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Original Research Paper

Analysis of Generation and Composition of Domestic Solid Waste at the dr. R. Soedjono Regional General Hospital, East Lombok

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Abstract: The dr. R. Soedjono Regional General Hospital Selong East Lombok is a government-owned health service facility that has experienced an increase in accreditation status to a class B hospital. The calculation of waste generation and waste sorting at the hospital has never been carried out so that the waste management team cannot determine a waste management strategy. Therefore, it is necessary to conduct research to analyze waste generation at the dr. R. Soedjono Regional General Hospital, East Lombok. A preliminary survey was conducted to determine the techniques and schedule for collecting waste data and waste producers. Waste data collection was carried out using the load count method every day for eight days. Data collection on the daily number of people producing waste was carried out through document searches. The waste producers in question include employees, medical personnel, patients and visitors. Data were analyzed descriptively to describe waste generation and its composition. The results show that the generation of domestic solid waste at the dr. R. Soedjono Regional General Hospital, East Lombok, which was observed every day for eight days was 0.3705 kg/person/day. Waste generation fluctuates every day of the week and the highest waste generation occurred on Sundays (holidays), where the number of people producing waste was dominated by patient visitors. Domestic solid waste in the hospital is dominated by plastic waste (36%), leftover food and leaves (31%), paper (15%) and other (11%). Others include diapers, sanitary napkins and bandages. Other waste components that were also found but with a much smaller weight percentage were wood, fabric or textile, metal and glass.

Keywords: Hospital, waste compotition, waste generation.

Introduction

Every activity to meet needs certainly produces waste. Waste produced from human activities, where humans continue to grow, causes waste production to continue to increase every year. This is in accordance with data from the National Waste Management Information System (SIPSN) from the Ministry of Environment and Forestry (KLHK) in 2022, which states that waste generation in Indonesia is 38 million tons and will increase to 41 million tons in 2023 (Saputra & Fauzi, 2022). The fifth largest contributor of waste is public facilities with a contribution of around 5.24% of the total national waste, and public facilities that are widely used by the community are hospitals (Marianingsih *et al*. (2023). Hospitals can produce waste from their operational activities, such as kitchen activities, canteens, laundry, operating rooms, delivery rooms, inpatients, outpatients, medical rehabilitation, laboratories, radiology rooms, surgical rooms, outpatients, emergency units, pharmaceutical installations, nutrition installations, offices, garden activities, and others (Ariani *et al*., 2022). The waste that is mostly produced by hospitals is domestic solid waste, which is around 85% (Marianingsih *et al.*, 2023; Kasim, 2024).

The Regional General Hospital (RSUD) dr. R. Soedjono in Selong, East Lombok is a hospital owned by the East Lombok Regency government. Based on East Lombok Regent

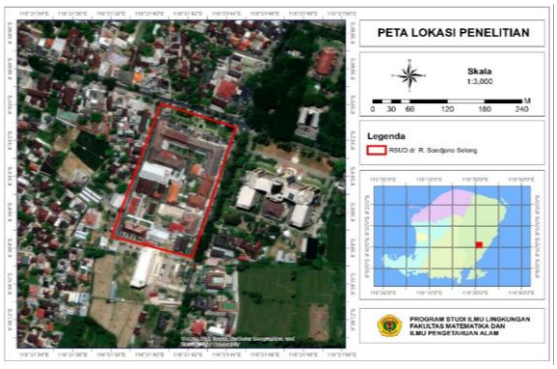
Regulation Number 18 of 2021, the above hospital is a regional referral center for patients from within and outside Lombok Island. In addition, this hospital has increased its accreditation to a class B hospital, which causes service activities in the hospital to also become higher and more complex. Thus, the waste problem in the hospital continues to increase and becomes more complex. To deal with the problem of increasing waste production, it is actually not enough to just increase the quantity of facilities and services (for example, just increasing the number and size of trash bins and increasing the number of garbage collectors), but there must be efforts to reduce waste production (for example, sorting waste and providing waste bins according to type and providing signs indicating proper waste disposal).

As an initial step in efforts to reduce waste generation, waste is sorted into its components (composition of waste types), so as to produce groups of waste components that can be recycled, reused and those that must be disposed of (Maulidia & Haryo, 2024; Nurhayati *et al*., 2024; Hasan *et al*., 2025)). These components or types of waste that can be recycled and reused are the objects for reducing waste generation and can even provide added value both economically and for improving the quality of environmental health. Based on a preliminary survey, the provision of facilities and implementation of waste sorting as described above have not been carried out in this hospital. How waste is currently generated and what its composition is in the hospital is not yet known. Thus, a study needs to be conducted with the aim of determining the amount of waste generated, especially domestic solid waste, and its composition in the hospital.

Materials and Methods

Time and location of research

The study was conducted from November 2024 to May 2025 at the dr. R. Soedjono Selong Regional General Hospital, East Lombok. Collection of waste data and waste producers data in the hospital was carried out every day for eight days in March 2025, which coincided with the month of Ramadan in 1445 H. The address of the hospital is at Jln. Prof. M. Yamin, SH. No. 55 Selong, West Nusa Tenggara (Figure 1).



Source: Google Earth

Figure 1. Map of research location at Dr. R. Soedjono Regional Hospital, Selong, East Lombok, Indonesia

Preliminary survey

The preliminary survey was conducted through direct observation, interviews with relevant sources and document searches regarding waste production and its handling which are usually carried out at the dr. R. Soedjono Regional General Hospital, Selong East Lombok.

Procedures of solid waste data collection

Domestic solid waste data collection was carried out every day for 8 consecutive days, in accordance with the method of determining the time for collecting waste data according to SNI 19-2454-2002 (Badan Standardisasi Nasional, 2002). Waste collection wass carried out using the load count method in accordance with standard procedures of SNI 19-3964-1994 (Badan Standardisasi Nasional, 1994), namely collecting waste every day at the Temporary Disposal Site (TDS).

The waste obtained is sorted based on the components for the composition of solid waste types according to SNI 19-3964-1994 and measured (weighed) in a manner adapted from Ferial & Kosasih (2019); Kaiya *et al*. (2022). Each waste component was weighed in kg using a spring scale. Collecting data on waste sources (the number of individuals producing waste) through information searches (documents) by using a modified method from Ferial & Kosasih (2018); Siswoyo & Mai (2022); Rivadeneira (2024). Hospital personnel who were counted as waste producers include doctors, nurses, employees, outpatients, inpatients and visitors to

inpatients who were present on the observation day. The number of visitors was set equal to three times the number of inpatients. To obtain data on domestic solid Waste (WG) Generation in kg units per person per day, calculations were carried out on waste data and data on waste-producing unit using the formula based on SNI 19-3964-1995 (Badan Standarisasi Nasional, 1995) as follows (Equation 1):

$$WG = \frac{W}{u} \quad \text{..... (1)}$$

Where,

WG = Waste generation (kg/person/day)
W = Total weight of waste on the observation day (kg)
U = Number of units or sources of waste generation (people)

Data analysis

Waste generation

The waste generation data from observations were compared with the waste generation categories for hospitals according to SNI 19-3983-1995 as follows (Table 1):

Table 1. Categories of domestic solid waste generation according to SNI 19-3983-1995

Categories	Waste generation (kg/person/day)
Above average	> 0,70
Average	0,625 – 0,70
Below average	< 0,625

Source: Badan Standarisasi Nasional, 1995) *Waste composition*

Table 2. Components of domestic solid waste according to SNI 19-3964-1994

No.	Waste components
1.	Leftover food and leaves
2.	Paper
3.	Wood
4.	Fabric/textile
5.	Plastic
6.	Metal
7.	Glass
8.	Rubber
9.	Others

Source: Badan Standarisasi Nasional, 1994)

The composition of waste types is determined based on the comparison of the percentage weight of each waste component to the total weight of all waste components. The types or components of waste observed are based on the sorting for domestic solid waste according to SNI 19-3964-1994 by using modified techniques from Halomoan (2021); Hasan *et al*. (2025) (Table 2).

Results and Discussion

Results

Domestic solid waste generation

Domestic solid waste generation at dr. R. Soedjono Hospital Selong, which was observed daily for 8 days, was 0.3705 kg/person/day.The highest production of domestic solid waste occurred on Tuesday (631.5 kg/day) and fluctuated between days for 8 days, while the highest waste generation occurred on Sunday (0.5448 kg/person/day), where the number of people producing waste was the least (741 people) (Table 3).

Table 3. Domestic solid waste generation observed daily for 8 days at the dr. R. Soedjono Selong Regional Hospital, East Lombok

Day	Waste weight (kg)	Number of producers (people)	Waste generation (kg/person/ day)
Saturday	498,5	1322	0,3771
Sunday	403,7	741	0,5448
Monday	570,5	1663	0,3431
Tuesday	631,5	1775	0,3558
Wednesday	629,6	1654	0,3807
Thursday	540,4	1676	0,3224
Friday	584,0	1548	0,3773
Saturday	513,3	1420	0,3614
Total	4371,5	11799	0,3705

Composition of domestic solid waste

Data on the composition of waste types is very important as a basis for determining methods for waste reduction. Based on weight, the plastic and food waste components as well as leaves, paper and others have the largest percentage (36, 31, 15 and 11%), respectively. Other waste in question is mixed waste that cannot be sorted, including diapers, bandages and sanitary napkins. Other types or components of solid waste that were also found but with a smaller weight percentage were fabric or textile and metal. Wood, glass and rubber waste were not found during the observation (Figure 2).

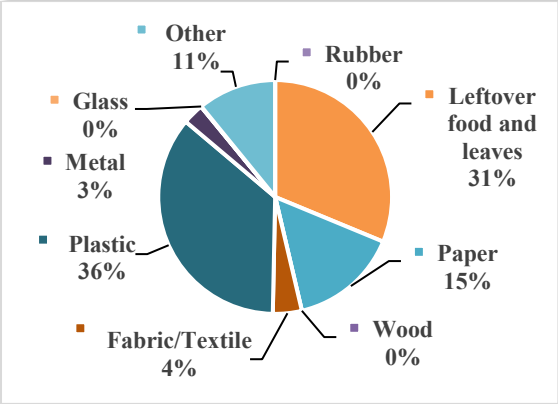


Figure 2. Weight composition of domestic solid waste collected for 8 days at the Dr. R. Soedjono Selong Regional Hospital, East Lombok

Discussion

Domestic solid waste generation

It has been stated that the generation of domestic solid waste at the dr. R. Soedjono Selong Lombok Timur Regional Hospital to date wass 0.3705 kg/person/day, which is included in the below average category according to SNI 19-3983-1995 (<0.625 kg/person/day). The highest waste generation occurs on Sunday (holiday), which was 0.5448 kg/person/day and the lowest waste generation occurs on Thursdays, which was 0.3224 kg/person/day. Fluctuations in waste generation and the number of waste producers were not synchronized (Figure 3).

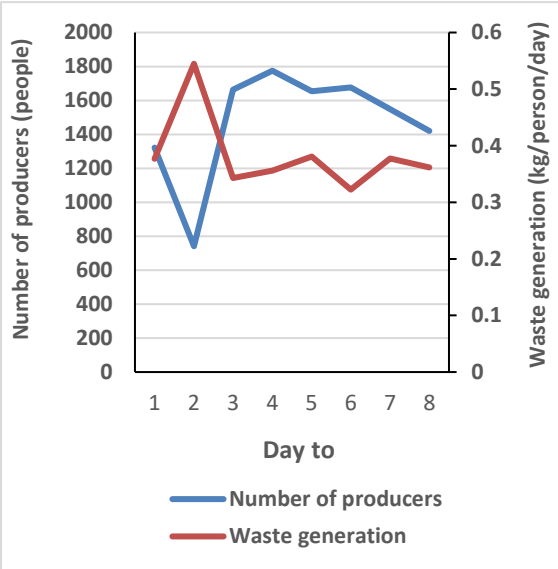


Figure 3. Visual relationship between waste generation and the number of waste producers.

The difference between the highest and lowest waste generation figures is 0.2223 or 68.94%, which shows a fairly significant fluctuation in waste generation at the hospital. This shows that the influence of waste producers on waste generation is not due to the number of producers but is more influenced by the characteristics of the producers themselves. On Sunday (holiday), there were fewer service facilities available than on weekdays, and there were also far fewer outpatients and staff present. On Sundays there was also an increase in the number of visitors to the hospital. They were mainly visitors to inpatients. This increase in visitors occurs because Sunday is a holiday or weekend so that families and relatives of patients tend to have more time to visit and do activities at the hospital.

The factors that influence the differences in waste generation were not only the number of people producing waste, but were more determined by the quantity and quality of service facilities and the characteristics of the waste producers themselves or the culture of the community. This is in accordance with research conducted by Firdaus & Hidayah (2022); Marianingsih *et al.* (2023) that several factors that influence the amount of waste generated by a hospital are the type of health services offered, the number of beds, the number of health workers, and the activities carried out by patients and visitors. Sari (2023); Astuty *et a*l., (2024); Kasim (2024) also reported that factors that influence high and low levels of waste generation in hospitals include the number of patients, service facilities, economic and social status, and culture. Suciyati *et al*. (2023); Risnawati *et al.* (2025) added that waste generation is closely related to an individual's behavior and lifestyle. Behaviors such as overconsumption, lack of environmental awareness, and product preferences can influence the generation of waste.

Composition of domestic solid waste

It has been stated that the components of domestic solid waste at the Dr. R. Soedjono Selong Lombok Timur Regional Hospital are dominated by three main components of waste, namely plastic, leftover food and leaves and paper. These three components or types of waste contribute more than 80% of the total domestic waste produced. This shows that activities in hospitals produce a lot of plastic waste, food waste or leaves and paper waste. Previously,

Marianingsih *et al*. (2023); also reported that waste generation in health facilities is generally dominated by plastic, food and leaf waste and paper. The high level of hospital plastic waste is caused by the number of patients, staff or employees and visitors as well as their consumption activities, which cannot be separated from the use of plastic. This condition is in line with the findings of Thoyyibah & Warmadewanthi (2023), which stated that the high consumption of packaged snacks, food, and drinks by the community is one of the main contributors to plastic waste. In addition, plastic has many benefits in modern society.

The high percentage of plastic waste components from solid waste is actually an opportunity for waste reduction efforts, namely by further sorting plastic waste into categories of recycle, reuse or disposal (Shofi *et al*., 2023; Thoyyibah & Warmadewanthi, 2023). Plastic waste that can be separated into the recycle and reuse categories such as intact plastic bottles can be used as objects for potential waste reduction. The same applies to paper waste components.

The high amount of paper waste is mostly generated from pharmaceutical installation activities, especially from paper and cardboard-based drug packaging. During the research period, a lot of paper waste was obtained from rice boxes because it was related to the month of Ramadan, the hospital provided rice boxes for breaking the fast and *sahur*, thus increasing the paper waste generated in the hospital. Apart from that, water spills from leftover drinks on paper are also a factor that causes an increase in the weight of the pile of paper waste produced. Paper waste that can be sorted into the recycle or reuse category, namely paper that is still intact and clean such as newspapers and office paper, can be processed into art products such as paper masks, paintings from paper pulp or a combination of utilizing plastic bottles into art products in the form of eco-bricks. (Agung *et al*., 2021; Jerico, 2024; Darunnafis *et al*., 2025).

The presence of food waste and leaf components at dr. R. Soedjono Hospital was quite large (31%) and this is also an opportunity for waste reduction efforts through a reuse or recycle approach. Previously, Dewi (2024) also reported that the food and leaf waste produced by hospitals could reach 130 kg or more every day. According to Tuhumury *et al*., 2023; Destiasari *et al*., (2024); Ernawati *et al*. (2024), leftover food and leaves can be processed into compost while other kitchen waste such as fruit and vegetable peels can be processed into eco-enzymes.

Conclusion

Domestic solid waste generation at the dr. R. Soedjono Regional Hospital, East Lombok, observed daily for eight days was 0.3705 kg/person/day. The highest waste generation occurs on holidays, where the number of waste producers was dominated by patient visitors. Domestic solid waste in the hospital was dominated by plastic waste (36%), food and leaf scraps (31%), paper (15%) and others (11%). Other waste components that were also found but with a much smaller weight percentage were wood, fabrics or textiles, metal and glass.

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