Perception Analysis of Airport Noise on Environment, Social, and Economic at Halim Perdana Kusuma Airport

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Abstract. The increase in aircraft noise is an inevitable impact of Halim Perdanakusuma Airport (HLP) commercial operations since 2014. The perception of noise risk from people living around airports is a factor that must be considered for formulating strategic, comprehensive airport noise control plans and policies, and participatory. The purpose of this study is to analyze the noise conditions and the perception of environmental noise risk to the perception of socioeconomic risks that live around the HLP Airport. The results of the WECPNL calculation in area of Jaticempaka and Makasar was ranged between 73.80─79.72. The environmental noise risk of the community in HLP Airport’s vicinity was studied from knowledge aspects, perception aspects, and behavior aspects. Most of respondent were in the moderate category of environmental noise risk knowledge and environmental noise risk perception. While for environmental noise risk behavior aspects most respondent were in the low category. The social and economic risk perception for most respondent were in the moderate category. The conclusion of this research is that the community settlements in HLP Airport’s vicinity at the distance of 300 m and 600 m does not meet the environmental noise standard for a residential area which is regulated at 55 dB(A). The ideal area for settlement use in the vicinity of HLP Airport is Makassar area which is located 600 m from HLP Airport’s runway.

Keywords: Aircraft Noise, Environmental Noise Risk Perception, Social Risk Perception, Economic Risk Perception

1. Introduction
Aircraft noise is an inevitable negative externality which is caused by an airport operation. The rapid development and needs for an air transportation has led Halim Perdanakusuma (HLP) Airport being converted and commercially operated in order for supporting the flight operations and services of Soekarno-Hatta (CGK) Airport which has already exceeded its capacity. Since commercially operations of HLP Airport will cause a significant increase in aircraft movement near society living
areas. Based on database from HLP Airport operator which is PT. Angkasa Pura II (Persero), in the last five years (2014-2018) there has been an increasing in the aircraft movement almost three times as many. This condition causes aircraft noise become a risk that must be dealt with by the society in HLP Airport’s vicinity, in particular society who live under the landing and take-off (LTO) flight path.

Noise becomes an externality and major environmental problems arising from operations and the presence of the airport. The airport as a supporting infrastructure for air transportation has an important and strategic role in supporting the development and open access of a region. Noise is one of the inhibiting factors in airport development, development and expansion activities. The rapid development of urban urbanization has led to a shift in residential space for settlements closer to the airport which was originally located far away and in suburban areas. The increasing public demand for air transportation as a solution for transportation modes with high mobility and short travel times seems to be a driving factor for airport development, development and expansion. Airport capacity building and operational activities will not be avoided, this is due to the connectivity of air transportation that is reliable, integrated, and directed cannot be realized without the presence of the airport.

According to International Civil Aviation Organization (ICAO, 2007), the demand and demand for air transportation is projected to experience an average annual increase of 4.5-5% in the next 20 years. Air transportation statistical data published by the Central Statistics Agency (2019) shows that aircraft traffic in Indonesia increased by an average of 5.34% per year during the period 2014-2018. Airplane traffic in Indonesia is dominated by domestic aviation activities which have reached 2 million aircraft movements in 2018, while international flights have not reached 500 thousand aircraft movements per year. Distribution of flight development in Indonesia both domestically and internationally is presented in Figure 1.

![Figure 1. Distribution of Aircraft Traffic Development in Indonesia in 2014-2018](Source: Statistics Indonesia, 2019)

Changing the status of the HLP Airport to a commercial airport has the potential to have a positive and negative impact on people who live around the airport. The positive impact of the operationalization of Halim Perdanakusuma Airport is the ease of access to the airport, savings in transportation costs to the airport, expansion of employment opportunities, and business opportunities. The negative impact that cannot be avoided is exposure to noise originating from increased aircraft traffic. Airplane noise will have an impact on the disruption of comfort, and will always be the main cause of complaints by people who live in settlements around the airport [1]. The intensity of aircraft noise impact caused depends on the type of aircraft, the frequency of flight traffic, operational procedures, time of day or night, meteorology (weather conditions, direction factors and wind speed), land use around the airport, building types around the airport, distance from the airport, environmental noise, and the attitude of the surrounding community [2]. Long-term exposure to high-intensity noise can cause impaired hearing function [3], and non-auditory effects that affect physiological capacity such as increased heart rate, blood pressure, risk of disease cardiac, cardiovascular disorders, and risk of developing hypertension [4][5][6][7][8]. An increase in the number of aircraft and passenger
movements at HLP Airport during 2013-2018 is presented in full in Figure 2. Previous research related to aircraft noise over the past 10 years has been quite a lot carried out in Indonesia which included studies of aircraft noise from airport operational activities, the impact of aircraft noise on public health, economic valuation of the impact of noise due to flight activity, noise mapping and public assessment of noise airport, as well as airport noise control models. However, in Indonesia there is not much research related to the risk perception of people who live around the airport. Specifically, the main focus of this research is an analysis of environmental noise risk perceptions, and socio-economic conditions of the people who live around the airport so that they can contribute to the concept of a sustainable airport.

2. Literature Review

Broadly speaking, the definition and purpose of environmental science in Indonesia have been listed in Law Number 32 of 2009 concerning Environmental Protection and Management which includes efforts that are carried out systematically and integrated to preserve environmental functions and prevent environmental pollution and / or damage, which includes planning, utilization, control, maintenance, supervision and law enforcement. The definition of the environment according to the law is the unity of space with all objects, power, conditions, and living things, including humans and their behavior, which affect nature itself, the survival of life, and the welfare of humans and other living creatures. The scope of the environment is biological and non-biological in nature and functions naturally without excessive human intervention [9]. The author agrees with Miller & Spoolman's (2016) opinion that environmental science is a multidisciplinary science that integrates natural sciences, social sciences, and economics that aims to solve environmental problems holistically in order to improve the welfare of humanity, and other living things.

Noise can be interpreted as an unwanted sound from a business or activity within a certain time level that can cause interference with human health and environmental comfort (Minister of Environment Decree No. 48 of 1996 concerning Noise Level Standards). Noise is expressed in decibels on a scale A or commonly abbreviated as dB (A) according to the Decree of the Minister of Environment No. 48 of 1996 concerning Noise Level Standards. Noise can be categorized as pollution that contaminates the environment if it reaches a level that endangers the health, safety, and activities of humans or other organisms [10]. Noise level standard is the maximum level of noise level allowed to be exposed to the environment as a result of business activities within a certain threshold so that it does not cause disturbance to human health and environmental comfort (Minister of Environment Decree Number 48 of 1996 concerning Noise Level Standards).

The airport is one of the public buildings that has a major contribution to the economy of a region. The large economic contribution is linear and cannot be separated from the magnitude of environmental problems and the prolonged social impacts caused. Airport development must consider the future environmental impacts arising from the ongoing airport operational activities [11]. The existence of the airport has an impact on the economy of the surrounding community in the form of
economic growth [12], increased income [13], creating jobs and regional developments. The social impact of the existence of airports is that the population of the community around the airport is increasing, there is a crowd or density, reducing quality of life decline in residential property prices [14], highway congestion, public rejection, land use, and population retention in residential locations [15].

3. Methodology

3.1. Data Collection

Data collection techniques used in this research are as follows:

1. Literature study, which is data collection carried out by reading, quoting both directly and indirectly from various scientific references in accordance with the research topic.

2. Field observations, namely data collection techniques with direct noise measurement at the research location. Noise measurements are carried out using a Sound Level Meter that has been set using a sound level pressure scale A or dB (A) for 10 (ten) minutes for each measurement in order to obtain a Leq (Equivalent Continuous Noise Level). Leq is a certain value of noise from changing or fluctuating noise, but the value is equivalent to a steady noise level at the same time interval. The reading value is done every 5 (five) seconds. Noise measurement time is carried out during the 16 hour activity following the HLP Airport operating hours with noise measurement intervals every 2 hours.

3. Interview is a technique of collecting data through a number of questions in accordance with interview guidelines related to the topic studied. The main purpose of making the interview alloy is to obtain information relevant to the research conducted.

4. Questionnaire is a data collection technique that is done in a way arranged according to the research objectives. Questions raised related to the risk of environmental noise, and the socio-economic perception of the people who live around the HLP Airport. Questions related to environmental noise risk include knowledge, perception, and behavior.

3.2. Knowledge Aspects of Environmental Noise Risk

Evaluation of aspects of community knowledge in the settlements around HLP Airport on the knowledge of environmental noise risk is given a score of 0% (low) and 100% (high). Data on community knowledge questionnaires in the settlements around HLP Airport are processed by multiplying the number of respondents' answers correctly divided by the number of respondents whose results are further categorized. Knowledge aspects are categorized according to [16], which are as follows:

1. If the correct respondent's answer <56%, it is categorized as low.
2. If the correct respondent answers 56-75%, it is categorized as medium.
3. If the correct respondent’s answer is 76-100%, it is categorized high.

Aspects of environmental noise risk perception, social risk perception, and economic risk perception Evaluation of environmental noise risk perception, social perception, and economic perception of the people who live around the HLP Airport are measured on a Likert scale with certain provisions so that they can be interpreted qualitatively [17]. In general, the Likert scale used in the questionnaire is four answers starting from the answers of Strongly Agree (SS), Agree (S), Disagree (TS), and Strongly Disagree (STS). The Likert scale on some of the research questionnaire statements was modified and adjusted to the measurable variable that was to be achieved. The modification still uses four answer choices. The reason for using the four answer choices is to avoid responses that might answer neutral answer choices or find safe middle values [18]. Scoring is used based on levels from grades 1 to 4. Scoring is applied to every statement both positive and negative that is adjusted to each research variable in the questionnaire.

4. Results and Discussion.

4.1. HLP Airport General Conditions

HLP Airport has runway facilities with an asphalt type with dimensions of 45 m x 3,000 m. The runway is capable of accommodating aircraft in the class of Air Bus A-330. HLP airport can accommodate aircraft in the class of Air Bus A 330, Boeing B-737 Series, Boeing B-737 ER Series 900, MD 82, F 100, Casa, Das B, Twin Other (DHC 6). HLP Airport serves civil and military flights
(TNI-AU and TNI-AL) with an average aircraft movement of 90 movements per day (PT. Angkasa Pura II, 2016). HLP Airport is built on an area of 170 ha which has been equipped with Runway facilities 06/24 measuring 45 m x 3000 m or the equivalent of an area of 135,000 m², and taxiways and apron facilities are available like most large airports. HLP Airport Taxiways facilities consist of 5 (five) parts, namely Taxiways A, B, C, G, and H with a total area of 38,612 m². The air side facilities of HLP Airport are an apron consisting of 2 (two) parts, namely the north apron and the south apron. The north apron is built with dimensions of 710.3 m x 125 m or equivalent to an area of 88,787.5 m², while the south apron is built with dimensions of 469.5 m x 135 m or the equivalent of an area of 63,382.5 m². The complete characteristics of HLP Airport are presented in Table 1. The number of respondents in this research was 198 people as representatives of the community who reside in Kelurahan Makasar (East Jakarta) and Kelurahan Jaticempaka (Bekasi, West Java) which are located on the flight path. The characteristics of the respondents are presented to obtain a general description of the respondents which include gender, age, time of domicile, level of education, type of work, income, time at home or living environment, as well as a history of hearing loss experienced in the past 1 year.

**Table 1. Characteristics of HLP Airport (Source: Angkasa Pura II, HLP Airport, 2018)**

| Information                      | Description                                      |
|----------------------------------|--------------------------------------------------|
| Year into operation             | 1974                                             |
| Runways                          | 1 runways, long ± 3 km (size 3000m x 45m)        |
| Apron                            | 2 apron, south and north                         |
| Taxiways                         | 5 taxiways (A, B, C, G, H)                      |
| Main terminal building           | 2 levels, building area 19,917 m²                |
| Check in hall                    | 1,008 m², capacity 504 passenger                 |
| Boarding lounge domestic         | 448 m², capacity 224 passenger                   |
| Arrival hall                     | 700 m², capacity 350 passenger                   |
| Average aircraft movement (Max.) | 194 trip/day (landing and take-off)              |
| number of passengers a year 2013 | 299,997 passenger                                |
| number of passengers a year 2018 | 7,446,937 passenger                              |
| number of cargo a year 2013      | 9,722.70 ton                                     |
| number of cargo a year 2018      | 34,381.23 ton                                    |
| number of aircraft movement 2013 | 32,203 trip                                     |
| number of aircraft movement 2018 | 66,780 trip                                     |

**Table 2. Characteristic of Respondents (Source: Research analyst results, 2019)**

| Category          | Number of Responden | Percentage |
|-------------------|---------------------|------------|
| 1. Gender         |                     |            |
| Male              | 145                 | 73%        |
| Female            | 53                  | 27%        |
| 2. Age            |                     |            |
| ≤ 20 year         | 3                   | 2%         |
| 21–30 year        | 11                  | 6%         |
| 31–40 year        | 38                  | 19%        |
| 41–50 year        | 65                  | 33%        |
| 51–60 year        | 61                  | 31%        |
| 61–70 year        | 16                  | 8%         |
| > 70 year         | 4                   | 2%         |
| 3. Long of residence |                 |            |
| 5–10 year         | 20                  | 10%        |
| 11–30 year        | 88                  | 44%        |
| 31–50 year        | 79                  | 40%        |
4. Level of education

| Kind of education  | Number of Respondent | Percentage (%) |
|-------------------|----------------------|----------------|
| Primary school    | 20                   | 10%            |
| Junior high school| 18                   | 9%             |
| Senior high school| 104                  | 53%            |
| University        | 56                   | 28%            |

5. Type of occupation of the respondent

| Type of Occupation  | Number of Respondent | Percentage (%) |
|--------------------|----------------------|----------------|
| Does not work      | 35                   | 18%            |
| Retired            | 18                   | 9%             |
| Precarious job     | 43                   | 22%            |
| Permanent job      | 74                   | 37%            |
| Business Owner     | 28                   | 14%            |

6. The average income of the respondents

| Income Range      | Number of Respondent | Percentage (%) |
|-------------------|----------------------|----------------|
| ≤ 1,9 million     | 60                   | 30%            |
| 1,9 - 2,9 million | 34                   | 17%            |
| 2,9 - 3,9 million | 35                   | 18%            |
| > 3,9 million     | 69                   | 35%            |

7. Time at Home or Living Environment

| Hours             | Number of Respondent | Percentage (%) |
|-------------------|----------------------|----------------|
| 1 - 6 hour        | 3                    | 2%             |
| 7 - 12 hour       | 66                   | 33%            |
| 13 - 18 hour      | 43                   | 22%            |
| 19 - 24 hour      | 86                   | 43%            |

8. History of Hearing Loss in the Last 1 Year

| Kind of Hearing Loss | Number of Respondent | Percentage (%) |
|----------------------|----------------------|----------------|
| No                   | 23                   | 12%            |
| Yes                  | 175                  | 88%            |

Table 3. Frequency Distribution of Aircraft Noise Impacts by Respondents

| Kind of distraction | Hard to sleep | Deafness | Hard to concentrate | Young emotion | Total |
|---------------------|---------------|----------|---------------------|---------------|-------|
| Number of Respondent| 42            | 82       | 54                  | 20            | 198   |
| Percentage (%)      | 21.21         | 41.41    | 27.27               | 10.1          | 100   |

Source: Research analyst results, 2019

The distribution of respondents in this study was 73% were male respondents and 27% were female respondents. Female respondents are respondents who can be met and represent the Head of the Family (KK) who cannot fill out the questionnaire directly at the time of distributing the questionnaire. The complete characteristics of research respondents are presented in Table 2. Based on Table 2, it is known that the age distribution of respondents in this study has a range between 17-75 years, with the largest age range of 41-50 years as much as 33%. The age characteristics of respondents in this study are identical to the research conducted by Lim et al., 2007 in community settlements around Gimhae and Gimpo Airports (South Korea) with the majority age of respondents being 40-60 years as much as 38%. The majority of respondents in this research have lived in settlements around HLP Airport for a period of 11-30 years. The majority of respondents (88%) stated that they had no history of hearing loss in the past 1 year, and only about 12% of respondents stated that they had a history of hearing loss within the last 1 year. In general, the majority of respondents (41.41%) think that the main disturbance that can be caused by airplane noise is deafness. Continuous exposure to noise can cause various detrimental effects, especially on hearing; further the impact of noise on hearing is considered an important factor affecting the public and environmental health [20]. Research conducted by [21] shows that the majority of respondents (68.7%) who live near airports in Taiwan experience hearing
loss caused by damage to the cochlear peripheral due to noise exposure. According to respondents, the impact of the main disturbance of aircraft noise is in Table 3.

4.2. Noise Conditions for Community Settlements around HLP Airport

The problem in this research is the environment whose scope consists of the artificial environment, the natural environment, and the social environment. The community settlements around HLP Airport in this research are categorized as an artificial environment.

4.3. Environmental noise level

Determination of noise monitoring points in this research is in accordance with those recommended by ICAO, namely 300 m and 600 m from both ends of the HLP Airport runway (runway 24 and runway 06). There are 4 points in this research which are located parallel to the flight path for take-off and landing activities at HLP Airport. Noise measurements are carried out for 16 hours at intervals every 2 hours, so there are 8 noise measurements (L1-L8) for each point. The average level of environmental noise for 16 hours in community settlements around HLP Airport has a range between 67.01-70.19 dB (A). The average range of environmental noise is not only influenced by airplanes that pass but there is influence from other background noise sources originating from the noise of motor vehicles, traffic congestion, and the activities of communities.

Table 4 shows the distribution of the results of environmental noise measurements carried out for 16 hours in order to provide an overview of the environmental noise characteristics of community settlements around HLP Airport, especially Makassar and Jaticempaka sub-districts which are right on the LTO route of the aircraft. The environmental noise level in Kelurahan Jaticempaka ranges between 64.2-73.6 dB (A) and in Kelurahan Makasar has a range between 61.4-83.3 dB (A). The highest environmental noise level is in Jaticempaka Village, reaching 73.6 dB (A) at L3 (09.00-11.00 WIB) which is at point 1 with a distance of 300 m from the end of the HLP Airport runway. The highest level of environmental noise is in Makassar, reaching 83.3 dB (A) at L6 (15.00-17.00 WIB) which is at point 3 with a distance of 300 m from the end of the HLP Airport runway. The lowest environmental noise level in Jaticempaka Village, namely 64.2 dB (A) is at L8 (19.00-21.00 WIB) which is at point 2, while the lowest environmental noise level is in Makassar Village, namely 61.4 dB (A) L5 (13.00-15.00 WIB) which is at point 4. The two points, namely point 2 and point 4 are at a distance of 600 m from the end of the HLP airport runway.

Table 4. Distribution of noise levels for residential communities around HLP Airport

| Time of Measurement | Measurement result (dBA) | sub-district | sub-district |
|---------------------|--------------------------|--------------|--------------|
|                     |                          | Jaticempaka  | Makasar      |
|                     |                          | Node 1 (300 m) | Node 2 (600 m) | Node 3 (300 m) | Node 4 (600 m) |
| L1 05.00—07.00 WIB  | 69.3                     | 66.1         | 68.9         | 68.1         |
| L2 07.00—09.00 WIB  | 67.2                     | 71.7         | 64.7         | 67.2         |
| L3 09.00—11.00 WIB  | 73.6                     | 71.6         | 69.6         | 66.1         |
| L4 11.00—13.00 WIB  | 69.6                     | 68           | 65           | 65.3         |
| L5 13.00—15.00 WIB  | 67                       | 70.7         | 69.8         | 61.4         |
| L6 15.00—17.00 WIB  | 69.5                     | 66.5         | 83.3         | 73.9         |
| L7 17.00—19.00 WIB  | 66                       | 69.3         | 72.8         | 66.2         |
| L8 19.00—21.00 WIB  | 70                       | 64.2         | 67.4         | 67.9         |
| Noise Level         | 69.03                    | 68.51        | 70.19        | 67.01        |

Source: Research analyst results, 2019

4.4. Noise area boundary

The noise index of HLP Airport towards the surrounding community settlements in this research is determined through WECPNL calculations. WECPNL is useful in determining the categorization of
noise areas in accordance with the Decree of the Minister of Transportation Number 48 of 2002 Chapter VI Article 14 paragraph 3 concerning noise areas. The WECPNL calculation requires measuring noise when an airplane flies by taking the highest instantaneous aircraft noise level generated from each measurement time. WECPNL is categorized into three levels of noise areas that can be used as noise zoning which is informative and anticipatory in the context of land use arrangements around HLP Airport. The factors that affect the WECPNL value are the dB (A) value of instantaneous aircraft movements and the number of daily aircraft movements. The value of dB (A) is influenced by several factors, namely: the altitude position of the aircraft, the type of aircraft, and the aircraft engine used. The number of aircraft movements depends on the operational activities of the airport.

The distribution of the results of instantaneous aircraft noise measurements and the WECPNL value as an indicator of the noise area boundary is presented in Table 5. Related to the sensitivity to noise felt in the respondent's living environment compared to other living environments around the airport. The results of the questionnaire answers showed that the majority of respondents (53.54%) agreed, and as many as 8.08% of respondents strongly agreed. Other respondents, 34.85%, disagree, and 3.54% of respondents strongly disagree. These results explain that the majority of respondents in this study have a risk perception that aircraft noise exposure received by their living environment is higher than other living environments around HLP Airport. The environmental noise level of the majority of respondents which is higher in this research is supported by the location and position that is parallel to the plane's trajectory for both take-off and landing activities which are respectively at a distance of 300 m and 600 m from the end of the HLP airport runway.

Table 5. Aircraft Noise Levels and WECPNL HLP Airport (Source: Research analyst results, 2019)

| Time of Measurement | Aircraft Noise Measurement Results Momentary Flying (dBA) |
|---------------------|----------------------------------------------------------|
|                     | sub-district Jaticempaka (300 m) | sub-district Makasar (600 m) | Node 1 | Node 2 | Node 3 (300 m) | Node 4 (600 m) |
| L1 05.00—07.00 WIB  | 95.1 | 94.1 | 99.1 | 91.3 |
| L2 07.00—09.00 WIB  | 99.9 | 92.2 | 98 | 87.9 |
| L3 09.00—11.00 WIB  | 87.9 | 91.1 | 95.9 | 93.5 |
| L4 11.00—13.00 WIB  | 94 | 97.1 | 90.7 | 86.7 |
| L5 13.00—15.00 WIB  | 83.8 | 94.7 | 93.1 | 81.7 |
| L6 15.00—17.00 WIB  | 98.5 | 96.1 | 104 | 98.2 |
| L7 17.00—19.00 WIB  | 98.7 | 90.7 | 89.8 | 88.3 |
| L8 19.00—21.00 WIB  | 95.5 | 94.4 | 91.8 | 86.6 |

**Aircraft Noise Intensity Flying Moment on Average (dBA)**

|                | sub-district Jaticempaka (300 m) | sub-district Makasar (600 m) |
|----------------|----------------------------------|-----------------------------|
| L1             | 82.74                            | 80.72                       |
| L2             | 84.29                            | 78.37                       |

**WECPNL**

| Region category | Noise: |
|------------------|--------|
|                  | Level 1 (70 ≤ WECPNL < 75) | Level 2 (75 ≤ WECPNL < 80) | Level 3 (WECPNL ≥ 80) |
|                  | level 2 | level 2 | level 1 |

The aircraft that will carry out landing activities to HLP Airport can be seen clearly at a very close distance from the two-story building owned by the respondent in Jaticempaka Village as presented in Figure 3.
Research by [22] show that respondents who live around Manila Airport, Philippines are more tolerant of aircraft noise when they are informed that people living in other neighborhoods are more affected by aircraft noise exposure. Increased tolerance for aircraft noise means a decrease in the perception of environmental noise risk owned by respondents. The implication that can be concluded is that individual tolerance to noise tends to be increased along with the severity of the noise situation in other areas.

The influence of individual attitudes towards noise in a positive way can increase tolerance to aircraft noise [23]. The results of this study are not in line with the research of [24] because based on the results of case studies that occur in settlements around HLP Airport show that there is no socialization either from the HLP Airport manager or the government regarding information on the noise level of aircraft passing through the surrounding settlements, even many respondents in this research do not know if the environment where they live is just below the plane's trajectory for take-off or landing activities.

5. Conclusions.

The residential area around the HLP Airport, namely Jaticempaka and Makasar Sub-districts (average range of environmental noise 67.01-70.19 dBA) does not meet the required noise level standard for residential areas according to the Decree of the Minister of Environment No. 48 of 1996 which is 55 dB (A). The ideal area to be used as a settlement around the HLP Airport is only the Makassar Village which is located at a distance of 600 m from the end of runway 06 HLP Airport (point 4) with a WECPNL value of 73.80 with a level 1 noise area category (70 ≤ WECPNL <75).

The environmental noise risk of the community in settlements around the HLP Airport in terms of knowledge, perception, and behavior aspects shows the following results: the knowledge of the environmental noise risk of the majority of respondents (39.39%) is categorized high, the perception of the environmental noise risk of the majority of respondents (82.83 %) is categorized as medium, and the majority of environmental noise risk behavior (84.34%) is categorized as low. This shows that in general the people around the HLP Airport already have good knowledge and attitudes towards the risk of environmental noise, but the implementation of facing the risk of aircraft noise is still very low.

Patterns of community characteristics in settlements around HLP Airport such as domicile time and education level do not affect the perception of environmental noise risk. Most of the social risk perceptions in the settlements around HLP Airport (71.72%) are in the moderate category, which means that the majority of respondents can still tolerate aircraft noise disturbance towards social activities in a reasonable stage.
The majority of community economic perceptions in the settlements around HLP Airport are mostly (90.40%) included in the medium category which means that the majority of respondents have the view that living around the HLP Airport continues to provide indirect economic benefits.

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