Factors Predicting Fly Density in Temporary Waste Shelters Bandung City

Agus Riyanto[1*)], Mona Megasari[2], Wulan Sriwahyuni[3]

[1,3] Faculty of Health and Technology Sciences, Jenderal Ahmad Yani University, Cimahi Bandung
[2] Nursing Study Program, School of Health Sciences Budi Luhur, Cimahi Bandung

ABSTRACT

Waste has become a problem in Bandung City and occupies rating second highest in West Java. Hoarding waste utilized vector flies for developing breeds. Height density fly describes the quality of the site environment the not good enough. The aim of this study is to assess factors that predict the density of flies on the spot in temporary shelter waste in Bandung City. Desain study is cross-sectional, sampling as many as 76 places of temporary shelter waste in Bandung City. Method data collection was used with interviews using questionnaires and observation of flies on the spot shelter waste using the fly grill. Analysis statistics use the chi-square test and examine big risk using the Prevalence Ratio (95% CI). Research results show that predicting factor fly density that is waste sorting (p= 0.002), waste collection (p= 0.0001), and waste transportation (p= 0.0001). Election waste is not good enough 1.5 times the risk of happening density fly high in place temporary shelter waste. Collection of waste is not enough good risk 1.9 times happen density fly high in temporary shelter waste. Freight waste is not enough good risk 2.3 times happen density fly high in place temporary shelter waste. The environment and hygiene Department may train officers on how to temporarily shelter waste about the method of handling trash, as well as give counseling to the Public to use appropriate in throwing away the trash.

*) corresponding author

Dr.K.M. Agus Riyanto, SKM.,M.Kes

Kesehatan Lingkungan, Fakultas Ilmu dan Teknologi Kesehatan, Universitas Jenderal Achmad Yani Cimahi
Jl. Terusan Jenderal Sudirman Cimahi Bandung-Indonesia 40531

E-mail: aguskesmas78@gmail.com

ABSTRAK

Sampah menjadi permasalahan di Kota Bandung dan menduduki peringkat kedua tertinggi di Jawa Barat. Penimbunan sampah dimanfaatkan vektor lalat untuk berkembang biak. Tingginya kepadatan lalat mengambarkan kualitas lingkungan di tempat tersebut kurang baik. Tujuan penelitian ini mengkaji faktor-faktor memprediksi kepadatan lalat di tempat penampungan sampah sementara di Kota Bandung. Rancangan penelitian ini potong lintang, sampel sebanyak 76 tempat penampungan sampah sementara Kota Bandung. Metode pengumpulan data dengan wawancara menggunakan kuesioner dan observasi lalat di tempat penampungan sampah menggunakan Fly grill. Analisis statistik menggunakan uji kai-kuadrat dan mengkaji besarnya risiko menggunakan Prevalens Ratio (95% CI). Hasil penelitian menunjukkan bahwa faktor yang memprediksi kepadatan lalat yaitu pemilahan sampah (p= 0.002), pengumpulan sampah (p= 0.0001), dan pengangkutan sampah (p= 0.0001). Pemilihan sampah kurang baik berisiko 1,5 kali terjadi kepadatan lalat tinggi di tempat penampungan sampah sementara. Pengumpulan sampah kurang baik berisiko 1,9 kali terjadi kepadatan lalat tinggi di tempat penampungan sampah sementara. Pengangkutan sampah kurang baik berisiko 2,3 kali terjadi kepadatan lalat tinggi di tempat penampungan sampah sementara. Dinas Lingkungan Hidup dan Kebersihan supaya memberikan pelatihan

kepada petugas tempat penampungan sampah sementara tentang cara penanganan sampah, serta memberikan penyuluhan kepada masyarakat supaya tepat dalam membuang sampah.

INTRODUCTION

Waste is an ingredient or object already not used again by humans (Pituari et al., 2021). Waste house ladder is waste from activity daily human, where if amount resident in an area increases so impact the high volume of waste generated by house ladder (Hasibuan, 2016). Indonesia occupies rating fourth as the country with a population the most populous in the world, where 2021 the number Indonesia's population is 273,879,750 people with the total volume of waste generated reached 15,834,843 tons (KemenLHK RI, 2021).

The city of Bandung is the capital city of West Java and is one of the cities most populous in West Java. In 2020 the population in Bandung City reaches 2.5 million souls (BPS Kota Bandung, 2020). the density of the population of Bandung City has an impact on the volume of waste in the city of Bandung rating second highest i.e. 581,280 tons per year (KemenLHK RI, 2021). Junk volume high in place Final Disposal (TPA) as a result of activity improved human and handling waste still not enough effective, efficient, and insightful environment (Pituari et al., 2021). Handling waste is not yet maximum influenced by the volume of waste, facilities, and infrastructures like The place of Final Disposal (TPA) whose land is limited, route travel, and trouble cost (Mahyudin, 2017).

Total waste in Bandung City is 60% garbage domestic house ladder (KemenLHK RI, 2021). Operational engineering handles waste that starts from sorting, collecting, moving and transporting, to processing waste in the TPA (Badan Standarisasi Nasional, 2002). The place Shelter Temporarily (TPS) is used to accommodate waste before brought to the landfill. The high volume of waste in TPS illustrates that that TPS is not yet enough to accommodate generated waste population as well as the system handling waste that is sorting, collecting, and transporting is not yet maximum in Bandung City (Rumakat et al., 2020). Hoarding waste in TPS is used vector as a source of food as well as a nest in the process of reproduction (Kristanti et al., 2021).

Vector disease is something an organism carries a virus or bacteria pathogens and parasites from infected hosts to other hosts. Vector most diseases found that is *arthropod*s from group *hexapod*s like mosquitoes, flies, and fleas (Majdi, M., & Ruhardi, 2018). Fly species play a role in vector transmission disease channel digestion is one which is diarrhea. The prevalence of diarrhea in Bandung City in 2021 reached 17,615 cases, Temporarily in January-May 2022 prevalence of diarrhea reached 9,165 cases (Bandung City Health Office, 2022). Research results in Ponorogo obtained there is connection density fly with incident diarrhea (Hanif, DI & Martini, 2019).

Fly often perch on the spot dirty so that their whole body flies dirty and become the place stick it microorganisms disease. One fly insect reason *vector-borne diseases* or *food-borne diseases* (Al-Irsyad & Deniati, 2021). The fly could land on food and contaminate food (Husin, 2018). The existence fly Becomes indication cleanliness is not enough good in one place (Kristanti et al., 2021). Fly play a role in decay, parasites,

predators, etc carrier agent disease. One tail fly could bring more than 100 pathogens (Zhang et al, 2018). Flying distances reach 8 km so one could perch on various places like housing, market, places cutting animals, and food, including places, waste (Puspitarani et al., 2017).

Habitat for flies could be found where just because they live side by side with a man such as water, sand, plants, and one of the good habitats fly that is in place disposal trash. By instinct and bionomy flies, trash is made to source food for larvae after hatching from eggs. one _ method of evaluating the sanitation environment could be seen from the number density flies, more tall number density flies , then show bad sanitation in the area (Husin, 2018). The environment is healthy if flies have Quality Standards _ with a score of raw quality < 2 (Masyhuda & Hestiningsih, 2017). Research in several areas such as Lombok (Majdi, M., & Ruhardi, 2018), New Banjar City (Marlinae et al., 2019), Kendari (Arisanto et al., 2019), Sidoarjo (Mahrusah et al., 2022), obtained there is connection Among toilet facilities and drains disposal with level density fly. Research results in several other areas such as Cirebon Regency TPS (Kristanti et al., 2021), Bengkulu (Husin, 2018), Lombok (Majdi et al., 2021), Kuningan West Java (Rahim et al., 2020), there is connection significant Among sorting trash, collection garbage, transport waste with level density fly.

Application hygiene and sanitation environment is an effort to prevent breed population flies in the environment farm nor settlements. Repair hygiene and sanitation environment including entering waste organic or waste wet into the place closed before thrown away place disposal. The remainder plant is buried so that results the decay could make as fertilizer. Cage cattle are always cleaned, the floor waterproof, watering every day, and there is sewerage. Installation wire in ventilation home, use tools to trap mosquitoes like *fly traps, light traps with electrocution,* and *sticky tapes* (Andiarsa, 2018). Based on the problem the so study this wants to study factors that predict the density of flies on the spot shelter waste Temporarily Bandung City.

METHODS

This study was approved by the Ethics Committee for Health Research, Faculty of Health Science and Technology, University of Jenderal Ahmad Yani : (B.073/ Kesmas / Fitkes-Unjani /VIII/2022). Study this survey analytics use cross-sectional design, sample as many as 76 places of shelter waste in Bandung City. Method data collection with Interviews using questionnaires and observation flies on the spot shelter waste using the fly grill. For measurement density fly uses a *fly grill* that is *Fly grill* placed at a minimum distance of 1 meter from the source to be measured, put *fly grill* by horizontally at the place that has been determined, calculate every flying fly using a tool counter (*hand counter*) for 30 seconds, move *fly grill* 1-3 meters from distance measurement start and do ten times the calculation, next set amount fly most and 5

calculations highest made average. If the average result ≥ 2 then the density flies tall (Kemenkes RI, 2017) . Evaluation sorting waste is good if to do sorting waste organic and trash inorganic, collection of waste is good if the collection of waste is in accordance type of waste disaggregated and source garbage, transport waste is good if capacity vehicle transport max and frequency transport from the place shelter temporary to the place shelter end in accordance amount existing trash. We use the chi-square test for determining the factors that predict density flies and study big risk density flies on the spot shelter waste temporary use Prevalence Ratio (95% CI).

RESULT AND DISCUSSION

Variable study this that is characteristics of respondents, density flies, sorting trash, collection garbage, and transportation trash. Figure 1 presents characteristics of officers the place shelter waste Temporarily, where show part big officers the place shelter waste temporary aged adults (88.2%), junior high school education (67.1%), those not yet once get information about handling garbage (67.5%), and length work more of five years (75.5%). Figure 2 shows the results study that is part big the place shelter waste temporarily in Bandung City the density the fly high (76.3%), sorting waste good (76.1%), collecting waste bad (64.5%), and transportation waste bad (61.8%).
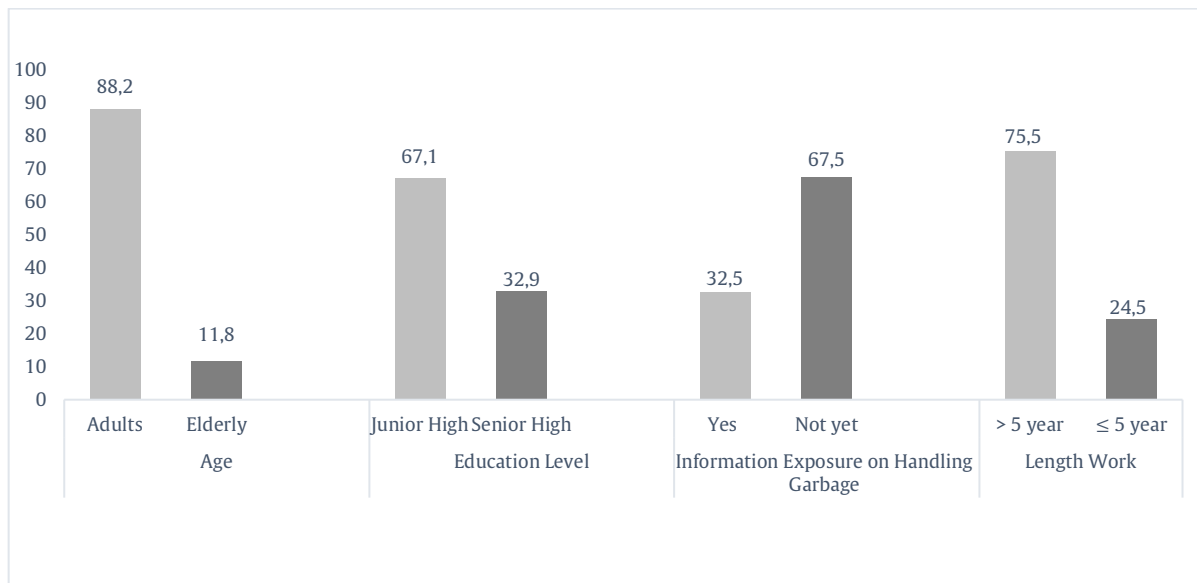

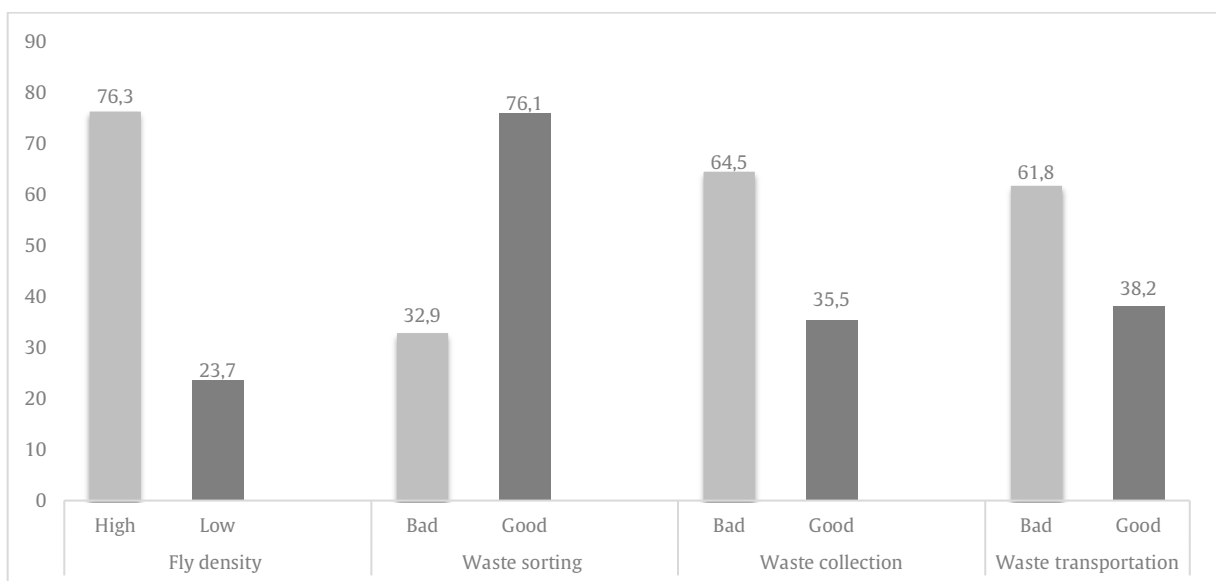**Figure 1. Characteristics Officer The place Shelter Waste Temporary**

Figure 2. Density Flies, Sorting, Collection and Transportation of Waste

Table 1 shows that the place shelter waste temporary density fly tall there are 25 places (100%) sorting waste bad and there are 33 places (65%) sorting waste good. There is a connection between mean sorting waste with density flies (p=0.002). The place shelter waste temporary density fly tall there are 45 places (92%) collection waste bad and there are 13 places (48%) collection waste good. There is a connection that means the collection of waste with a density of flies (p=0.001). The place shelter waste temporary density fly tall there are 46 places (98%) of transport waste bad and there are 12 places (41%) transport waste good. There is a connection between mean transport waste with the density of flies (p=0.002).

Research results show there is a connection mean sorting waste with density flies, where sorting waste bad risks 1.5 times density fly tall compared with sorting waste good (PR=1.5, 95% CI=1.2-1.8). The study following research in Cirebon Regency found that there is connection mean sorting waste with density flies (Kristanti et al., 2021) . Sorting waste is action important first in handling waste by whole (Yudhistirani et al., 2016) . Management of waste goods must be initiated by the sorting process of good trash (Harjanti & Anggraini, 2020) .

Table 1.
Factors Predict Density Fly

Factors Predicting	Density fly				Total	Prevalence Ratio (95%CI)	p
	Tall		Low				
	n	%	n	%			
Sorting waste							
Bad	25	100	0	0	25	1.5	
Well	33	65	18	35	51	(1.2 – 1.8)	0.002
Collection waste							
Bad	45	92	4	8	49	1.9	
Well	13	48	14	52	27	(1,2-2.8)	0.001
Freight waste							
Bad	46	98	1	2	47	2.3	
Well	12	41	17	59	29	(1.5-3.6)	0.001

Sorting good trash must be conducted because many types of waste and handling every type of waste is different (Kurniawan, DA & Santoso, 2020) . Regulation Government No. 81 of 2012 concerning the Management of Waste House Stairs and Trash similar House Stairs, sorting waste is an activity grouping waste consist from; waste contains ingredient dangerous and toxic, trash easy decompose, trash could use back, trash could be recycled repeat, and trash other. Minister of Labor Regulation General year 2013, sorting waste is good if to do sorting waste organic and trash inorganic, as well as separated in accordance type trash on the spot different. Research results this show there are as many as 25 places to shelter waste Temporarily in Bandung it is not To do sorting because no there is an officer special to do sorting trash. Officer education is part of a big middle school and not yet one gets information about handling waste takes affect knowledge of officers in the process of sorting trash. The place to shelter waste temporarily is not enough sufficient to be an obstacle to do sorting waste with good.

Community action takes effect big in sorting trash, where still not enough awareness of Public sorting waste starts from the source (Debrah et al., 2021) . Community action takes effect in pushing the amount of waste enter to the place shelter waste Temporarily, that is change old paradigm (collect, transport, dispose of) becomes the paradigm new namely 3R (*Reuse, Reduce,* and *Recycle*) (Mohammed et al., 2021). Sorting waste is already good at 51 places to shelter waste temporarily because several officers utilize trash that has scored economical like bottles plastic and cardboard.

Research results show there is a connection that means the collection of waste with density flies, where the collection of waste bad risk 1.9 times the density fly tall compared with the collection of waste good (PR=1.9, 95% CI=1.2-2.8). Research following research in the district Brass obtained there is a connection collection of waste with density flies (Rahim et al., 2020) . Collection waste no can be mixed and returned after conducted sorting and collecting. A collection based on the type of waste sorted covers Settings timetable officer in accordance type of waste and resources trash, as well as provision means the collection of waste disaggregated (Kristanti et al., 2021) . Research in the City of Parepare shows there is a connection that means the place disposal is temporary with density fly (Sulasmi, & Wahyuni, 2022) .

Linkages collection waste with density fly occur when waste no accommodated in the tub on-site container shelter trash, so much waste is saved nearby tub container. Other things have an effect big to the collection of waste that is part Public only throws waste to the place shelter waste because the place shelter wastees not always guarded by officers (Kristanti et al., 2021) . Collection of waste period a long time cause waste organic experience decay as well as produces methane gas and smells rotten. Waste smells rotten inviting flies for the look to eat and grow breed (Rahim et al., 2020) . Handling waste good like collecting waste is one control vector, the thing they could remove the parenting media fly (Khairiyati, 2018) .

Waste too long in place shelter waste cause pollution land, water and air. If trash hard rot will result in polluted soil and water seepage results in decay waste will cause water pollution around the place shelter garbage (Chaudhry, FN & Malik, 2017) . Collection of waste bad at 49 places shelter waste temporary occurs not only error officer trash, but Public around takes effect in collection waste that. Amount Public throw away trash all around the place shelter trash, then the Public need educated to throw away waste into the tub container

Research results show there is a connection between mean transport waste with density flies, where transport waste bad risk 2.3 times density fly tall compared with transport waste good (PR=2,3, 95% CI=1,5-3.6). Study this following research conducted in Meulaboh there is a connection between mean transport waste with level density fly (Murdani et al., 2020) . Freight waste is the activity move waste goods from the source or the place of shelter waste

temporarily to the place of shelter end. Freight waste must be in accordance schedule, where every place shelter waste temporary has timetable transport to the place of shelter end. Less than optimal transport waste because the amount of waste no following tub available containers, result in waste left in place shelter waste temporary moment transport (Kristanti et al., 2021) .

Freight waste badly results in transport late, the thing the because Trouble on the truck carrier waste no could operate or queue on the spot shelter end, so waste is left in place shelter waste temporary (Rahim et al., 2020) . If trash no handled so impacts the environment around, by bringing vector disease and flies. If the environment is not clean, and shabby, and the handler's waste is not enough effective, then flying Becomes an intermediary carrier disease for the man (Yunus & Juherah, 2020) .

Research results this show i.e. 76 places shelter waste temporary already have timetable transportation, but 47 places shelter waste temporary moment transport waste not yet following schedule, so there is waste left in place shelter waste Temporarily. That thing occurs because vehicle carrier waste no operates at maximum, so that hinders timetable transport trash. Besides the existing queue on the spot shelter end, the truck late transport waste going to the place shelter end. left behind trash on the spot shelter waste temporarily impact negatively for the environment or the Public around. Stacking waste disturbing aesthetics all around the place sheltering waste temporarily and the area has seen slums.

CONCLUSION AND SUGGESTION

Studies prove that predicting factor density fly that is sorting trash, collecting garbage, and transporting trash. Election waste is not enough good 1.5 times risk of happening density fly high in place shelter waste temporarily compared with sorting good trash. Collection waste not enough good with risk 1.9 times happen density fly high in place shelter waste temporary compared with collection good trash. Freight waste not enough good risk 2.3 times happen density fly high in place shelter waste temporary compared with transport good trash.

Environment and Hygiene Department has to give the training to officers the place shelter waste temporary about methods of handling good trash, then supervise procedure for handling trash. They need to give counseling to the Public so that they appropriately throw away the trash, as well as sort waste organic and inorganic. Waste organic made fertilizer compost through technology composting and garbage inorganic utilized return through the 3R mechanism (*Reuse, Reduce, Recycle).*

Conflict of Interest Statement

We declare no conflicts of interest.

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