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Artikel

## Relationship Of Organizational Resources To Pre-Analytic Errors In Bandung City Community Health Center (CHCs) Laboratory

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### A B S T R A C T

Lack of awareness about the role of laboratory services in many developing countries causes a lack of resources which is the main factor that affects the poor quality of laboratory services. Errors that occur in the pre-analytic stage are the largest, reaching 60-70% of the total laboratory errors. Pre-analytical error data from one of the Puskesmas laboratories in Bandung is 4.7%. To find out the description of organizational resources, description of pre-analytical errors and to determine the relationship of organizational resources to pre-analytical errors in the Bandung City Health Center Laboratory. This research is a correlation analytic research. The research subjects were laboratory officers at the Bandung City Health Center Laboratory as many as 20 respondents. The results indicate that the organizational resources at the Bandung City Health Center Laboratory are 65% quite good, 30% good and 5% not good. Pre-analytical errors as many as 20% did not have pre-analytic errors, as many as 80% had pre-analytical errors. Most (65%) of Bandung City Health Center Laboratories have good organizational resources. Pre-analytical errors in the Bandung City Health Center Laboratory varied between 0.10-27.03%. There is no relationship between organizational resource variables and pre-analytic errors in the Bandung City Health Center Laboratory.

## INTRODUCTION

Community health centre (CHCs) is a health service facility that organizes public health efforts and first-level individual health efforts, by prioritizing promotive and preventive efforts in its working area (Permenkes, 2019). The Puskesmas is a functional health organization unit that is the center of public health services and fosters community participation in addition to providing comprehensive and integrated health services to the community in its working area (Mustofa, et al., 2019).

Community health center (CHCs) laboratory is a health service facility at a Puskesmas that carries out measurements, determinations, and testing of materials derived from humans to determine the type of disease, the spread of disease, health conditions, or factors that can affect individual and community health. Each Puskesmas laboratory must be properly organized by meeting the criteria for personnel, facilities, infrastructure, equipment and equipment, inspection activities, occupational health and safety, and quality (Permenkes, 2012).

Public demands for proper, accurate, and professional Community health center (CHCs) Laboratory services encourage Puskesmas laboratories to improve quality and adapt their services to science and technology (Permenkes, 2012). Quality is getting the right results right away every time and on time, using resources effectively and efficiently. Quality laboratory examination results are the goal of daily laboratory examination activities (Siregar, et al., 2018).

Health center laboratory services must focus on quality, effectiveness, efficiency and professionalism. The inspection results issued by the Puskesmas Laboratory must meet quality standards, so that they can be trusted and satisfy customers by paying attention to technical aspects such as high accuracy and precision, and are well documented so that they can be scientifically defended. Quality and organizational resources are an integral part of the Puskesmas management system that cannot be separated from one another (Permenkes, 2016). To obtain the expected laboratory quality, adequate resources are needed that are managed effectively and efficiently (Siregar, et al., 2018).

Organizational resources are one of the important components in the organization of an organization. These components include human resources, equipment or facilities used, work procedures and sources of funds. The human resource component includes the availability of manpower in terms of quantity and quality through planning for manpower requirements, increasing knowledge, skills, distribution and utilization of manpower. The components of procedures and equipment include the availability of facilities and facilities as well as clarity of work management and the funding component is the total amount of funds needed and issued for the implementation of organizational roles and functions in order to achieve organizational goals comprehensively (Malayu, 2004 in Safrizal, 2009).

According to Bolandbala (2019), the quality of laboratory examinations is very important in establishing a diagnosis and patient safety. Laboratory diagnosis determines 60-70% of medical decisions and is an important key in solving patient safety

problems (Agarwal, et al., 2012; ACLA, 2009 in Bolandbala 2019). Poor quality of laboratory tests can result in inaccurate disease determination, inadequate treatment, and increased morbidity (Mesfin, et al., 2017).

Quality control is important in all stages of the laboratory inspection process, starting from the pre-analytical, analytical and post-analytic stages. Control of each of these stages aims to reduce or minimize errors that occur in the laboratory (Siregar, et al., 2018). Each stage of the laboratory examination process can be directed separately to improve the quality of laboratory examinations and patient safety (Bolandbala, 2019).

The purpose of controlling the pre-analytic stage is to ensure that the specimen received is correct and from the right patient and fulfills the specified requirements. Errors that occur in the pre-analytic stage are the largest, which can reach 60-70%. This can be caused by specimens received by the laboratory that do not meet the specified requirements. If the specimen does not meet the requirements for examination, an incorrect test result will be obtained. The purpose of controlling the analytical stage is to ensure that the results of the examination of specimens from patients are reliable/valid, so that clinicians can use the results of these laboratory tests to make a diagnosis of their patients. The error rate of the analytical stage is about 10-15%, not as big as the pre-analytic stage. The post-analytic stage error rate is only about 15-20%. Errors in writing the results of patient examinations can make clinicians misdiagnose their patients. Errors in interpreting and reporting test results can also be dangerous for the patient. Errors at the pre-analytical, analytical and post-analytic stages can affect the quality of laboratory examinations (Siregar, et al., 2018).

Errors that occur in the pre-analytic stage are the largest of the total errors in the laboratory compared to analytical and post-analytic errors (Siregar, et al., 2018). Pre-analytic error is any process that can affect the accuracy and reliability of the examination results that occur before the sample is analyzed (Bolandbala, 2019). Pre-analytic errors are greater than other stages can be caused because the pre-analytic stage involves interactions between patients, doctors, laboratory personnel, and other staff outside the laboratory and is the most error-prone stage of the entire laboratory examination process and is considered the biggest obstacle for staff. laboratory (Sianipar, 2019). However, the pre-analytic stage has not been studied as the main cause of errors (Bolandbala, 2019).

The Institute of Medicine (IOM, 1999) reported that as a result of medical errors in hospitals in America, 770,000 injured patients and 44,000-98,000 people died. The contribution of laboratories to health care errors was 37,532 cases or about 14.1% of all reported error cases. Of these cases, the pre-analytic error was 81.1% (Snydman et al., 2012 in Bolandbala, 2019).

According to Bolandbala (2019), pre-analytical errors can occur when recording patients, identifying patients, inputting examination requests, collecting specimens, identifying specimens, transporting or sending specimens to the laboratory. According to Siregar, et al. (2018) some pre-analytic errors that affect the results of laboratory examinations are clerical, patient preparation, specimen collection, and sample handling.

Research conducted by Bir, et al. (2018) at the Central Laboratory of the Clinical and Biochemical unit, IQ City Medical College, West Bengal, East India during the period 1 December 2016 - 30 November 2017 the results obtained from 108,000 samples received, the pre-analytic error recorded was 277 samples or around 0.25% of the total sample. Includes patient identification errors 11.1%, examination requests not inputted 4.3%, samples not accepted 10.1%, samples not properly labeled 8.3%, samples with wrong tubes 5%, samples that did not match the anticoagulant ratio (less volume) 11.9% and hemolysis sample 49%.

Research conducted by Cakirca (2018) at the Hematology and Biochemistry Laboratory, Mustafa Kemal Teaching Hospital, Pakistan, which was conducted from September 2014 to

September 2015 resulted in a pre-analytic error resulting in 0.6% rejection of the sample in the Biochemistry Laboratory (1,467 samples). of a total of 255,943 samples) consisting of labeling errors 2.2%, tube selection errors, empty tubes, and damaged samples by 1.8%, lipemic samples 3.1%, samples with clotting 2.2%, sample volume less 16, 5%, and 74.1% hemolysis samples. While the pre-analytic errors that resulted in the rejection of samples in the Hematology Laboratory of 1% (2,305 samples from a total of 225,563 samples) consisted of labeling errors of 1.3%, tube selection errors, empty tubes, and damaged samples of 1.2%, lipemic samples 0.1%,

A survey conducted by Lee (2019) at the Chilgok Hospital Medical Laboratory of Kyungpook National University Korea from January-December 2017 found a pre-analytic error of 0.44% (4,347 samples out of a total of 989,888 samples) consisting of rejected samples (85.28%). ) includes 46.12% incorrect sample volume, 31.10% clot, 5.5% wrong sample container, 1.29% hemolysis sample, 0.64% empty sample container, and 0.62% error in sample delivery. . Errors related to check requests 11.3%, misidentification 0.12%, and other errors 3.31%.

To know the sources of pre-analytic errors it is important to distinguish between active errors i.e., the direct result of an action by the person performing the task or as latent errors (system errors) which are deficiencies of the system due to poor design or implementation that allow or amplify active errors (Sepulveda, 2007). 2019). Understanding the difference between these two types of errors can help laboratories analyze errors better and improve the quality of laboratory tests. Identifying active faults is relatively easy and can quickly propose fixes, and it is sometimes expensive to identify latent faults and resolve them.

The combination of latent errors can be very problematic because they can put the laboratory in a dangerous and error-prone state (Astion, 2009). According to Astion (2009) latent error factors in the laboratory consist of personnel, information technology, equipment, work environment, policies and procedures, teamwork and management or organization factors. According to the Ministry of Health (2020) problems in laboratory services can be sourced from factors of tools, materials, methods, Human Resources (HR), systems, and the environment, including interactions with patients and clinicians.

The city of Bandung has 80 health centers spread over 30 sub-districts (Bandung City Health Profile 2020). However, only 56 Puskesmas have laboratories (data as of July 2021). Of the 56 Puskesmas, 30 Puskesmas have had laboratories since before 2011 and 26 Puskesmas have relatively new laboratories (since May 2017).

Based on data in one of the Puskesmas laboratories in Bandung City from July 2020 to June 2021, a pre-analytic error of 4.7% (152 specimens from a total of 3,262 specimens) consisted of 149 specimens that did not meet the requirements (99.3%). ) consisted of patient preparation errors of 11 specimens (7.38%), 34 specimens volume was lacking (22.82%), hemolysis specimens were 2 specimens (1.34%), specimen quality was not good as many as 97 specimens (65, 1%), and storage errors of 5 specimens (3.36%), misidentification, namely labeling errors of 1 specimen (0.66%), and other errors, namely 2 specimens missing (1.32%). The pre-analytic error data above is higher than the data in previous studies.

As stated above, the inspection results issued by the Puskesmas Laboratory must meet quality standards, so that they can be trusted (reliable) and satisfy customers by paying attention to technical aspects such as high accuracy and precision (Siregar, et al., 2018). Quality control activities aim to reduce or minimize errors that occur in the laboratory (Siregar, et al., 2018). The biggest laboratory error is pre-analytic error (60-70%) but pre-analytic error is less studied as the main cause of error. Pre-analytical error is any process that can affect the accuracy, precision and reliability of the examination results that occur before the sample is analyzed (Bolandbala, 2019).

Quality and organizational resources are an integral part of the Puskesmas management system that cannot be separated from one another (Permenkes, 2016). On the other hand, according to Mesfin, et al. (2017) the lack of awareness about the role of laboratory services in many developing countries leads to a lack of resources and systems to implement, manage, and monitor laboratory activities which are the main factors that affect the poor quality of laboratory services. Improving laboratory quality requires financial support, resources, infrastructure, and competent and motivated laboratory staff.

Based on the above background, the authors are interested in conducting research on the relationship of organizational resources to pre-analytical errors at the Bandung City Health Center Laboratory as a first step to study pre-analytical errors and the factors associated with pre-analytical errors. The author chose the organizational resource factor because the organizational resource factor is a fundamental factor that must be available to reduce the potential for pre-analytic errors and to ensure laboratory quality.

## METHOD

The design of this research is a correlation analytic study. The independent variable used is organizational resources and the dependent variable is pre analytic error. The population in this study is the Bandung City Health Center Laboratory. The research subjects were laboratory officers at the Bandung City Health Center Laboratory as many as 20 respondents. The resource variable was measured using a questionnaire and the pre-analytic error variable was derived from secondary data.

## RESULTS AND DISCUSS

The description of the Health Center Laboratory Organizational Resources which includes Human Resources (HR), Facilities, Infrastructure, Equipment, Equipment and Materials, Standard Operating Procedures (SOP) and Budget factors are as follows:

### Overview of Human Resources (HR)

Table 1. Overview of Human Resources (HR)

| Dimension | Category    | Frequency | Percentage (%) |
|-----------|-------------|-----------|----------------|
| HR        | Not good    | 0         | 0              |
|           | Pretty good | 8         | 40             |
|           | Well        | 12        | 60             |
| Amount    |             | 20        | 100            |

As many as 60% of the Puskesmas laboratories have good human resources, 40% of the Puskesmas laboratories have good enough human resources and there are no Puskesmas laboratories that have poor human resources.

### Overview of Facilities, Infrastructure, Equipment, Equipment and Materials

Table 2 Description of Facilities, Infrastructure, Equipment, Equipment and Materials

| Dimension                                                      | Category    | Frequency | Percentage (%) |
|----------------------------------------------------------------|-------------|-----------|----------------|
| Facilities, Infrastructure, Equipment, Equipment and Materials | Not good    | 2         | 10             |
|                                                                | Pretty good | 8         | 40             |
|                                                                | Well        | 10        | 50             |
| Amount                                                         |             | 20        | 100            |

As many as 50% of Puskesmas laboratories have good facilities, infrastructure, equipment, equipment and materials, 40% of Puskesmas laboratories have good facilities, infrastructure, equipment, equipment and materials and only about 10% of Puskesmas laboratories have facilities, infrastructure, equipment, Poor equipment and materials.

### Overview of Standard Operating Procedures (SOP)

Table 3 Overview of Standard Operating Procedures (SOP)

| Dimension | Category    | Frequency | Percentage(%) |
|-----------|-------------|-----------|---------------|
| SOUP      | Not good    | 6         | 30            |
|           | Pretty good | 10        | 50            |
|           | Well        | 4         | 20            |
| Amount    |             | 20        | 100           |

As many as 50% of Puskesmas laboratories have good SOPs, 30% of Puskesmas laboratories have bad SOPs and about 20% of Puskesmas laboratories have good SOPs.

### Budget Overview

Table 4 Budget Overview

| Dimension | Category    | Frequency | Percentage(%) |
|-----------|-------------|-----------|---------------|
| Budget    | Not good    | 3         | 15            |
|           | Pretty good | 11        | 55            |
|           | Well        | 6         | 30            |
| Amount    |             | 20        | 100           |

As many as 55% of Puskesmas laboratories have a fairly good budget, 30% of Puskesmas laboratories have a good budget and about 15% of Puskesmas laboratories have a bad budget.

### Organizational Resource Overview

Table 5 Overview of Organizational Resources

| Variable                 | Category    | Frequency | Percentage(%) |
|--------------------------|-------------|-----------|---------------|
| Organizational Resources | Not good    | 1         | 5             |
|                          | Pretty good | 13        | 65            |
|                          | Well        | 6         | 30            |
| Amount                   |             | 20        | 100           |

As many as 65% of Puskesmas laboratories have good organizational resources, 30% of Puskesmas laboratories have good organizational resources and about 5% of Puskesmas laboratories have poor organizational resources.

### Overview of Pre-Analytical Errors in the Health Center Laboratory

The description of the pre-analytical error of the Puskesmas Laboratory which includes misidentification, the sample does not meet the requirements, the sample is not accepted as follows:

#### Misidentification Pre Analytical Error Overview

Table 6 Overview of Misidentification Pre-Analytical Errors

| Dimension      | Category         | Frequency | Percentage(%) |
|----------------|------------------|-----------|---------------|
| Identification | There is not any | 18        | 90            |
|                | < 1%             | 1         | 5             |
|                | 1-5%             | 1         | 5             |

90% of Puskesmas laboratories had no misidentification errors, 5% of Puskesmas laboratories had misidentification errors of less than 1% (0.23%), and 5% of Puskesmas laboratories had misidentification errors of around 1-5% (1.62%).

*Pre-Analytical Error Overview Sample Not Eligible*

Table 7 Overview of Pre-Analytical Errors Samples do not meet the requirements

| Dimension           | Category         | Frequency | Percentage(%) |
|---------------------|------------------|-----------|---------------|
| Sample Not Eligible | There is not any | 4         | 20            |
|                     | < 1%             | 6         | 30            |
|                     | 1-5%             | 4         | 20            |
|                     | >5-10%           | 4         | 20            |
|                     | >10%             | 2         | 10            |
| Amount              |                  | 20        | 100           |

As many as 20% of Puskesmas laboratories have no sample errors that do not meet the requirements, as many as 30% of Puskesmas laboratories have samples that do not meet the requirements of less than 1%, as many as 20% of Puskesmas laboratories have sample errors that do not meet the requirements of about 1-5%, as many as 20% of laboratories In Puskesmas there is an error in the sample that does not meet the requirements of more than 5-10%, and as much as 10% of the Puskesmas Laboratory there is an error in the sample that does not meet the requirements of more than 10%. The pre-analytic error of the sample did not meet the highest requirements of 25.41% and the lowest was 0.10%.

#### *Pre-Analytical Error Overview Sample Not Accepted*

| Table 8 Overview of Pre-Analytical Errors Sample Not Accepted |                  |           |               |
|---------------------------------------------------------------|------------------|-----------|---------------|
| Dimension                                                     | Category         | Frequency | Percentage(%) |
| Sample Not Accepted                                           | There is not any | 15        | 75            |
|                                                               | < 1%             | 3         | 15            |
|                                                               | 1-5%             | 2         | 10            |
| Amount                                                        |                  | 20        | 100           |

As many as 75% of the Puskesmas laboratories had no sample errors not accepted, 15% of the Puskesmas laboratories had samples not accepted errors of less than 1%, and as many as 10% of the Puskesmas laboratories had samples not accepted errors of around 1-5%. The highest pre-analytic error of the sample was not accepted at 2.72% and the lowest was 0.04%.

#### *Pre-Analytical Error Overview*

| Table 9 Overview of Pre-Analytical Errors |                  |           |               |
|-------------------------------------------|------------------|-----------|---------------|
| Dimension                                 | Category         | Frequency | Percentage(%) |
| Pre Analytical Error                      | There is not any | 4         | 20            |
|                                           | < 1%             | 6         | 30            |
|                                           | 1-5%             | 4         | 20            |
|                                           | >5-10%           | 3         | 15            |
|                                           | >10%             | 3         | 15            |
|                                           |                  |           |               |
| Amount                                    |                  | 20        | 100           |

As many as 20% of Puskesmas laboratories have no pre-analytical errors, 30% of Puskesmas laboratories have pre-analytical errors of less than 1%, as many as 20% of Puskesmas laboratories have

pre-analytic errors of around 1-5%, as many as 15% of Puskesmas laboratories have more pre-analytical errors. from 5-10%, and as many as 15% of Puskesmas laboratories have pre-analytical errors of more than 10%. The highest pre-analytic error was 27.03% and the lowest was 0.10%.

#### **Relationship of Organizational Resources to Pre-Analytical Errors**

The relationship between Organizational Resources and Pre-Analytical Errors can be seen in the table below.

| Table 10 Relationship of Organizational Resources with Pre-Analytical Errors (Spearman correlation analysis) |                      |       |
|--------------------------------------------------------------------------------------------------------------|----------------------|-------|
| Variable                                                                                                     | Pre Analytical Error |       |
| Organizational Resources                                                                                     | Sig. (2-tailed)      | 0.422 |

Based on the Spearman correlation analysis, it was found that the organizational resource variable had no relationship with pre-analytic errors. This can be seen from the significance value of Sig. (2-tailed) > 0.05.

The description of organizational resources in the Bandung City Health Center Laboratory is quite good, with a percentage of 65%, 30% of the Puskesmas Laboratory has good organizational resources and only 5% has poor organizational resources.

According to Permenkes (2016) organizational resources and quality are an integral part of the Puskesmas management system that are not separated from one another. While the definition of the quality of laboratory examination results according to Siregar et al. (2018) is to get the right results directly every time and on time, using effective and efficient resources starting from the pre-analytic, analytical and post-analytic stages. Quality control of laboratory examinations must be carried out to reduce or minimize errors that occur in the laboratory.

The description of the dimensions of organizational resources consisting of Human Resources (HR), facilities, infrastructure, equipment, equipment and materials, Standard Operating Procedures (SOP) and Budget at the Bandung City Health Center Laboratory can be explained as follows. The description of the human resources in the Bandung City Health Center Laboratory is mostly good, namely 60%, 40% of the human resources in the Bandung City Health Center Laboratory are quite good and there are no human resources that are in the bad category. According to Dharma (2005) in Widiana (2014) the measurement of the quality of HR work can be done one of them through error indicators. HR work quality is influenced by ability and motivation. Ability is influenced by knowledge and skills, while motivation is influenced by the attitude of workers towards their work situation. (Safrizal, 2009).

The description of the facilities, infrastructure, equipment, equipment and materials in the Bandung City Health Center Laboratory is in the good category, namely 50%, 40% of the facilities, infrastructure, equipment, equipment and materials in the Bandung City Health Center Laboratory are quite good, and only 10% are included in the bad category. According to Niswati (2019), adequate facilities and infrastructure will support HR to work optimally, can facilitate and complete their tasks effectively, and can support success in work.

Most of the descriptions of Standard Operating Procedures (SOP) at the Bandung City Health Center Laboratory are in the good enough category, namely 50%, 20% of the Standard

Operating Procedures (SOP) at the Bandung City Health Center Laboratory are in the good category and 30% are in the bad category. According to Permenpan (2012) SOPs are useful as standardization of ways to complete work, reduce the level of errors and omissions that may be made in carrying out tasks, assist in tracing procedural errors in providing services.

The description of the budget at the Bandung City Health Center Laboratory is mostly in the fairly good category, namely 55%, 30% of the budget at the Bandung City Health Center Laboratory is in the good category and 15% is in the bad category. According to Sari et al. (2017) the availability of a budget is very necessary so that the operational activities of the Puskesmas Laboratory can run well and organizational goals can be achieved/fulfilled. Without an adequate budget, laboratory operations will run slowly, and may not even be able to operate properly.

The description of pre-analytical errors in the Bandung City Health Center Laboratory is 6 Puskesmas laboratories (30%) there are pre-analytical errors of less than 1%, 4 Puskesmas laboratories (20%) have pre-analytical errors of 1-5%, 3 Puskesmas laboratories (15%) there are pre-analytical errors of more than 5-10%, 3 Puskesmas laboratories (15%) have pre-analytical errors of more than 10%, while 4 Puskesmas laboratories (20%) have no pre-analytical errors. The highest pre-analytic error was 27.03% and the lowest was 0.10%.

According to Agarwal (2013) in Roy et al. (2019) the laboratory error ranged from 0.012-0.6%, while the results of the study conducted by Bir et al. (2018) at the Central Laboratory of the Clinical and Biochemical unit, IQ City Medical College, West Bengal, East India, the pre-analytic error was recorded at 0.25%. Research conducted by Cakirca (2018) at the Hematology and Biochemistry Laboratory, Mustafa Kemal Teaching Hospital, Pakistan, showed that the pre-analytical error in the Biochemistry Laboratory was 0.6% and the pre-analytic error in the Hematology Laboratory was 1%. A survey conducted by Lee (2019) at the Chilgok Hospital Medical Laboratory of Kyungpook National University, Korea, found a pre-analytic error of 0.44%.

In this study, 4 Puskesmas laboratories (20%) had no pre-analytical errors and 6 Puskesmas laboratories (30%) had pre-analytic errors of less than 1% comparable to previous studies. However, 10 Puskesmas laboratories (50%) had a pre-analytical error rate greater than previous studies, as many as 4 Puskesmas laboratories (20%) had pre-analytical errors of 1-5%, 3 Puskesmas laboratories (15%) had errors. pre-analytic is more than 5-10%, 3 Puskesmas laboratories (15%) have a pre-analytic error of more than 10%.

The description of pre-analytic errors in this study includes misidentification, samples that do not meet the requirements and samples are not accepted. The description of the misidentification pre-analytical error in the Bandung City Health Center Laboratory as many as 18 Puskesmas laboratories (90%) there was no misidentification pre-analytical error, as many as 1 Puskesmas Laboratory (5%) there was 0.23% pre-analytical misidentification error and 1 Puskesmas Laboratory (5%) ) there is a misidentification pre-analytic error of 1.62%.

The description of the pre-analytical error of the sample does not meet the requirements in the Bandung City Health Center Laboratory as many as 6 Puskesmas laboratories (30%) there are pre-analytical errors the sample does not meet the requirements of less than 1%, as many as 4 Health Center laboratories (20%) there are pre-analytical errors the sample does not meet the

requirements by 1-5% and 4 Puskesmas laboratories (20%) there were pre-analytical errors the sample did not meet the requirements of more than 5-10%, as many as 2 Puskesmas laboratories (10%) there were pre-analytical errors the sample did not meet the requirements of more than 10% and as many as 4 Puskesmas laboratories (20%) there were no pre-analytical errors the sample did not meet the requirements.

The description of the pre-analytical error of the sample was not accepted at the Bandung City Health Center Laboratory as many as 15 Puskesmas laboratories (75%) there were no pre-analytical errors the sample was not accepted, as many as 3 Puskesmas laboratories (15%) there were pre-analytical errors the sample was not accepted less than 1% and 2 The Puskesmas laboratory (10%) had a pre-analytic error of 1-5% of the sample not being accepted.

Pre-analytic errors can be sourced from active errors i.e. the direct result of actions by the person performing the task or as latent errors (system errors) which are system deficiencies due to poor design or implementation that allow or reinforce active errors (Sepulveda, 2019).

Active errors consist of slips, lapses, and mistakes. Slip (failure to focus) and lapse (failure to remember) are errors that result from multiple failures in the implementation phase and or deviations from the sequence of actions, regardless of whether the implementation plan is adequate or not to achieve its objectives. Mistakes (rules-based errors, knowledge-based errors, errors that are deemed necessary) are deficiencies or failures in the assessment process and or conclusions that underlie the selection of an objective, regardless of whether the implementation based on the assessment is in accordance with the plan or not (ISO/DIS 22367: 2019 ).

According to Astion (2009) latent error factors in the laboratory consist of personnel, information technology, equipment, work environment, policies and procedures, teamwork and management or organization factors.

According to Sepulveda (2019) only about 11% of the errors are cognitive in nature and about 33% of the errors are due to the system. Most of the errors are non-cognitive in the form of slips and irregularities made by officers who are directly involved in the process.

The results of the bivariate test showed that there was no relationship between organizational resources and pre-analytic errors at the Bandung City Health Center Laboratory. In other words, the dimensions of organizational resources consisting of Human Resources (HR), facilities, infrastructure, equipment, equipment and materials, Standard Operating Procedures (SOP) and Budgets have nothing to do with pre-analytical errors in the Bandung City Health Center Laboratory.

According to Mesfin et al. (2017) the main factors affecting the provision of quality laboratory services are lack of resources, poor equipment, poor staff motivation, lack of knowledge and skills, equipment failure, shortage of supplies and reagents. According to Bolandbala (2017) HR factors which consist of knowledge and skills are significantly related to pre-analytic errors. According to Siregar et al. (2018) Qualified staff, adequate facilities, the availability of a good inspection protocol (SOP) are necessary conditions to obtain the expected laboratory quality and prevent/minimize laboratory errors.

According to Wardhani (2017) the existence of distraction or distraction is the main cause of errors. This is exacerbated by memory weakness and choice. Another cause is the inability of the

implementer to realize a mistake, which is generally caused by burn out (physical and mental fatigue). Errors can also be caused by ignorance (knowledge based) or procedures or standards that apply are no longer appropriate. According to Wardhani (2017) only 1% of errors are caused by incompetent officers, and 99% because they are in conditions that increase the risk of errors.

From the results of this study, most of the organizational resources owned by the Bandung City Health Center Laboratory are quite good at 65% and good at 30% and only 5% are not good but there are pre-analytical errors of 1-5% in 4 Puskesmas laboratories (20%), pre-analytical errors of more than 5-10% in 3 Puskesmas laboratories and pre-analytic errors of more than 10% in 3 Puskesmas laboratories (15%), taking into account the conditions under which the error occurred and the wider organizational context (latent errors), then need to be studied further on the factors that influence or that might trigger pre-analytical errors in the Bandung City Health Center Laboratory.

According to Astion, 2009 latent errors are organizational failures or designs that are less visible that contribute to the occurrence of active errors including personnel factors, Information Technology (IT), equipment, work environment, policies and procedures, teamwork, and management/organization.

- Staffing factors, including factors such as high workload, fatigue and stress that can increase the risk of errors.
- Information Technology (IT) factors, the absence of a Laboratory Information System can cause data entry errors.
- Equipment factor, non-routine and unscheduled equipment maintenance and calibration have the potential to cause errors.
- Work environment factors, multitasking culture which is common in laboratories with 1 officer because they have to do various kinds of work at the same time, such as taking blood and analyzing specimens at the same time, increasing the risk of errors. Ineffective communication between officers and patients can also cause errors, for example in terms of explaining patient preparation before laboratory examinations, this can be due to patient factors which include personality, language and psychological problems that can affect patient communication with officers, in addition to delivery and clarity. information provided by the officer.
- Policy and procedural factors, handwritten laboratory examination request forms and various versions have the potential for errors. Policies that permit the re-labeling of mislabeled or unlabeled specimens increase the likelihood of misidentification.
- Teamwork factors, laboratory staff work is limited and influenced by team members and the way they communicate both verbally and in writing, support and supervise each other, socialization of laboratory information to other officers can help prevent errors such as matters relating to specimen requirements.
- Management/organizational factors, including management actions and decisions made at higher levels in the organization. This includes policies for continuing education, training and supervision and the availability of organizational resources and how management manages organizational resources through the functions of planning

(planning), organizing (organizing), actuating (directing), and controlling (controlling) so that the goal of quality laboratory services is and without error can be achieved.

## CONCLUSION

Dari hasil penelitian yang diteliti terhadap 20 sampel bakso ikan yang diperjualbelikan di Pasar Lembang Kabupaten Bandung Barat, ditemukan 1 sampel yang positif menggunakan formalin, yaitu P13 (pedagang 13) dengan kadar rata-rata 1,4592 ppm. Berdasarkan Peraturan Menteri Kesehatan Republik Indonesia Nomor 033 Tahun 2012 kandungan formalin dalam makanan harus 0 ppm atau negatif, sehingga sampel tersebut tidak layak untuk dikonsumsi.

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