Jurnal Berkala Epidemiologi
Volume 13 No 1. Januari 2025. 66 – 74
p-ISSN: 2301-7171; e-ISSN: 2541-092X

DOI: 10.20473/jbe.v13i12025.66 – 74
https://e-journal.unair.ac.id/JBE/index
Email: jbe@fkm.unair.ac.id / jbepid@gmail.com

JBE Jurnal Berkala EPIDEMIOLOGI

Jurnal Berkala
EPIDEMIOLOGI
PERIODIC EPIDEMIOLOGY JOURNAL

ORIGINAL ARTICLE

THE RELATIONSHIP BETWEEN SANITATION PERCEPTION AND THE INCIDENCE OF RESPIRATORY TRACT INFECTION (RTI) IN CORRECTIONAL INSTITUTION

Hubungan Persepsi Sanitasi dengan Kejadian Respiratory Tract Infection (RTI) di Lembaga Pemasyarakatan

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ARTICLE INFO

Article History:
Received, October, 25th, 2024
Revised form, December, 6th, 2024
Accepted, January, 18th, 2025
Published online, January, 30th, 2025

Keywords:
Sanitation perception;
Respiratory Tract Infection;
Correctional institution;
Inmates;
Water, sanitation and hygiene

Kata Kunci:
Persepsi sanitasi;
Infeksi Saluran Pernapasan;
Lembaga pemasyarakatan;
Narapidana;
Air, sanitasi dan kebersihan

ABSTRACT

Background: The incidence of respiratory tract infection (RTI) in Class IIA Correctional Institution (Lapas) Kendal is notably high. RTI consistently ranks as the most common illness occurring each month, accounting for over 50% of all diseases within the facility. Previous research has indicated that one of the contributing factors to RTI is poor sanitation conditions within the correctional institution. **Purpose:** This study aims to analyze the relationship between sanitation perceptions and the incidence of RTI in Class IIA Correctional Institution Kendal. **Methods:** This quantitative study uses a cross-sectional research design with a sample of 294 inmates from the Class IIA Correctional Institution Kendal. The sample was selected using total sampling, involving all inmates in the facility. A Chi-Square test was applied for bivariate analysis. **Results:** The variable of sanitation perception showed a significant relationship with the incidence of RTI in Class IIA Correctional Institution Kendal. The p-value for the Pearson Chi-Square test was 0.00. Sanitation perception factors included building indicators (p=0.02), room indicators (p=0.54), drinking water indicators (p=0.06), and waste indicators (p=0.00). **Conclusion:** Sanitation perception factors, such as building indicators and waste indicators, are associated with the incidence of RTI in Class IIA Correctional Institution Kendal. Meanwhile, room indicators and drinking water indicators were not related to the incidence of RTI. To achieve the Sustainable Development Goals (SDGs, it is necessary to implement the Water, Sanitation, and Hygiene (WASH) concept within the correctional institution to minimize the transmission of RTI.

How to Cite: Satria, H. D., Musthofa, S. B., & Adi, M. S. (2025). The relationship between sanitation perception and the incidence of respiratory tract infection (RTI) in correctional institution. *Jurnal Berkala Epidemiologi*, *13*(1), 66–74. https://dx.doi.org/10.20473/jbe.v13i12025.66–74

ABSTRAK

Latar Belakang: *Angka kejadian infeksi saluran pernapasan (ISPA) di Lembaga Pemasyarakatan (Lapas) Kelas IIA Kendal tergolong tinggi. ISPA secara konsisten menempati peringkat sebagai penyakit yang paling sering terjadi setiap bulan, mencakup lebih dari 50% dari semua penyakit di dalam lembaga tersebut. Penelitian sebelumnya telah menunjukkan bahwa salah satu faktor penyebab ISPA adalah kondisi sanitasi yang buruk di dalam lembaga pemasyarakatan.* ***Tujuan:*** *Penelitian ini bertujuan untuk menganalisis hubungan antara persepsi sanitasi dengan kejadian ISPA di Lembaga Pemasyarakatan Kelas IIA Kendal.* ***Metode:*** *Penelitian kuantitatif ini menggunakan desain penelitian cross-sectional dengan sampel sebanyak 294 orang narapidana dari Lembaga Pemasyarakatan Kelas IIA Kendal. Sampel dipilih dengan menggunakan total sampling, melibatkan semua narapidana di lembaga tersebut. Uji Chi-Square diterapkan untuk analisis bivariat.* ***Hasil:*** *Variabel persepsi sanitasi menunjukkan hubungan yang signifikan dengan kejadian ISPA di Lembaga Pemasyarakatan Kelas IIA Kendal. Nilai p untuk uji Pearson Chi-Square adalah 0,00. Faktor persepsi sanitasi meliputi indikator bangunan (p=0,02), indikator ruangan (p=0,54), indikator air minum (p=0,06), dan indikator limbah (p=0,00).* ***Simpulan:*** *Faktor persepsi sanitasi berupa indikator bangunan dan indikator limbah berhubungan dengan kejadian ISPA di Lembaga Pemasyarakatan Kelas IIA Kendal. Sedangkan, indikator ruangan dan indikator air minum tidak berhubungan dengan kejadian ISPA. Untuk mencapai Tujuan Pembangunan Berkelanjutan (SDGs), perlu dilakukan penerapan konsep Air, Sanitasi, dan Higiene (WASH) di lingkungan Lembaga Pemasyarakatan guna meminimalisir penularan ISPA.*

INTRODUCTION

Based on data from the Correctional Database System (SDP) of the Directorate General of Corrections (Ditjenpas), the number of inmates in correctional institutions (Lapas) has fluctuated over the past five years, from 2018 to 2023. Research indicates that the issue of inmate overcapacity triggers various follow-up problems such as security and order disruptions, human rights violations, and health issues (1). Research conducted by Ditjenpas has shown that respiratory diseases are the most common illnesses among inmates in correctional facilities, with respiratory tract infection (RTI) being the most frequently observed respiratory condition. RTI is caused by viruses and bacteria in the air that are inhaled by new hosts and enter the respiratory tract. RTI remains a global health issue, with nearly four million people dying from respiratory infections (2). It is one of the diseases frequently suffered by inmates, caused by several factors such as sanitation, overcapacity, and personal hygiene (3). According to data from the Community Guidance and Care Subsection (Bimkemaswat), one of the correctional institutions in Indonesia experiencing overcapacity and a high incidence of RTI is the Class IIA Correctional Institution Kendal. The incidence of RTI in this correctional institution is relatively high, consistently ranking as the most common illness each month.

RTI accounts for more than 50% of all diseases reported in the prison. Previous research has shown that one of the contributing factors to RTI is poor sanitation conditions in the prison. Data from Class IIA Correctional Institution Kendal in 2024 indicate that the prison's capacity is 126 inmates, while the population in August 2024 was 320 inmates. This indicates that the prison is overcrowded, increasing the risk of various diseases. Furthermore, the data also show limitations in the availability of facilities, infrastructure, and human resources in the prison clinic. It is well known that cleanliness in food and beverage management, as well as environmental health, or sanitation, is a key concern in prisons (4). Directorate General of Corrections (Ditjenpas) defines sanitation as a series of actions aimed at maintaining and improving environmental cleanliness and health. Sanitation includes the availability of facilities and infrastructure that support health in a given location. The sanitation perception variable includes enabling factors that

assess the building indicators, room indicators, drinking water indicators, and waste indicators.

Sanitation perception is a research variable aimed at evaluating the sanitation conditions at Class IIA Correctional Institution Kendal, primarily from the perspective of the inmates. From the inmates' point of view, sanitation facilities are an important part of the overall health quality within the prison. For example, their perception of cleanliness and the availability of clean water and hygiene facilities plays a crucial role. If their assessment of the sanitation conditions is poor, this variable can be linked to the incidence of RTI at Class IIA Correctional Institution Kendal. According to the psychology dictionary, perception is a process of recognizing or identifying something through the use of the senses. The term "sanitation" in English is defined as "health preservation." Sanitation involves oversight efforts aimed at environmental factors that could act as links in the chain of disease transmission (5). Based on the aforementioned background, this study will focus on the factors causing RTI in prisons, particularly the perception of sanitation. As is known from preliminary research through interviews, observations, and data analysis from the field, it was found that Class IIA Correctional Institution Kendal also experiences overcapacity and health issues, specifically RTI. Therefore, this research aims to analyze whether there is a relationship between the inmates' perception of sanitation and the incidence of RTI at Class IIA Correctional Institution Kendal.

The Sustainable Development Goals (SDGs), particularly Goal 6, aim to ensure the availability and sustainable management of clean water and sanitation for all (6). The concept of Water, Sanitation, and Hygiene (WASH) serves as a crucial approach to achieving this goal by ensuring access to clean water, adequate sanitation facilities, and healthy hygiene practices (7). Prisons are among the locations that require the implementation of WASH due to high population density, limited facilities, and the potential spread of infectious diseases such as RTI.

METHODS

This study has passed an ethical review with the statement "ethical approval" No. 307/EA/KEPK-FKM/2024. This statement was issued by the Health Research Ethics Committee, Faculty of Public Health, Diponegoro University, on June 27, 2024, in Semarang.

The research titled "The Relationship Between Sanitation Perception and the RTI in Class IIA Correctional Institution Kendal" uses a quantitative approach with a cross-sectional design. Using a cross-sectional design, data were collected simultaneously during the research period, which took place from July to August 2024.

The inclusion criteria for this study are all inmates of Class IIA Correctional Institution Kendal who have or have not experienced ARI in the past month. Additionally, inmates who are willing to participate in the study, provide the required information, and sign the informed consent. Furthermore, inmates who have the ability to answer questions in a language understood by the researcher. The exclusion criteria involve removing or excluding subjects who meet the inclusion criteria from the study for various reasons. The exclusion criteria for this study are inmates who have recently entered the correctional institution with a minimum detention period of 1 week. Additionally, inmates whose sentence has ended are also excluded.

The research sample consisted of 294 inmates in Class IIA Correctional Institution Kendal, with the sampling technique using the total sampling method, where all inmates who met the criteria were included in the study. Of the 320 inmates undergoing rehabilitation, only 294 met the inclusion criteria. The inclusion criteria were all inmates registered as residents of Class IIA Correctional Institution Kendal with a detention period ranging from one month to completion. The exclusion criterion was inmates who had already been granted parole. The results revealed that 120 inmates had suffered from RTI in the last month. Determination of RTI status was carried out through several stages: inmates had to report ARI symptoms they had experienced in the last month, followed by a doctor's anamnesis, and verification through checking medical records.

Perception refers to an individual's viewpoint or assessment of a particular matter. Sanitation in correctional institutions consists of indicators such as building, space, drinking water, and waste. Therefore, sanitation perception is a combination of perception indicators, building indicators, space indicators, drinking water indicators, and waste indicators. The data are measured on an ordinal scale. The measurement method involves using a questionnaire with Likert scale indicators and interviews.

The sanitation perception indicator has the following parameters:

Always with a score of 4
Often with a score of 3
Sometimes with a score of 2
Never with a score of 1
Sanitation Perception Categories:
Good: Scores between 56% – 100%
Poor: Scores below 56%

Meanwhile, the building indicator, space indicator, drinking water indicator, and waste indicator have the following parameters:

0 = No
1 = Yes
Indicator Categories:
Good: Scores between 76% – 100%
Enough Scores between 56% – 75%
Poor: Scores below 56%

The findings of this study indicate that sanitation perception in the prison environment may be linked to the risk of RTI. With 120 inmates affected by RTI and 174 inmates not affected, this study is expected to provide new insights into the importance of addressing sanitation conditions in correctional facilities to reduce disease incidence, particularly RTI.

This study used the Chi-Square correlation test to analyze the relationship between sanitation perception and the incidence of ARI in Class IIA Correctional Institution Kendal. The Chi-Square test was chosen because the data obtained were categorical, consisting of inmates who had ARI and those who did not, as well as their perceptions of sanitation conditions. This test helps determine whether there is a significant difference in proportions between inmates with good and poor sanitation perceptions regarding the occurrence of RTI.

The analysis process was carried out by comparing the frequency of RTI occurrences among inmates with good sanitation perceptions and those with poor sanitation perceptions. The results of the Chi-Square test provide an indication of whether sanitation perception is significantly related to the occurrence of RTI, marked by a p-value. If the resulting p-value is less than 0.05, the relationship is considered statistically significant.

From the results of the analysis, this research is expected to offer recommendations on the importance of improving sanitation facilities and providing health education for inmates in correctional institutions. These findings can also serve as a foundation for policymakers to enhance sanitation standards in prisons, aiming to minimize the risk of contagious diseases, particularly RTI, in the prison environment.

RESULTS

The study results at Class IIA Correctional Institution Kendal show that most inmates' sanitation perception falls into the good category, with 276 respondents (93.87%). The perception level for the building indicator is also dominated by the good category, with 282 respondents (95.91%). For the room indicator, the perception level is likewise led by the good category, with 236 respondents (80.27%). The sound category is predominant in the drinking water indicator, with 273 respondents (92.85%). Finally, the good category also leads to the waste indicator, with 263 respondents (89.45%). Based on these variables related to sanitation perception, it can be concluded that all variables are rated in the good category.

Table 1 shows that the proportion of respondents who contracted RTI have a good sanitation perception (85%), which is higher than those with a poor sanitation perception (15%). Furthermore, respondents who did not contract RTI all have a good sanitation perception (100%), with none having a poor perception (0%). According to the Chi-Square test, a p-value of 0.000 (<0.05) was obtained, concluding that the hypothesis is accepted, indicating a relationship between sanitation perception and the incidence of RTI in Class IIA Correctional Institution Kendal.

The proportion of respondents who contracted RTI have a good perception of building indicators (90%), which is higher than those with an adequate perception (2.50%) or poor perception (7.50%) of building indicators. Furthermore, respondents who did not contract RTI also have a good perception of building indicators, with a dominant score of sound (100%). According to the Chi-Square test, a p-value of 0.02 (<0.05) was obtained, concluding that the hypothesis is accepted, indicating a relationship between building indicators and the incidence of RTI in Class IIA Correctional Institution Kendal.

Respondents who contracted RTI have a good perception of room indicators (71.67%), which is higher than those with enough perception (12.50%) or poor perception (15.83%). Additionally, respondents who did not contract RTI predominantly have a good perception of room indicators (86.21%), followed by enough (7.47%) and poor (6.32%) perceptions. According to the Chi-Square test, a p-value of 0.545 (>0.05) was obtained, concluding that the hypothesis is rejected, indicating no relationship between room indicators

and the incidence of RTI in Class IIA Correctional Institution Kendal.

Table 1
Cross-tabulation of The Indicators and RTI Incidence in Class IIA Correctional Institution Kendal

Variables	RTI Incident						p-value
	Yes		No		Total		
	n	%	n	%	n	%	
Sanitation Perception							
Good	102	85	174	100	276	93.88	0.00
Poor	18	15	0	0	18	6.12	
Building							
Good	108	90	174	100	282	95.92	
Enough	3	2.50	0	0	3	1.02	0.02
Poor	9	7.50	0	0	9	3.06	
Room							
Good	86	71.67	150	86.21	236	87.27	
Enough	15	12.50	13	7.47	28	9.52	0.54
Poor	19	15.83	11	6.32	30	10.20	
Drinking Water							
Good	106	88.83	167	95.98	273	92.86	
Enough	2	1.67	3	1.72	5	1.70	0.06
Poor	12	10	4	2.30	16	5.44	
Waste							
Good	103	85.83	160	91.95	263	89.46	
Enough	5	4.17	9	5.17	14	4.76	0.00
Poor	12	10	5	2.87	17	5.78	

The proportion of respondents who contracted RTI have a good perception of drinking water indicators (88.33%), which is higher than those with enough perception (1.67%) or poor perception (10%). Additionally, respondents who did not contract ARI predominantly have a good perception of drinking water indicators (95.98%), followed by enough (1.72%) and poor (2.30%) perceptions. According to the Chi-Square test, a p-value of 0.066 (>0.05) was obtained, concluding that the hypothesis is rejected, indicating no relationship between drinking water indicators and the incidence of ARI in Class IIA Correctional Institution Kendal.

Respondents who contracted RTI have a good perception of waste indicators (85.83%), which is higher than those with enough perception (4.17%) or poor perception (10.00%). Additionally, respondents who did not contract RTI predominantly have a good perception of waste indicators (91.95%), followed by enough (5.17%) and poor (2.87%) perceptions. According to the Chi-Square test, a p-value of 0.00 (<0.05) was obtained, concluding that the hypothesis is accepted, indicating a relationship between waste indicators and the incidence of RTI in Class IIA Correctional Institution Kendal.

DISCUSSION

Relationship Between Sanitation Perception Factors and RTI Incidence in Class IIA Correctional Institution Kendal

In Class IIA Correctional Institution Kendal, there is a relationship between sanitation perception and RTI incidence. These results are consistent with a study conducted at the Narcotics Correctional Institution Class IIA Sungguminasa in Gowa Regency, which showed a relationship between sanitation and the incidence of ARI in a prison setting. The study further suggested that the correctional facility should focus on the condition of inmate housing and implement redistribution strategies to address high occupancy levels (3).

Research from Bangladesh in 2022 highlighted the importance of improving sanitation quality and understanding how to ensure the adoption and sustainability of sanitation facilities in areas with limited access. However, the study revealed no significant difference in RTI incidence (8).

Similarly, research conducted in 2023 in Benin, West Africa found no relationship between sanitation and RTI incidence, focusing on children in household sanitation conditions. Only diarrhea incidence was influenced by limited access to basic sanitation (9).

From studies conducted across various countries, some show a relationship between sanitation conditions and RTI incidence, while others report no relationship. In Indonesia, a 2021 study found a significant relationship between sanitation—specifically air pollution, housing density, and ventilation—and RTI incidence in Takalar Lama Village, Takalar Regency (10). These findings align with this article. Through the Chi-Square test, a relationship between sanitation perception factors and ARI incidence was found, with a p-value of 0.00 (<0.05).

Relationship Between Building Indicator Factors and RTI Incidence in Class IIA Correctional Institution Kendal

In Class IIA Correctional Institution Kendal, there is a relationship between building indicators and RTI incidence. Previous research at the Class IIA Correctional Institution Bentiring in Bengkulu indicated a relationship between sanitation—specifically regarding building conditions—and the incidence of RTI (11). A study conducted at the Class I Detention Center in Bandar Lampung, Lampung Province, also showed a link between environmental sanitation, including building aspects, and the incidence of RTI (12). The findings in Class IIA Kendal further demonstrate that building factors significantly influence RTI incidence among inmates.

The building materials and ventilation conditions impact indoor air quality, contributing to RTI. This study recommended interventions to use safer building materials and household products to reduce volatile organic compounds (VOCs) (13). Another 2022 study on building indicators emphasized the need to control RTI spread, especially in public buildings. It recommended building management with proper drainage and disinfection systems to reduce RTI transmission, along with managing room density to minimize overcrowding (14).

The building conditions affect respiratory health. Both old and new buildings pose respiratory risks, as old buildings may contribute to RTI due to material contaminants, while new buildings can release chemical odors that also risk respiratory health (15). Another study from 2021 focused on ventilation within buildings, explaining that air ventilation is crucial to controlling RTI risk. Case studies in public buildings showed that increasing airflow rates is a key factor in lowering infection risk (16).

Relationship Between Room Indicator Factors and RTI Incidence in Class IIA Correctional Institution Kendal

In Class IIA Correctional Institution Kendal, there was no relationship between room indicators and RTI incidence. A 2023 study conducted at Hawassa Central Prison in Ethiopia showed that respiratory infections were responsible for 50% of deaths in that facility, with room factors in the prison significantly related to increased respiratory infection risk (17). Another 2022 study indicated a worrying spread of RTI within prison rooms, highlighting the need for proper ventilation systems to reduce the persistence of infectious particles. Sufficient ventilation in prison rooms helps minimize the spread of such particles (18).

Crucial factors in room indicator assessments include temperature and humidity. Multiple studies have linked temperature and humidity to RTI incidence. A 2020 study indicated that temperature and humidity, influenced by seasonal patterns, affect the stability and transmission rate of respiratory viruses and the body's immune response to infection. Indoor conditions are thus critical in controlling RTI transmission (19). In 2021, research highlighted that high occupancy rates increase ARI exposure in prisons. RTI control requires infrastructure adjustments and protective measures for vulnerable populations, with reducing crowding as a key strategy (20). Bacterial contamination in prison air is also a serious issue. A study of prisons in East Hararghe and Harari regions showed bacterial levels far above standard, with room temperature positively correlated with bacterial growth (21).

Relationship Between Drinking Water Indicator Factors and RTI Incidence in Class IIA Correctional Institution Kendal

The drinking water at Class IIA Correctional Institution Kendal comes from a refillable water depot, which is then distributed to inmates through gallon containers or specialized vessels. In Class IIA Correctional Institution Kendal, there is no relationship between drinking water indicators and RTI incidence. This condition contrasts with several previous studies. For example, a 2020 study in the Southwest United States reported a high risk of arsenic exposure in drinking water at the facility. The poor quality of drinking water can lead to

various diseases. Inmates in the Southwest US faced the risk of arsenic exposure in drinking water between 2006 and 2011 (22). A 2019 study in sub-Saharan African prisons highlighted the concerning conditions of children imprisoned with their mothers, facing inadequate basic needs, sanitation, and drinking water. They also suffered from exposure to diseases in overcrowded prison rooms. Such prison conditions are in violation of international mandates regarding children's rights, health rights, and care standards (23).

A 2023 study indicated that the drinking water quality at Class IIB Bangkinang and Pasir Pangaraian prisons, based on physical, chemical, and bacteriological parameters, met the required standards. The study recommended that correctional facilities conduct regular checks to assess water quality, cleanliness, and food safety to ensure inmate health (24). One of the rights of inmates is to receive adequate healthcare and nutrition, as stipulated in various laws, providing a strong legal foundation for fulfilling these rights. The need for clean drinking water is stated in the Minister of Justice Decree No. M.02-PK.04.10 of 1990 on Inmate Guidance Patterns (25).

Relationship Between Waste Indicator Factors and RTI Incidence in Class IIA Correctional Institution Kendal

In Class IIA Correctional Institution Kendal, there is a relationship between waste indicators and RTI incidence. Previous research at the Class IIA Correctional Institution Palu concluded that sanitation conditions, such as waste management, toilets, and wastewater drainage systems, are related to the incidence of RTI (26). Similarly, at Class IIA Correctional Institution Kendal, there is a connection between poor waste conditions and RTI incidence. Earlier research at the Class IIB Correctional Institution Sleman showed that environmental sanitation, particularly room indicators including occupancy density, significantly affects RTI incidence (27). Sanitation is often related to humans and their environment, and waste disposal systems are a part of sanitation. Many inmates contract RTI due to poor sanitation management in the facility. Therefore, correctional facilities must regularly control and clean the environment around the prison to prevent the spread of diseases that may harm the inmates (28).

A 2022 study emphasized that prison sanitation facilities, such as clothing, bathrooms, clean water, and waste disposal areas, need to be well-maintained. In prisons, maintaining proper sanitation is crucial for ensuring inmate health. Although the facility provides spit and trash disposal areas, inmates often neglect these facilities. Poor sanitation conditions increase the vulnerability to infectious diseases such as tuberculosis (RTI), hepatitis, and HIV (29).

The WASH program plays a crucial role in supporting the achievement of the SDGs, particularly Goal 6 on clean water and sanitation and Goal 3 on good health and well-being. In correctional institutions, implementing the WASH program is essential for improving sanitation quality (30).

Research Limitations

The limitations of inmates' sanitation perceptions were minimized through anamnesis checks conducted by healthcare staff. The inmates were in excellent condition at the time of the study. The researcher conducted daily interviews with 5 to 10 inmates. From this number, it was ensured that the inmates were in good condition and voluntarily signed the informed consent while fully conscious.

CONCLUSION

Research at the Class IIA Correctional Institution Kendal indicates that sanitation factors, such as building infrastructure and waste management, are linked to the incidence of ARI among inmates. Poor infrastructure and waste management contribute to higher ARI cases, while room conditions and drinking water quality do not show a significant impact. Despite this, improving facilities is crucial to creating a healthier environment, which can help reduce the spread of other diseases. Implementing WASH (Water, Sanitation, and Hygiene) principles in correctional facilities is vital for minimizing RTI transmission, supporting SDG 3 (good health and well-being) and SDG 6 (clean water and sanitation).

CONFLICT OF INTEREST

All authors have no conflict of interest in this article. There was no resistance at all from any of the prisoners or respondents.

AUTHOR CONTRIBUTIONS

HDS: Developed the research design, conducted data collection in the field, managed data, performed statistical analysis, and drafted the final conclusions of the study. SBM & MSA:

Provided conceptual and methodological guidance, reviewed the research design and data analysis, and advised on result interpretation.

ACKNOWLEDGMENTS

I would like to thank Mr. Syamsulhuda Budi Musthofa and Mr. Mateus Sakundarno Adi for their guidance.

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