# Statistical Analysis of Logistics Management Impact on Medical Device Indicators in Indonesian Island Clinics

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**Abstract:** *Background*: Public health centers have a strategic role in the implementation of primary health services, to meet minimum service standards. The ASPAK application is used as an instrument for monitoring facilities, infrastructure, and medical devices, but the achievement of medical device indicators in Banggai Laut district is still very low, at 27.87%, which indicates obstacles in the logistics management of medical devices. This study aims to analyze the relationship between logistics management and medical device indicators on the ASPAK Application.

*Methods*: This study employed a quantitative approach with a cross-sectional design. Statistical analysis was conducted using the Pearson Product-Moment Correlation test and multivariate regression to examine the relationship between logistics management and medical device indicators on the ASPAK application across 10 health centers in Banggai Laut District. The research was carried out from September to December 2024, involving a total population of 70 individuals, all of whom were included as the study sample.

*Result*: There is a relationship between logistics management sub-variables and medical device indicators (r=0.583-0.659; p=0.000). Multivariate analysis, planning, and deletion are significantly related (y = 6.877 + 0.437 planning + 0.481 deletion), with an R-square value of 0.638, which means 63.8% of the variation in indicator achievement is explained by the model.

*Conclusion*: Planning and deletion have a positive correlation and are the largest contributors to the fulfillment of the ASPAK medical device indicator. This finding emphasizes the importance of both aspects in supporting indicator achievement.

**Keywords**: Management, Logistics, Medical Devices, ASPAK.

## 1. INTRODUCTION

In recent years, Indonesia has adopted the World Health Organization's Primary Health Care (PHC) framework as the cornerstone of its health system reform, emphasizing an integrated promotive and preventive approach. As frontline providers, puskesmas are expected to operationalize this paradigm by ensuring universal, equitable, and continuous access to care, especially for vulnerable and remote populations [1,2]. One of the critical, yet often overlooked, contributors to these outcomes lies in the performance of logistics management at the puskesmas level. Inefficiencies in forecasting, procurement cycles, warehousing, and last-mile distribution frequently result in stockouts or misallocated resources, ultimately disrupting service continuity and quality. These systemic bottlenecks not only impede clinical readiness but also compromise the health system's ability to fulfill the PHC vision of being community-responsive, data-driven, and resilient.

Based on the 2021 data release, it is indicated that the minimum service standards in the health sector have not been achieved. This is reflected in the high maternal and child mortality rates, as well as the prevalence of non-communicable diseases. This problem is exacerbated by low public awareness and limited access to services, especially in primary and advanced health facilities [3-5]. As the spearhead of primary care, public health centers have a responsibility in the achievement of the program. This obligation is stipulated in Permenkes No. 75/2014, that the public health center is obliged to provide comprehensive, quality, and sustainable services. In line with the vision of community-based health development [6]. The availability of facilities and infrastructure that meet minimum service standards is needed to realize this success.

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The provision of facilities and medical devices in adequate quantity and quality is strongly influenced by logistics management. This system covers the entire process from planning, procurement, and storage to the disposal of medical devices. This priority is reinforced by previous research, which states that logistics is a crucial element in the operation of organizations, including public service agencies [7]. The main objective of such management is to ensure that tools and materials are always available in a ready-to-use condition, including cost efficiency and distribution accuracy [8]. Thus, it is believed that in addition to the availability of medical personnel, effective logistics management is a determinant of the success of health services. This is an important foundation in the implementation of health logistics information systems.

Following up on the health decentralization policy, the Ministry of Health established the *ASPAK* information system as a means of collecting and managing medical device data. The application is web-based and contains information on facilities, infrastructure, and medical devices for service facilities, as well as more than one hundred indicators from various directorate generals within the Indonesian Ministry of Health [9]. The aim is to facilitate the registration and licensing process of health facilities online. The existence of *ASPAK* is expected to accelerate the data-based decision-making process. Utilization of *ASPAK* data also supports more precise and accurate planning of equipment expenditures. However, optimizing the function of *ASPAK* requires accountability in data entry and updating by the public health center. Continuous data validation also needs to involve the district or city health office [10].

The achievement of *ASPAK* data entry by the public health center Banggai Laut was only 59.70% in 2023, which is far below the national average [11]. Data analysis shows that the lowest achievement value is the medical device indicator (27.87%). Of all public health centers, Banggai Timur Raya was the lowest at 14.23%. This finding was corroborated by similar survey results in several other districts, such as South Bolaang Mongondow and Demak [12]. This condition reflects the ineffective management of the medical device logistics management system. The most common reason is that the managers are seconded personnel. The planning process is generally done without a thorough needs analysis. In addition, the elimination of equipment often only aims to fulfill reporting demands, not logistical efficiency. Studies state that logistics success is influenced by planning, maintenance, distribution, and periodic evaluation, and these activities have not been fully carried out [13].

The phenomena found in the initial survey and corroborated by the results of a systematic study of field conditions in several regions in Indonesia from

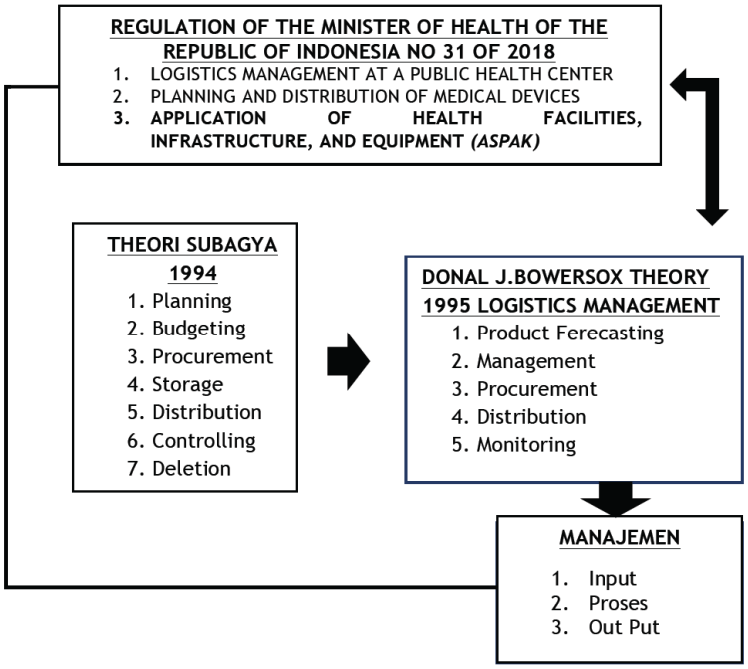


**Figure 1:** Research Flow.

Source modification: [14], [15], (Donald J.Bowersox, 1995), [16].

several previous studies confirm that the first step to solving the main problems in the fulfillment of *ASPAK*, especially medical devices, can be done by studying the main problems that hinder the completeness of the *ASPAK* itself. Thus, it is considered important to analyze the logistics management of medical devices on medical device indicators in the application of health facilities, infrastructure, and equipment (*ASPAK*) in the Islands region of Banggai Laut Regency.

## 2. MATERIALS AND METHODS

### 2.1. Study Design

The research method used is quantitative, namely, analytic observations with a *cross-sectional study* approach or design. This study was conducted at 10 health centers in the work area of the Banggai Banggai Laut District Health Office from November to December 2024. The population in this study was 70 people, all of whom became samples consisting of *ASPAK* managers, planning managers, MCH managers, people in charge of maternity rooms, people in charge of general poly, people in charge of laboratories, and people in charge of health center assets.

### 2.2. Data Collection

This study uses primary data and secondary data, Primary data collection was carried out directly by researchers using questionnaires on *ASPAK* managers, planning managers, MCH managers, maternity ward managers, general poly managers, laboratory managers, and health center asset managers in 10 health centers in the work area of the Health Office of Banggai Laut Regency. Secondary data was previously available at the Banggai Laut District Health Office.

### 2.3. Analysis Method

#### *2.3.1. Statistical Analysis*

Statistical analysis was conducted using the Pearson Product-Moment Correlation test to assess the relationship between the dependent variable, Medical Device Indicators in the *ASPAK* application, and the independent variables representing logistics management components, including planning, budgeting, procurement, storage, distribution, elimination, control, and monitoring and evaluation.

Prior to conducting the Pearson correlation test, the Shapiro-Wilk normality test was performed to assess whether the data met the assumptions of normal distribution. The results showed that most variables were normally distributed ($p > 0.05$), supporting the use of the Pearson correlation test. However, for variables with non-normal distribution ($p < 0.05$), the Spearman Rank Correlation test was applied as a non-parametric alternative.

Furthermore, multivariate regression analysis was carried out to identify which aspects of logistics management had the most significant influence on the medical device indicators. This approach allowed for a more comprehensive understanding of the relative contributions of each variable within the logistics management system.

## 3. RESULTS

### 3.1. Univariate Analysis

The characteristics of the respondents studied can be seen in the following distribution Table **1**.

**Table 1: Statistical Distribution of Research Variables**

| Variables | Respondents (n=70) |
|---|---|
| | Total (%) |
| **Gender** | |
| Male | 29(41.43) |
| Female | 41(58.57)) |
| **Age** | |
| 17 - 25 Years | 2(2.86) |
| 26 - 35 Years | 47(67.14) |
| 36 - 45 Years | 17(24.29) |
| 46 - 55 Years | 4(5.71) |
| **Last Education** | |
| Pharmacist | 1(1.43) |
| Diploma | 37(52.86) |
| S1 | 29(41.43) |
| S2 | 1(1.43) |
| SMA/MA/SMK | 2(2.86) |
| **Work Agency Region** | |
| Adean Health Center | 8(11.43) |
| Banggai Health Center | 7(10.00) |
| Public health center Banggai Timur Raya | 7(10.00) |
| Bungin Health Center | 8(11.43) |
| Dutabusara Health Center | 7(10.00) |
| Lantibung Health Center | 8(11.43) |
| Lipulalongo Health Center | 6(8.57) |
| Lokotoy Health Center | 6(8.57) |
| Matanga Health Center | 7(10.00) |
| Tikson Raya Health Center | 6(8.57) |

Description. Frequency Distribution.

**Table 2: Analysis of the Relationship between Logistics Management and the Achievement of Medical Device Indicators in the *Aspak* Application**

| Variables | Value of r | Correlation Coefficient | *p-value* |
|---|---|---|---|
| Planning | 0.6328 | Strong correlation | 0.000[a] |
| Budgeting | 0.6130 | Strong correlation | 0.000[a] |
| Procurement | 0.6267 | Strong correlation | 0.000[a] |
| Storage | 0.6599 | Strong correlation | 0.000[a] |
| Distribution | 0.5683 | Strong correlation | 0.000[a] |
| Deletion | 0.6420 | Strong correlation | 0.000[a] |
| Controlling | 0.6194 | Strong correlation | 0.000[a] |
| Monitoring Evaluation | 0.6346 | Strong correlation | 0.000[a] |

Description. r and p value [a]pearson correlation.

Most of the respondents were female (58.57%), the age range was 26-35 years (67.14%), with the highest level of education being a diploma (52.86%). The number of respondents from each health center ranged from 6-8 officers from each health center.

### 3.2. Bivariate Analysis

The bivariate test conducted in Table **2** aims to see the relationship between the variables of planning, budgeting, procurement, storage, distribution of deletion, control, monitoring, and evaluation of the achievement of medical device indicators in the *ASPAK* Application.

The data in Table **2** shows that there is a correlation between logistics management variables and the achievement of medical device indicators in the *ASPAK* Application. The correlation coefficient (r) obtained ranged from 0.5683 to 0.6599, with a p-value <0.05 indicating a strong and significant relationship between these variables. In this context, positive r values close to 1 indicate a strong positive relationship between logistics management and the achievement of medical device indicators. That is, improvements in certain aspects of logistics management tend to be followed by improvements in the achievement of medical device indicators in the *ASPAK* Application.

### 3.3. Multivariate Analysis

Multivariate analysis in this study used multiple linear regression analysis to see the modeling of the relationship between the indicator variables of medical devices in the *ASPAK* Application with logistics management planning, budgeting, procurement, storage, distribution, elimination, and control. The results of the regression equation can be seen in Table **3** below.

Based on the regression results in Table **3**, a multiple linear regression model, $Y = 6.877 + 0.473_{(planning)} + 0.481_{(removal)}$ is obtained. From the modeling obtained above, it is known that the constant (a) has a value of 6.877, which means that if the independent variable is 0, the achievement of the medical device indicator in the *ASPAK* application has a value of 6.877.

The planning variable has a positive regression coefficient value of 0.473, which means that if the other independent variables are fixed, then every 1 point or

**Table 3: Equation Estimation Using Multiple Linear Regression**

| Regression Variable | Coeff | t-count | p-value | F-count | R-square |
|---|---|---|---|---|---|
| Const | 6.877 | 3.15 | 0.003 | 0.000 | 0.638 (*moderate explanatory power*) |
| Planning | 0.473 | 3.30 | 0.002 | | |
| Budgeting | - 0.2761 | -1.03 | 0.309 | | |
| Procurement | - 0.019 | -0.09 | 0.923 | | |
| Storage | 0.127 | 0.54 | 0.592 | | |
| Deletion | 0.481 | 2.47 | 0.017 | | |

Description. p-value multiple linear regression.

1% increase in the planning variable will increase the achievement of the medical device indicator in the *ASPAK* application by 0.473. Meanwhile, the deletion variable also has a positive regression coefficient value of 0.481, which means that if the other independent variables are fixed, then every 1 point or 1% increase in the deletion variable will increase the achievement of the medical device indicator in the *ASPAK* application by 0.481.

## 4. DISCUSSION

### 4.1. Relationship between Planning and Medical Device Indicators in the *ASPAK* Application

Planning in general is a systematic process that involves making decisions regarding the selection of goals, objectives, strategies, policies, programs, and assessment of success, taking into account changes that will occur to achieve effective and efficient goals [17]. In the context of health, planning includes systematic collection, analysis, and organization of data related to the needs of medical devices, in order to ensure the availability of medical devices in accordance with the needs of services at the Public health center. The process involves identifying needs, managing resources, and adjusting to the guidelines contained in Permenkes No. 43 of 2019 concerning Community Health Centers (Public health center) and Permenkes RI No. 31 of 2018 concerning Application of Medical Device Facilities and Infrastructure.

The results of this study indicate a strong and statistically significant positive relationship between medical device planning and the achievement of medical device indicators in the *ASPAK* Application at the Public Health Center in the working area of the Banggai Laut District Health Office. This finding confirms the importance of good planning in improving the effectiveness of the use of medical devices, which in turn can support the improvement of the quality of public health services. The implementation of careful planning in the logistics management of medical devices at a public health center can improve operational efficiency and the quality of health services. These results are in line with the findings in a study conducted by Rachel Karimah, which states that good logistics management, including proper planning, contributes significantly to the availability and quality of medical consumables in hospitals [13].

Planning is carried out to formulate goals and determine the steps that must be taken to achieve predetermined goals. Implementation at the Public health center, especially for medical devices, is carried out at the beginning of each year, including determining the needs, types, specifications, and number of medical devices required. Activities carried out in a structured manner (bottom-up planning) from the health center to submission to the District Health Office result in more optimal financial budget efficiency [18].

The main foundation in health center logistics management is medical device planning. The success of this stage is crucial because it serves to ensure the availability of medical equipment that is appropriate, in quantity, and according to standards to support health services. This stage includes:

1. Needs Identification

The head of the Public health center and the planning manager must identify the needs of medical devices appropriately, this is very important to be able to determine the number and type of medical devices needed by referring to Minister of Health Regulation number 43 of 2019 concerning Community Health Centers (Public health center) and Permenkes RI No. 31 of 2018 concerning Application of Medical Device Facilities and infrastructure as a basis for analyzing medical device data in the *ASPAK* application. At this stage, the head of the public health center also formed a planning team consisting of planning managers, program managers, asset managers, and *ASPAK* Application managers, so that the data needs obtained were more accurate.

2. Prioritization of Medical Devices and technical specifications

At the stage of determining the priority of medical device planning by involving program managers, the person in charge of health center assets and *ASPAK* managers in the planning team, the Head of Public health center and planning managers minimize the occurrence of errors in determining the priority scale of medical devices that will be included in the planning document. The priority scale of medical devices will be determined based on the results of the analysis of the planning team by referring to the results of the needs data analysis to support the achievement of health data indicators in the *ASPAK* application, of course, by considering the available budget.

In addition to determining the priority scale of health equipment, it is important to pay attention to technical specifications to determine the specifications of equipment that meet quality standards and clinical needs [19].

3. Plan Of Action

At this stage, the head of the public health center and the planning manager can determine the right time to carry out shopping/procurement based on the results that have been planned to ensure the availability of equipment when needed.

The results of Linggo A's research state that planning is one of the factors related to logistics management at the public health center. planning is carried out based on requests for medical equipment needs from the producer [20]. Then they will submit the request to the head of the field in each of their respective rooms. Then it will be submitted to the medical support section, after which the medical support will be submitted to the program section, where later logistics requests submitted by users will be discussed at the RBA meeting, planning logistics needs for each user. Not all of them agree to be held. A similar statement by Rachel Karimah emphasized that logistics management of consumable medical materials determines the success of other management tasks. The crucial function of planning in health management is to ensure the accuracy of the type and criteria of needs, quantity, and timeliness of delivery [13].

### 4.2. Relationship between Procurement and the Achievement of Medical Device Indicators in the *ASPAK* Application

Budgeting is a fundamental step in the preparation of a financial plan, which starts from the preparation phase to the collection of data and information. In this context, the budget serves as a work plan that is expressed quantitatively and measured in monetary units, covering one year [19]. This budgeting process is not only about the allocation of funds, but also includes the procurement, maintenance, and care of medical devices, with reference to Permenkes No. 31 of 2018 and Permenkes No. 43 of 2019. This is done by considering the existing financial conditions and is implemented in a planned and transparent manner at the public health center.

Without adequate financial support, the procurement of devices can be hampered, which in turn has a negative impact on health services [19]. Therefore, the budget should include the cost of routine maintenance and calibration of medical devices to ensure that the devices can function optimally and have a long service life [22]. Preferably, budgeting considers the cost of ownership throughout the life cycle of the device, including operational costs, maintenance, and replacement parts. This approach will help in long-term financial planning and avoid unexpected expenses [23].

The results of this study indicate a significant positive relationship between medical device budgeting and the achievement of performance indicators in the *ASPAK* application at the public health center under the Health Office of Banggai Laut Regency. With a correlation coefficient value of r = 0.6130, which is close to one, indicating a strong and positive relationship between medical device planning and the achievement of these indicators, with a p value = 0.000 indicating statistical significance. This confirms that proper budgeting is crucial in ensuring that sufficient funds are available for the procurement of appropriate medical devices.

This finding is in line with research by Sri Devi, which confirms that the proper allocation of funds in the Regional Budget (APBD) contributes to improving access to health services, the availability of medicines and medical equipment, and supporting public health programs [24]. Research conducted by Nita in 2021 also shows that good budget management has a positive impact on public satisfaction in health services, indicating that effective budgeting not only ensures the availability of tools but also improves the quality of services felt by the community [25]. However, other studies have found different results. by Lando H in 2022 in his research report, asserted that programmed budgeting without the support of a comprehensive logistics management function does not produce optimal output [16]. Like this statement, the 2021 DPR RI Report noted that the increase in the special health budget carried out in several budget periods was not followed by significant improvements in certain health indicators. These findings reinforce the fact that budget increases are not the only solution in a management process [26].

Regulations from the Ministry of Health of the Republic of Indonesia, through Minister of Health Regulation Number 7 of 2020, emphasize that the success of health development is largely determined by the quality of good planning and budgeting. Therefore, efficient budgeting is key in ensuring the availability and quality of medical devices, which in turn has a positive impact on the achievement of health indicators and public satisfaction with health services [27].

The increasing development of the health budget, especially in the context of economic recovery,

accompanied by output achievements that are not always in line, indicates that there is still a lot of homework to be done by the government, especially in the health sector. The effectiveness of budgeting is strongly influenced by efficient management, appropriate resource distribution, and the capacity of human resources in managing and implementing health programs. Therefore, in addition to increasing budget allocations, improvements in management systems and human resource training are needed to ensure that available funds can be used optimally, in order to improve overall health indicators [28].

### 4.3. Relationship between Procurement and the Achievement of Medical Device Indicators in the *ASPAK* Application

Procurement is the activity of implementing the selection of procurement providers carried out by the procurement committee to meet needs. Decree of the Minister of Health of the Republic of Indonesia Number 1121 of 2008 explains planning by looking at the data from the results of data recapitulation use of medical supplies in each work unit of hospital outpatient services sourced from usage reports and request sheets to obtain information on the use of each type of medical supplies in each work unit of hospital outpatient services. Procurement is an operational activity to meet the needs that have been determined based on the planning process. Procurement can be done by purchasing, renting, borrowing, giving (grants), exchanging, and making repairs [29].

The activity is a series of processes to ensure the availability of medical devices at the public health center in a planned, transparent manner, and by procedures and quality standards. The procurement process must meet the needs of health services based on accurate data based on accurate data by looking at data from the application of infrastructure and medical devices (*ASPAK*) and budget availability. It is very important to conduct a needs analysis, not focusing on quantity, but it is important to pay attention to the quality and suitability of medical devices based on needs, to improve the achievement of medical device indicators to support quality services.

The results of this study indicate that there is a strong positive relationship between the procurement of medical devices and the achievement of medical device indicators in the *ASPAK* application at the public health center in the working area of the Banggai Laut District Health Office. This can be shown by the value of r = 0.6267 where the value of r is close to 1 which indicates a strong positive relationship between medical device planning and the achievement of medical device indicators in the *ASPAK* application (strong correlation coefficient) with a value of p = 0.000, which means that the relationship is statistically significant.

Similar results were revealed by Wahyuddin 2024, efficient and accountable procurement of medical devices is a key factor in ensuring the availability of quality medical devices, and in accordance with service needs. This success is evident in the procurement mechanism carried out at Prof. Dr. H.M. Anwar Makkatutu Bantaeng Hospital, both through the LKPP e-catalog and tender/selection. The use of the LKPP e-catalog provides convenience and speed in the procurement of medical devices that have been registered, while tenders/selections are used for the procurement of medical devices that have not been registered or have a large value. However, this study also revealed challenges in the procurement process. Delays in delivery from the supplier and mismatches in the specifications of the goods ordered can disrupt the smooth running of health services. Therefore, it is important for hospitals to improve supervision of suppliers' performance and implement strict quality control mechanisms. In addition, the use of information technology such as e-procurement systems can help improve efficiency, transparency, and accountability in the procurement process [30].

Based on research by Widodo 2019 Procurement is one of the factors related to logistics management in community health centers. Procurement of medical devices includes the entire process from planning, preparation, licensing, to the implementation stage and the administrative process in the procurement of goods. Procurement of regional property is carried out based on the principles of efficient, effective, transparent and open, competitive, fair and non-discriminatory, and accountable [31]. Procurement of local government medical devices is carried out by a procurement committee, namely the Commitment Making Officer (PPK) at the Health Office [32].

Efficient and effective procurement of government medical devices is an important part of state financial management. One of the realizations is the implementation of the electronic procurement process of government medical devices, namely the procurement of medical devices using information technology and electronic transactions in accordance with statutory provisions. The implementation of

electronic medical device procurement is regulated in Presidential Regulation number 70 of 2012. The process of electronic procurement of government medical devices will further improve and ensure efficiency, effectiveness, transparency, and accountability in spending State money [33].

The Electronic Procurement System (SPSE) was created to realize the expectations of implementing the procurement of medical devices electronically. The current service available in SPSE is e-tendering. In addition, SPSE has also prepared facilities for online audits and e-purchasing of medical device products. E-purchasing was created so that the process for procuring government medical devices can be carried out electronically. In the e-purchasing of medical device products, there are features for package creation, download the format of the order letter / agreement letter, upload the scanned signed contract, print orders for medical device products. With the epurchasing of medical device products, it can be more efficient and transparent [33].

Products that have appeared in the e-catalog of medical device products can be purchased using e-purchasing. The process of distributing logistics management of medical devices in health centers starts from the agency handing over to the head of the health center, then handed over to the person in charge of medical devices and distributed to all rooms in need. And the city health office conducts supervision aimed at the safety and suitability of these medical devices [33].

It is very important to conduct a needs analysis, not focusing on quantity, but it is important to pay attention to the quality and suitability of medical devices based on needs in order to improve the achievement of medical device indicators to support quality services.

### 4.4. Relationship between Storage and the Achievement of Medical Device Indicators in the *ASPAK* Application

Storage can be defined as an activity that involves managing and organizing supplies in a storage space. In the context of health centers, the storage of medical devices is an important managerial process, which aims to ensure that these devices are managed and stored safely, in accordance with applicable standards, and are adequate to maintain their quality and availability [29].

This activity includes several important aspects such as the organization, supervision, and protection of medical devices. A good organization not only facilitates the accessibility of the devices when needed but also helps in keeping the devices in optimal condition. Careful supervision is needed to ensure that the devices do not suffer damage or deterioration during storage. In addition, the protection of medical devices is also very important to prevent losses due to external factors, such as inappropriate humidity or temperature. With effective management, health centers can ensure the availability of medical devices needed to provide optimal services to the community. This shows that this activity is not just a physical activity, but an integral part of a health management system that focuses on quality and efficiency.

The results of this study indicate that there is a strong positive relationship between storage and the achievement of medical device indicators in the *ASPAK* Application at the Public Health Center of the Banggai Laut District Health Office work area. This can be shown in the Bivariate analysis with a value of r = 0.6599 where the value of r is close to 1 which indicates a strong positive relationship between medical device planning and the achievement of medical device indicators in the *ASPAK* application (strong correlation coefficient) with a value of p = 0.000b, which means that the relationship is statistically significant.

The results of this study are in line with the findings that storage management affects the performance of the Humanitarian organization they run in Kakamega, Kenya. Safe and organized storage is an important factor in maintaining the quality and safety of equipment, the availability of goods, and easy accessibility when needed [34]. Thus, the performance of the organization is greatly helped by the implementation of such management. Their observations also prove that logistics activities without storage management pose a risk of loss, damage, or the loss of records.

Research conducted by Anastasya, the storage methods applied are FIFO (First In First Out) and FEFO (First Expired First Out) [35]. This finding is in line with research conducted by Wibowo, which shows that drug storage at Tugurejo Semarang Hospital is carried out with the FIFO / FEFO principle, and the preparation of goods is alphabetized according to the provisions of the Ministry of Health [36]. In addition, Asyifa, in her research on Ciamis Hospital, stated that the drug storage method was also arranged alphabetically and grouped with the principles of FEFO and FIFO, prioritizing effectiveness and efficiency [37].

Another survey conducted by Ramadhan showed that there are still many health facilities that have not implemented logistics functions optimally. Among other things, limited storage of medical devices, removal has not covered all damaged medical devices, and the availability of medical devices is still considered insufficient and has an adverse impact on the overall device management system, so it is recommended to implement effective storage management. Thus, it is expected to help improve the achievement of medical device indicators. Implementation of a good storage system ensures the availability of quality medical devices, prevents damage, and supports optimal health services [18].

### 4.5. Relationship between Distribution and the Achievement of Medical Device Indicators in the *ASPAK* Application

Distribution is an activity or effort to manage the transfer of goods from one place to another. Before the goods or medical devices are distributed, an inspection is carried out so that the items to be used are still feasible and in good condition. Distribution is also inseparable from existing storage records so that goods can still be ascertained whether or not there are goods [18]. According to Permendagri No. 17 of 2007, Distribution / Distribution is an activity to deliver goods from the warehouse to the work unit [38].

The results of this study indicate that there is a strong positive relationship between the distribution of medical devices and the achievement of medical device indicators in the *ASPAK* application at the public health center in the working area of the Banggai Laut District Health Office. This can be shown by the value of r = 0.5683 where the value of r is close to 1 which indicates a strong positive relationship between medical device planning and the achievement of medical device indicators in the *ASPAK* application (strong correlation coefficient) with a value of p = 0.000a, which means that the relationship is statistically significant.

The results of this study are in line with research at Prof. Dr. H.M. Anwar Makkatutu Bantaeng Hospital. They found that a timely and accurate medical device distribution process is a key factor in ensuring that medical devices are available in-service units when needed. However, this process is not free from several obstacles, such as late delivery from the provider, miscommunication between the logistics department and service units, and data mismatches. Therefore, it is important for hospitals to improve coordination and communication between the logistics department and service units and implement an integrated logistics management information system to ensure data accuracy and facilitate tracking of medical device distribution. In addition, the development of a more responsive distribution system, for example by implementing an online request and delivery system, can help improve the efficiency and speed of medical device distribution [30]. Research conducted by Rmadhan at Public health center Boja II Kendal Regency on the study of the distribution of medical devices that have gone through the procurement process and received by the receiving committee complements the field application of the results of this study. The flow of the activity process can be started from the receiving committee checking the medical device according to the type, specification, and quantity. After the medical device has been inspected and tested, it will be distributed to the public health center. The treasurer of goods of the health office will make documents and minutes of handover. Then, medical devices distributed to health centers will be received by medical device administrators at the health center. The health center medical equipment manager checks the medical equipment according to the type, quantity, and specifications. The effective distribution of medical devices, supported by careful planning and an efficient logistics system, contributes significantly to improving health services [18].

### 4.6. Deletion Relationship to the Achievement of Medical Device Indicators in the *ASPAK* Application

According to Subagya, deletion can generally be said to be activities and efforts to release goods from liability according to regulations or laws [15]. Deletion is a process that involves identifying, evaluating, and removing medical devices from the Public health center's inventory when they no longer meet quality standards, are obsolete, or cannot be used. This process must be carried out by applicable procedures, including complete documentation, and comply with environmental and legal regulations.

In this study, deletion demonstrated a stronger influence on medical device indicators in the multivariate analysis compared to storage, despite a slightly lower bivariate correlation. This suggests that deletion plays a more strategic role in maintaining device quality and operational efficiency within primary healthcare settings. Aligned with WHO's PHC framework, effective deletion supports safety, resource optimization, and system responsiveness, particularly

in decentralized health systems like Indonesia's. Prior research emphasizes that product deletion decisions are shaped not only by short-term financial considerations but also by competitive and sustainability factors within the supply chain. In this context, deletion ensures the removal of obsolete or non-functional devices, enabling continuous service improvement and alignment with national health priorities. Conversely, storage, while operationally relevant, contributes less directly to long-term system performance when not integrated with active inventory and lifecycle management [39,40].

Another survey conducted at RSUD Prof. Dr. H.M. Anwar Makkatutu Bantaeng, which has implemented a medical device write-off procedure involving various parties, including the Installation of Facilities and Infrastructure Management (IPSRS), hospital management, and local government assets, found that there are still some obstacles in the implementation of the process they run. The constraints were related to the removal of small devices that were prone to loss, as well as procedures that required approval from the district head, which could slow down the process [30].

To overcome these obstacles, hospitals can increase supervision of small devices by implementing a stricter storage system with the use of tracking technology. In addition, simplifying the procedures for deletion or destruction is also necessary without neglecting the aspects of legality and accountability. With these steps, it is expected that the medical device removal process can run more efficiently and support more effective logistics management in hospitals [30].

With such organized and systematic procedures, it is expected to ensure that health facilities will use equipment in good condition and fit for use. Obsolete or damaged medical devices not only interfere with the service process but also potentially endanger patient safety. The elimination of damaged or unfit-for-use medical devices can also improve the output data in the *ASPAK* application, which will make it easier to analyze and identify medical devices that will be included in medical device planning activities. *ASPAK* data is the basis for planning medical device needs [30].

### 4.7. Controlling Relationship to the Achievement of Medical Device Indicators in the *ASPAK* Application

Control is the core of the equipment included in the effort to monitor and secure the overall logistics management. The means of control consist of organizational structure, systems and procedures, officers, and equipment [18]. According to Subagya, controlling is the core of equipment that includes efforts to monitor and secure overall logistics management. Controlling medical device logistics management is a process that involves monitoring, evaluating, and controlling to ensure that the use, availability, and condition of medical devices comply with established standards. This process includes problem identification, reporting, and corrective action to ensure efficiency and effectiveness in the management of medical devices [15].

The results of this study indicate that there is a strong positive relationship between the removal of medical devices and the achievement of medical device indicators in the *ASPAK* application at the public health center in the working area of the Banggai Laut District Health Office. This can be shown by the value of r = 0.6194 where the value of r is close to 1 which indicates a strong positive relationship between medical device planning and the achievement of medical device indicators in the *ASPAK* application (strong correlation coefficient) with a value of p = 0.000a, which means that the relationship is statistically significant.

These results are in line with the conclusion written by Wahyudin that the effective control stage is an important element in logistics management to ensure that the entire process goes according to plan. Identify problems and deviations, and take the necessary corrective action. A survey conducted at a hospital that implements this function with a work team that checks the function of the equipment, the condition of the damage, and the suitability of maintenance with applicable standards revealed challenges in the control process. The biggest obstacles are related to limited human resources, especially experts in the field of medical device engineering, as well as budget limitations [30].

The steps taken to overcome these obstacles are to improve staff competence through training. Considering cooperation with third parties for the maintenance of certain equipment. Implementing information technology, such as logistics management information systems, can help improve the efficiency and effectiveness of medical device control. In addition, controlling the logistics management of medical devices. These activities can help ensure the effectiveness and efficiency of each stage in the

process of planning, budgeting, procurement, storage, distribution, and elimination of medical devices, and strive for activities to run according to predetermined standards.

### 4.8. Relationship between Monitoring, Evaluation, and the Achievement of Medical Device Indicators in the *ASPAK* Application

Monitoring and Evaluation (M&E) is an integrated activity to control a program. According to [41]Monitoring and evaluation a techniques used to assess how well a planned health program has achieved its stated objectives. Monitoring is a continuous assessment or monitoring carried out by program holders and the community together using a recording system that has been established in the program. Evaluation refers to a systematic review of the program and its impact, usually conducted at the end of the program cycle.

Monitoring and Evaluation in the context of medical device logistics management is a systematic process that includes continuous monitoring and periodic assessment of the performance of medical devices to ensure that they function according to established standards. This process involves data collection, performance analysis, reporting of results, and corrective actions based on evaluation results to improve effectiveness and efficiency in medical device management.

Research conducted by Hizriansyah found that digital-based monitoring can improve the efficiency of medical device logistics management. The implementation of the reporting dashboard and health data visualization is a module developed to support monitoring activities and evidence-based decision-making processes [42].

Logistics management tends to be increasingly complex in its implementation, so that the planning process requires an adequate monitoring, evaluation, and reporting system that functions as feedback [43].

Monitoring and evaluation play an important role in ensuring the availability of medical devices according to the needs of health care facilities.

1. With effective monitoring, potential shortages or overstocks can be minimized.

2. Regular evaluation helps in making more informed decisions regarding the procurement and distribution of medical devices.

The Application for Facilities, Infrastructure, and Medical Devices *(ASPAK)* was developed by the Ministry of Health as an information system to monitor and evaluate the availability and condition of medical devices in health service facilities (fasyankes). *ASPAK* enables more accurate, faster, and real-time data management, thus supporting better decision-making in medical device logistics management.

1. With the *ASPAK* application, health facilities can: Monitor the stock of medical devices regularly to prevent shortages or excesses.

2. Identify medical devices that need to be repaired or replaced based on the age and condition of the device.

3. Facilitate the evaluation of medical device logistics performance with standardized data.

## 5. CONCLUSIONS

The results of the study found that planning and deletion management were the main contributors to the achievement of medical device indicators in the application of facilities, infrastructure, and medical devices *(ASPAK)* at the public health center in the working area of the Banggai Laut District Health Office in 2024.

## RESEARCH LIMITATIONS

This study has several limitations that should be acknowledged. First, the cross-sectional design restricts the ability to infer causal relationships between logistics management components and the achievement of medical device indicators. While statistical associations were identified, the temporal sequence of events cannot be established. Second, the use of self-reported questionnaires introduces the possibility of information bias, as the data relies on participants' subjective assessments without independent validation or triangulation. Future research should consider longitudinal designs and incorporate objective verification methods to strengthen the reliability and causal interpretation of the findings.

## ETHICAL APPROVAL

This study has received ethical approval from the Health Research Ethics Committee (KEPK) of the Faculty of Public Health, Hasanuddin University, with approval number 3286/UN4.14.1/TP.01.02/2024 dated November 13, 2024. Data collection was also

conducted subsequent to respondents' reading, understanding, and signing the consent form to participate in the study, filling out the questionnaire, and agreeing to answer questions in the interview session.

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