

Original Research Paper

Implementation of Feeder System to Support Monitoring the Potential Malnutrition

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Abstract: The case of malnutrition affecting many toddlers of Banjarmasin in isolated areas, remote areas, and remote villages. It is caused by the resultant of economic problems, facilities, infrastructures, and the lack of medical personnel. One of the ways undertaken by the government to overcome this problem is to carry out Posyandu activities. The posyandu program is organized to improve and monitor the nutrition of children under five. However, the reporting of posyandu data by each puskesmas is sometimes delayed because of the large amount of bureaucracy that must be passed to get to the center. Therefore a system feeder application is needed to monitor and mapping on the number of toddlers with potential malnutrition in the city of Banjarmasin.

Keyword: Information Management, Monitoring System, Web-Based Application.



1. Introduction

Cases of malnutrition or are not only a burden on the family but also a burden on the State [1]. The Health and nutritional status of children under five is one of the benchmarks that can reflect the nutritional situation of the wider community [2]. The pattern of parenting in the community in general prefers children under five. Malnutrition in infants does not occur suddenly but begins with the limitation of insufficient weight gain. Historical changes in toddler weight are the initial indication of the nutritional status of toddlers [3]. In 6 months, babies who have not to weight gained twice, have the risk of experiencing 12.6 times less nutrition than those under five who continue to gain weight [4].

Based on the above background, it can be formulated that the research problem is how to make it easier for posyandu cadres to fill in the data and facilitate the city Health Office in monitoring the status of children under five and the status of an area based on data from posyandu.

2. Literature Review

The case of malnutrition affecting many toddlers of Banjarmasin in isolated areas, remote areas, and remote villages. It is caused by the resultant of economic problems, facilities, infrastructures, and the lack of medical personnel. One of the ways undertaken by the government to overcome this problem is to carry out Posyandu activities. The posyandu program is organized to improve and monitor the nutrition of children under five [5].

However, the reporting of posyandu data conducted by each Banjarmasin's Puskesmas (local public health facilities) sometimes experiences delays due to the large amount of bureaucracy that must be passed to get to the national health center. With a system that is not directly monitored by the central government, sometimes there are only cases recorded for many puskesmas, so the number of cases of malnutrition does not reflect the real situation [6]. Therefore, a system feeder application is needed to monitor and mapping on the number of children under five who have the potential for malnutrition, as input for the government, especially the health ministry and policymakers in the field of public health in the prevention and control of potential malnutrition [7]. Thus, it can be said that information on the nutritional status of toddlers is important for related parties, both in terms of data and area labels [8].

Based on these descriptions, the purpose of this study is to map data on the number of children under five who have the potential for malnutrition in the city with a Feeder System Application.

Toddlers can be called poor nutrition if the Body Weight by Age (BB/U) < 3 SD. The situation of toddlers with poor nutrition is often described by the presence of hungry edema. So to determine the toddler is said to include malnutrition can be determined using anthropometric measurements, In this method, several measurements are carried out including measurements of body weight, body length, upper arm circumference by the age most often done in nutrition surveys. In nutrition, nutrition status is not only known by measuring body weight (BB) or body length (PB) according to age individually but also in the form of indicators that can be a combination of all three.

Based on the indicators above, the growth problems represented as [9]:

- stunted, severely stunted
- underweight, severely underweight
- wasted, severely wasted
- possible risk of overweight, overweight, obese

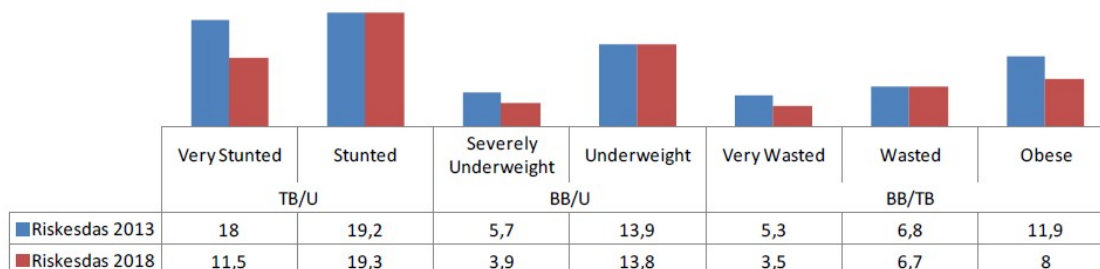


Figure 1. Prevalence of Toddler Nutrition Problems in 2013 and 2018

Whereas the nutritional problems of children under five in 2013 [10] to 2018 [11] are reflected in the prevalence rates as shown in Figure 1, which in some cases have improved. Besides, to mark the status of an area, a data-mining algorithm can be used to mark the nutritional status of children under five in each puskesmas area [12].

3. Methodology

3.1. Data

This study uses data, which was obtained from Posyandu Purnama, Pasarlama Village, Central Banjarmasin sub-district, Banjarmasin. Other Posyandu's data in the same puskesmas working area was obtained from the Puskesmas S.Parman. Other data, obtained from the Banjarmasin Municipal Health Office.

The Posyandu data were obtained are toddler by name, parents by name, toddler's age, toddler's weight, and toddler's body length.

3.2. Current System

The decomposition of a whole system into its parts to identify and evaluate problems and obstacles that occur in the needs which are expected to be proposed [13]. The current system is in the process of mapping the potential for malnutrition of children under five in the city of Banjarmasin, as shown in Figure 2.

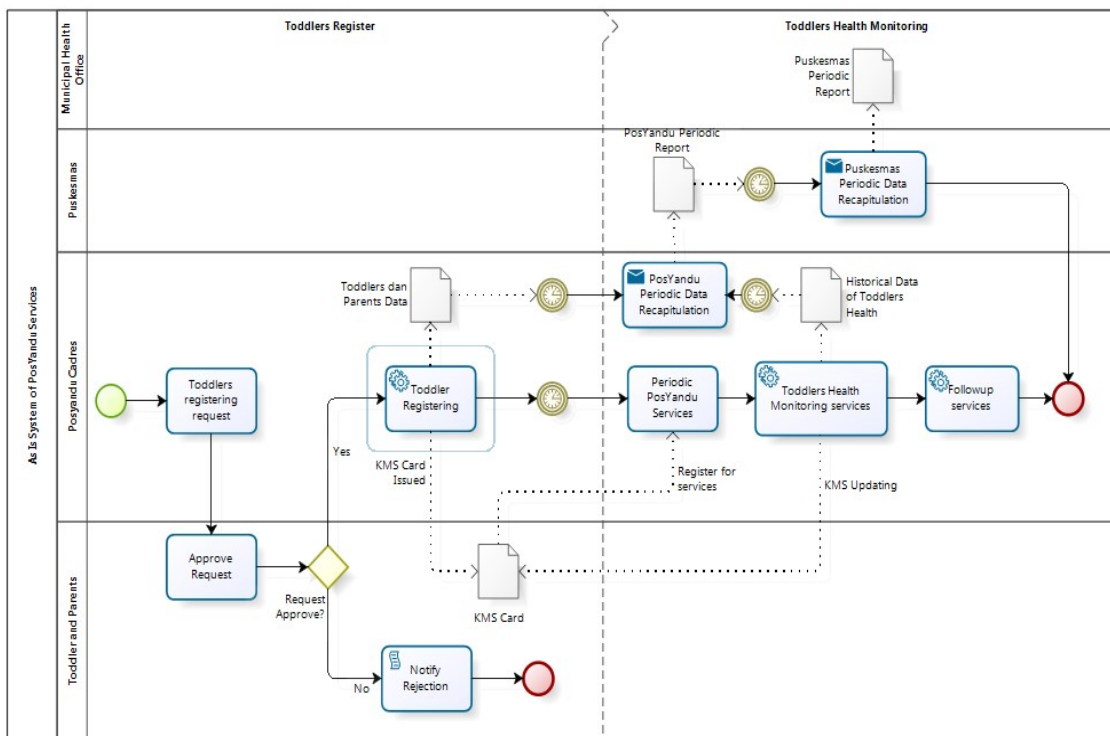


Figure 2. Current System

3.3. Proposed System

Based on the description that has been described in the ongoing system, the authors propose to design an application that can help the Municipal Health Office in mapping the potential for malnutrition in the city of Banjarmasin, so it can be known which areas are potentially malnourished.

An overview of the proposed system shown in Figure 3 and Figure 4.

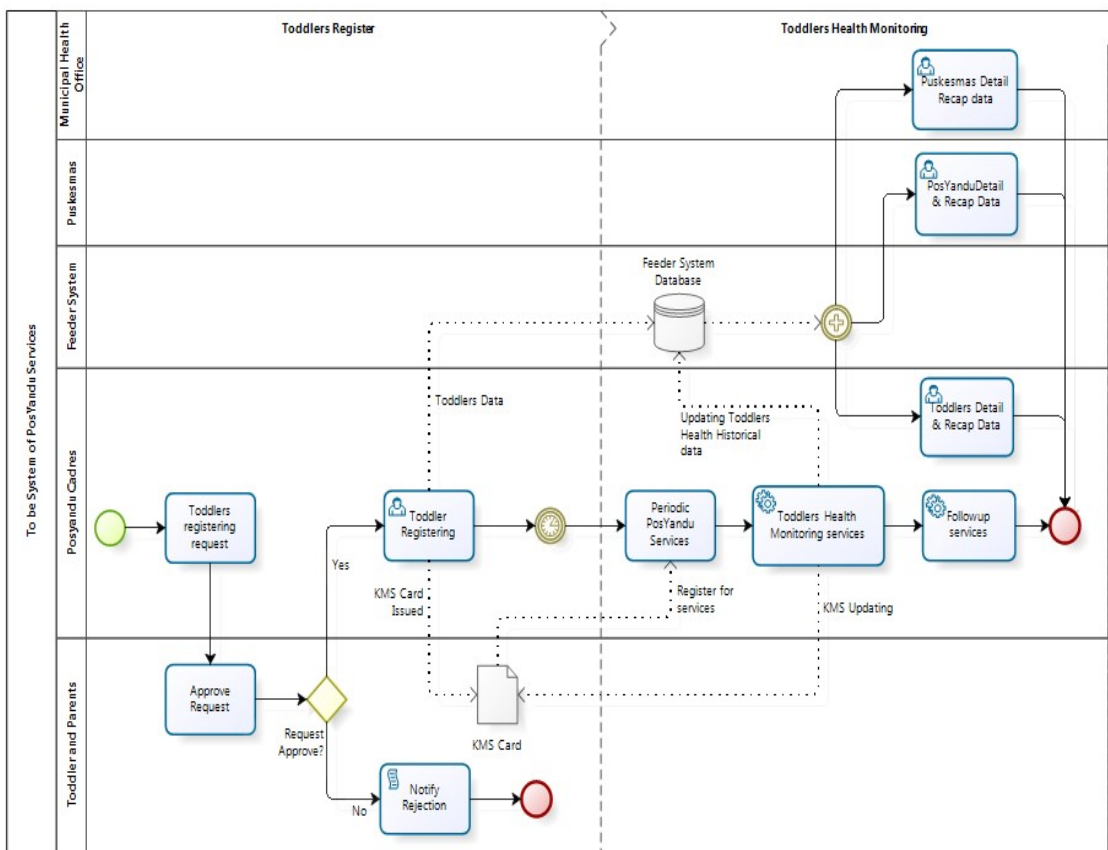


Figure 3. Proposed System: Business Process Model

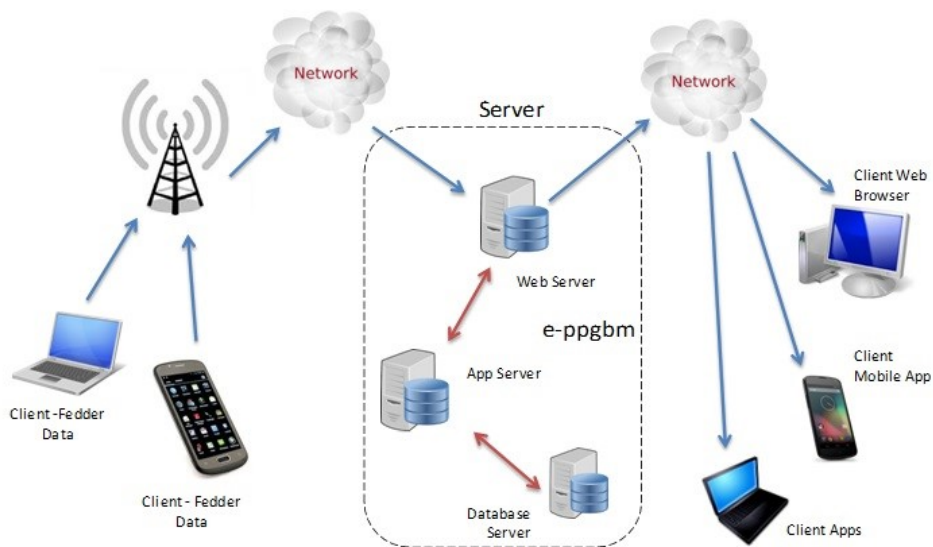


Figure 4. Proposed System: Cross Platform Information Model

4. Finding and Discussion

4.1. Design Phase

The system design is a stage that is carried out before making the application. In designing the system using modeling namely *Unified Modeling Language* (UML) [14] [15].

4.1.1. Use Case Diagrams

The *use case diagram* is a scenario description of the interaction between the user and the system. Use case diagrams illustrating the relationship between actors and the activities they can do to the application are shown in Figure 5.

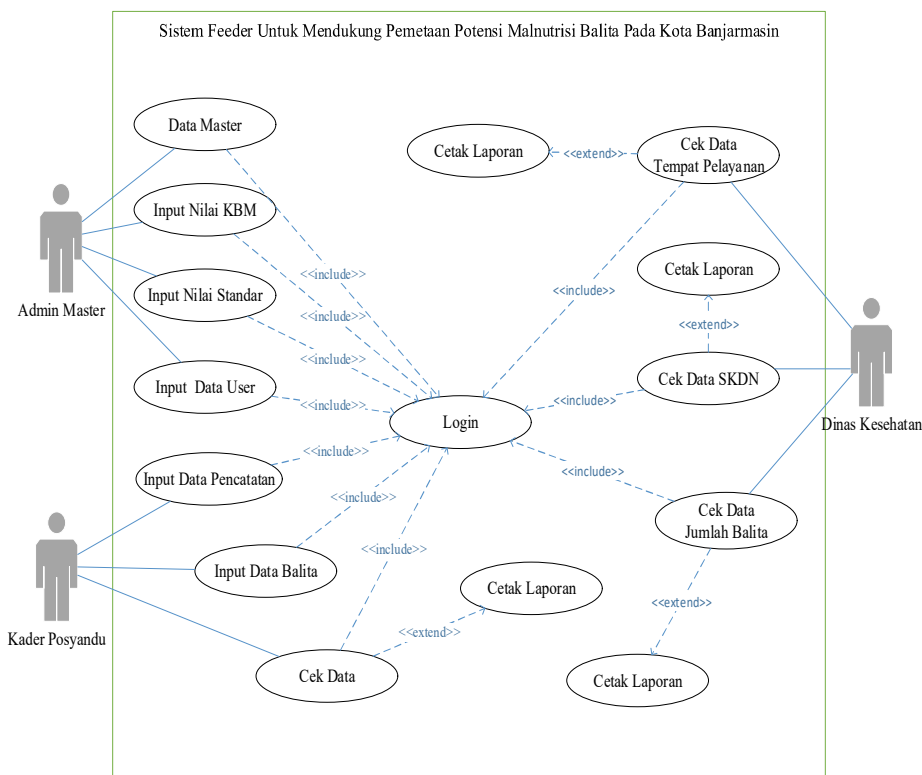


Figure 5. Use Case Diagrams

4.1.2. Class Diagram

The *class diagram* is a diagram that illustrates the structure in terms of defining the classes that will be created to build the system and is the core of object-oriented development and design. Following is the class diagram of the system feeder application to support mapping the potential for malnutrition in the city of Banjarmasin shown in Figure 6.

4.1.3. Relationships Between Tables

The database is a collection of files that are interrelated or related, wherein the database design used in making this application program uses also entity-relationship techniques. That is the relationship between files associated with the primary key-foreign key relationship which is the key to each file. The relationship of these files as shown in Figure 7.

4.1.4. Area Labeling

Examples of data used and outputs (in the color map) [12] for each Posyandu (shown in the table below). The red, amber, yellow, and green are associated with the common community health-risk label: high, medium, moderate, and low. The same goes for the puskesmas and city levels.

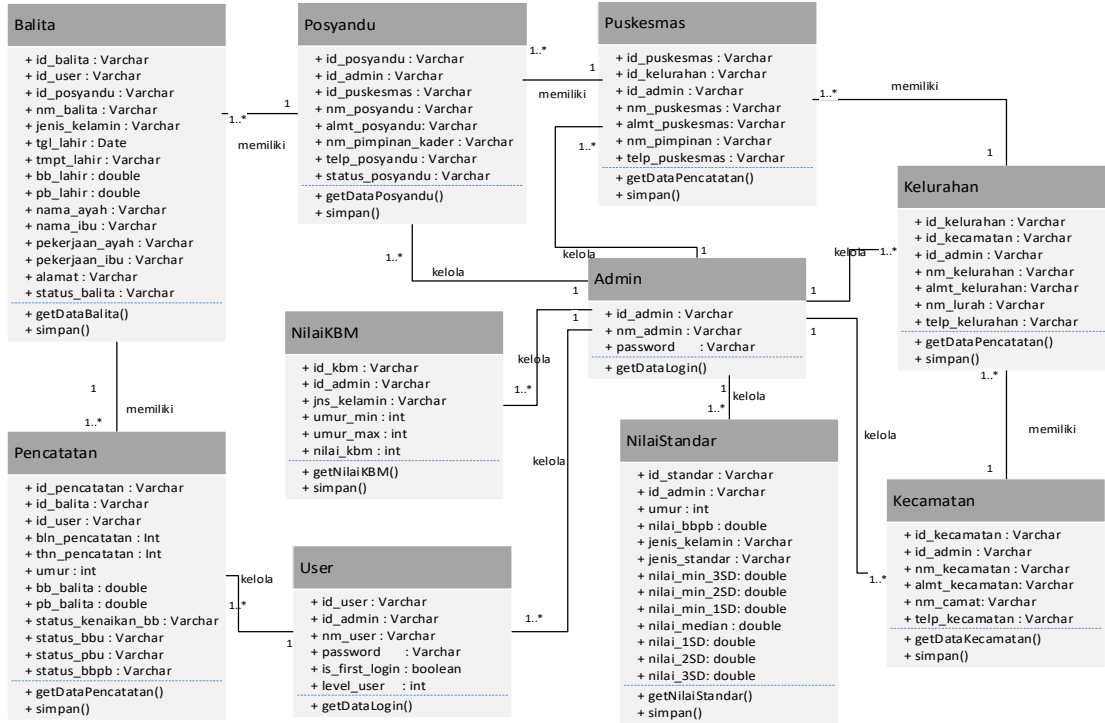


Figure 6. Class Diagram

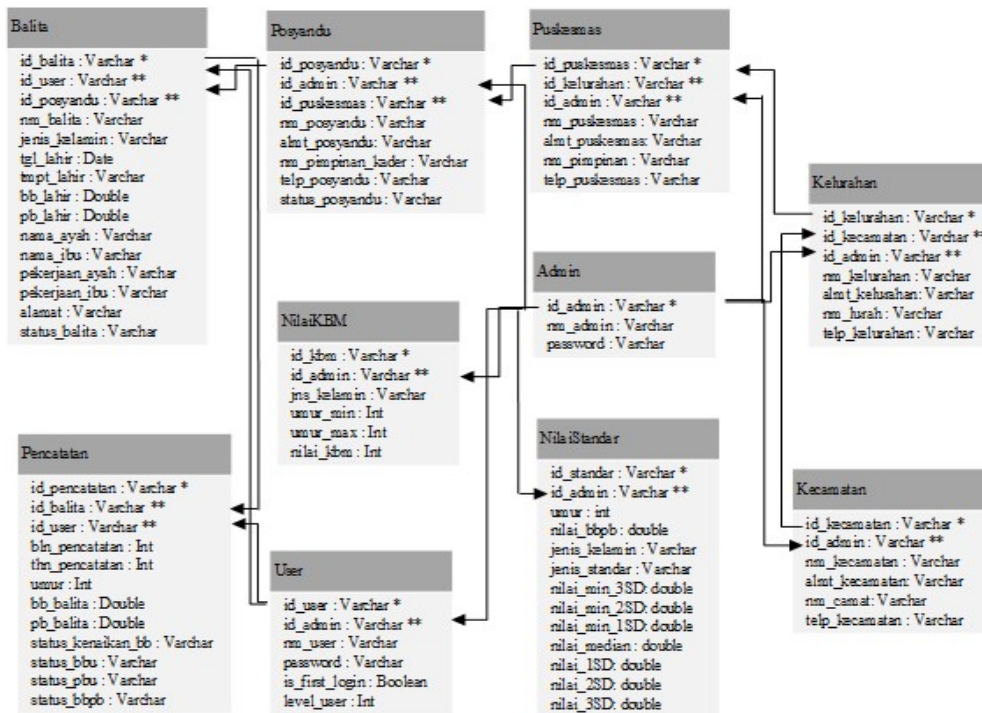


Figure 7. Tables Relationships

In Table 1, even though the coverage was 100% and the number of children with BGM was only 1, the community in the Posyandu Purnama working area was marked as having high-risk health in Desember. Only 17 (34%) children were weighed, and only 10 (58.82%) was gain weight.

Tabel 1. Posyandu Level

Posyandu	2013		
	Okt	Nop	Des
Purnama			
S	50	50	50
K	50	50	50
D	27	20	17
N	25	17	10
BGM	0	0	1
K/S	100,0%	100,0%	100,0%
D/S	54,0%	40,0%	34,0%
N/D	92,6%	85,0%	58,8%
(K-D)/K	46,0%	60,0%	66,0%
BGM/D	0,0%	0,0%	5,9%
Result	Yellow	Amber	Red

So the awareness of the local community to utilize health facilities is still lacking. Their children's growth is not monitored. When this happens (unchanged or worsening), they may be having problems: water quality and sanitation, food fortification, access to health services, childcare education, nutrition knowledge, and reproductive health education.

Tabel 2. Puskesmas Level

NO	POSYANDU	S	K	D	N	BGM	P1	P2	P3	P4	P5	C.45
							K/S	D/S	N/D	(K-D)/K	BGM/D	
1	Purnama Sari	50	50	17	10	1	100,00%	34,00%	58,82%	66,00%	5,88%	Red
2	Mulia Sari	101	98	93	88	0	97,03%	92,08%	94,62%	5,10%	0,00%	Green
3	Mekar Sari	84	84	66	65	2	100,00%	78,57%	98,48%	21,43%	3,03%	Amber
4	Indah Sari	100	80	83	81	0	80,00%	83,00%	97,59%	-3,75%	0,00%	Yellow
5	Mayang Sari	97	97	80	70	1	100,00%	82,47%	87,50%	17,53%	1,25%	Amber
6	Maya Sari	99	99	77	77	0	100,00%	77,78%	100,00%	22,22%	0,00%	Yellow
7	Restu Ibu	72	72	61	61	1	100,00%	84,72%	100,00%	15,28%	1,64%	Amber
8	Antasan Indah I	121	121	103	101	0	100,00%	85,12%	98,06%	14,88%	0,00%	Yellow
9	Antasan Indah II	154	154	131	127	0	100,00%	85,06%	96,95%	14,94%	0,00%	Yellow
10	Antasan Indah III	158	150	140	130	0	94,94%	88,61%	92,86%	6,67%	0,00%	Green
11	Antasan Indah IV	133	133	120	116	0	100,00%	90,23%	96,67%	9,77%	0,00%	Green
S. Parman		1169	1138	971	926	5	97,35%	83,06%	95,37%	14,67%	0,51%	Yellow

The work-area of Posyandu Mulia Sari is marked as low risk, although the coverage is not 100%, public awareness in utilizing Posyandu is high, as evidenced by the number of children who weight gained was 88 out of 93 (92.62%). Overall, Puskesmas S. Parman has received a moderate-risk label, with: the coverage was 97.35%; the participation was 83.06%; the program achievement was 95.37%, and the malnutrition was 0.51% as shown in Tabel 2.

4.2. Development Phase

The system feeder application to support the mapping of potential malnutrition of toddlers in Banjarmasin city that can make it easy for posyandu cadres to process toddlers' data (such as inputting toddler data, toddler recording data, display monthly BB / U and PB / U graphs. And also can make it

easy for the Health Office to monitor data on potential malnutrition of children under five by displaying a SKDN chart of the results of recording children under five in the Posyandu.

The implementation phase has been carried out, namely testing the input and output. Posyandu cadres can input toddlers' data and data on toddlers recording form input is shown in Figure 8 and Figure 9.

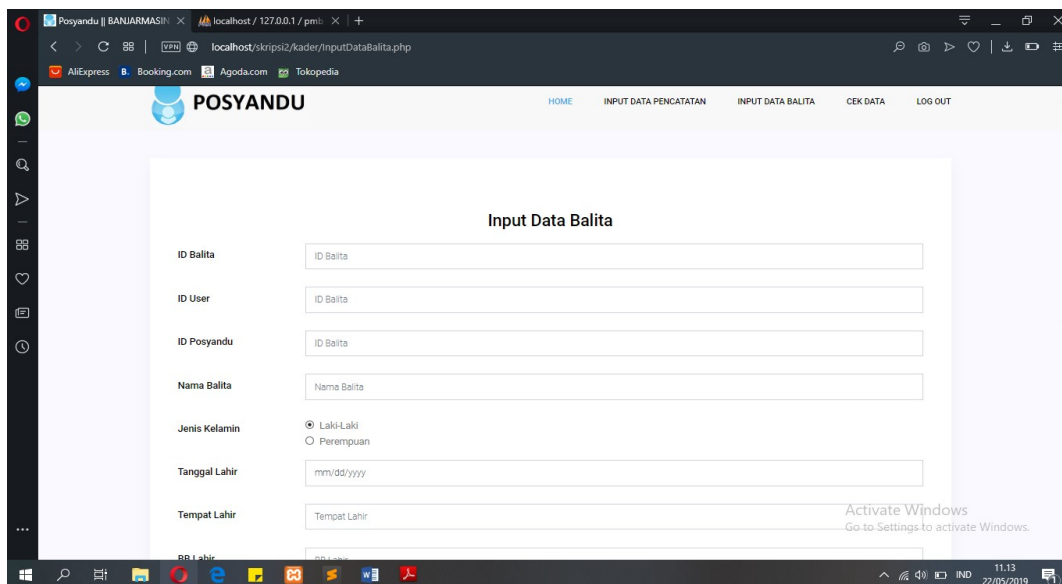


Figure 8. Input Page: Toddlers Data

After inputting the Posyandu cadres, they can see the data, look at the graph, and make a report shown in Figure 10 to Figure 13.

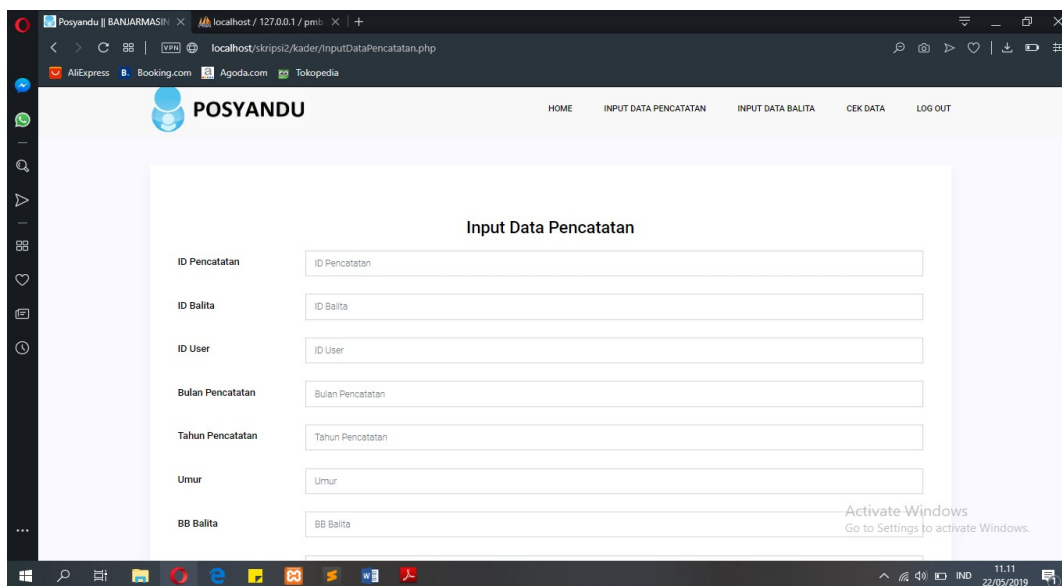


Figure 9. Input Page: Historical Toddlers' Weight and Length

ID Balita	ID Posyandu	Nama Balita	Jenis Kelamin	Tanggal Lahir	Tempat Lahir	BB Lahir	PB Lahir	Nama Ayah	Nama Ibu	Pekerjaan Ayah	Pekerjaan Ibu
01	pos05	Dzakia Talita Azzahra	Perempuan	2017-12-11	Banjarmasin	3.5	47	A. M. Rachmadansyah	St. Misbah	Dil.	Dil.
02	pos05	Yukina Abidah	Perempuan	2017-09-29	Banjarmasin	3.2	43	M. Fitri Ansyari	Kamarini	Dil.	Dil.
03	pos05	Zahra Amelia	Perempuan	2018-01-30	Banjarmasin	3	37	M. Dama	Karyana	Dil.	Dil.
04	pos05	Fariz	Laki-Laki	2017-01-12	Banjarmasin	4.4	48	Imam	Anita	Dil.	Dil.
05	pos05	Revalina	Perempuan	2016-10-31	Banjarmasin	2.8	32	Rifansyah	Hikmah	Dil.	Dil.

Figure 10. Display Page: Toddler Data

ID Pencatatan	ID Balita	Bulan Pencatatan	Tahun Pencatatan	Umur	BB Balita	PB Balita	Status BBU	Status PSU	Status BBPB	Aksi
PI30050101	PI3005001	1	2018	13	4	60	Kurang	Kurang	Kurang	Edit Hapus
PI30050102	PI3005001	2	2018	14	4.7	60	Kurang	Kurang	Kurang	Edit Hapus
PI30050103	PI3005001	3	2018	15	5.4	60	Kurang	Kurang	Kurang	Edit Hapus
PI30050104	PI3005001	4	2018	16	6.1	60	Kurang	Kurang	Kurang	Edit Hapus
PI30050105	PI3005001	5	2018	17	7	63	Kurang	Kurang	Kurang	Edit Hapus
PI30050106	PI3005001	6	2018	18	7.4	63	Kurang	Kurang	Kurang	Edit Hapus
PI30050107	PI3005001	7	2018	19	7.6	69	Kurang	Kurang	Kurang	Edit Hapus
PI30050108	PI3005001	8	2018	20	7.2	69	Kurang	Kurang	Kurang	Edit Hapus

Figure 11. Display Page: Historical Data

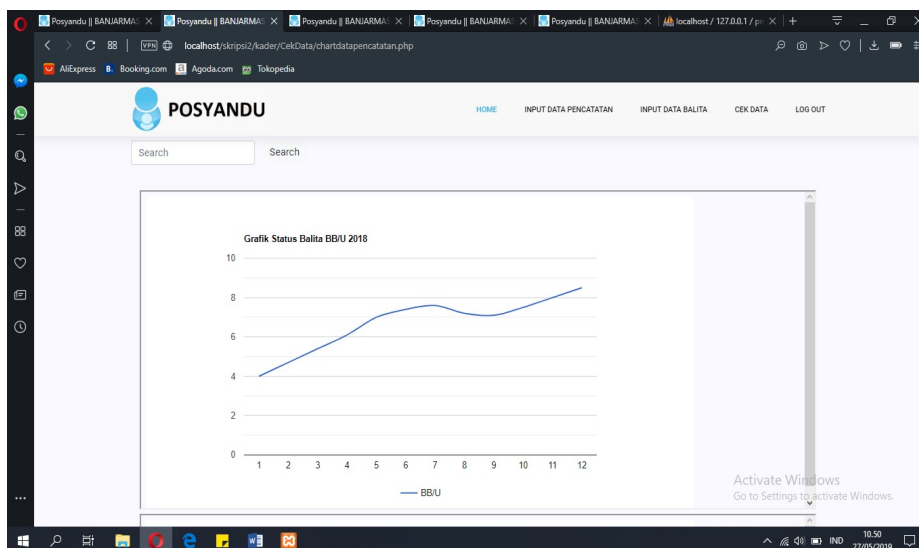


Figure 12. Display Page: Shows the BB/U

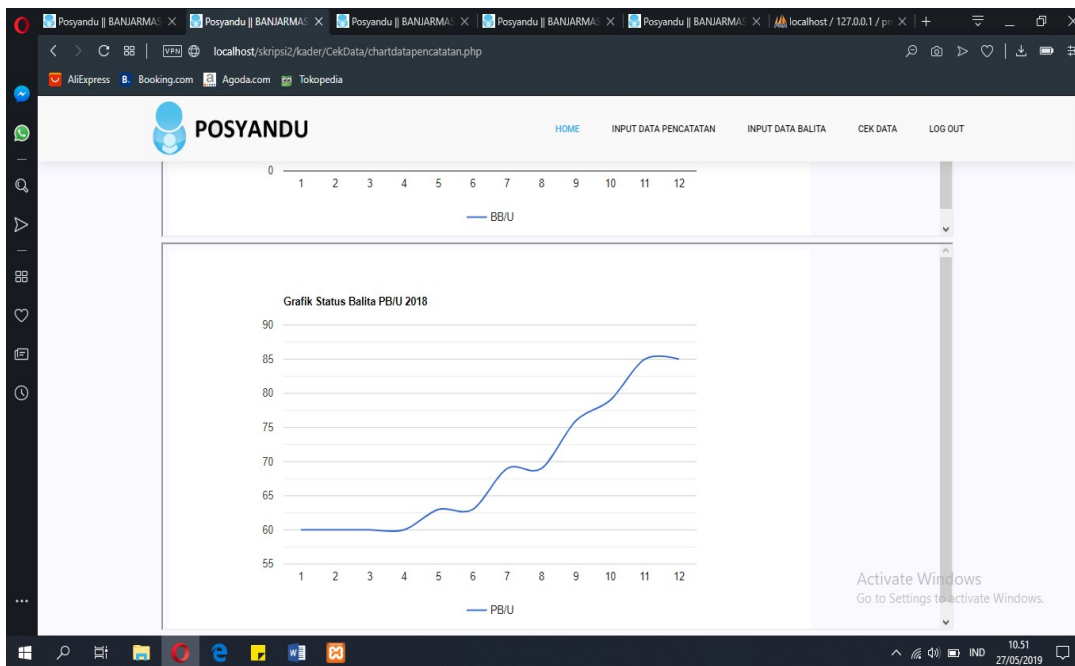


Figure 13. Display Page: Shows the PB/U

Municipal Health Office can monitor the potential for malnutrition of children under five through the data table or the SKDN chart per Posyandu as shown in Figure 14 and Figure 15.

ID Balita	ID Posyandu	Nama Balita	Jenis Kelamin	Tanggal Lahir	Tempat Lahir	BB Lahir	PB Lahir	Nama Ayah	Nama Ibu	Pekerjaan Ayah	Pekerjaan Ibu	Alamat	Status Balita
PIS00501	PIS005	Dzakira Talita Anzahra	Perempuan	2017-12-03	Banjarmasin	3.5	47	A. M. Rachmadansyah	St. Mibah	Dil.	Dil.	Banjarmasin	Sehat
PIS00502	PIS005	Yukins Alwah	Perempuan	2017-09-29	Banjarmasin	3.2	43	M. Fitri Anayari	Kamarini	Dil.	Dil.	Banjarmasin	Sehat
PIS00503	PIS005	Zahra Analia	Perempuan	2018-01-30	Banjarmasin	3	37	M. Dama	Karyana	Dil.	Dil.	Banjarmasin	Sehat
PIS00504	PIS005	Furiz	Laki-Laki	2017-01-12	Banjarmasin	4.4	48	Imam	Anita	Dil.	Dil.	Banjarmasin	Sehat
PIS00505	PIS005	Revalina	Perempuan	2016-10-31	Banjarmasin	2.8	32	Rifansyah	Hikmah	Dil.	Dil.	Banjarmasin	Sehat
PIS00506	PIS005	M. Rafiq	Laki-Laki	2017-07-30	Banjarmasin	3.3	38	Hartanto	Ernawati	Dil.	Dil.	Banjarmasin	Sehat
PIS00507	PIS005	Yasmin	Perempuan	2017-12-20	Banjarmasin	3.5	40	Acid	Irna	Dil.	Dil.	Banjarmasin	Sehat

Figure 14. Display Page: BB/U Table

This information is delivered quickly and used as input for related public institutions in taking interventions to improve the health of children and the community.

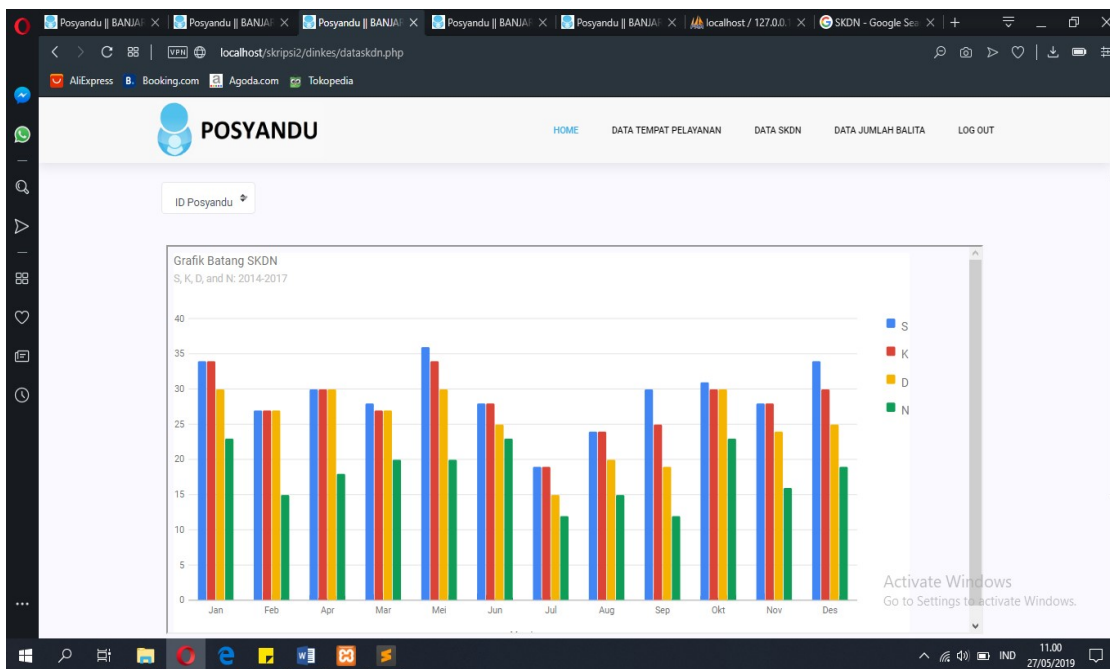


Figure 15. Display Page: SKDN Chart

5. Conclusion

Based on the implementation of the feeder system to support monitoring and mapping the potential of toddlers' malnutrition in Banjarmasin, we conclude that the Application of Feeder System provides convenience:

1. For posyandu cadres in inputting, storing, check and manage data of toddlers who participate in posyandu service activities.
2. For the municipal health office to monitor toddlers' data and take action on regions or posyandu that have toddlers with potential malnutrition.

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