Potential Emergence of New Zoonotic Disease in Semarang City Based on Eco-Geographical Analysis

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Abstract. Semarang City is included in the Covid-19 red zone. The natural evolution of CoV has been confirmed as the cause of Covid-19 transmission in various countries. Based on eco-geographical mapping, it can be seen the distribution of animals as a potential source of possible origin coronavirus. This information can be used to analyze the potential for emerging zoonotic diseases in Semarang City. Research aims to describe the potential emerging zoonotic diseases through the distribution of data&information on distribution of various animal species. Collecting data conduct by cluster random sampling through surveys. Criteria for sample people who live near monitored, patients &confirmed positive Covid-19(treated/cured/deceased) that have pets/livestock also wild animals around residence. The results show there are 3 animal health center (Gayamsari, Mijen, Gunungpati) from a total of 16 sub-districts. Wild/ownerless animals are cats (65%),bats (6%), birds (16%), dogs (2%),chickens (9%), and squirrels (1%). Finding in Ngaliyan district there are respondents monitored,patients,&confirmed positive Covid-19; presence of pets:cats&birds; wild animals: bats&cats. This condition makes Ngaliyan district has the potential to emerge of new emerging zoonotic diseases.

Keywords: Mapping, demography, pets, transmission.

1 Introduction

The severity of the Covid-19 pandemic has affected various countries. Even the sars-cov-2 virus that causes Covid-19 is able to reach 70 countries. Covid-19 cases in Indonesia were recorded as of April 2020 reaching 9096 cases. The first case of Covid-19 was discovered on March 2, 2020. The transmission of Covid-19 was very fast, there were an addition of 214 positive cases within 24 hours. The discovery of the Covid-19 transmission route that occurred in various countries was made possible, because the virus underwent a natural evolution. Indonesia is one of the countries affected by the Covid-19 pandemic. Covid-19 has infected residents in various provinces and many areas have been designated as red zones [1,2,3].

Central Java province is listed as a red zone category. One of the regions in the Central Java province with the greatest concentrations of Covid-19 cases and designated a red zone is Semarang City. Based on information from the corona.jatengprov.go.id case findings website, the number of people being monitored in the province of Central Java reached 28,826 cases. Found 1307 cases of patients with the status under surveillance. Patients who were positive

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infected with the corona virus were found to be 704 cases. The virus that causes corona belongs to the Betacoronavirus genus. Precisely, the corona virus belongs to the Coronavirinae subfamily and the Coronaviridae family. There are several strains of the coronavirus that are zoonotic, even found in animals and humans [3,4,5]. The virus that causes Covid-19 is an ss-RNA virus. The nature of the Betacoronavirus group includes being pathogenic to mammals. Although CoV in animals will be different from CoV that infects humans. Coronaviruses that infect humans can cause SARS-CoV and MERS-CoV diseases. CoV infects animals in example it can infect cows, chickens, cats, dogs, and pigs. However, when analized from the genome sequence of the virus that causes Covid-19 that was SARS-CoV-2 and related viruses, it does not originate from laboratory or engineering laboratory activities. From the results of the investigation, it was found that there was a CoV reservoir (bats). This CoV can spread and form into a new strains, which appears from recombination or mutations that occur in the bat's body [4,6,7].

Based on laboratory investigations of gene sequence analysis, it was thought that there are two evolutionary pathways for CoV. Bats are suspected as reservoirs for SARS-CoV-2. Coronavirus that infects bats, it is possible to act as an intermediate host, as a host between humans and bats. Another evolutionary pathway, viruses that are pathogenic can pass from animals to humans. Viruses become pathogenic when they are in the human body, because they have evolved, then transmission occurs between humans. Knowledge to obtain information regarding the first path of CoV evolution is difficult to obtain. The pathogenic SARS-CoV-2 originates from animals and infects humans. The occurrence of outbreaks in the future may be hampered by this situation. There is a substantial danger of transmission to humans from Covid-19 virus variants that are still present among animal populations. [7,8,9].

Estimation of the Covid-19 virus may have originated in animals and then naturally evolved. The transmission of Covid-19 which has become a pandemic is due to its very fast transmission, as well as human-to-human transmission. This condition can still be prevented from spreading, by carrying out Covid-19 prevention rules in accordance with the health protocols issued by the WHO. The Covid-19 preventative health regimen must be thoroughly implemented with full compliance from the populace. compliance with the physical separation requirements and personal-environmental hygiene requirements of the Covid-19 health protocol. This prevention is carried out to prevent infection or transmission between humans, or transmission to animals. Animals in this case are pets, farm animals and poultry as well as wild animals (animals without owners) that around the settlements [9,10,11,12].

Research has confirmed that there is transmission from humans to animals. The re-transmission cycle, or back transfer from animals to humans, has not yet been further studied. It is still important to be concerned about this scenario and to be aware of the possibility of new zoonotic diseases. It is crucial to have knowledge of the various species and geographic locations of animals that can readily contract Covid-19 or may serve as a source of transmission of Covid-19. This information as a real form to prevent the possibility of emerging zoonotic diseases [9,12,13].

Given the possibility of the virus strain that causes Covid-19 still existing in animal populations, this knowledge is crucial. It can switch hosts between animals and people. Cases of pets infected with Covid-19 from their owners have been confirmed, occurring in cats and dogs. The discovery of the transmission of Covid-19 also occurred in tigers at the zoo. This still causes great concern, despite the cycle of re-transmission from animals that are positive for Covid-19 infecting humans. The possibility of this cycle of reverse transmission needs to be aware of the

possibility of an outbreak. In order to prevent the spread of Covid-19, it is crucial to understand the species, distribution, health, and number of livestock and wild animals that could potentially harbor the virus (possible animal origins) [7,12,14].

2 Methods

In Semarang City, Indonesia, this study was carried out. In the province of Central Java, Semarang City is classified as a red zone with the highest number of verified positive Covid-19 cases. The population of this study consists of all people who live in Semarang City's red zone, which includes 46 urban villages. The sample was chosen based on the criteria of having pets or livestock, having individuals under surveillance, having patients under observation, having positive Covid-19 patients who were treated, recovered, or died, and having wild animals around the respondent's home.

The survey method and descriptive research design are both used in this study. The predictive study was carried out to determine the likelihood of new zoonotic diseases contributing to the spread of viral zoonotic diseases (CoV). This study focuses on the status-distribution-number of animals-types or animal species around the respondent's residence. The animals explored in this study were domesticated animals, farm animals, and wild animals that lived around the respondent's house. Management of animal care carried out by owners or treatment of respondents when interacting with wild animals, as well as reports on cases of viral-zoonotic diseases that have occurred.

A sample of each subdistrict in Semarang City was taken using the sampling technique of simple random sampling. The information gathered is both primary and secondary data. Primary data collected through questionnaires and interviews. Guidelines for interviews and questionnaires were employed as the study instrument. Secondary data, in the form of information on the number of viral-zoonotic cases, was received from the Semarang City Agriculture and Animal Husbandry Service and the Semarang City Health Service.

Data collection was carried out by survey by taking data in the form of: species, type, status, number of animals (wild animals/farm animals/pets) - distribution of animals, management of wild animals around the respondent's residence, number of viral zoonotic cases that occurred in the Semarang City. Data analysis using univariates processed with SPSS and ArcGIs. The study' findings are displayed as putative origin CoV zoning maps and narratives to show the possibility for new zoonotic disease viral viruses to emerge in Semarang City.

3 Results and discussion

A zoonotic illness has the potential to spread or give rise to "new emerging zoonotic diseases" if it is pathogenic and has the ability to infect both people and animals. a zoonotic illness with the potential to spread worldwide in the future. Because of this, it's important to understand the potential range and animal species that could harbor the corona virus. the capacity of the Corona virus to organically develop. If there has been human-to-human transmission, a pandemic could develop. Even if it is challenging to pinpoint the exact evolutionary path that took place, this evolutionary cycle needs to be understood. However, by understanding the potential source of

the corona virus, it is possible to understand how diseases spread and take the necessary precautions [7,10,12]. 16 districts make up Semarang City's land area. In this study, a survey of people residing in 46 red zone villages in Semarang City was undertaken. There are 3 sub-districts in Semarang City's total of 16 sub-districts that have an animal health center, according to records (Mijen, Gayamsari, and Gunungpati). Cats (65%), bats (6%), birds (16%), dogs (2%), chickens (9%), and squirrels (1%) are the most common wild or ownerless animals. Finding in Ngaliyan district there are respondents who are people under surveillance, patients under surveillance, and confirmed positive Covid-19. There are presence of pets : cats & birds,; also wild animals: bats & cats in Ngaliyan District.

The status of respondents in this study obtained data, 10% of respondents live in areas where there are people under surveillance, 8% live in areas where there are cases of Covid-19 treated patients, and as many as 3% of respondents live in areas with cases of Covid-19 died patients. There are 3% of respondents who live in the same house as people under surveillance status. Respondents who had direct contact with people with the status of people under surveillance, patients under surveillance, and positive COVID-19 patients who were treated/recovered/died within 1-14 days (8% of respondents). A 21% of respondents have a history of traveling to red zone areas. Respondents who self-isolate at home are known to be 36%. It is also known that 46% of respondents have pets, 3% of livestock ownership, and 51% do not have pets or livestock.

Figure 1 in this study depicts the distribution of animals that may be potential origins of CoV in Semarang City and that fall under the category of pets. In this investigation, the distribution of animals with the potential to be Possible Possible Origins Coronavirus in Semarang City, groups of wild animals / without owners within a radius of 10, patients under observation and in good health In the vicinity of 10 meters for Covid-19 patients who underwent treatment, recovered, or passed away, there were dogs (1%), cats (65%), birds (16%), chickens (9%), bats (6%), and others (4%). According to the study's findings, cats make up the majority of both pets and wild animals that don't have owners. Animals with the potential to serve as hosts or reservoirs for the corona virus include cats. Particularly in stray cats, who have a very high chance of catching the disease or becoming ill. According to the most recent study, the corona virus can persist in the environment for several hours or even days. Even the spread of Covid-19 can happen via contaminating droplets in the environment. If infected with Covid-19, animals that have the ability to serve as coronavirus reservoirs, such as dogs, cats, and birds, then spread Covid-19 to other animal species. causes New Emerging Diseases (NEDs) in certain animal species. Additionally, it is predicted that in the future there will be Emerging Zoonotic Disease (EZD) and the possibility of a pandemic if there is re-transmission to humans and a cycle develops [11,13,14, 15].

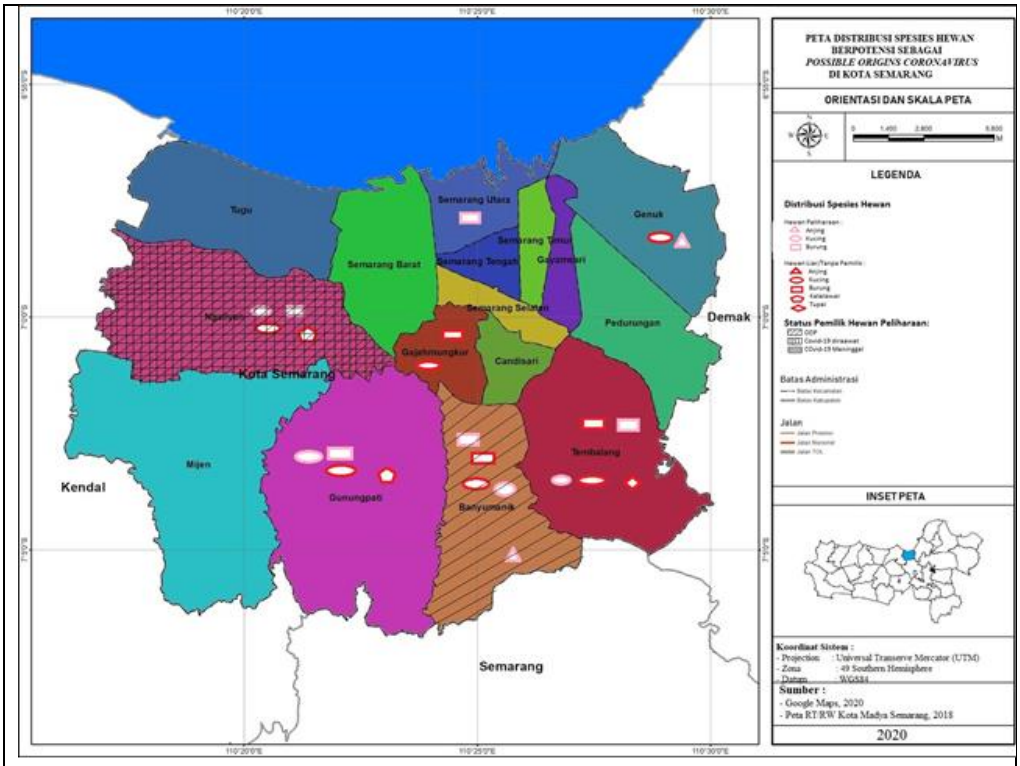

Fig. 1. Distribution Map of Potential Animal Species as Possible Coronavirus in Semarang City

The location of the residence of the pet owner with a residence radius of 10 m from people under monitoring (10%), Covid-19 sufferers being treated (8%), Covid-19 who has died (3%), does not have pets & is far from Covid-19 sufferers 19 (79%). In this study, it was discovered that roughly 10% of pets belonged to owners who fell under the Covid-19 monitoring category. According to the findings of respondents' interviews, it represents a relatively tiny portion of animal ownership. The risk that pets may contract or become infected with Covid-19 from their owners makes the ailment still a concern. When dealing with their dogs, especially if pet owners have a history of visiting red zone locations and disobeying Covid-19 preventative health practices. Covid-19-infected individuals can shed droplets that can live in the environment for hours or even days. Different time variations exist in droplets in the environment, on contaminated equipment, and in open air [4,14,15,16].

In this investigation, it was discovered that about 10% of domestic pets belonged to owners who were monitored under COVID-19. Despite the fact that just a small portion of the population under observation has pets, this is still a concern because it's possible that animals could contract Covid-19 from their humans. 13% of respondents said they regularly engage with their dogs. People from the red zone who have previously traveled and interacted with pets without using Covid-19 preventive measures (12%). All respondents who have pets carry out animal checks and vaccinations at the vet. Routine a pet health checks (15%), routine pet vaccinations (19%). Early vigilance about the spread of Covid-19 is important. In this study, it was discovered that 12% of the participants used co-19 prevention techniques when dealing with pets. Owners do

not perform personal hygiene before to dealing with their pets after leaving Covid-19 red zone sites. The Covid-19 preventive regimen is not followed by owners when caring for their pets. The risk of EZD can be reduced by following the Covid-19 preventative health program before dealing with dogs [5,14,16,17].

Only 12% of pet owners directly connected with their animals after leaving the red zone, according to one survey. Animals are at a significant risk of contracting Covid-19 via direct contact with pets if Covid-19 preventative health practices are not followed. Although a Real-Time Polymerase Chain Reaction (RT-PCR) test and a fast test are required to identify SARS-CoV-2 in animals. The purpose of this test is to rule out any chance of transfer from owner to animal. Only 15% of pet owners frequently performed pet health checks, and only 19% of owners vaccinated their animals, according to this survey. According to this statistic, more than 50% of pets are unvaccinated. Pets that have not received their vaccinations are more prone to illness. vaccination of animals, particularly with vaccinations designed to stop the spread of viral diseases [10,12,13,17].

The findings revealed that 66% of wild/ownerless animals walked about the respondent's home virtually every day; 13 respondents responded every 5–6 days; nevertheless, 2% of 16 respondents responded in the range of 1–2 days; and 3% responded in the range of 3–4 days. claims that no wild animal or animal without an owner has ever entered the yard of a house. 25% of respondents indicated they had direct contact with wild animals without their owners, while 75% said they had no contact with them. When respondents interacted directly with wild animals/without owners, 6% of respondents said they used masks and gloves, 10% said they did so but did not wear gloves, 6% said they did not use either, 29% said they washed their hands before and after interacting with these animals, 35% said they did so after, and as many as 13% said they did something different.

70% of respondents said they did not spray disinfectant when these wild/ownerless animals entered the yard, compared to 30% of respondents who did. 6% of respondents claimed they would adopt wild or abandoned animals, while 94% said they would not. respondents who have taken in wild or abandoned animals; 29% of these respondents check them out at the vet, and 40% of these respondents vaccinate the animals. Bats were also discovered (6%) in this study's red zone-designated residential zones. CoV can infect dogs and cats in animals. Despite the differences between the CoV that infects humans and animals, the study's findings revealed that bats serve as a reservoir for the virus. CoV in bats has the ability to mutate and combine to form new strains that can spread to other species. If it has infected humans, CoV that mutates from the reservoir is very simple to propagate and has the potential to become a pandemic [7,15,17].

4 Conclussion

There have been found species of domesticated and wild animals that can be at high risk as hosts for CoV. Found species of bats that are known to theoretically be the origin of CoV around the red zone. Finding in Ngaliyan district there are respondents monitored, patients, & confirmed positive Covid-19; presence of pets: cats & birds; wild animals: bats & cats. This condition makes Ngaliyan district has the potential to emerge of new emerging zoonotic diseases.

5 Recommendation

Covid-19 prevention procedures should still be carried out properly and correctly, especially in red zone areas. Continue to carry out the Covid-19 prevention health protocol, especially when mobilizing from and to the red zone area, especially when interacting with pets, or wild animals around the place of residence. Vaccinate pets or wild animals/animals without owners, especially animals that can act as coronavirus reservoirs

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