BKM Public Health & Community Medicine
(Berita Kedokteran Masyarakat)

Volume 39 **Number** 4, 2023, **Pages** e33834
DOI: 10.22146/bkm.v39i04.33834

Quality analysis and utilization of e-PPGBM data (Electronic recording and reporting community-based nutritional)

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Abstract

Purpose: Nutrition surveillance is a continuous process of monitoring nutritional problems. The Electronic Community-Based Nutrition Recording and Reporting System (e-PPGBM), developed by the Directorate of Nutrition, Ministry of Health, collects, processes, analyzes, and presents community nutrition data. In Sumbawa Regency, Nutrition Implementation Officers (*Tenaga Pelaksana Gizi*, TPG) at public health centers (*Puskesmas*) use this system to generate timely, accurate information on nutritional status. This study aimed to assess the quality of data produced by e-PPGBM and to examine the utilization of e-PPGBM data at *Puskesmas* in Sumbawa Regency, West Nusa Tenggara. **Methods:** This study employed a descriptive qualitative approach with a case study design conducted in four Puskesmas. The study recruited 20 participants, including TPG, *Puskesmas* heads, and structural officials at the district health office. Data were collected through in-depth interviews, focus group discussions (FGDs), and document review. **Results:** The data generated were accurate but incomplete, and reports were not available on time. The Puskesmas and the District Health Office did not use the e-PPGBM data optimally. The availability of human resources, infrastructure, and management support influenced the implementation and utilization of the e-PPGBM system at the Puskesmas, functioning as both enabling and constraining factors. **Conclusion:** Continuous support for *Puskesmas* is essential, particularly to enhance monitoring of electronic surveillance activities and ensure the availability of required facilities.

Keywords: data quality; data utilization; e-PPGBM; nutritional surveillance

Submitted:
July 3rd, 2020
Accepted:
April 25th, 2023
Published:
April 30th, 2023

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INTRODUCTION

Indonesia is currently facing a dual burden of malnutrition. In addition to persistent problems of undernutrition, such as stunting, wasting, severe acute malnutrition, and underweight, the country is also experiencing a growing prevalence of overnutrition, including overweight and obesity. In West Nusa Tenggara Province, the proportion of children under five with poor nutritional status, undernutrition, thinness, and severe thinness increased in 2018. Although the prevalence of stunting declined that year, it remained above the national average [1].

Nutritional surveillance conducted by Nutrition Implementation Officers (*Tenaga Pelaksana Gizi*, TPG) at community health centers (*Puskesmas*) plays a crucial role in monitoring, preventing, and anticipating nutritional problems, particularly among vulnerable age groups such as children under five. As part of the health information system, nutritional surveillance serves as a mechanism to ensure the availability of information designed to support organizational decision-making. The Electronic Community-Based

Nutrition Recording and Reporting System (e-PPGBM) is a web-based nutrition surveillance tool that provides real-time information on cases of malnutrition and functions as a routine reporting system for the nutritional status of children under five, the performance of nutrition programs, and the determinants influencing these outcomes [2]. Data generated through the e-PPGBM system are expected to produce high-quality information useful to policymakers and accessible to district, provincial, and central health offices [3].

As of January 2019, the coverage of nationally entered e-PPGBM data remained low, reaching only 28.9% across all provinces in Indonesia [2]. In West Nusa Tenggara Province, data had been entered for 69.20% of the target population of children under five. In Sumbawa Regency, one of the districts in West Nusa Tenggara, data from the District Health Office showed that 74.18% of the target children under five had been entered into the e-PPGBM system. Although this coverage exceeded the national average, incomplete data entry was still observed in several Puskesmas. These findings are consistent with a study by Kusumawardhani, which reported low e-PPGBM utilization among nutrition implementers at *Puskesmas* in Serang Regency [4].

The nutrition program at *Puskesmas* in Sumbawa Regency conducts routine recording and reporting activities, which are recapitulated monthly and manually submitted using the FIII Nutrition reporting format. TPG at *Puskesmas* are also required to enter program target data and routine anthropometric measurement results from *Posyandu* (integrated community-based health posts for maternal and child health services) into the e-PPGBM system monthly. However, reporting is frequently delayed, and the results of data analysis on growth monitoring and child under-five reporting are not optimally utilized for planning nutrition interventions within the *Puskesmas* catchment area. Consequently, delays occur in the response to identified nutrition problems. In addition, alerts generated by the e-PPGBM system are not consistently followed up by some *Puskesmas*.

TPG at *Puskesmas* in Sumbawa Regency has received socialization and training since 2017 through 2019. The implementation of the e-PPGBM system in Sumbawa Regency began in 2017 and was more intensively applied in 2018; however, to date, no study has examined the quality of data generated by the e-PPGBM system or its utilization by *Puskesmas* or the District Health Office. Data quality directly impacts the performance of health information systems. One widely used approach to assessing data quality is the Performance of Routine Information System Management (PRISM) framework. Within the PRISM framework, data quality is influenced by organizational, technical, and behavioral factors. These factors affect the processes of routine health information systems, which in turn influence data quality and the sustainable use of information [5].

A literature review on the benefits of health information technology indicates that such technologies have substantial potential to improve individual health outcomes and provider performance. However, many healthcare professionals continue to underutilize health information technology for various reasons. The human element, particularly technology users, plays a significant role in the successful implementation of health information systems. Strong leadership and staff support are therefore essential for the effective management and utilization of health information technology [6].

Evidence from a data quality assessment conducted in healthcare facilities and district health offices in Malawi showed that although most records were complete, data quality varied across facilities in completeness, timeliness, relevance, and accuracy. Poor routine health data quality was found to limit the use of information for decision-making by managers and leaders. Factors influencing data quality included human resources, governance, and funding [7]. These findings are consistent with research on barriers to implementing Indonesia's one-data policy, which highlights that substantial effort is required to establish an integrated national data system. The study emphasizes the importance of robust data governance policies and procedures, as well as strong commitment from leadership at both central and regional levels [8].

METHODS

This study employed a descriptive qualitative case study design to examine the quality and utilization of e-PPGBM, as well as the factors influencing its use at *Puskesmas* in Sumbawa Regency. Data quality was assessed based on three dimensions: completeness, timeliness, and accuracy. Data utilization was examined by assessing how data generated through the e-PPGBM system were processed into understandable information and disseminated. The use of this information for follow-up actions and as input for health planning, particularly nutrition programs, as well as for cross-program and cross-sector advocacy, was also assessed.

The study was conducted over three months, from December 2019 to February 2020, at four *Puskesmas* in Sumbawa Regency, West Nusa Tenggara Province. The selected *Puskesmas* met the inclusion criteria and

represented different service-area characteristics, namely urban, rural, remote, and very remote settings. The exclusion criteria included unwillingness to participate as research subjects and absence during focus group discussions. Data collection was carried out at *Puskesmas* Sumbawa Unit I, *Puskesmas* Unteriwes, *Puskesmas* Labuhan Badas, and *Puskesmas* Lunyuk.

The study involved 20 participants selected through purposive sampling who met the inclusion criteria. These participants consisted of 14 TPG at *Puskesmas* who had received e-PPGBM training at least once, four Puskesmas heads who had led their respective health centers for a minimum of one year, and two structural officials at the District Health Office, namely the Head of the Nutrition Section and the Head of Public Health, who were responsible for the performance of nutrition programs. Data were collected through in-depth interviews, focus group discussions (FGDs), and document review. Qualitative data analysis was conducted using OpenCode version 4.03 to generate codes and categories. Data obtained from focus group discussions and in-depth interviews were analyzed through several stages, including transcription, coding, open coding, identification of patterns and relationships across the data, and interpretation leading to conclusions.

RESULTS

Characteristics of the study area and participants

The study was conducted at four *Puskesmas*: *Puskesmas* Sumbawa Unit I, classified as an urban area with 42 *Posyandu* services; *Puskesmas* Unteriwes, categorized as rural with 34 *Posyandu* services; *Puskesmas* Labuhan Badas, classified as a remote area and comprising both island and mainland service areas with 37 *Posyandu* services; and *Puskesmas* Lunyuk, categorized as a very remote area with 33 *Posyandu* services.

Table 1. Characteristics of study participants

Characteristic	In-depth interview (TPG)	In-depth interview (structural officials)	Focus Group Discussion (TPG)
Gender			
Male	1	4	1
Female	3	2	9
Age			
21-30	2	-	3
31-40	1	-	5
41-50	1	3	2
>50	-	3	-
Level of Education			
Associate degree	3	1	9
Bachelor's degree	1	3	1
Master's degree	-	2	-
Total	4	6	10

A total of 20 informants participated in the study, consisting of TPG at *Puskesmas* and structural officials at both *Puskesmas* and the Sumbawa District Health Office. As shown in Table 1, the majority of study participants were female, aged 31–40 and 41–50 years, and held an associate degree.

Recording and reporting of *Puskesmas* nutrition programs

One of the main duties of TPG at *Puskesmas* is the routine recording and reporting of nutrition programs, conducted monthly and submitted both manually and electronically. Approximately 17 types of nutrition program reports are submitted to the District Health Office, including electronic reports entered through the e-PPGBM. The Sumbawa District Health Office began implementing the e-PPGBM system at *Puskesmas* in 2017. Sumbawa Regency was among the first districts to adopt the e-PPGBM application; however, its implementation encountered numerous obstacles.

Factors affecting the implementation of e-PPGBM

Human Resources

Table 2 shows that the average number of TPG at *Puskesmas* exceeded one person. From a quantitative perspective, the availability of nutrition human resources met the minimum staffing requirements for both inpatient and non-inpatient Puskesmas.

Table 2. Availability of TPG at *Puskesmas*

Public Health Center (*Puskesmas)*	Availability of TPG
Unit 1 Sumbawa	2 civil servants, 1 contract staff
Unter Iwes	2 civil servants, 1 contract staff
Labuhan Badas	1 civil servant, 1 contract staff
Lunyuk	1 civil servant, 1 contract staff

However, despite meeting the minimum standards, several *Puskesmas* heads expressed the need for additional nutrition personnel to support the implementation of their duties, as reflected in statements from all *Puskesmas* head informants:

> *"Considering the intensity of activities and patient visits, the number of nutrition personnel is insufficient. At the same time, two or three Posyandu sessions are often conducted on the same day. Who is assigned to the Posyandu, and who remains at the clinic? This indicates that the number of nutrition personnel is still inadequate"* (WM.KD)

In performing their duties, TPG at *Puskesmas* work in accordance with their core roles and responsibilities; however, some are also assigned additional duties by the Puskesmas head. All TPGs have received e-PPGBM

training since 2017, with a minimum of 2 training sessions completed, the most recent in 2019.

Management

The District Health Office played an important role in supporting the implementation of the e-PPGBM application at *Puskesmas*. In addition to providing budgetary support for honoraria for e-PPGBM administrators at *Puskesmas* during 2017–2018, district-level data entry and evaluation meetings also served as a platform for advocacy with local government authorities, particularly through the Department of Communication and Information, to address internet connectivity needs, especially in remote and hard-to-reach areas. Furthermore, advocacy efforts were directed toward *Puskesmas* heads during planning meetings to ensure the availability of e-PPGBM-related infrastructure through *Puskesmas* budgets.

Monitoring and evaluation activities included accompanying all *Puskesmas* in Sumbawa Regency, tracking the progress of e-PPGBM data entry at each *Puskesmas*, and providing feedback, particularly on malnutrition cases identified through the e-PPGBM alert system. However, these monitoring and evaluation activities were not conducted continuously, as noted by one of the informants:

> *" Monitoring and evaluation are conducted very frequently, for example through WhatsApp groups. The rhythm depends on data needs; when data are required, monitoring and evaluation can take place weekly. In a single month, it may occur several times, but there may also be periods of several months without any monitoring related to e-PPGBM "* (WM.GD)

Most *Puskesmas* heads reported that they had never conducted monitoring and evaluation of e-PPGBM data entry and utilization. One *Puskesmas* head stated that they had never been exposed to the e-PPGBM system, as they had not received any information or reports from the *Puskesmas* TPGs. This was reflected in the following statement by an informant:

> *"I have never conducted an evaluation because I have not been exposed to the e-PPGBM system. I also have not asked about the extent to which the application has been used. Monitoring and evaluation are usually based on routine reports. "* (WM.KST)

Infrastructure availability

Most *Puskesmas* at the study sites had internet or Wi-Fi facilities, except for very remote *Puskesmas,* which lacked internet connectivity at the facility. Based on the results of internet speed measurements, connectivity was considered adequate; however, staff more frequently relied on mobile tethering due to frequent network disruptions when using the *Puskesmas* Wi-Fi, as described by the informant below:

> *"Although Wi-Fi is available, the connection is sometimes unstable; therefore, we use personal mobile internet (tethering)" (WM. GT)*

In addition to network/internet availability, a laptop or computer is required for e-PPGBM data entry. The FGD results showed that all TPGs responsible for data entry have access to a laptop or computer, most of which are provided by *Puskesmas*. *Puskesmas* at the study sites are equipped with laptop/computer facilities, including both *Puskesmas*–provided and personally owned devices.

Quality of e-PPGBM data

Data quality in the e-PPGBM application was assessed using indicators of completeness, timeliness, and accuracy.

Table 3. e-PPGBM data quality

Public Health Center (*Puskesmas*)	Completeness			Accuracy	Timeliness
	Identity information	Number of targets	Nutritional status	Input errors	Timely reporting
Unit 1 Sumbawa	Complete	Incomplete	Complete	Accurate	Not timely
Unter Iwes	Complete	Incomplete	Incomplete	Accurate	Not timely
Labuhan Badas	Complete	Incomplete	Incomplete	Accurate	Not timely
Lunyuk	Complete	Incomplete	Complete	Accurate	Not timely

Table 3 shows that not all *Puskesmas* completed the entry of growth monitoring data in accordance with the target numbers. Some *Puskesmas* had complete records of nutritional status at the village or sub-district level, while others had incomplete records. All *Puskesmas* failed to submit e-PPGBM reports promptly.

Utilization of e-PPGBM data

Some *Puskesmas* reported that e-PPGBM data had not been utilized, while others indicated that the data were used to support nutrition programs, as described by the informants below:

> *"The data has not been utilized optimally. Apparently, at the district level, the information can be accessed by officials because it is online and may even reach the central level. Thus, it could potentially be used by the Regional Development Planning Agency (Bappeda) to prepare the budget." (*WM.GD)

> *"The data is used for nutrition programs, but not yet for the Puskesmas Activity Proposal Plan*

(RUK). So far, it has been utilized primarily for addressing nutrition cases." (WM.GT)

At the district health office level, some e-PPGBM data are utilized and supplemented with manual weekly weighing data for planning purposes and cross-sector advocacy in efforts to reduce stunting rates.

DISCUSSION

Factors affecting the implementation of e-PPGBM

The reference used by all *Puskesmas* to assess the adequacy of human resources is the minimum standard for meeting the needs of health personnel in *Puskesmas* with and without inpatient services [9]. The results of this study indicate that, quantitatively, TPG in all *Puskesmas* at the study sites meet the minimum standards. However, TPGs remain insufficient due to high workloads and additional duties. This finding aligns with Rahayu (2011), who reported that one obstacle to implementing the *Puskesmas* information system is the assignment of dual tasks to functional staff [10]. Research by Dodi Setiawan (2016) also indicated that the utilization of the information system was not optimal due to a shortage of dedicated data entry personnel [11].

Regarding human resource quality, the staff meet the expected qualifications for data entry and have received training. The e-PPGBM application is relatively easy to use, and trained *Posyandu* cadres can also assist TPG in entering data into the system. Sudiarti (2017) reported that most cadres who had received e-PPGBM training agreed that the application was easy to use and helpful in their work [12]. Other studies have shown that nutrition staff perceive the application as easy to use in all aspects [4]. According to the Minister of Health's ministerial circular, the results of the weighing team's activities are reported in stages and recorded using the e-PPGBM system [13]. The results of this study indicate that the District Health Office plays a fairly good role in supporting the implementation of e-PPGBM at the *Puskesmas*.

Understanding among *Puskesmas* heads regarding e-PPGBM remains low due to limited socialization from both the TPG and the district level. The person responsible for e-PPGBM has not been formally appointed in the Head of *Puskesmas* Decree (SK), resulting in staff working largely at their own discretion with limited accountability. There is no standard operating procedure (SOP) yet for the use of e-PPGBM to guide TPG in their work. The results of this study indicate that support from *Puskesmas* heads remains insufficient. This finding aligns with previous research [14] showing that one factor contributing to the failure of *Puskesmas* information systems management is the lack of support from the *Puskesmas* head. Additionally, there is no policy from the *Puskesmas* head to sustain SIMPUS use, nor is there an adequate budget to meet infrastructure needs.

Most *Puskesmas* are equipped with computers or laptops, specifically available in the nutrition clinic, which facilitates data entry. Although internet speeds at most *Puskesmas* are reasonably good, TPG often enters data via personal tethering because they perceive the connection to be more stable. Internet coverage at *Puskesmas* is limited, and many users share a low-capacity network. The results of this study indicate that the supporting infrastructure for internet access is still insufficient. Previous research [15] has shown that electronic health information systems offer many benefits, but a major limitation is frequent internet disruptions, which render the application unusable. Other studies [16,10] also support these findings, indicating that frequent internet disruptions are one of the factors hindering the optimal implementation of information systems in *Puskesmas*.

Quality of e-PPGBM data

The performance of a health information system aims to improve the quality of data and information so they can be used continuously. Information system processes, including data collection, entry, analysis, and verification, influence this performance. These processes are affected by three key factors: organizational, behavioral, and technical. To achieve high-quality data, all these factors must function in a supportive, integrated manner [5].

Good-quality data produce high-quality information that meets the criteria of accuracy, completeness, and timeliness [17]. The findings of this study indicate that the quality of e-PPGBM data has not fulfilled all of these dimensions. Data completeness was not achieved, as the number of records entered into the e-PPGBM system was lower than the target numbers documented in manual records. Timeliness was also not met, as data entry was frequently delayed and reports were often unavailable in the subsequent month. In contrast, the accuracy dimension was met, as evidenced by consistency between manual records and e-PPGBM entries, the implementation of data verification procedures, the use of standardized growth-monitoring instruments, and measurements conducted by trained and competent personnel.

Utilization of e-PPGBM data

Data collected through technological systems enables leaders to access the information they need

more quickly [18]. Such information is used to identify problems, support decision-making among alternative options, and facilitate advocacy efforts [5]. At the district level, the District Health Office uses e-PPGBM data; however, these data are not entirely derived from the e-PPGBM application. This is because not all target data and anthropometric measurements of children under five from all *Puskesmas* have been entered, meaning the data do not fully represent nutritional status. Most *Puskesmas* do not utilize e-PPGBM data due to incomplete data entry and untimely reporting. The findings of this study indicate that e-PPGBM data have not been optimally utilized because the information cannot be generated in real time. This finding is consistent with previous research [19], which showed that nutrition data in nutrition applications were not used, even though *Puskesmas* and District Health Office nutrition staff had received training.

CONCLUSION

The quality of e-PPGBM data has not fulfilled all dimensions, as the data generated is accurate but incomplete and not timely. The utilization of e-PPGBM data at the Puskesmas level remains suboptimal because the information is not available in real time. In contrast, the District Health Office utilizes e-PPGBM data by comparing and supplementing it with other data sources to address limitations in the application data. Human resources, management support, and infrastructure function as both enabling and constraining factors in the implementation of the e-PPGBM application at *Puskesmas*.

Based on the findings of this study, it is recommended that *Puskesmas* strengthen data validation during *Posyandu* activities by using simple, Excel-based tools accessible on Android devices to facilitate rapid assessment of children's nutritional status. At the district level, harmonization between the Posyandu recording and reporting format (SIP) and the e-PPGBM application is necessary to ease data entry and ensure consistency between manual and electronic records. Innovations in *Posyandu* recording and reporting systems that are aligned with the data requirements of e-PPGBM and enable direct integration should also be developed. Furthermore, support from the central level is required in the form of clear regulations to serve as a standardized reference for data availability in the e-PPGBM application at *Puskesmas*, as well as the provision of central government funding for supporting infrastructure, such as laptops, to facilitate e-PPGBM data entry.

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