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## **Hygiene and Sanitation Condition in the Karangayu Market Regional Technical Implementation Unit**

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### **Abstract**

**Background:** Lack of access to sanitation and hygiene in the traditional market can increase infectious disease transmission. Based on a preliminary study in the Karangayu Market, it was found that the hygiene and sanitation condition did not meet the requirements of Minister of Health regulation No. 17 of 2020. The purpose of this study was to determine the condition of market hygiene and sanitation in the working area of Karangayu Market Regional Technical Implementation Unit, Semarang City, Central Java, Indonesia.

**Methods:** This observational study was conducted in all of the eight markets located in the working area of Karangayu Market Regional Technical Implementation Unit. A score of  $\geq 70\%$  of the total score of each variable was determined as met the requirement and the score of  $\leq 70\%$  was defined as did not meet the requirements. The determination of the scores was done through the observation using sanitary assessment, based on the Ministry of Health Regulation No. 17 of 2020.

**Results:** The condition of market hygiene and sanitation in the working area of Karangayu Market, Semarang City had not met the requirements. The used indicators were traders/employees, visitors, market buildings, garbage disposal sites, drainage ditches, toilets, places to sell food and groceries, control of disease-carrying animals, parking lots. However, the level of density of flies was still met the requirements.

**Conclusion:** Poor hygiene and sanitation in the working area of Karangayu Market Regional Technical Implementation Unit, Semarang City, can increase the risk for disease transmission if it is not resolved.

**Keywords:** Traditional market; Fly density; Hygiene; Sanitation; disease transmission

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### **Introduction**

Lack of access to sanitation facilities is closely related to the spread of infectious diseases caused by environmental factors. Sanitation problems have spread throughout the world. The environment in public places is one aspect of sanitation that is very influential in improving public health<sup>(1)</sup>. One of the efforts to achieve good health is a good hygiene. Good sanitation is considered as a form of disease prevention by taking into account environmental factors around the objects, as opposed to efforts which are

prevention efforts focused on an object or one of human activities<sup>(2)</sup>. Market environment sanitation aims to maintain, avoid, manage, and control everything in the market environment, especially things that are closely related to disease outbreaks or epidemics that can be spread by fly vectors.

Java Island had the highest number of traditional markets in Indonesia. It has 5,949 traditional markets, according to the 2020 Market Profile Data. The total number of traditional markets at various points throughout Indonesia reached 16,235

markets <sup>(3)</sup>. There were 56 traditional markets in Semarang City alone, which was divided into 6 UPTD (Regional Technical Implementation Units). Based on estimates of the traditional market number in Indonesia, more than 50 million people or nearly 25% of the Indonesian population participated in the traditional markets. A study on the environmental health condition of 448 traditional markets spread across 28 provinces in Indonesia, showed that only 10.94% met the requirements, while the remaining of 89.06% did not meet the requirements <sup>(4)</sup>.

Communities are usually preoccupied with their daily activities, in crowded public places such as markets. Environmental media components such as water, soil, air, facilities, food, buildings, and vectors can spread diseases in the market environment. The environment has the potential to cause health problems if it is not fulfilled the health standards and norms. The improvement of environment quality to prevent the spread of disease should be done to prevent the negative impact on society at the economic, social and cultural level <sup>(4)</sup>. In the traditional market, the sellers and buyers are gathers and interacts to each other <sup>(5)</sup>.

The results of the observation during preliminary study showed that the market building was not maintained, some puddles and scattered garbage were on the alleys inside the market. Many traders threw away the garbage in front of their stalls, the trash piled up and scattered around. There was no separation between inorganic and organic wastes.

There were no separate toilets between women and men. Hand washing facilities equipped with soap were not available in the toilet area. There was no hand washing facility with running water and soap in the food stall area. Cutting boards were made from wood. Flies and several other vectors such as rats and cockroaches were found at food stall area.

In the parking area, there was no separation for loading/ unloading and visitor parking lot. In terms of traders'/ workers' hygiene, many of the wet food traders who did not wear gloves, aprons, and used jewelry during serving the customers. Some traders smoked. Many visitors did not implement healthy and cleanliness behavior.

A study by Febri (2015) at traditional markets in Pontianak City showed that at the

Flamboyan and Mawar markets, there was no separation between wet and dry waste. Scattered garbage around the sewerage area were found. There was no special management for liquid waste before disposal to the city sewers. The bathrooms and toilets were smelly and slippery and had no washing facilities. They were closed to the stallers. This sanitation situation can directly affect the hygiene of food and beverages in the market <sup>(6)</sup>.

The poor sanitation of the market has the potential to food borne and the other infectious disease transmissions. Diseases which related to the inadequate sanitation are diarrhea, cholera, ARI (Acute Respiratory Tract Infection). Diseases related to animals, such as SARS and avian flu, can also be transmitted easily in the markets which have poor sanitation or can be called unhealthy markets <sup>(7)</sup>.

A study in Liang Modern Traditional market found that the sanitary conditions was poor <sup>(8)</sup>. A good traditional market sanitation can result in the clean merchandise and minimal risk for disease transmission in the market environment <sup>(9)</sup>.

The researchers aimed to describe the market hygiene and sanitation conditions in the working area of Karangayu Market, Regional Technical Implementation Unit, Semarang City. The results of the study can be used to recommend the improvement on the condition, so that the infectious diseases transmission can be prevented and reduced.

## Methods

This study was conducted quantitatively, in an observational descriptive method. This research was done in December 2022, in the working area of Karangayu Market Regional Technical Implementation Unit, Semarang City. This unit covers 8 markets in the West Semarang City, including Karangayu, Simongan, Jrasah, Mijen, Simongan, Gunungpati, Ngaliyan and Purwoyoso markets. All of 8 markets were included in the study. An observational sheet was used as the instrument in this study. A *fly grill* was used for measuring the fly density. The measurements were done at the waste dump disposal closest to the markets. The measurements were carried out at 2 markets per day. The number of flies perched on *fly grill* within 30 seconds at each location were counted at least 10 times. Then the results of 10x30 seconds calculation were categorized by low (0-2), moderate (3-5),

high (6-20) and very high (>21). The markets' sanitation were observed and assessed using a check list of some indicators for market buildings, stall buildings, garbage disposal sites, drainage waste channels, toilets, clean water, places for selling food and groceries, control of disease-transmitting animals, parking lots, levels of fly density and hygiene based on Ministry of Health Regulation No. 17 of 2020, regarding the healthy market. Market hygiene and sanitation was determined as

meeting the requirements if the score was  $\geq 70\%$  and as not met the requirements if the score was  $\leq 70\%$  of the total score for each variable.

### Results

Market hygiene conditions in the working area of Karangayu Market, Regional Technical Implementation Unit, Semarang City can be seen in Table 1, while market sanitation can be seen in Table 2.

**Table 1. Market Hygiene Assessment Results**

Hygiene Variables	Frequency (Number of Markets)	(%)
Trader/ Employee		
Not Qualified	8	100
Qualified	0	0
Visitors		
Not Qualified	8	100
Qualified	0	0

**Table 2. Market Sanitation Assessment Results**

Market Sanitation Variables	Frequency (Number of Markets)	(%)
Market Building		
Not Qualified	5	62.5
Qualified	3	37.5
Stall Building		
Not Qualified	4	50
Qualified	4	50
Landfills		
Not Qualified	8	100
Qualified	0	0
Sewerage		
Not Qualified	5	62.5
Qualified	3	37.5
Toilet		
Not Qualified	6	75
Qualified	2	25
Clean Water		
Not Qualified	0	0
Qualified	8	100
Food and grocery stalls		
Not Qualified	8	100
Qualified	0	0
Control of Disease Transmitting vectors		
Not Qualified	8	100
Qualified	0	0
Parking area		
Not Qualified	8	100
Qualified	0	0

Table 1 shows that in terms of traders and visitors, all of the 8 markets (100%), had not met the healthy requirements. They had not implemented personal hygiene behavior yet. In term of market sanitation, most of the markets had not meet the criteria of healthy market for building condition, landfills, sewerage, toilets, food and grocery stalls, control for disease transmitting vectors and parking area. However, all of the markets had clean water facilities.

Table 3 shows the level of fly density in 8

markets in the working area of Karangayu Market Regional Technical Implementation Unit, Semarang City. Most of the markets (62.5%) had moderate density of flies.

Based on the overall results, the hygiene and sanitation of the markets in the working area of Karangayu Market Regional Technical Implementation Unit, Semarang City had not met the requirements based on the Minister of Health Regulation No. 17 of 2020 concerning Healthy Markets.

**Table 3. Fly Density Assessment Results**

Fly Density Figures	Frequency (Number of Markets)	(%)
Low	2	25
Moderate	5	62.5
High	1	12.5

## Discussion

### Traders

In the trader assessment, all of the markets did not meet the criteria for healthy market, as they were not equipped with working clothes such as aprons, boots, gloves, headgear/hats, or footwear. It was also noted that the traders were smoking and spitting in the market area, which resulted in contamination of the merchandise by the splashing saliva. Other unfavorable activities observed were not washing their hands with soap and running water. Traders only used a cloth to clean or remove dirt without washing their hands thoroughly. In addition, traders who had long nails are at a greater risk of harboring pathogens of the mesophilic group such as bacillus, clostridium, pseudomonas, micrococcus, and proteus <sup>(10)</sup>.

Due to the lack of compliance in using of personal protective equipment (PPE) such as apron, boot, glove, headgear/hat, or footwear, the traders did not meet the requirements. This study is in line with Aris' research, (2020) which explains that the compliance in using PPE by waste transporters in Pelabuhan District Area in 2020 was only 20.9% <sup>(11)</sup>. The use of PPE for traders/employees should be complied during the activities in the market. Compliance to the use of PPE is an effort to protect the body partly or completely from unwanted hazards in the workplace such as

work injuries including being stabbed by sharp objects and other health problems.

Minister of Health Regulation No 17 of 2020 concerning healthy market regulates the use of personal protective equipment for traders and carcass workers who handle poultry and cut fish as well as employees. Employees are also expected to keep the market environment neat and clean every day. Fast food traders must be free from infectious diseases, including diarrhea, hepatitis, tuberculosis, scabies, and respiratory tract infection.

### Visitors

The visitors did not meet the criteria for a healthy market as they were not washing hands before entering and leaving the market or before handling goods such as live or dead poultry and did not washing hands with soap after handling gaseous fish, meat, live poultry, and cooked food.

There were some visitors who littered around the market. The Decree of the Minister of Health of the Republic of Indonesia Number 17 of 2022 concerning healthy market regulate the community or market associations to implement a clean lifestyle to reduce the risk of disease transmission in the market's area.

A study conducted by Amelia, (2021) showed that the visitors to the Kemiri Muka market had implemented clean behavior through hand washing after choosing the

food product to buy <sup>(12)</sup>. Persuasive strategies through messages or verbal images that can evoke deep affection have the power to change opinions and beliefs so that human behavior can be persuaded to live clean and healthy. <sup>(13)</sup>

### *Market Building*

The market building in the working area of Karangayu Market, Semarang City, was built and operated with a permit from the Semarang City Trade Office. Based on the observations, many market buildings were not maintained very well, so some damaged occurred. In terms of construction, the roof should be strong, impermeable to water and can't be a breeding ground for disease-spreading vectors. A roof of higher than 10 meters should have a lightning rod and have a slope in such a way to prevent from puddles of water.

Some market structure buildings were in bad condition. The floors were cracked, uneven and slippery, and there were puddles of water. There were some holes at the roof of the market building, which can be a breeding ground for disease-carrying vectors. The walls and ceiling of some market building were dirty, damp, and mossy. The aisles in the market often were used for selling goods, or some equipment were placed there so that it blocked the visitors who passed through the aisles <sup>(1)</sup>.

The poor condition of the market building could be caused by the lack of maintenance. The building can be collapsed if the maintenance was neglected. This condition is in line with Johannes' research, (2020) which showed that the Winenet market building were not met the requirement by Ministry of Health regulation No 519 in 2008 as the market floor was cracked unevenly and corner of the two walls was not in a curved shape(*CONUS*)<sup>(14)</sup>.

### *Stall Building*

Some stall buildings were not kept clean, or not well maintained, which resulted in some damage. There were some leftover merchandises that piled up or scattered in front of the stall and not thrown into the trash. Based on the layout of the building, the market stall did not meet the requirements because the stall distribution was not based on the type of merchandises. There was no signs for the visitors regarding the kind of goods for sales. This result was not in line

with Anggraeni's studies (2017) which stated that the arrangement of trading spaces in the Blambangan market in the western and eastern parts of the market had a special division between wet, dry, and wet areas <sup>(15)</sup>. This condition occurred as many traders threw away the garbage at any place. This research was in line with Ginting's study conducted at the Kabenjahe city market. Some traders also threw away the waste into a trash can in front of the booth, which resulted in the bad smell for the traders and visitors <sup>(16)</sup>. The absence of clues between wet, dry and ready-to-eat traders causes confusion among the visitors.

### *Landfills*

A trash can is a component that should be available in every public place. It was found that trash cans in the markets were not available at every stall. The trash bins at every stall in the market environment were made of fruit baskets from traders who were no longer used so they were used as garbage dumps. Thus, the trash bins were not watertight and closed. Directly or indirectly, waste is a source of disease <sup>(17)</sup>. The waste dump in the market was approximately 10 meters from the market building. The waste from the stalls transported to the dump routinely to avoid waste accumulation. The decomposition process of the waste can interfere the comfort <sup>(18)</sup>. Another study at two Luwuk City terminals shows that the trash bin did not meet health requirements due to the unavailability of separate trash bins for wet and dry waste, not made from waterproof material, and not closed. <sup>(19)</sup>

### *Sewage and Drainage*

The markets that did not meet the requirements for Regulation of the Minister of Health Number 17 of 2020 concerning healthy markets were the markets without cover by metal gratings or cement for their sewerage. Furthermore, there was no waste water treatment before disposal to the public channels. Waste water from the market contains pathogenic bacteria and hazardous compounds, thus waste water treatment plan is needed for a market <sup>(20)</sup>. The market should have sufficient waste water treatment plant capacity, and its quality tested for every six months, which meet the requirements. Waste Water Treatment Plant (WWTP) is a building used

to remove biological and chemical waste from the water to be used for the other activities <sup>(8)</sup>. Without waste water treatment, water pollution may transmit some diseases such as hepatitis A, typhoid, cholera, dysentery, amoebic dysentery, and filariasis <sup>(21)</sup>. Another study at Liang Modern Traditional Market also showed that this market did not have waste water treatment plant <sup>(8)</sup>.

### *Toilet*

This study shows that the toilets in Karangayu market did not meet the health standards as their slippery floor, difficult to clean and cracked, which resulted in puddles of water. Poor lighting, inadequate air ventilation, and the absence of a separatory sign between men's and women's toilets were the other problems about the toilets. They did not have any sink and soap to wash hands. The traders usually washed their hands using a dipper to collect water taken from water reservoirs.

Thohira's study in Yogyakarta also showed that the markets did not have a separation for men's and women's toilets, the distance between the toilet and the trader only about 5 meters, no closed trash cans, and the hand washing facilities with soap was only available in one market <sup>(3)</sup>. Without hand washing facilities and soap in the bathrooms and toilets, the risk of fecal contamination from human hands after urinating or defecating and various cross-contamination increased <sup>(23)</sup>. Furthermore, bathroom facilities that are closed to food and groceries sellers can also spread the virus and bacteria into the food and groceries.

To fulfill the requirements, the number of available toilets must be sufficient in the market, easy-flowing water which are free from mosquito larvae, ample hand washing stations with soap and running water. Waste water must be disposed in a septic tank that does not contaminate groundwater. The floor should be made waterproof, non-slip, with a slope according to applicable guidelines.

### *Clean water*

Water can be the medium for various diseases if it does not meet health requirements. Clean water should be available in market environments <sup>(24)</sup>. Water is a medium that can carry pathogenic

microbes such as cholera, typhus, or water contaminated with pesticides, as well as other poisons that can affect the health of the human body <sup>(25)</sup>.

In this study, clean water was available in all of the markets. The water has met the physical quality. The distance between clean water sources and septic tank were more than 10 meters. However, there was no public faucets that can be used by the traders to wash their hands, their trade tools, or foodstuffs. Thus, many traders carried the water in the buckets for washing their hands at their stalls. The study at the Winenet market, showed that the water faucets were available in the fish stalls, and in the toilets <sup>(14)</sup>. Another study in Randik market also showed that the clean water facilities for traders and visitors were good <sup>(26)</sup>.

### *Food and grocery food stalls*

Places for displaying food are not grouped based on the type of trade. Places to sell food and necessities were made of wood. Wooden cutting mats and non stainless steel knives can be the source of contamination for butchers because the knives and cutting boards cannot be cleaned very well, which then may become the breeding grounds for bacteria. <sup>(27)</sup> Based on the results of observations in one of the markets in the working area of Karangayu Market, several traders chose a place to sell that was close to the garbage dump, which might result in food contamination by the flies. This research is in line with the research of Johannes, (2020) which shows that the selling area of dirty food will be a source of contamination of cross-infection contamination from one device to another <sup>(14)</sup>.

### *Control of Disease-Transmitting vectors*

The regulation states that every booth or kiosk that sells ready-to-eat food and food ingredients must be free from rats, cockroaches, and flies. The density of rats must be zero in the market area, while the maximum density of cockroaches is 2 per net measured by market area and the maximum fly density in bins and drainage is 30 per net. This study found that the markets, had never been have the regular spraying for flies, cockroaches, and rats at least for every 2 years. There were still many flies in the ready-to-eat food stalls, and the surrounding areas.

Without vector control, the markets can become the centers for the spreading of vector-borne diseases such as typhus and dysentery. To control vectors, spraying, natural enemies, layered traps, fumigation, or fogging are required <sup>(28)</sup>.

The aspect that needs to be done to control disease-transmitting vectors in the market environment is disinfection, which is an activity that aims to kill pathogenic organisms on objects by using materials mixed with liquid but environmentally friendly chemicals. Routine market disinfection is carried out once a week on Fridays using environmentally friendly materials. This research is in line with the study in the Kusumba public market, which also did not are not carried out vector control routinely. The presence of disease-transmitting animals such as rats and cockroaches are very risky, besides being able to transmit diseases, especially rats, can also damage merchandise <sup>(29)</sup>.

#### *Parking lot*

According to Minister of Health Regulation No. 17 of 2020 concerning healthy markets, separate parking areas based on the type of transportation should be available. This study showed that there was no parking space available for loading and unloading of merchandise. There was no parking space for live poultry transport vehicles. The parking space was only one for two-wheeled, three-wheeled, and four-wheeled vehicles. Entry and exit routes of the market are not separated into one access and exit for traders and visitors. There was one market that did not have a parking space in the market, so the visitors parked their vehicles in front of the stalls.

Another study conducted by Seviana, (2021), carried out at the Blahbatuh public market in Blahbatuh District, Gianyar Regency, showed that the market had separate parking lots for live poultry transport vehicles as well as separate entrances and exits <sup>(1)</sup>.

#### *Fly Density Level*

Flies are one of the disease-carrying vectors. Flies are belonged to the class of insects that have two wings. Flies have stages of development from eggs, larvae (maggots), and cocoons to adults <sup>(30)</sup>. The density of flies in the working area of

Karangayu Market was caused by the garbage scattered around the market. The odor attracted flies to perch around the garbage. Most of the stalls did not have trash bins. Each stall disposes the trash in front or on the side of the trading place and allows the pile up around the stalls.

This research is in line with another study at Peunayong market in Banda Aceh City which stated that the level of fly density in the fish selling area was in the medium category. The traders washed the fish as part of the efforts to control fly vectors and use fly traps as bait <sup>(31)</sup>. A study in Parepare City found an association between the availability of trash dump and the fly density at Lakessi Central Market with a p value of 0.006 <sup>(32)</sup>.

### **Conclusions**

The hygiene and sanitation conditions of the market in the working area of Karangayu Market Regional Technical Implementation Unit, Semarang City, did not meet the requirements based on the Minister of Health Regulation Number 17 of 2020 for the indicators of traders/employees, visitors, market buildings, landfills, sewerage, toilets, food and groceries stalls, control of disease-carrying vectors, and parking lots. The density of flies was classified as moderate.

It is recommended for the market managers to maintain the market facilities, provide more market infrastructure such as placing trash bins in each booth, maintain the market environmental hygiene and improve the vector control, supervise and guide the market traders to maintain the cleanliness of the market environment.

### **Ethics approval**

This study has received ethical approval eligibility from the Health Research Ethics Commission of the Faculty of Sport Science, Semarang State University, with the number of 451/KEPK/EC/2022

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