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Use of API in Data Warehouse Integration for One Data Stunting Presentation

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Abstract

The Office of Population Control, Family Planning, Empowerment of Women and Child Protection (DP2KBP3A) of Kediri Regency is one of the key government agencies responsible for stunting management. To monitor the current status of stunting in the region, DP2KBP3A utilizes the 'Aksipenting' application (Stunting Monitoring Integration Application), a platform designed for stunting data entry across Kediri Regency. Beyond stunting monitoring, Aksipenting is also employed to track the health conditions of prospective brides, pregnant women, and postpartum mothers. The system processes data across three hierarchical levels: the cadre level, the district level, and the regency level. While DP2KBP3A manages comprehensive stunting data through this application, data integration across Regional Government Agencies (OPD) continues to face challenges regarding standarization and interoperability. This study aims to design and implement a Data Warehouse-based Application Programming Interface (API) to support the 'One Data Stunting' policy across various agencies. The system development follows a Research and Development (R&D) approach using the Rapid Application Development (RAD) method to produce a reliable, standarized, and accessible data integration solution as a foundation for decision-making in accelerating stunting reduction.

INTRODUCTION

Information is the result of a data processing process, which is processed in such a way as to produce new knowledge. The data processed can come from various sources and the results of data processing can be distributed to various departments that need it by utilising information technology. The data management system is part of information resource management, which includes all activities from identifying data needs to collecting and utilising data, to ensure accurate and up-to-date information (1). With the use of technology, connected data can be presented as information that is useful to users, especially for policy makers in determining the direction of policies to be taken (2). The development and utilisation of information technology continues to grow rapidly, one of which is technology for data integration between units. This allows units or departments to share data and information. However, in practice, not all agencies or companies are able to utilise this technology to its full potential. As part of data governance, this research applies policy-based data classification in accordance with data characteristics. This approach is in line with the principles of personal data protection and privacy by design practices in government information systems.

Data integration is the process of combining data from various sources into a single, integrated unit that can be accessed efficiently (3). The importance of data integration is also known as data integration because it allows a wide range of information sources to be brought together into a single,

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interconnected and integrated information ecosystem. Integration helps build responsive, effective and accountable systems in addition to directing the data exchange process (4). The implementation of the One Data Stunting policy requires data integration that includes specific and sensitive interventions. This is crucial considering that the national prevalence of stunting, at 24.4%, is still far from the target of 14% in 2024 (5). The use of APIs in the Data Warehouse enables the standardisation of data from various indicators, such as immunisation coverage, ANC visits, and centralised monitoring of toddler growth. Stunting remains an unresolved nutritional problem in Indonesia (6). Meanwhile, tackling stunting requires cooperation between relevant departments and information that describes the stunting conditions in a particular region. The importance of stunting data that can be used by relevant departments to control stunting rates is a very important requirement. However, in reality, many agencies face obstacles in distributing data and information across departments due to the lack of technology to integrate the data produced by the P2KBP3A agency.

Based on the problems described above, this study will discuss one of the technologies that can be used to share information and data across departments and even across agencies. One such technology is the Application Programming Interface (API), which is a set of rules, protocols, and tools that enable one application to communicate with another. APIs enable different systems (e.g., software, databases, or web services) to exchange data or functions without needing to know each other's internal workings (7). APIs are generally implemented when there is a need to connect two or more different systems, where these systems want to communicate with each other and share certain information or functionalities (8). The P2KBP3A agency already has a data warehouse structure where the stored data has undergone a cleaning process so that it can display more accurate information. This data warehouse will then be distributed to the relevant departments using API technology. The ultimate goal of this research is to build and produce a web-based API that is ready for use by other systems within the Kediri Regency government.

RESEARCH METHOD

This study utilises qualitative methods, an approach or technique for collecting and analysing data descriptively, with the aim of understanding the phenomenon being studied from the perspective of the subjects or participants (2) (9). The following is a diagram of the research scheme that will be used to integrate stunting data at the P2KBP3A office.

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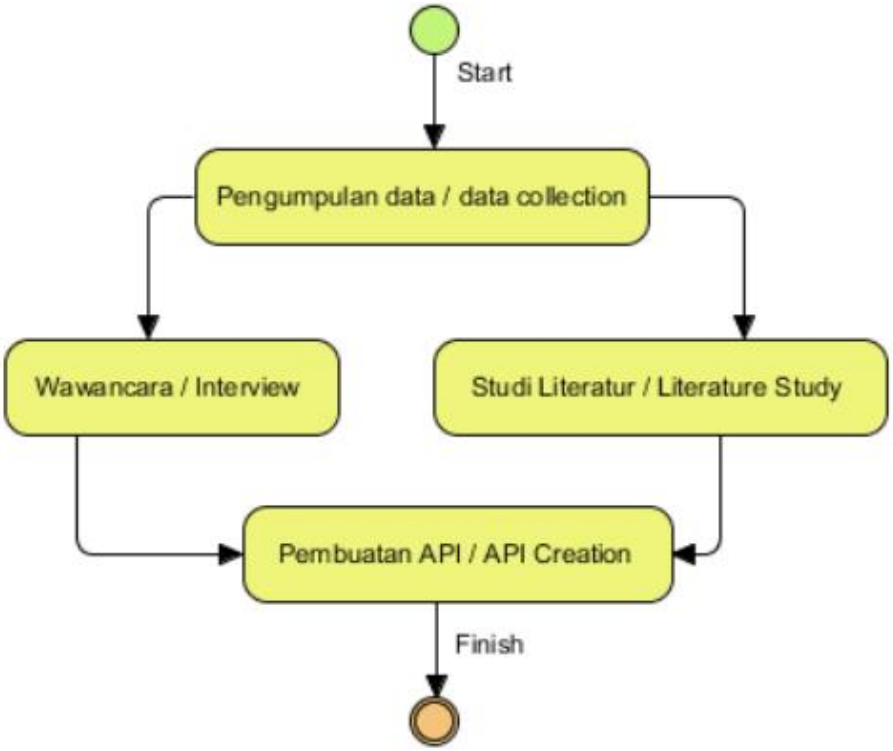

Figure 1 Research Methodology

1.1. Data collection

Data collection is carried out to obtain information related to data availability, existing data types, what data information is already provided, desired data outputs, and what data will be shared with relevant parties. This stage is necessary to produce APIs according to the needs of each department. At this stage, needs are mapped according to the requirements of each agency, such as the social services agency, which handles families who are below the poverty line and do not have health insurance. The health agency is directly involved with the health needs of stunted children. The Perkim Agency (Housing and Settlement Agency) is involved if there are stunted families who do not have access to clean water or proper sanitation. The DKPP (Food Security and Agriculture Agency) requires data related to stunted children due to nutritional deficiencies. The following is a table of policy-based data classification

Table 1 Data Classification

Data category	Characteristics	Access
Open data	Aggregate data, without individual identities	Public
Limited Data	Aggregate data by region	OPD
Private Data	Individual data (name, NIK, address) or BNBA (By Name By Address)	Limited admin

1.2. Interviews

During the interview stage, researchers gathered information related to the needs of each data user and identified the availability of data to meet those needs. The results of this stage can be mapped

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in relation to the creation of APIs in each section, starting from the needs of the social services agency, health agency, housing and settlement agency, and the Central Statistics Agency (BPS).

1.3. Literature study

Explore information related to data policies on what data may be shared and what data may not be shared. This is because it relates to the confidentiality of data and information.

1.4. API Creation

At this stage, the process involves creating the API structure, API access, and data information to be displayed according to the needs of each section. The creation and development of the API will use the Software Development Life Cycle (SDLC) method. The mapping of the API itself is tailored to the information needs of each department, as each regional government agency (OPD) has different data requirements, so the API is designed based on the type of stunting indicators, regional level and access classification (open data or private data). For example, the social services agency, which deals with families in pre-prosperous status, will have different information needs than the food security and agriculture agency, which requires information related to stunting caused by nutritional deficiencies.

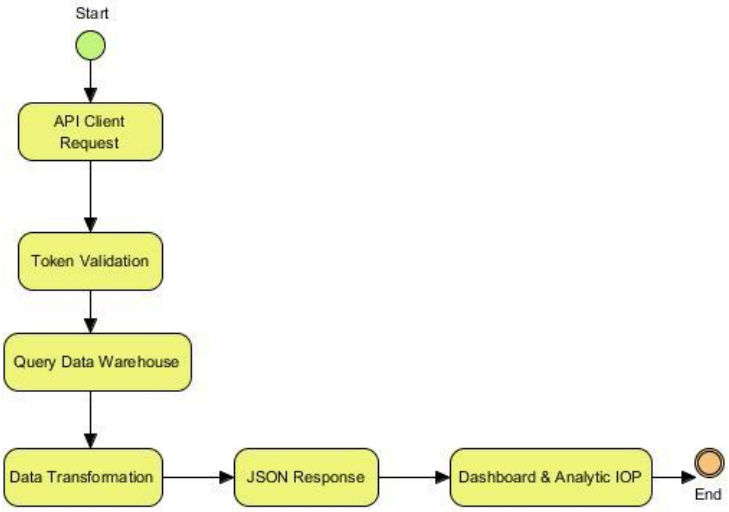

Figure 2 API Process

The image illustrates the workflow of data integration through a Data Warehouse-based Application Programming Interface (API) designed to support cross-agency data analytics and visualisation needs. The process begins with a request from the API Client, which can be an internal OPD application, an analytics dashboard, or a registered third-party system. This request serves as the initial trigger for standardised data exchange between systems.

The next stage is authentication token validation, which aims to ensure that the request originates from a legitimate client with access rights in accordance with system security policies. This mechanism is important to guarantee confidentiality and access control, while preventing unauthorised access to sensitive stunting data.

After successful authentication, the system queries the Data Warehouse, which is an integrated data repository that stores stunting data from various OPD sources in a structured and standardised format. The use of a Data Warehouse enables efficient processing of historical data and large-scale data aggregation, thereby supporting cross-sector analysis needs.

The query results then undergo data transformation, where raw data is adjusted to the application's consumption needs, including attribute normalisation, indicator calculation, and data structure simplification. This stage aims to ensure data compatibility with the API output schema and improve data readability and interoperability.

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The transformation results are then packaged in JSON Response format, which is a lightweight, flexible data exchange format commonly used in modern system integration. This format makes it easier for recipient systems to process data automatically without dependence on a particular platform.

The final stage is the utilisation of data by the OPD Dashboard and Analytics, which serve as a means of visualisation, monitoring, and analysis of stunting data in real-time and periodically. The information generated forms the basis for data-driven decision making in planning, evaluating, and accelerating interventions to address stunting. This process is then completed once the data has been successfully presented and utilised by end users.

1.5. Software Developement Life Circle (SDLC)

SDLC or Software Development Life Cycle is the process of developing or modifying a software system using software development models and methodologies that people use to develop software systems (10) (11). The approach will use the Rapid Application Development (RAD) method. The Rapid Application Development (RAD) method is a software development model whose development is classified as an incremental technique (10). RAD incorporates special techniques and computer tools to speed up the analysis, design, and implementation phases in order to get some portion of the system developed quickly and into the hands of the users for evaluation and feedback (12).

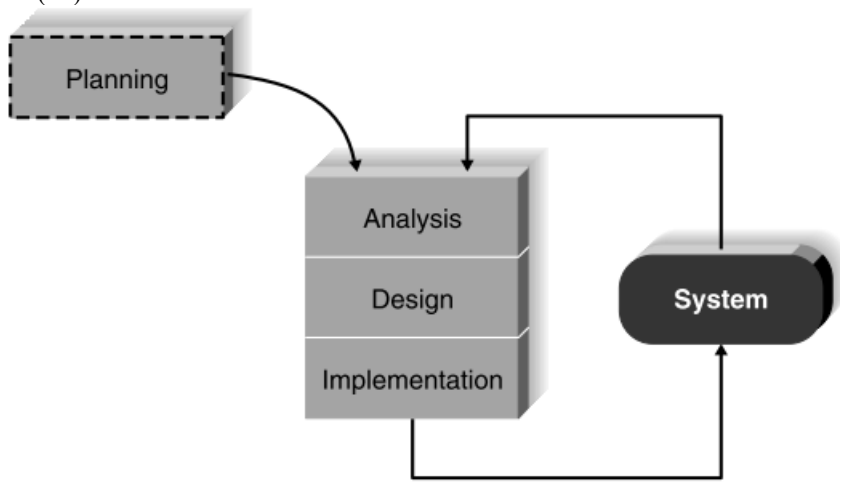

Figure 3 RAD Method

1.5.1. Planning
At this stage, the process of identifying the requirements needed by the system is carried out, with the aim of exploring what information is needed, the limitations of the system and the possible obstacles that may arise and how to deal with them.

1.5.2. Analysis
The analysis process aims to understand how the system behaves and how it operates.

1.5.3. Design
The process of designing business processes based on the previous stages. This step also involves the programming design process for the data that has been obtained.

1.5.4. Implementation
After the analysis and design processes are complete, the next step is implementation, which involves translating the design into programming language (coding). This stage results in a system that is ready for testing.

RESULTS AND DISCUSSION

3.1. System workflow

In order to produce useful information that can provide new knowledge and added value, a process is needed to obtain data and process it. Below is a general overview of how data is obtained by the Office of Population Control, Family Planning, Women's Empowerment and Child Protection (DP2KBP3A).

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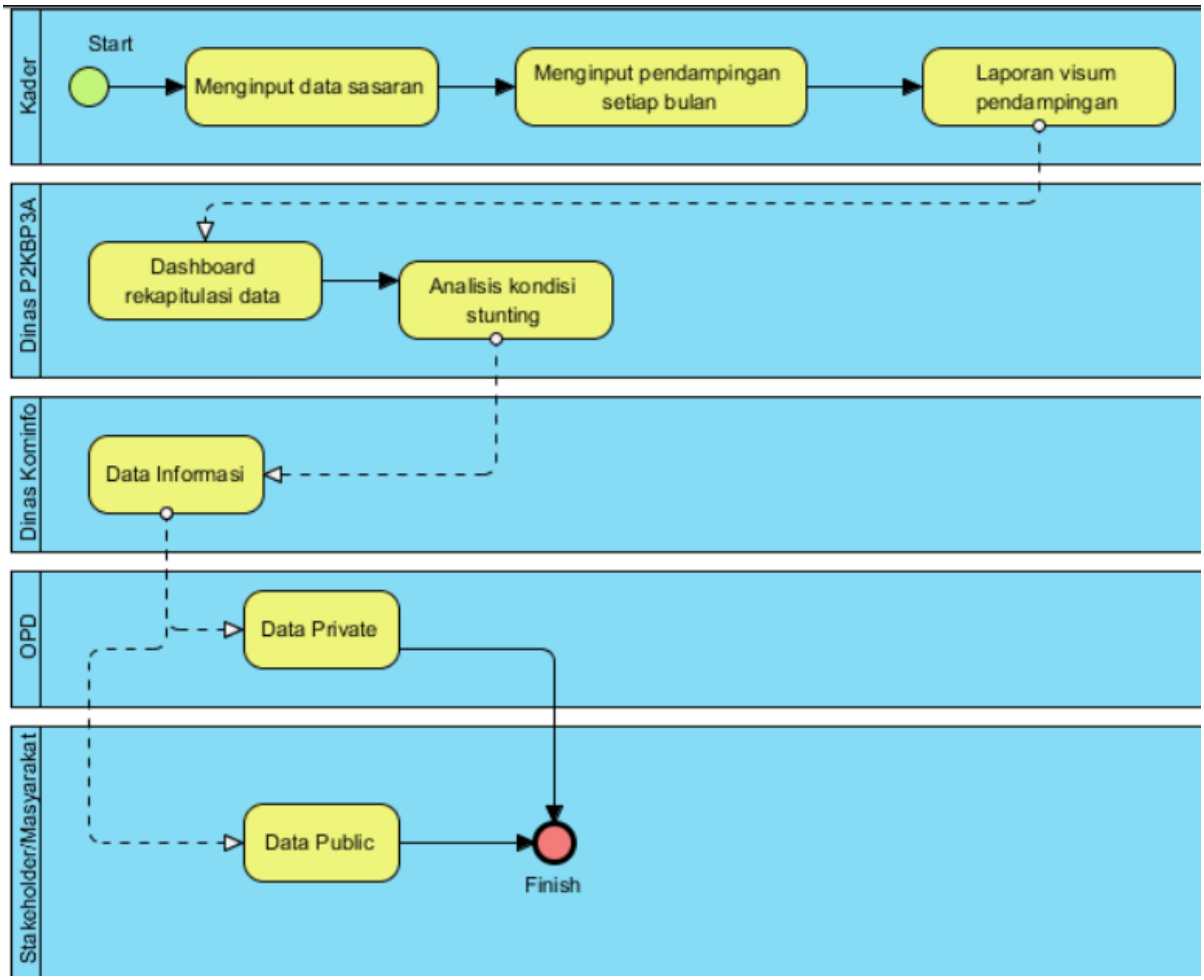

Figure 4 Data system flow

The image above shows the current business process for generating information, which will then be shared with the relevant departments or parties.

1. Cadres (Kader)

This is the most important part of the system because it is responsible for collecting data in the field and entering it into the system provided. The Population Control, Family Planning, Women's Empowerment and Child Protection Agency (DP2KBP3A) of Kediri Regency has more than 4,000 cadres spread across all villages in Kediri Regency. These cadres consist of community members, namely PKK members, family planning members and health workers, each of whom has different tasks in providing assistance to the target population.

2. Dinas DP2KBP3A

As the office authorised to instruct all cadres to collect data from the target population at the village level. The data entered by the cadres is factual data from the field, which is then processed and analysed.

3. Dinas Kominfo

As part of one of the Regional Apparatus Organisations (OPD), one of its tasks is to be responsible for all data entered by existing OPDs, one of which is the P2KBP3A Agency. The data processed by the P2KBP3A Agency is then disseminated by the Communication and Information Agency (Kominfo). The data section classifies information as public or private.

4. Organisasi Perangkat Daerah (OPD)

This is a regional apparatus that assists in government tasks, particularly at the district level. From the business process above, this OPD is a unit that receives and can utilise private data. This private data and

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information can be used as preliminary information to determine a policy for each OPD in accordance with the data received.

5. Stakeholder/Masyarakat

There is some data or information that can be accessed publicly and requires specific access. This is where stakeholders can utilise the information and data that is shared freely without requiring specific access.

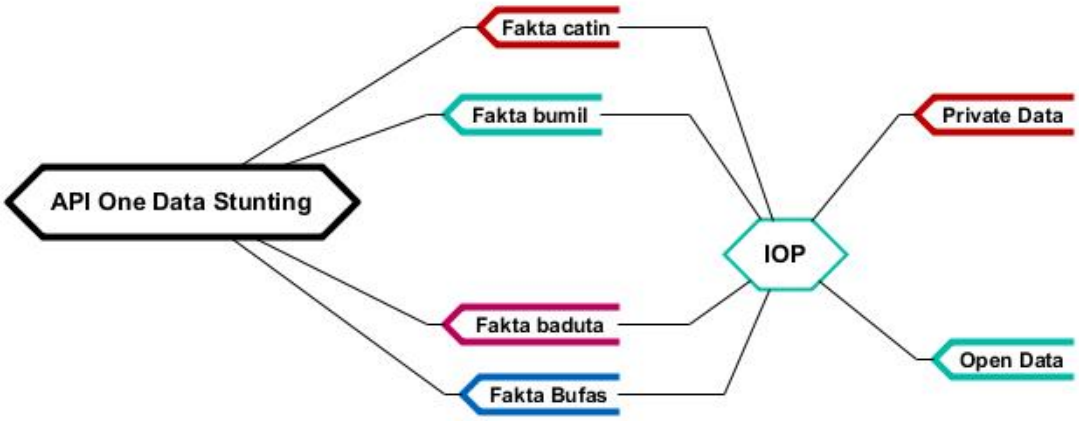

Figure 5 API Integration Diagram

3.2. API Implementation

The image above is a diagram of the integration of One Data Stuinting API data with another system, the Intelligent Operating Platform (IOP). This application is used for data management and dissemination. The data will be used by policymakers to make data-driven decisions and policies (13). The IOP will serve as a system that retrieves data from other systems that are ready for publication, both open data and private data. The retrieved data has undergone validation and cleaning processes in accordance with existing requirements, resulting in more accurate data for use in policymaking.

1. Fakta Calon Pengantin (CATIN)

This data provides information related to the condition of pregnant women. It is automatically updated every month by the IOP system.


```
{
    status: "200",
    message: "success",
    datetime: "1763002087",
    total_items: 3359,
    page_size: "0",
    total_pages: "0",
    page_no: "0",
  - data: [
    - {
          custom_unique_id: 1,
          data_date: "2025-05-23",
          kecamatan: "BADAS",
          desa: "BADAS",
          usia: "0",
          tahun: "2025",
          jml: "1"
      },
    - {
          custom_unique_id: 2,
          data_date: "2025-10-13",
          kecamatan: "BADAS",
          desa: "BADAS",
          usia: "17",
          tahun: "2025",
          jml: "1"
      },
    - {
          custom_unique_id: 3,
          data_date: "2025-02-23",
          kecamatan: "BADAS",
          desa: "BADAS",
          usia: "18",
          tahun: "2025",
          jml: "1"
      },
    - {
          custom_unique_id: 4,
          data_date: "2025-07-08",
          kecamatan: "BADAS",
```


Figure 6 API Data on Prospective Brides and Grooms

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2. Fakta Ibu Hamil (BUMIL)

Provides information on pregnant women throughout the Kediri Regency, along with the API display of pregnant women data in JSON format.


```
{
    status: "200",
    message: "success",
    datetime: "1763002137",
    total_items: 344,
    page_size: "0",
    total_pages: "0",
    page_no: "0",
  - data: [
    - {
          custom_unique_id: 1,
          data_date: "2025-10-26",
          kecamatan: "BADAS",
          desa: "BADAS",
          tahun: "2025",
          jml: "64"
      },
    - {
          custom_unique_id: 2,
          data_date: "2025-10-23",
          kecamatan: "BADAS",
          desa: "BLARU",
          tahun: "2025",
          jml: "93"
      },
    - {
          custom_unique_id: 3,
          data_date: "2025-11-11",
          kecamatan: "BADAS",
          desa: "BRINGIN",
          tahun: "2025",
          jml: "79"
      },
    - {
          custom_unique_id: 4,
          data_date: "2025-11-11",
          kecamatan: "BADAS",
          desa: "CANGGU",
          tahun: "2025",
          jml: "115"
```


Figure 7 API for Pregnant Women

3. Fakta Balita Bawah Dua Tahun (BADUTA)

These facts present information related to the condition of toddlers under two years of age in each village in the Kediri Regency. This data includes all data on both normal toddlers and toddlers with stunting, pre-stunting and wasting conditions.

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```
{
    status: "200",
    message: "success",
    datetime: "1763002177",
    total_items: 944,
    page_size: "0",
    total_pages: "0",
    page_no: "0",
  - data: [
    - {
          custom_unique_id: 1,
          data_date: "2025-10-24",
          kecamatan: "BADAS",
          desa: "BADAS",
          status: "Normal",
          tahun: "2025",
          jml: "50"
      },
    - {
          custom_unique_id: 2,
          data_date: "2025-08-14",
          kecamatan: "BADAS",
          desa: "BADAS",
          status: "Pra%20Stunting",
          tahun: "2025",
          jml: "2"
      },
    - {
          custom_unique_id: 3,
          data_date: "2025-07-19",
          kecamatan: "BADAS",
          desa: "BADAS",
          status: "Stunting",
          tahun: "2025",
          jml: "3"
      },
    - {
          custom_unique_id: 4,
          data_date: "2025-10-21",
          kecamatan: "BADAS",
```


Figure 8 Baduta API

4. Fakta Ibu Nifas (BUFAS)

The postnatal mother fact sheet provides up-to-date information on the condition of postnatal mothers in each village throughout Kediri Regency.

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```
{
    status: "200",
    message: "success",
    datetime: "1763002159",
    total_items: 342,
    page_size: "0",
    total_pages: "0",
    page_no: "0",
  - data: [
    - {
          custom_unique_id: 1,
          data_date: "2025-10-21",
          kecamatan: "BADAS",
          desa: "BADAS",
          tahun: "2025",
          jml: "56"
      },
    - {
          custom_unique_id: 2,
          data_date: "2025-11-03",
          kecamatan: "BADAS",
          desa: "BLARU",
          tahun: "2025",
          jml: "55"
      },
    - {
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          data_date: "2025-10-23",
          kecamatan: "BADAS",
          desa: "BRINGIN",
          tahun: "2025",
          jml: "96"
      },
    - {
          custom_unique_id: 4,
          data_date: "2025-11-13",
          kecamatan: "BADAS",
          desa: "CANGGU",
          tahun: "2025",
          jml: "107"
```


Figure 9 Bufas API

3.3. From the data obtained from each API, the data will be processed by the IOP system into a dashboard page that is easier for users to read.

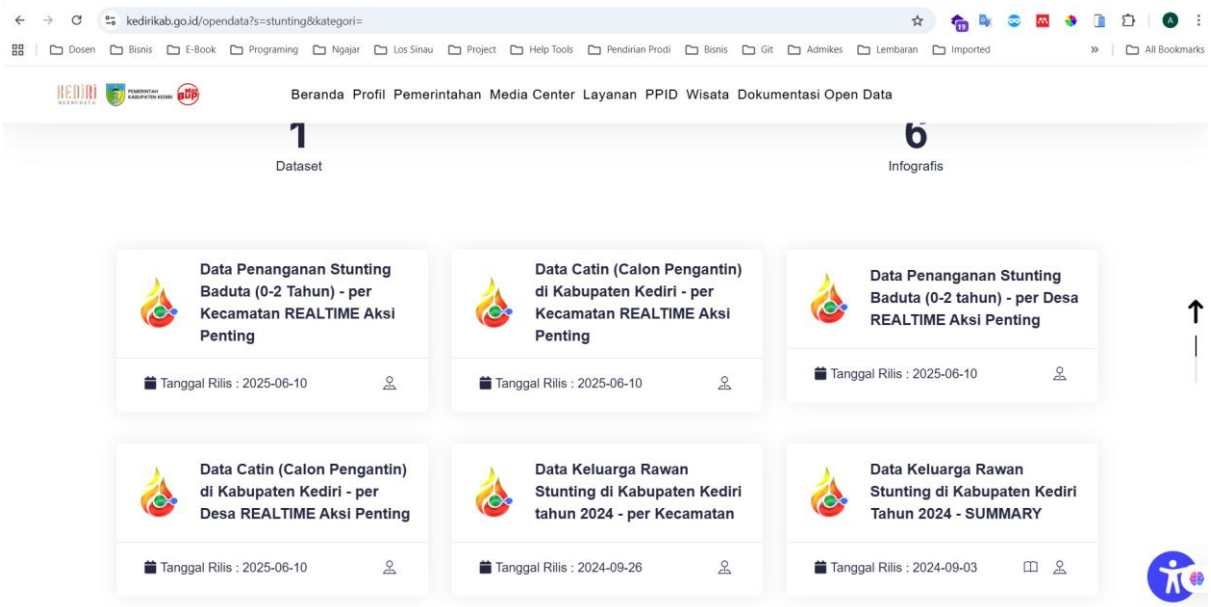

Figure 10 Dashboard showing the results of IOP Open Data integration

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The image above shows the data dashboard related to the results of integrating the stunting data warehouse API with the IOP system.

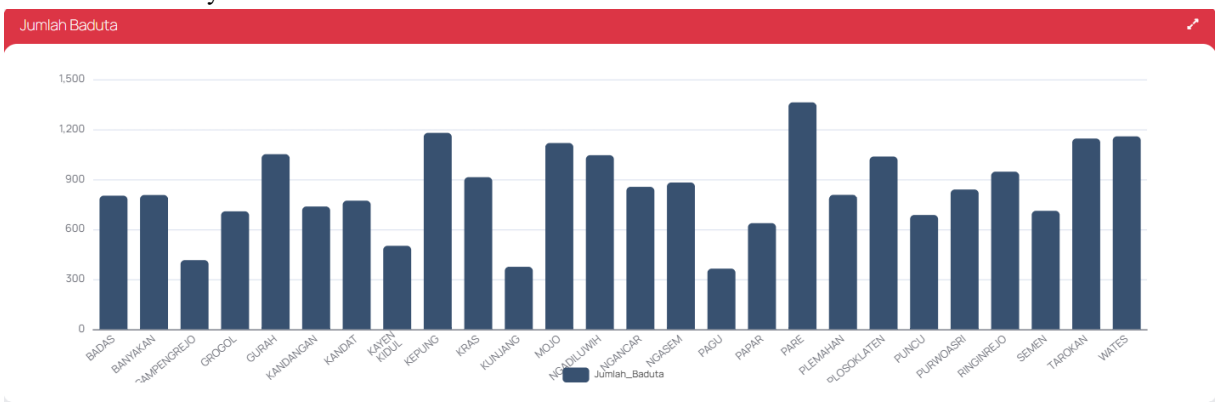

Figure 11 Data Information in Graphical Form

The graph above shows data on the number of children under two years of age globally in each subdistrict.

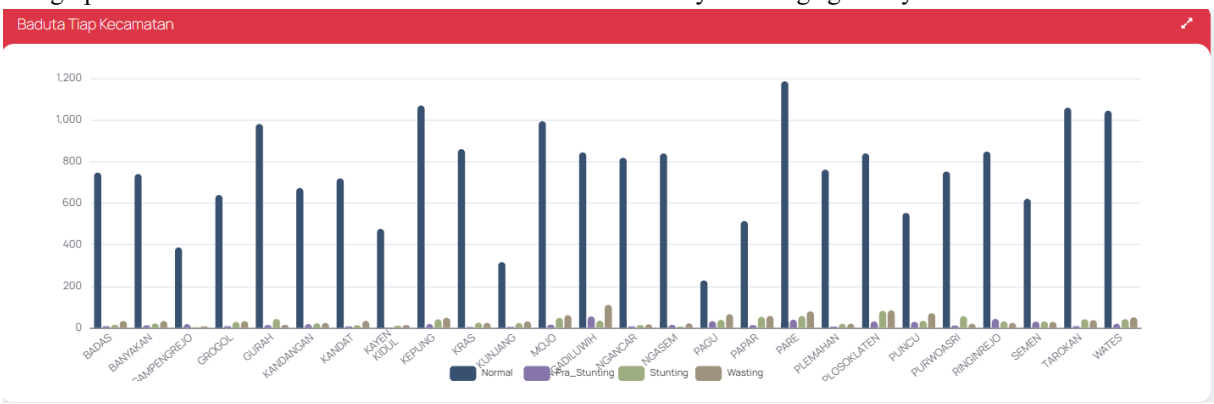

Figure 12 Stunting Graph for Each Subdistrict

3.4. Comparison of data distribution

Table 2 Comparison of Data Distribution

Aspect	Manual	API Integration
Distribution time	3-7	Real Time
Format data	Excel	JSON
Risk of inconsistency	High	Low
Cross-OPD access	Limited	Standardised

CONCLUSION

From the results of the stunting data integration process using the Rapid Application Development (RAD) approach, it can be concluded that:

1. Data can be integrated using APIs in the form of JSON data.
2. The resulting APIs can also be processed by the IOP system and can display data in graph form.
3. This study successfully implemented a Data Warehouse-based API to support the integration of One Data Stunting across OPDs.

This data integration process certainly has limitations that need to be evaluated further. The limitations of this system include standard API security, scalability that has not been tested for national-scale traffic, and a lack of long-term evaluation.

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SUGGESTIONS

Further research is recommended to develop a policy-based Open API to support controlled data utilisation by external stakeholders. System security needs to be improved through the implementation of OAuth 2.0 or JSON Web Token (JWT), rate limiting, and encryption of sensitive data. Additionally, the API system needs to be aligned with national API security standards and the OWASP API Security Top 10 principles, and should be directed to support integration with the Satu Data Indonesia portal to strengthen cross-sector data interoperability and governance.

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