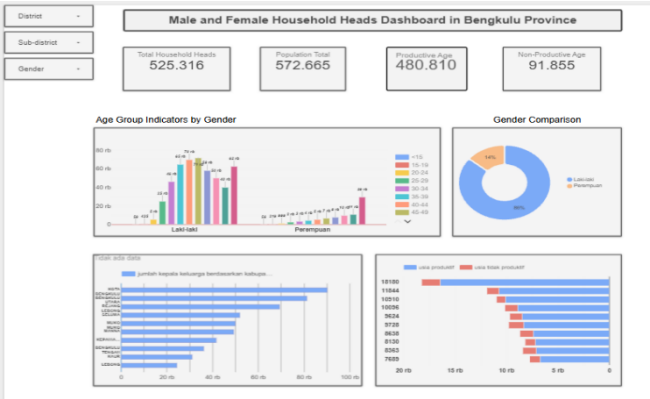


Fig 2. Population Dashboard

Picture 2 presents a population data visualization dashboard displaying the distribution of household heads in Bengkulu Province based on gender, age group, and administrative regions (districts and sub-districts). The data used in this dashboard are secondary data obtained from BKKBN Bengkulu Province in 2025.

The dashboard consists of several main components. At the top section, scorecards display key indicators, including the total number of household heads (525,316), total population (572,665), productive age population (480.810), and non-productive age population (91,855). These indicators provide a quick overview of the overall demographic condition.

In the middle section, a bar chart illustrates the distribution of household heads by age group and gender, showing variations across different age ranges. A pie chart presents the proportion of household heads by gender, indicating that male household heads dominate compared to female household heads.

In the lower section, a horizontal bar chart shows the number of household heads across different districts, enabling comparison between regions. Another chart displays the comparison between productive and non-productive age groups, highlighting the dominance of the productive population.Overall, this dashboard enables users to understand data patterns, identify trends, and perform comparisons across categories in an interactive and efficient manner.

B. Data and Visualization Results

The developed dashboard comprises several key visualization components derived from secondary data obtained from BKKBN Bengkulu Province in 2025. The dataset includes information on the number of household heads categorized by gender, administrative areas (districts and sub-districts), and age groups ranging from under 15 years to over 65 years, which are systematically processed and presented to facilitate comprehensive analysis and interpretation of population patterns.

Table 1. Summary of the Number of Household Heads by Gender

Gender	Number of Heads of Household
Male	445.001
Female	80.315
Total	525.316

Table 1 shows the distribution of heads of household by gender in Bengkulu Province. It can be seen that the number of male heads of household is much higher than female, indicating differences in gender roles in household leadership structures.

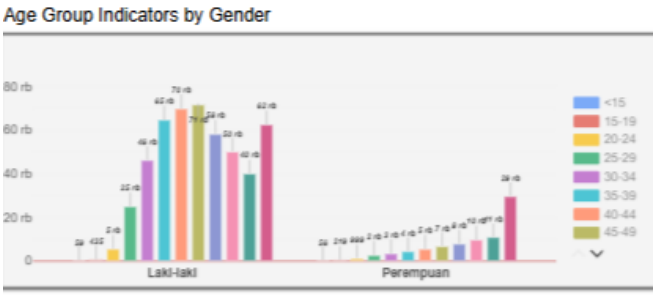


Fig 3.Number of Heads of Household by Age Group

Picture 3 presents the distribution of male and female heads of household by age group based on data from BKKBN Bengkulu Province in 2025. This visualization facilitates the analysis of demographic patterns by displaying the number of heads of household across different age categories, enabling users to compare the distribution among age groups more effectively.

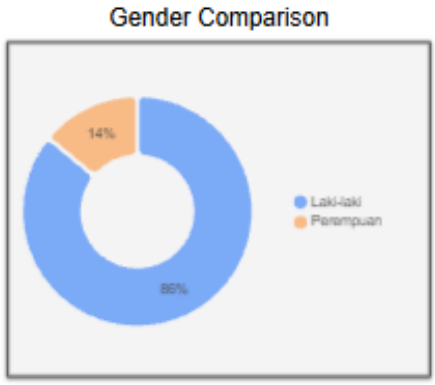


Fig 4. Proportion of Household Heads by Gender

Picture 4 presents the proportion of heads of household by gender processed from the same data. This visualization aims to provide an overview of the composition between male and female heads of household.



Fig 5.Population Summary Statistics

Picture 5 presents key demographic indicators, including the total number of household heads, total population, productive-age population, and non-productive-age population. These indicators provide a concise overview of the demographic characteristics represented in the dataset.

C. Analysis of Results

The distribution of household heads across age groups demonstrates noticeable variation among different age ranges. In general, the number of household heads increases within the productive age group, particularly between approximately 25 and 60 years, and declines in both younger and older age categories. The younger age group, especially individuals under 20 years old, exhibits a relatively low number of household heads, as most individuals at this stage have not yet entered the phase of family formation.Conversely, the productive age group records a higher number of household heads, reflecting that individuals in this range have typically established households and assumed economic and social responsibilities. In the older age group, the number of household heads declines once again, which may be attributed to aging factors, shifts in family structure, and the potential transfer of the head-of-household role to younger generations.

This distribution pattern indicates that household heads in Bengkulu Province are predominantly in the productive age group, defined as individuals aged 15–64 years, compared to the non-productive age group, which includes those under 15 years and over 64 years. This suggests that most household heads are in an economically and socially active phase. Therefore, this information can serve as a basis for more targeted program planning, particularly in supporting family welfare and population development.

IV. CONCLUSION

This study aims to develop a population data visualization dashboard at BKKBN Bengkulu Province to enhance the effectiveness of data presentation and support data-driven decision-making. The results indicate that the dashboard, developed using Looker Studio, is capable of presenting data on the number of household heads by gender and age group in an interactive and informative manner. Various visualization components, including bar charts, pie charts, and scorecards, facilitate users in understanding data distribution, identifying patterns, and performing comparisons across categories.Furthermore, the developed dashboard improves the efficiency of data exploration compared to conventional table-based data presentation. Nevertheless, this study has several limitations, such as the absence of real-time data integration and the limited availability of advanced analytical features. Therefore, future research is recommended to focus on integrating real-time data sources and incorporating more sophisticated analytical functionalities to further enhance the overall performance and usability of the dashboard.

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