

THE EFFECT OF NOISE DUE TO AIRCRAFT PASSING IN SETTLEMENTS AROUND JUANDA AIRPORT ON COMMUNITY SUBJECTIVE COMPLAINTS

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1 THE EFFECT OF NOISE DUE TO AIRCRAFT PASSING IN SETTLEMENTS AROUND JUANDA AIRPORT ON COMMUNITY SUBJECTIVE COMPLAINTS

(Case Study in Sedati Gede Village, Sidoarjo in 2021)

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ABSTRACT

Aircraft activity in the area around the airport can cause hearing loss, communication disorders, sleep disorders, higher levels of stress, **g**amely anxiety, depression, psychological morbidity, hypertension disorders and coronary heart disease. This study aims to determine the effect of noise caused by airplanes on subjective complaints of people in Sedati Gede Village, Sidoarjo. This type of research is descriptive analytic with a Cross Sectional approach. Data was collected by measuring noise, interviews, and observations. The study was conducted in settlements in the village of Sedati Gede, Sidoarjo, totaling 2290 families and a sample of 45 families. The data obtained will then be processed and presented in tabular form. The analysis of differences in noise intensity with distance and the effect of noise on people's subjective complaints was then analyzed by descriptive analysis and analysis of differences in subjective complaints of people in three zones and then analyzed by statistical analysis to test the hypothesis with the one-way anova test. The results showed that the noise in the near zone was 86.8 dBA, in the middle zone was 85.3 dBA, and in the far zone was 67.5 dBA, people who experienced complaints were quite disturbed by 15.6%, slightly disturbed 48.9%, not disturbed 35.6%, and there were no people with complaints of being very disturbed and disturbed, there was a difference in noise level with distance, there was a significant difference between the subjective complaints of the community with the three zoning of the study area with a significance value of $p = 0.005 (<0.05)$, and there is an influence effect of noise intensity on the subjective complaints of the community. The conclusion of this study states that there is an influence due to aircraft noise in settlements around Juanda airport on people's subjective complaints. Therefore, the community can improve the health condition of their homes by planting vegetation and greening plants around their homes.

Keywords: Noise, Airplanes, People's Subjective Complaints, Distance

INTRODUCTION

Technology and services are developing rapidly in today's era. Transportation facilities have also progressed a lot, such as many people traveling either just to relieve stress or between cities using public transportation. Public transportation is one of the ideal choices for every human movement today. One of the public transportation that is often used is an airplane. Airplanes have high efficiency and speed, so many tourists and business people prefer to use airplanes as a means of transportation for tourism and business activities¹.

Juanda International Airport is one of the airports with the highest passenger growth during the period of July 2020. Cumulatively up to July 30, Juanda airport has served 319,609 domestic passengers. When compared with the same period last year, airplane passengers tend to decrease by 75%. Despite the impact of the pandemic, the number of domestic flights at Juanda Airport Surabaya in August increased by 24%².

The community's need for public transportation certainly causes many impacts, including positive and negative impacts. The positive impact due to the location adjacent to the airport, namely, a strategic location, land prices that continue to increase from time to time so that it benefits people who will sell land, as well as high selling prices for entrepreneurs in the culinary, hotel, and boarding houses. From an economic point of view, the people around the airport tend to be profitable. However, less in terms of health. The negative impact that is felt is that the quality of the environment decreases, which can cause health problems and discomfort for the surrounding community. Environmental impacts in residential or residential areas include air pollution and noise. The dominant source of noise comes from vehicular traffic and transportation³.

The negative effects of noise that occur continuously from airport activities are very broad, providing psychological and physiological effects such as disturbances when communicating because the noise generated by airplanes is greater than the sound when talking, can cause discomfort and fear for the public. Newcomers because loud noises can cause shock, anxiety and discomfort⁴. The impact of aircraft activities at the airport, among others, can cause hearing loss, communication disorders, sleep disorders, higher stress levels, namely anxiety, depression, psychological morbidity, hypertension and coronary heart disease⁵.

Based on the preliminary survey conducted by the researcher, on February 9, 2021 with 10 respondents in Sedati Gede Village. that, respondents who feel uncomfortable launching an airplane crossing their house get a percentage of 60%, respondents who feel surprised when they first live in an area exposed to noise get a percentage of 80%, and respondents who experience communication disorders such as asking for repetition when the plane passes get a percentage 90%. From the results of these observations, there were several complaints from the community, namely discomfort, shock when they first arrived home, and communication disorders.

The purpose of this study was to analyze the effect of noise due to aircraft traffic in settlements around Juanda airport on people's subjective complaints (a case study in Sedati Gede Village, Sidoarjo in 2021).

METHODS

This research is included in analytical descriptive research, using approach *cross sectional*. The study was conducted in settlements in the village of Sedati Gede, Sidoarjo, totaling 2290 families and a sample of 45 families. The sampling technique was carried out by accidental sampling. Data was collected by measuring noise, interviews, and observations. The data obtained will then be processed and presented in tabular form and analyzed by statistical analysis to test the hypothesis with the test *one-way anova*.

RESULT

Noise Intensity Measurement

Tabel 1. Average Noise Intensity Based on Sample Points in the morning, afternoon, and evening in Sedati gede Village in 2021

No	Sample point	Noise intensity measurement results			Average noise intensity
		morning 06-00	afternoon 12.00	evening 15.00	
1.	Point 1	86,6	86,9	86,8	86,8
2.	Point 2	85,4	85,4	85,1	85,3
3.	Point 3	68,2	66,0	68,4	67,5

Based on the table above, it can be seen that the noise intensity at point 1 results in 86.6 dBA in the morning, 86.9 dBA in the afternoon, and 86.8 dBA in the afternoon with an average noise intensity of 86.8 dBA. The noise intensity at point 2 obtained results of 85.4 dBA in the morning, 85.4 dBA in the afternoon, and 85.1 dBA in the afternoon with an average noise intensity of 85.3 dBA. The noise intensity at point 3 obtained results of 68.2 dBA in the morning, 66.0 dBA in the afternoon, and 68.4 dBA in the afternoon with an average noise intensity of 67.5 dBA.

Community Subjective Complaints in the Research Area

Tabel 2. The level of community complaints in the research area in Sedati Gede Village in 2021

No.	Community complaints level	Number of respondents	Percentage (%)
1.	<i>Very disturbed</i>	0	0%
2.	<i>Disturbed</i>	0	0%
3.	<i>Moderately disturbed</i>	7	15,6%
4.	<i>Slightly disturbed</i>	22	48,9%
5.	<i>Not disturbed</i>	16	35,6%
	amount	45	100%

Based on the table above, it can be seen that the level of complaints from people who experience complaints are quite disturbed as many as 7 people with a percentage of 15.6%, people who experience complaints are slightly disturbed as many as 22 people with a percentage of 48.9%, people who are not disturbed as many as 16 people with a percentage of 35.6%, and there are no people who feel very disturbed and disturbed.

Analysis of differences in noise levels in 3 zones at Sedati gede Village in 2021

Tabel 3. Differences in Noise Levels in 3 Zones at Sedati Gede Village area.

No.	3 sampling point zones	Measurement results	Noise (<55 eligible, 55 not eligible)	explanation
1.	point 1 (near)	86,8 dBA	≥ 55 dBA	Not eligible
2.	Point 2 (middle)	85,3 dBA	≥ 55 dBA	Not eligible
3.	Point 3 (far)	67,5 dBA	≥ 55 dBA	Not eligible

Based on the table, it can be seen that the noise level in the three zones of the measurement area, namely, point 1 (near) gets a result of 86.8 dBA, point 2 (middle) gets a result of 85.3 dBA, and point 3 (far) gets a result of 67, 5 dBA. The noise level in the three regional zones exceeds 55 dBA so it does not meet the requirements.

Analysis of Differences in Community Subjective Complaints in 3 Research Zones

Tabel 4. Differences in Community Subjective Complaints in 3 Zoning Research Areas

Sedati Gede Village in 2021

No.	Community complaints	Sampling point zoning					
		near		middle		Far	
		N	%	N	%	N	%
1.	Very disturbed	-	-	-	-	-	-
2.	Disturbed	-	-	-	-	-	-
3.	Moderately disturbed	3	20%	4	26,7%	-	-
4.	Slightly disturbed	12	80%	3	20%	7	46,7%
5.	Not disturbed	-	-	8	53,3%	8	53,3%
	Total	15	100%	15	100%	15	100%

Based on the results of the analysis of differences in subjective complaints of people in the three research zones, it can be seen that in the near zone there are 3 people who experience moderately disturbed complaints and 12 people who experience slightly disturbed complaints, in the middle zone there are 4 people who experience moderately disturbed complaints, 3 people experience complaints slightly disturbed, and 8 people felt undisturbed, in the far zone there were 7 people experiencing complaints of being slightly disturbed and 8 people feeling undisturbed.

Analysis of the Effect of Airplane Noise on Community Complaints in Sedati Gede Village.

Tabel 5. The Effect of Aircraft Noise Levels Passing on Community Complaints in Sedati Gede Village in 2021.

No	Noise intensity	Subjective complaints									
		Very disturbed		Disturbed		Moderately disturbed		Slightly disturbed		Not disturbed	
		n	%	n	%	n	%	n	%	n	%
1.	< 55	0	0%	0	0%	0	0%	0	0%	0	0%
2.	≥ 55	0	0%	0	0%	7	15,6%	22	48,9%	16	35,6%

Based on the table, it can be seen that there are no people in Sedati Gede Village who get the results of measurements of noise intensity less than 55 dBA, while people who get results of measurements of noise intensity above 55 dBA experience complaints of being quite disturbed as many as 7 people with a percentage of 15.6%. 22 people who experienced complaints of being slightly disturbed with a percentage of 48.9%, and people who felt undisturbed were 16 people with a percentage of 35.6%.

DISCUSSION

Noise Intensity

Noise is unwanted sound from a business or activity at a certain level and time which can cause disturbances to human health and environmental comfort⁶. Based on the results of measurements of noise intensity conducted on April 27, 2021 in Sedati Gede Village using a sound level meter (SLM), the results were >55 dB.

This shows that the settlements around the airport, especially in the village of Sedati Gede, which is the take-off and landing route, do not meet the residential requirements because the noise level in the three zones exceeds 55 dBA. So it can be suggested that the community should make efforts to improve the health of the condition of the house by planting vegetation and reforestation around the residence. Some types of plants can be a noise reducer in the environment such as longan trees and swan trees. The Angsana tree can grow up to 40-30 meters high, has compound leaves with 5-11 leaflets, hairy, and sits alternately. The Angsara tree has a function as a tree that adorns the city, holds and filters solid particles and gases from the air, absorbs pollution, binds O2, and reduces noise⁷.

Another factor that affects aircraft noise is the type of aircraft and the number of flights, the more the number of flights, the more noise is generated. The biggest contributor to noise in the area around the airport is the flight traffic activity itself.

Community Subjective Complaints

Non-auditory complaints are a combination of physiological disorders, psychological disorders, and communication disorders that are subjectively felt by the public as a result of exposure to noise in the environment where they live and at work.

People's subjective complaints can be influenced by several factors such as the intensity of noise received and the length of exposure to noise so that people feel accustomed to the noise caused by passing airplanes. However, the public is disturbed by several types of large airplanes because they cause quite high noise.

Analysis of Differences in Noise Levels in Three Zones

Based on the results of the analysis, it can be seen that there are differences in the three zoning research areas. The further away the sampling point is, the less noise generated by passing aircraft. It can be concluded that there are differences in noise levels in the three study zones. However, the noise obtained at the three points does not meet the requirements because it is still above the noise threshold for residential areas, which is 55 dBA. Therefore, it can be recommended to consider the distance of the area zoning measurement in order to get a variety of noise, so that it can determine the noise distance that meets the requirements.

Analysis of Differences in Community Subjective Complaints in the Three Zoning Research Areas

Based on the results of statistical tests get a P value of 0.005. In this study, $p < \alpha$, then H_0 is rejected, which means that there are differences in subjective complaints of the community in the three study zones in Sedati Gede Village, Sidoarjo. It can be concluded that there are significant differences in the level of subjective complaints of the community with the three study zones. This is caused by differences in the level of noise intensity received by the community in each zone of the study area, so that there are differences in complaints in each zone of the study area.

It can be concluded that distance has an effect on noise. As is the case with community complaints which show that there is a difference between community complaints and distance because there are differences in the intensity of noise received by the community at each zoning distance of the research area. So that there are differences in public complaints in each zoning of the research area.

Analysis of the Effect of Aircraft Noise on Community Subjective Complaints

According to the results of the analysis, it can be seen that there is an influence between aircraft noise on people's subjective complaints because the intensity of noise causes various complaints from the community. The most common complaint in the community was that it was slightly disturbed by 22 people. Another factor that affects subjective complaints due to noise is the length of stay so that people are used to the noise disturbance caused by passing airplanes.

The results of this study contradict the results of research by Ristyna Choirunisa which state that there is no influence between aircraft noise and psychological and physiological disturbances⁸. However, this research is in line with Rahmi's research entitled Analysis of the Relationship between Noise Levels and Subjective Complaints (N₄ Auditory) on gas station operators in DKI Jakarta. In the study stated that there is an influence between noise and psychological disorders.

CONCLUSION

The noise intensity in the three zones of the study area exceeds the threshold, the near zone gets 86.8 dBA of noise, in the middle zone it gets 85.3 dBA of noise, and in the far zone it gets 67.5 dBA of noise. People who experience the most complaints are slightly disturbed by 48.9%. There are differences in noise levels in the three zoning research areas. There is a significant difference between the subjective complaints of the community and the three zoning research areas with a significance value of $p = 0.005 (<0.05)$. There is an influence between aircraft noise on people's subjective complaints.

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