Relationship Factors of Prevention of Leptospirosis Disease Prevention of Rat Rate in Tandang Village, Semarang City

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Abstract. *Based on data from the Semarang City Health Office, the highest rat population in Tembalang District in 2019 was in Tandang Village, with 164 rats caught. In addition, in 2018 there were 4 cases of Leptospirosis in Tandang Village and Leptospirosis was the highest infectious disease in Tandang Village, Tembalang District, Semarang City. This study aims to determine the relationship between the behavioral factors of leptospirosis disease prevention on rat density in Tandang Village, Semarang City. This study is a cross sectional study with a total sample of 64 respondents (RW 03 Tandang Village, Semarang City). The results of the analysis showed that the relative density of rats (trap success) in Tandang village was 28.1% and it was categorized as dense (> 7%) and showed that there was no relationship between knowledge of rat density (α = 0.05. P = 0.068), community attitudes. In the prevention of leptospirosis on rat density (α = 0.05. p = 0.07), there was a relationship between leptospirosis prevention behavior and rat density (α = p = 0.00). Conclusion: There is no relationship between knowledge and attitude in the prevention of leptospirosis on rat density. There is a relationship between leptospirosis prevention practices and rat density in Tandang Village, Semarang City.*

Keywords: *Behavior, Leptospirosis, Rat Density*

INTRODUCTION

The UN estimates that by 2030 there will be 41 megacities worldwide, which will lead to massive urbanisation with both negative and positive impacts. On the positive side, urbanisation is often associated with culture, trade, and economic productivity, higher life expectancy, higher levels of education and literacy, improved access to social services, better access to healthcare, and an overall higher quality of life. Urbanisation also has a negative impact if it fails to sustain a healthy population if it exceeds clean water reserves and waste management systems or when urban poverty results in unhealthy diets and reduced physical activity, low-quality housing, and environmental degradation, along with exposure to air, noise, and other forms of pollution. Population density can also be an important factor. Through such mechanisms, the effects can be

devastating in terms of disease transmission and even derail the Sustainable Development Goals (SDGs) (United Nations, 2016).

Rapid global urbanisation in the next few decades has potentially important implications for the increase in NTDs, as well as the comorbidity of NTDs and non-communicable diseases (NCDs) (Martins-Melo et al., 2018; Lopez et al., 2014). While an important feature of NTDs is their disproportionate impact on populations living in rural poverty, there are certain diseases that primarily affect the urban poor. leptospirosis is one of the major NTD diseases that has emerged in urban environments over the past three years (Hotez, 2017).

Leptospirosis is a zoonotic infectious disease in the world caused by the bacteria leptospira sp (Pal et al., 2021). Leptospirosis is transmitted through vector animals to humans either directly or indirectly. Leptospirosis is still a global health problem especially in developing countries (Diaswati et al., 2024) Leptospirosis is categorised as a re-emerging disease, an infectious disease that can re-emerge (Priyotomo, 2015). Worldwide it is estimated that more than one million cases of human leptospirosis occur each year, leading to nearly 60,000 deaths per year (Costa et al., 2015)

Leptospirosis cases in Indonesia in 2020 were reported in eight provinces namely South Sulawesi, North Kalimantan, East Java, Yogyakarta, DKI Jakarta, Banten, West Java, and Central Java with up to 1,170 leptospirosis cases. West Java had the highest Case Fatality Rate (CFR) of 16.4% in 2020. leptospirosis decreased from 906 cases to 734 cases in 2020-2021 (Andriani & Sukendra, 2020).

Central Java Province has experienced a significant increase in leptospirosis cases. Based on the Central Java Health Profile, the leptospirosis morbidity rate was 1.24 per 100,000 population in 2018. Leptospirosis cases in Central Java are spread across 21 districts/cities. Regions in Central Java with five high leptospirosis cases are Demak (IR 7.91), Klaten (IR 5.38), Semarang City (IR 2.25), Pati (IR 1.91), and Banyumas (IR 1.79) (Andriani & Sukendra, 2020).

Based on data from Semarang City Health Office in 2018, Leptospirosis cases in Semarang City in 2018 were 56 cases, an increase of 1.81% compared to the previous year. The mortality rate (CFR) was the same as the previous year at 25%. Leptospirosis cases in Semarang city spread in 24 out of 37 Puskesmas (64.86%), one of which is the Kedungmundu Puskesmas working area (Pudji Nugraheni et al., 2024).

The geographical condition of Semarang City is mostly in the form of economic and business centres such as: shops, malls, markets and offices as well as densely populated settlements (including the top five regencies or cities in Central Java). Rats are commonly found in densely populated residential areas, where there are sewers and rubbish that can be used as a place to live and a sufficient food source for rats (Kurnia et al., 2024). Based on data from the Semarang City Health Office, the largest rat population in Tembalang Subdistrict in 2019 was in Tandang Urban Village, where 164 rats were caught. In addition, in 2018 there were 4 cases of Leptospirosis in Kelurahan Tandang and Leptospirosis was the highest infectious disease in Kelurahan Tandang, Tembalang Subdistrict, Semarang City.

Leptospirosis disease is influenced by agent, host and environmental factors. Leptospirosis infection does not always occur due to an increase in the rat (rodent) population which is a reservoir, but poor environmental sanitation (Soo et al., 2020). The results showed that environmental factors influence the transmission of leptospirosis.

Poor sanitation around the house can increase the availability of food, shelter, and breeding of rats as a reservoir of leptospirosis (Prihantoro & Siwiendrayanti, 2017; Haq et al., 2020). The impact of leptospirosis, especially in endemic areas, is detrimental to the economic and social well-being of the affected family. The cost of health care and treatment of severe complications of leptospirosis is also a direct impact of leptospirosis. While the long-term impact on the productivity of patients due to leptospirosis therapy (Andriani & Sukendra, 2020). This study aims to find the relationship between knowledge, attitudes and behaviour of leptopsirosis prevention and rat density prevention with rat density in the respondent's home environment with a case study in Tandang Village, Semarang City.

METHODS

The type of research used was observational analytical research. The study design used was cross sectional. This study used quantitative methods, namely looking at the independent variable (community behaviour) by conducting interviews through Google Forms while the dependent variable (rat density) through a rat density survey using a single live trap. The sampling technique used in this research is probability sampling and sampling using simple random sampling. The sample measurement technique was calculated using the Slovin formula and obtained 64 respondents. The sampling technique used in this study was probability sampling. Univariate analysis was used to describe or describe in general the characteristics of the research subjects and research variables studied as information material in the form of narratives, tables and statistical distributions. Bivariate analysis was conducted to test the relationship between variables. The relationship test in this study was to see the relationship between knowledge, attitudes and practices of the community in efforts to prevent leptospirosis with rat density. Data were analysed with the Chi Square (X^2) test to determine the relationship between the independent variable and the dependent variable with the research hypothesis.

RESULT AND DISCUSSION

Univariate Analysis

Table 1. Relative density of rats

Rat density	f	%
Not dense	46	71.9
dense	18	28.1
Total	**64**	**100**

Based on the table, it can be seen that the relative density of rats (trap success) in Tandang village is 28.1%. The most common rat species caught in Kelurahan Tandang was Rattus tanezumi (55.6%) and the least common rat species caught was Rattus norvegicus (44.4%).

Table 2. Frequency Distribution of Respondents' Knowledge

Respondents' Knowledge	Total	
	f	%
Good	33	51.6
Bad	31	48.4
Total	**64**	**100**

The results showed that most of the respondents' knowledge was good at (51.6%), although the respondents' knowledge was classified as good, there were still many things that showed that the respondents' knowledge was not good. respondents did not know how to treat rat carcasses, factors that affect rat density, what is leptospirosis, intermediaries of leptospirosis, sources of transmission of leptospirosis, symptoms of leptospirosis and prevention of leptospirosis.

Table 3. Frequency Distribution of Respondents' Attitudes

Respondents' Attitudes	Total	
	f	%
Right	35	54.7
Buruk	29	45.3
Total	64	100

The results showed that respondents who had a good attitude about leptospirosis were 35 respondents with a percentage of 54.7%. While respondents who had a bad attitude about Leptospirosis were 29 respondents with a percentage of 45.3%. respondents had a perception of obstacles regarding the statement that the environment where they lived was still classified as slum or dirty (54.6%). And the sewers around where they live are still a place for rats to get into the house (76.6%). Based on the respondents' answers, it can be seen that there are still many respondents who have not received information about Leptospirosis disease (54.6%).

Table 4. Frequency Distribution of Respondents' Practices

Respondent Practice	Total	
	f	%
Right	35	54.7
Bad	29	45.3
Total	64	100

The results showed that most of the respondents' practices in preventing the transmission of Leptospirosis were good (54,7%), through statements inviting family members to always dispose of garbage in a closed place (87.5%) and also teaching family members to always use footwear when leaving the house (89%), although there were still respondents who did not teach family members to use footwear when leaving the house, namely (11%).

Bivariate Analysis

Table 5. Analysis of the relationship between respondents' leptospirosis prevention knowledge and rat density

Knowledge	Rat Density				Total	
	Not dense		Dense			
	f	%	f	%	f	%
Right	27	58.7	6	33.3	33	51.6
Bad	19	41.3	12	66.7	31	48.4

$\alpha = 0,05$ $p = 0,068$ Ho = Retrieved

The results showed that respondents who had good knowledge about the prevention of Leptospirosis were more (51.6%) than respondents who had poor

knowledge about the prevention of Leptospirosis (48.4%). After testing the hypothesis using the Chi Square Test with a 95% confidence level, the p-value was 0.068 (>0.05). From these results it can be concluded that there is no relationship between community knowledge in preventing Leptospirosis and Rat Density in Tandang Village.

Table 5. Analysis of the relationship between respondents' attitudes and rat density

Attitude	Rat Density				Total	
	Not dense		Dense			
	f	%	f	%	f	%
Right	30	65.2	5	27.8	35	54.7
Bad	16	34.8	13	72.2	29	45.3

α = 0,05 p = 0,07   Ho = Retrieved

The results showed that respondents with a good attitude category in preventing Leptospirosis (54.7%) were more than respondents with a bad attitude category in preventing Leptospirosis (45.3%). After testing the hypothesis using the Chi Square Test with a 95% confidence level, the p-value was 0.07 (>0.05). From these results it can be concluded that there is no relationship between community attitudes in preventing Leptospirosis and rat density in Tandang Village.

Table 6. Analysis of the relationship between respondents' leptospirosis prevention practices and rat density

Practice	Rat Density				Total	
	Not dense		Dense			
	f	%	f	%	f	%
Right	38	82.6	2	11.1	40	62.5
Bad	5	17.4	16	88.9	24	37.5

α = 0,05 p = 0,00   Ho = Retrieved

The results showed that respondents with good Leptospirosis prevention practices (62.5%) were more than respondents with poor Leptospirosis prevention practices (37.5%). After testing the hypothesis using the Chi Square Test with a confidence level of 95%, a p-value of 0.00 (<0.05) was obtained. From these results it can be concluded that there is a relationship between community practices in preventing Leptospirosis and rat density. Based on survey results in Kelurahan Tandang, Semarang City, the high rat population density (trap success) for three days at the study site was 28%. The rat density level is high because it is more than 7% (trap success). The community of Tandang still considers the presence of rats in the environment around the house is not a risk factor for diseases caused by rats. Factors that affect rat density include sewer conditions, TPS conditions, the presence of vegetation, lighting, humidity, temperature and the presence of predators (Husni et al., 2023).

The results showed no relationship between community knowledge in preventing Leptospirosis and Rat Density in Tandang village. The interview results showed that 51.6 people in Tandang Village had good knowledge. This is not in accordance with Murwani et al. (2022) in Tanggeran District which showed that 49% of respondents had low knowledge so that the results showed that there was a significant relationship between the level of knowledge and leptospirosis prevention behaviour (*p value <0.00*). The results of research conducted by Agus Sudaryanto (2018) in Pabelan Village, Sukoharjo Regency found that the majority of respondents had poor knowledge (53.3%)

(Sudaryanto et al., 2018). People in Tandang Village already know the definition of leptospirosis, how to prevent leptospirosis, and how it is transmitted. The community also had good knowledge of the types of rats, signs of rat presence, rat control, and factors affecting rat density. Communities get information from neighbours, health workers, and information on social media. Provision of relevant information on leptospirosis risk among communities from endemic areas that are highly vulnerable to flooding Improving knowledge about leptospirosis disease is key to promoting desired positive behaviours in the community (Ricardo et al., 2018; McPherson et al., 2018; Eyre et al., 2022).

Respondents' attitudes about leptospirosis and the vectors that cause leptospirosis found that there was no relationship between community attitudes in preventing leptospirosis and rat density in Tandang Village. This is in accordance with research conducted by Intan Nugraheni Hasanah (2017) in Semarang City that respondents have a supportive attitude towards leptospirosis prevention behaviour (58%) (Hasanah & Wahyuni, 2017). Attitudes will be formed as more information about an object is obtained (Rakebsa et al., 2018). In the context of behavioural and cognitive aspects of leptospirosis prevention and treatment efforts and risk-related behaviours, thoughts and actions are strongly linked (Zahiruddin et al., 2018). Lack of awareness leads to a reduced perceived threat of leptospirosis, which may minimise preventive measures (Agampodi et al., 2010).

The results showed that there was a relationship between leptospirosis prevention practices and rat density. Leptospirosis prevention behaviour is influenced by poor knowledge and attitude, age, education level, family income, information sources, and social support (Illahi & Fibriana, 2015). Practical efforts to prevent leptospirosis will increase as knowledge increases (Ricardo et al., 2018) . The results of another study conducted by Mellina Sukma Diaswati (2024) in the Kebonagung Health Centre work area, Pacitan Regency found that there was no influence of personal hygiene on the incidence of Leptospirosis (Diaswati et al., 2024) Residents in Kelurahan Tandang, Semarang City complained that their house rubbish was still not collected daily by the local village janitor. Poor hygiene practices such as waste accumulation can create an environment that favours a larger rat population, which in turn increases the risk of Leptospirosis transmission (Jahja & Drew, 2024).

Factors related to socioeconomic, sanitation and risk behaviour showed a consistent pattern associated with increased risk of leptospirosis in all sites (Mwachui et al., 2015). However, in this study there was no relationship between the knowledge and attitudes of respondents in leptospirosis prevention efforts with the density of rats in the residential area of Tandang village. while in the practical variable there was a significant relationship. sanitation improvement is the key in efforts to prevent leptospirosis in Tandang village, Semarang City.

CONCLUSION

The results showed that the knowledge, attitudes and practices of the community in Tandang Village, Semarang in preventing Leptospirosis were classified as good (knowledge 51.6%, attitudes 54.7% and practices 54.7%). The results showed that there was no relationship between knowledge and attitude towards the prevention of Leptospirosis with rat density in Tandang Village. However, there was a relationship between the practice of leptospirosis prevention and rat density in Tandang Village, Semarang City.

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