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Surveillance of Communicable Disease Incidence of Diarrhea in The Working Area of Puskesmas Samarinda Kota

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Abstrak

Diare merupakan salah satu penyakit tidak menular di Indonesia yang memiliki angka kejadian terbilang sangat tinggi, terutama pada kelompok usia rentan. Penelitian ini bertujuan untuk menganalisis pelaksanaan surveilans kejadian penyakit menular, yaitu penyakit diare di wilayah kerja Puskesmas Samarinda Kota. Jenis penelitian ini adalah survei kuantitatif deskriptif yang dilaksanakan pada bulan Mei tahun 2025 di Kelurahan Bugis, Kecamatan Samarinda Kota. Sampel berjumlah 30 responden dipilih menggunakan teknik *purposive sampling*. Data dikumpulkan melalui kuesioner secara langsung, kemudian diolah menggunakan perangkat lunak *IBM SPSS Statistics*. Hasil penelitian menunjukkan bahwa 50% responden adalah berusia balita, 96,7% memiliki tinja cair, 53,3% BAB lebih dari 4 kali sehari, dan 96,7% mengalami diare secara mendadak. Seluruh responden menggunakan air kemasan sebagai sumber air minum, 96,7% menggunakan air PDAM untuk kebutuhan sehari-hari, 60% memiliki kebiasaan jajan di luar rumah, dan 80% tinggal di dalam gang dengan kepadatan penduduk tinggi. Sebanyak 86,7% responden memeriksakan diri ke fasilitas kesehatan, didominasi Puskesmas Samarinda Kota (73,3%). Diare pada wilayah kerja Puskesmas Samarinda Kota masih menjadi masalah kesehatan utama, khususnya pada balita, dengan faktor risiko utama berupa sanitasi lingkungan yang kurang optimal dan kebiasaan jajan di luar rumah.

Abstract

Diarrhea is one of the non-communicable diseases in Indonesia with a considerably high incidence rate, particularly among vulnerable age groups. This study aimed to analyze the implementation of surveillance on communicable disease incidence, namely diarrheal disease, in the working area of Puskesmas Samarinda Kota. This study used a descriptive quantitative survey design, conducted in May 2025 in Kelurahan Bugis, Kecamatan Samarinda Kota. A total of 30 respondents were selected using purposive sampling technique. Data were collected through direct questionnaires and processed using IBM SPSS Statistics software. The results showed that 50% of respondents were toddlers, 96.7% had watery stools, 53.3% defecated more than four times per day, and 96.7% experienced sudden onset of diarrhea. All respondents used packaged water as their drinking water source, 96.7% used tap water (PDAM) for daily needs, 60% had habits of eating outside the home, and 80% lived in densely populated alleyways. A total of 86.7% of respondents sought care at health facilities, predominantly at Puskesmas Samarinda Kota (73.3%). Diarrhea in the working area of Puskesmas Samarinda Kota remains a major public health problem, particularly among toddlers, with poor environmental sanitation and the habit of eating outside the home as the main risk factors.

INTRODUCTION

Diarrhea is a gastrointestinal disorder characterized by an increase in bowel movement frequency exceeding three times per day with liquid stool consistency, and may be accompanied by blood or mucus (Kurniawan et al., 2024). Globally, the World Health Organization (WHO) records approximately 1.7 billion diarrhea cases annually, resulting in the deaths of 760,000 children under the age of five, making diarrhea the third leading cause of death in this age group (WHO, 2017). In Indonesia, diarrheal disease is an endemic condition with potential to trigger Extraordinary Events, contributing significantly to morbidity and mortality rates, particularly among toddlers. Data from the Kemenkes RI (2020) showed that 4,165,789 diarrhea patients were treated at health facilities, of whom 1,516,438 (36.4%) were toddlers. Indonesia is also recorded as the second largest country in the world where people still practice open defecation, causing approximately 150,000 children to die annually from diarrhea and diseases related to poor sanitation (Achmad et al., 2021).

The spread of diarrhea is heavily influenced by various risk factors, both environmental and behavioral. Transmission occurs via the fecal-oral route, when a person consumes food or beverages contaminated with pathogenic microorganisms such as Escherichia coli, Shigella, and rotavirus, or due to poor sanitation and hygiene practices (Listina et al., 2024). Toddlers are the most vulnerable group because of their underdeveloped immune systems, the habit of putting objects in their mouths, and dependence on caregivers for personal hygiene maintenance (Kemenkes RI, 2019). Environmental factors such as high population density, limited access to clean water, and inadequate waste management further heighten transmission risks (Wardani & Sari, 2018). Meanwhile, behavioral determinants including improper handwashing habits, consuming street food without hygiene consideration, and using untested water sources are major drivers behind the high incidence of diarrhea in densely populated urban communities (Curtis & Cairncross, 2017).

Epidemiological surveillance is a key instrument in controlling infectious diseases, including diarrhea. Through surveillance, disease occurrence data are systematically collected, processed, and analyzed to detect changes in disease patterns, identify high-risk groups, and serve as the basis for targeted health intervention planning. Puskesmas Samarinda Kota, as a primary healthcare facility, holds a strategic role in implementing diarrhea surveillance within Samarinda Kota District, East Kalimantan, which is a densely populated urban area with a heterogeneous population. However, the effectiveness of the surveillance system and a comprehensive epidemiological profile of diarrhea in the working area of Puskesmas Samarinda Kota has not been widely studied academically. This study aimed to analyze the implementation of infectious disease surveillance for diarrhea in the working area of Puskesmas Samarinda Kota through the identification of diarrhea characteristics, analysis of risk factors, distribution of cases based on person, place, and time variables, and assessment of the existing surveillance system effectiveness.

METHOD

This study employed a survey research design with a quantitative approach to describe and analyze the occurrence of diarrheal disease in the working area of Puskemas Samarinda Kota. The study was conducted from 19 to 26 May 2025 in the working area of Puskemas Samarinda Kota, Kelurahan Bugis, Kalimantan Timur. The population included residents from various age groups, namely toddlers (0–5 years), children (6–11 years), adolescents (12–17 years), adults (18–45 years), pre-elderly (46–59 years), and elderly (>60 years) who resided within the health center service area. A purposive sampling technique was used to select respondents, resulting in a total sample of 30 individuals who had experienced diarrhea and met the inclusion criteria established by the researchers.

Data collection was conducted using a structured questionnaire as the primary research instrument. The questionnaire was distributed both offline through direct household visits (door-to-door surveys) and offline. The study utilized both primary and secondary data sources. Primary data were obtained directly from respondents through interviews and questionnaire administration, while secondary data were collected from records and reports available at Puskemas Samarinda Kota. The variables observed included respondent characteristics, clinical manifestations of diarrhea, environmental risk factors, behavioral risk factors, and healthcare-seeking behavior.

Data processing consisted of editing, coding, data entry, and cleaning procedures. Editing was conducted to ensure completeness and consistency of questionnaire responses. Coding was performed by assigning numerical codes to each variable category. Subsequently, all data were entered into IBM SPSS Statistics software and underwent data cleaning to identify errors, inconsistencies, and missing values. Data analysis was performed using descriptive statistical methods to present frequency and percentage distributions of the variables under study. In addition, descriptive analytical techniques were applied to provide a more comprehensive understanding of diarrheal disease characteristics and associated risk factors within the study population.

RESULT AND DISCUSSION

Respondent characteristics were assessed across four dimensions: sex, age group, education, and occupation. of the 30 respondents, 56.7% were female and 43.3% were male. The predominance of female respondents reflects the tendency of housewives and female caregivers to be more accessible during household data collection and more engaged with family health issues (Notoatmodjo, 2018; Green & Kreuter, 2017). This finding is consistent with Rahmawati et al. (2019), who reported that women are generally more responsive to community health programs, particularly those related to maternal and child health.

The age distribution revealed that 50% of respondents were toddlers aged 0–5 years, while the remaining respondents ranged from children to elderly, each group comprising 3.3–13.3% of the sample. Toddlers are recognized as the most vulnerable age group for diarrhea due to their underdeveloped immune systems, tendency to place objects in their mouths, and dependence on caregivers for hygienic

practices (WHO, 2017; Kemenkes RI, 2019). Wardani and Sari (2018) similarly affirmed that the highest incidence of diarrhea occurs among toddlers because they are not yet capable of independently maintaining personal hygiene.

With regard to education, 56.7% of respondents fell into the 'other' category—predominantly because they were toddlers or children who had not yet entered formal schooling—while 30.0% had completed senior high school and 10.0% held a university degree. Lower parental education has been shown to correlate negatively with knowledge of hygiene and diarrhea prevention practices (Sulistyorini, 2020; Hastuti & Rahman, 2019). Similarly, 70.0% of respondents were classified as 'not working,' a proportion consistent with the high share of toddlers in the sample. Among adult respondents, unemployment may signal a lower socioeconomic status that limits access to clean water, nutritious food, and healthcare services (BPS, 2020). Handayani et al. (2018) found that families with low economic status face a 1.8-fold greater risk of diarrhea compared with middle-to-upper-income households.

Table 1. Distribution of Respondents by Sex, Age Group, Education, and Occupation (n=30)

Variable	Category	Frequency (n)	Percentage (%)
Sex	Male	13	43.3
	Female	17	56.7
		30	**100.0**
Age Group	0–5 years (Toddler)	15	50.0
	6–11 years (Child)	1	3.3
	12–17 years (Adolescent)	2	6.7
	18–45 years (Adult)	4	13.3
	46–59 years (Pre-elderly)	4	13.3
	>60 years (Elderly)	4	13.3
		30	**100.0**
Education	Junior High School	1	3.3
	Senior High School	9	30.0
	University	3	10.0
	Other	17	56.7
		30	**100.0**
Occupation	Not Working	21	70.0
	Self-employed	1	3.3
	Private Sector	4	13.3
	Other	4	13.3
		30	**100.0**

The clinical profile of diarrhea cases in the study area demonstrated several notable features. The majority (90.0%) of respondents reported that the onset of their symptoms occurred more than one to three months prior to the interview. This pattern may reflect a recall bias among respondents regarding the precise timing of onset, the presence of recurrent or chronic diarrheal episodes, or a follow-up survey conducted after a previous outbreak. According to Guerrant et al. (2017), acute diarrhea typically resolves within 14 days, whereas diarrhea persisting beyond four weeks is classified as chronic and warrants further clinical evaluation.

In terms of stool frequency, 53.3% of respondents reported more than four defecation episodes per day, while the remaining 46.7% experienced two to three episodes. The WHO (2019) classifies diarrhea with a frequency exceeding four episodes per day as severe, carrying a high risk of dehydration and requiring prompt medical management. This classification is corroborated by the stool consistency data: 96.7% of respondents presented with watery or liquid stools, a hallmark of acute infectious diarrhea. As noted by Riddle et al. (2016), liquid stools combined with high defecation frequency substantially increase the risk of fluid and electrolyte loss, particularly in toddlers whose total body water reserves are limited.

Table 2. Clinical Characteristics of Diarrhea Cases (n=30)

Variable	Category	Frequency (n)	Percentage (%)
Symptom Onset	Today	1	3.3
	>7 days ago	2	6.7
	>1–3 months ago	27	90.0
		30	**100.0**
Defecation Frequency	2–3 times/day	14	46.7
	>4 times/day	16	53.3
		30	**100.0**
Stool Consistency	Soft but formed	1	3.3
	Watery/liquid	29	96.7
		30	**100.0**

All 30 respondents (100%) used bottled or gallon water as their primary drinking water source, which is a positive indicator for diarrhea prevention. Bottled water in Indonesia must comply with SNI 01-3553-2015, which mandates freedom from enteric pathogens including Escherichia coli, Salmonella, and Vibrio cholerae (Badan Standardisasi Nasional, 2015). Rahmawati and Kusumaningrum (2019) reported that the use of bottled water is associated with a 67% reduction in diarrhea risk compared with the use of unprocessed water. Nevertheless, 90.0% of respondents did not boil their water before consumption, relying instead on the presumed safety of packaged water. The WHO (2017) emphasises that boiling water at 100°C for at least one minute remains the most effective method for eliminating virtually all bacterial, viral, and parasitic pathogens—including Giardia cysts and Cryptosporidium oocysts that are relatively resistant to chlorination. Furthermore, Sari et al. (2020) found that 15% of refill gallon water samples from several depots contained E. coli levels exceeding safe limits, indicating that the safety of commercially packaged water cannot be guaranteed without adequate hygiene practices at distribution and storage points.

For daily household water use (bathing, washing), 96.7% of respondents relied on PDAM (municipal piped water). The Kementerian Kesehatan RI (2019) reported that approximately 68% of PDAM water supply systems in Indonesia do not meet safe bacteriological quality standards, with E. coli contamination—a faecal indicator—being the most frequently detected issue. This finding highlights that even when drinking water is sourced safely, daily household water quality may still pose

a risk of indirect contamination through food preparation utensils and surfaces.

Regarding food and drink consumed prior to the onset of diarrhea, 'wrong food' (mishandled or incompatible foods) was the most commonly reported precipitating factor at 33.3%, followed by fever (26.7%) and spicy food (16.7%). The concept of 'salah makan' (wrong eating) in the Indonesian community context generally refers to consumption of foods that are not fresh, contaminated, or physiologically inappropriate. Sari and Wulandari (2020) identified street food and foods stored at room temperature for more than four hours as carrying high risk of bacterial contamination. This concern is amplified by the finding that 60.0% of respondents had a habit of purchasing food or drinks outside the home—a proportion that is epidemiologically significant, as street food has been shown to carry a three-to-five-fold higher risk of microbiological contamination compared with home-prepared food under adequate hygienic conditions (Samapundo et al., 2016).

Although all respondents (100%) reported always washing their hands before eating and after defecation, and 96.7% reported disposing of waste in designated receptacles, these self-reported findings must be interpreted with caution due to probable social desirability bias. Curtis and Cairncross (2017) demonstrated a significant discrepancy between self-reported handwashing behaviour and directly observed practice; objective indicators such as the availability of soap and clean water at handwashing stations would provide a more accurate picture of actual hygiene practice. The single respondent (3.3%) who reported not disposing of waste properly was most likely a toddler who had not yet developed the cognitive or motor capacity for independent waste management.

Most respondents (80.0%) lived within narrow alleyways, characterised by high population density, limited ventilation, shared sanitation facilities, and constrained access to clean water and handwashing infrastructure. These conditions represent significant environmental risk factors for fecal-oral transmission of enteric pathogens, with dense housing and inadequate sanitation estimated to increase the risk of diarrheal disease transmission by three-to-four-fold. Only 16.7% resided along main roads and 3.3% in residential housing estates.

Table 3. Environmental and Behavioural Risk Factors (n=30)

Variable	Category	Frequency (n)	Percentage (%)
Drinking Water Source	Bottled/Gallon	30	100.0
		30	**100.0**
Water Boiled Before Drinking	Yes	3	10.0
	No	27	90.0
		30	**100.0**
Daily Household Water	PDAM	29	96.7
	Bottled Water	1	3.3
		30	**100.0**
Food/Drink Before Diarrhea	Spicy food	5	16.7
	Wrong food	10	33.3
	Instant food	1	3.3

Variable	Category	Frequency (n)	Percentage (%)
	Iced drinks	1	3.3
	Fever	8	26.7
	None	5	16.7
		30	**100.0**
Handwashing Practice	Always	30	100.0
		30	**100.0**
Waste Disposal	Yes	29	96.7
	No	1	3.3
		30	**100.0**
Eating Outside the Home	Yes	18	60.0
	No	12	40.0
		30	**100.0**
Type of Residence	Along main road	5	16.7
	In narrow alleyway	24	80.0
	Housing estate	1	3.3
		30	**100.0**

The accompanying symptoms and clinical management data further contextualise the severity of the diarrheal episodes. Of the 30 respondents, 70.0% had no comorbidities, while 16.7% had hypertension and 6.7% had gastritis. Nearly all respondents (96.7%) experienced sudden onset diarrhea, suggesting predominantly acute infectious aetiology. Abdominal pain was reported by 80.0% of respondents, consistent with gastrointestinal tract inflammation. Fever, present in 56.7% of cases, is indicative of a systemic inflammatory response to infection, while nausea and vomiting affected 53.3% of respondents, suggesting that the gastroenteric infection extended beyond the intestinal tract. Critically, all respondents (100%) reported that diarrhea interfered with their daily activities. The WHO (2018) estimates that each diarrheal episode results in an average of three to five days of school or work absence, generating substantial economic burden for families and communities.

Healthcare-seeking behaviour was encouraging, with 86.7% of respondents visiting a health facility during their illness. The community health centre (Puskesmas Samarinda Kota) was the most frequently utilised facility, accounting for 73.3% of visits, reflecting its central role as the first-contact health service provider under Indonesia's national health system. As observed by Maharani and Tampubolon (2018), the proximity, accessibility, and affordability of community health centres are primary determinants of care-seeking decisions in Indonesian communities.

Table 4. Clinical Presentation, Comorbidities, and Healthcare Utilisation (n=30)

Variable	Category	Frequency (n)	Percentage (%)
Comorbidities	None	21	70.0
	Hypertension	5	16.7
	Gastritis	2	6.7
	Other	2	6.7
		30	**100.0**
Sudden Onset	Yes	29	96.7

	No	1	3.3
		30	**100.0**
Abdominal Pain	Yes	24	80.0
	No	6	20.0
		30	**100.0**
Nausea/Vomiting	Yes	16	53.3
	No	14	46.7
		30	**100.0**
Fever	Yes	17	56.7
	No	13	43.3
		30	**100.0**
Diarrhea Disrupts Activities	Yes	30	100.0
		30	**100.0**
Visited Health Facility	Yes	26	86.7
	No	4	13.3
		30	**100.0**
Type of Facility	Puskesmas Samarinda Kota	22	73.3
	Clinic	2	6.7
	Hospital	2	6.7
	Other	4	13.3
		30	**100.0**

The surveillance system employed by Puskesmas Samarinda Kota integrates both passive and active data collection approaches through cross-programme collaboration. In the passive mode, case data are compiled from patients attending the facility, providing a continuous flow of morbidity data. In the active mode, field visits are conducted to households in the catchment area, with community-reported cases triggering verification of patients' residential addresses, since some registered patients may have relocated beyond the facility's jurisdiction. Prior to any home visit, health staff confirm the patient's current address to ensure that follow-up occurs within the correct operational boundaries. This dual-approach surveillance model is consistent with national guidelines for communicable disease surveillance at the primary healthcare level in Indonesia (Kemenkes RI, 2019), and represents a pragmatic response to the challenges of population mobility in urban settings such as Samarinda.

CONCLUSION

This epidemiological surveillance study of diarrheal disease in the catchment area of Puskesmas Samarinda Kota demonstrated that diarrhea remains a significant public health problem, with toddlers (0–5 years) representing the most affected group, comprising 50.0% of the 30 respondents surveyed. Clinically, the majority of cases presented as acute diarrhea characterised by watery stools (96.7%), high defecation frequency exceeding four episodes per day (53.3%), and sudden onset (96.7%), accompanied by abdominal pain (80.0%), fever (56.7%), and nausea or vomiting (53.3%). The primary environmental and behavioural risk factors

identified included the habit of eating food purchased outside the home (60.0%), residence in densely populated alleyways with limited sanitation infrastructure (80.0%), and reliance on PDAM water for daily household use despite potential bacteriological quality concerns. Although all respondents used bottled water for drinking and reported consistent handwashing practices, the safety of refill gallon water and the gap between self-reported and actual hygiene behaviour cannot be discounted. The surveillance system at Puskesmas Samarinda Kota operated through an integrated passive–active approach with cross-programme coordination, enabling both routine case compilation and active household follow-up, which is effective for detecting cases in a mobile urban population.

Based on the findings, Puskesmas Samarinda Kota and relevant local government agencies are encouraged to intensify health education targeting mothers and caregivers of toddlers, focusing on safe food handling, proper handwashing technique with soap, and the risks associated with purchasing food from street vendors. Routine microbiological monitoring of refill water depots within the service area is also recommended, as commercially packaged water cannot be assumed safe without quality assurance at the point of distribution. Strengthening community-based surveillance through community health cadres would further enhance early detection and rapid response to potential outbreaks. This study was limited by its cross-sectional design, purposive sampling of only 30 respondents, and reliance on self-reported data for behavioural variables, which may be subject to social desirability bias. Future research should employ a larger probability-based sample with direct behavioural observation and microbiological water quality testing to provide a more comprehensive risk assessment. Additionally, studies examining the role of rotavirus and norovirus as specific aetiological agents in this setting would contribute valuable data for the development of targeted vaccination and antiviral intervention programmes.

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