THE RELATIONSHIP BETWEEN AIR TEMPERATURE AND HUMIDITY AND FLY DENSITY AT CEGER MARKET, SOUTH TANGERANG, IN 2024

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ABSTRACT

Flies are insects belonging to the order Diptera and are known as disease vectors due to their ability to transmit various pathogens. Environmental factors such as air temperature and humidity play a significant role in influencing their distribution. Markets serve as ideal locations for measuring fly density because they involve high levels of human activity and interaction. This study employed an analytic cross-sectional design. Samples were selected using a cluster sampling method. Data analysis included univariate analysis to describe each variable and bivariate analysis using Pearson's product-moment correlation and Spearman's correlation to assess relationships between variables. Statistical tests were performed at a 95% confidence interval level (α = 0.05). A study conducted at Ceger Market revealed that the fly density, particularly in food product sales areas, falls into the high category. which shows that the points with the high-density category number 24 locations, or equivalent to 39.4%. The temperature and humidity in Ceger Market are at the appropriate level to support the existence of flies. Based on the results of observations, it was found that this temperature and humidity that tends to be high can be caused by a lack of ventilation in Ceger Market. The recorded air temperature ranged from 26.5°C to 34.8°C, while humidity levels ranged from 61% to 85%. Statistical analysis showed a significant correlation between temperature and the fly density index, with a moderate strength of correlation. In contrast, no significant relationship was found between air humidity and the fly density index at the research site.

Keywords: *Fly density, Temperature,Humidity, Environment, Market*

INTRODUCTION

Health is a fundamental aspect of human life. Among the various factors influencing public health status, the environment plays a crucial role (1). Environmental health can be reflected through sanitation facilities that meet standards in residential areas, housing, public places, food processing sites, and health facilities (2). The implementation of sanitation in public areas aims to prevent the risk of disease transmission and environmental pollution (3).

Flies, belonging to the order Diptera, act as vectors of various diseases and are often used as indicators of environmental cleanliness. A high fly population indicates suboptimal waste management or inadequate sanitation (4). Flies can only survive and reproduce under favorable environmental conditions. Factors such as temperature, humidity, wind speed, as well as color and odor, influence their spread (5).

Flies act as mechanical vectors capable of transferring bacteria through their body parts. These bacteria can then be transmitted to food, objects, or other environments that humans may come into contact with. Flies tend to breed in poorly sanitized environments, particularly in moist and dirty areas such as garbage dumps (6). Flies are also known to transmit various diseases by carrying the eggs of helminths such as *Ascaris lumbricoides, Trichuris trichiura, Enterobius vermicularis, Toxocara canis,* and cysts of *Strongyloides stercoralis* (7).

Markets are ideal locations for measuring fly density, as they gather large numbers of people engaged in diverse activities. Additionally, markets generally have temporary waste storage sites that hold significant amounts of organic waste, which attract flies. The Ministry of Health Regulation (Permenkes) Number 17 of 2020 stipulates that a healthy market must be clean, safe, comfortable, and hygienic. These conditions affect the presence of flies in markets, which may serve as a medium for disease transmission (8).

RESEARCH METHODS

This study employed an analytic cross-sectional design to evaluate the relationship between temperature and humidity with fly density at Ceger Market, South Tangerang, in 2024. The study population consisted of all flies as well as stalls and vendors operating in Ceger Market.

Samples were selected using a cluster sampling method (9). The clusters included vegetable, fruit, meat, poultry, and fish vendors, as well as food stalls. To determine the number of samples within each cluster, purposive sampling was applied (10). Based on this approach, the researchers established 61 observation points, which consisted of active stalls selling food products and the temporary waste disposal sites (TPS) within Ceger Market.

Data analysis included univariate analysis to describe each variable and bivariate analysis using Pearson's product-moment correlation and Spearman's correlation to assess relationships between variables. Statistical tests were performed at a 95% confidence level ($\alpha = 0.05$).

Data collection was conducted through counting and measurement. Fly density index was determined by counting the number of flies that landed on a fly grill within 30 seconds using a tally counter. The five highest counts were recorded and averaged to generate the index at each observation point. The fly population index was calculated using the following formula (11):

$$\text{Fly population index} = [\ (\textstyle\sum 5 \text{ highest counts})/ \ 5\} \ x \ 100\%$$

The level of fly density in this study was classified into four categories. A low category was defined when the number of flies ranged from 0–2, while a moderate category was assigned for 3–5 flies. Furthermore, a range of 6–20 flies was classified as high or dense. Meanwhile, more than 20 flies were categorized as very high or very dense (9).

RESULTS AND DISCUSSION

The data collected in the field will be described using univariate analysis and further examined through bivariate analysis.

Univariate Test

The following table presents the distribution of fly density measurements at Ceger Market, South Tangerang in 2024:

Table 1. Distribution of Fly Density Levels at Ceger Market, South Tangerang, by Category

Fly Density Levels	Count	Percentage
Low	18	29,5%
Moderate	16	26,2%
High	24	39,4%
Very High	3	4,9%
Total	**61**	**100%**

Table 2. Distribution Table of Flies Density Level Measurement Results in Ceger Market, South Tangerang Based on Location

Location	Fly Population Index	Fly Density Levels
Vegetable	6,9	Tall
Fruit	5,6	Keep
Daging	17,9	Tall
Unggas	4,8	Keep
Fish	1,8	Low
Food stalls	1	Low
Total	**6,3**	**Tall**
TPS	17,6	Tall
Overall Total	**7,4**	**Tall**

The results of measurements and calculations of fly density levels in Ceger Market, South Tangerang show that the fly population index is relatively high. This condition indicates the need to improve the condition of potential points in the market that are the location of fly breeding sites. Therefore, appropriate control measures are needed (12). These findings are also supported by the data in Table 2, which shows that the points with the high-density category number 24 locations, or equivalent to 39.4%.

Flies in Ceger Market are influenced by various factors, one of which is the physical environmental conditions. The temperature and humidity in Ceger Market are at the appropriate level to support the existence of flies. Flies tend to choose humid locations as a

breeding ground, such as wet garbage, animal droppings, rotting vegetation, and accumulated feces (13). Flies are more active at high levels of air humidity, with an optimal humidity range of between 45% to 90% (6).

Table 3. Distribution Table of Observation Results of Temperature Measurement at Ceger Market, South Tangerang

No.	Location	Sampling Point	Temperature (°C)
1.	TPS	1	30,9
2.	Kiosks/Stalls Vegetable	1	31,7
		2	31,4
		3	32,4
		4	33,5
		5	34,8
		6	34,6
		7	33,9
		8	34,7
		9	34,6
		10	34,5
		11	34,4
		12	30,8
		13	30,6
		14	30,9
		15	31,5
		16	30,7
		17	31,3
		18	31,7
		19	31,2
		20	32,5
		21	31,4
		22	32
		23	32,1
		24	32,2
		25	31,9
		26	33,4
3.	Kiosks/Stalls Fruit	1	34,2
		2	31,2
		3	31
		4	32,1

		5	32,2
4.	Kiosks/Stalls Meat	1	31,9
		2	31,6
		3	31,2
		4	31,1
		5	31,3
		6	31,1
		7	31,1
		8	31,2
		9	31,3
5.	Kiosks/Stalls Chicken	1	33
		2	31,8
		3	32,4
		4	31,5
		5	33,3
		6	32,5
		7	32,9
		8	31,2
		9	32,1
		10	32,2
6.	Fish Stalls/Stalls	1	31,4
		2	32,7
		3	32,9
		4	31,8
		5	32,9
		6	30,9
		7	32,8
7.	Food Stalls	1	26,5
		2	31,4
		3	32,3

Based on table 3, it can be said that the temperature measured at the observation point of fly density in Ceger Market, South Tangerang ranges from 26.5 – 34.8 °C. Flies are active at a temperature of 15 °C-45 °C, so it can be said that the temperature in Ceger Market is the optimal temperature for fly breeding (6). This is in accordance with the results of calculations carried out by researchers that the density of flies in the Ceger Market is in the high category. Temperature is closely related to air ventilation. Based on the results of observations, it was

found that this temperature that tends to be high can be caused by a lack of ventilation in Ceger Market.

Table 4. Distribution Table of Moisture Measurement Results in Ceger Market, South Tangerang

No.	Location	Sampling Point	Humidity (%)
1.	TPS	1	72
2.	Kiosks/Stalls Vegetable	1	77
		2	76
		3	67
		4	61
		5	66
		6	67
		7	62
		8	67
		9	68
		10	66
		11	67
		12	76
		13	76
		14	78
		15	77
		16	76
		17	77
		18	77
		19	81
		20	79
		21	77
		22	75
		23	74
		24	72
		25	72
		26	72
3.	Kiosks/Stalls Fruit	1	64
		2	83
		3	79
		4	74
		5	75

4.	Kiosks/Stalls Daging	1	83
		2	81
		3	80
		4	81
		5	81
		6	79
		7	81
		8	79
		9	85
5.	Kiosks/Stalls Unggas	1	70
		2	72
		3	71
		4	70
		5	70
		6	75
		7	72
		8	74
		9	73
		10	67
6.	Fish Stalls/Stalls	1	65
		2	63
		3	69
		4	73
		5	71
		6	69
		7	78
7.	Food Stalls	1	85
		2	69
		3	67

Based on table 4, it is found that the humidity measured at the calculation point of the fly density in Ceger Market ranges from 61 – 85%. Humidity has a close relationship with the temperature in the local environment. The optimal humidity needed by flies to breed is 45-90%. So it can be concluded that the humidity in Ceger Market is at the optimal situation needed by flies and affects the high density of flies.

Bivariate Test

Before conducting *the person product moment test*, a normality test was carried out on independent variable data. The results obtained are as follows:

Table 5. Table of Temperature and Humidity Normality Test Results with Fly Density at Ceger Market, South Tangerang

No	Independent Variables	df	*p-value*	Interpretation
1	Temperature	61	0,16	Abnormal
2	Humidity	61	0,2	Normal

Based on the test results, the results of the normality test at abnormal temperatures were obtained, so the correlation test was carried out with the *Spearman Test.* Meanwhile, the results of the normality test on humidity were found that the data was distributed normally, so the correlation test was carried out with the *person product moment test.*

Table 6. Table of Correlation Test Results of Temperature and Humidity with Fly Density at Ceger Market, South Tangerang

No	Independent Variables	r (Crystal Synthesis)	*p-value*	Interpretation
1	Temperature	0,43	0,74	Moderate correlation
2	Humidity	0,25	0,04	Weak correlation

Based on the results of the statistical test in table 6, it was found that *the p value* of the humidity variable 0.04 (<0.05) explained that there was no significant relationship, with a weak correlation strength. Meanwhile, the *temperature variable p value* of 0.74 (>0.05) explains that there is a significant relationship, with a moderate correlation strength. In theory, these two variables have an influence on each other in creating an optimal

environment for fly breeding. Both are also affected by the amount of ventilation at Ceger Market. So this is suspected to be one of the factors that affect air humidity.

CONCLUSION

The findings of this study indicate that the level of fly density at food product sales areas and temporary waste disposal sites (TPS) in Ceger Market, South Tangerang, falls within the high category. The recorded environmental conditions showed air temperatures ranging from 15 °C to 45 °C with relative humidity levels between 61% and 85%. Statistical analysis revealed a significant relationship between temperature and the fly density index, with a moderate correlation observed. In contrast, no significant relationship was found between relative humidity and the fly density index at the study location.

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