Impact Assessment of Waste Management to the Prevalence of Diarrhea in Toddlers are domiciled in RW 06 Kel. Abadijaya and RW 16 Kel. Bhaktijaya Depok

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Abstract

Poor waste management can be a breeding source of microorganisms cause the disease. Diarrhea is a disease that occurs in toddlers susceptible as a result of exposure to waste. Waste management consists of technical and non-technical aspects that has relationship between waste and the diarrhea. The purpose of this research is to know the impact of waste management on the diarrhea in toddlers. Study design was used a retrospective cohort. Researchers conducted an assessment of the community in two areas that have been grouped into the exposed (managed by government) and unexposed (managed by community). Each area of study taken 60 so that the number of respondents used was 120 respondents families that have toddlers. Researchers used a questionnaire and observations to collect data. After the chi-square test researchers used multiple logistic regression analysis to determine the variables most influential waste management. The results of the study showed that significant relationship between the recycling effort [RR = 3.669 (95 % CI : 1.278-10.553)] and the position of the family waste receptacle [RR = 7.017 (95 % CI: 1.29-3.09)]. Multivariate analysis showed the position of the family waste receptacle is the most influential variable after controlled by variable recycling containers. Suggestion of this study that the government must improve socialization and facilities for the community to implement better waste management, especially laying waste containers outside the home. It is also necessary to trainings recycling efforts and other 3R principles that can be families applied in life.

Keywords: Waste management, diarrhea toddlers, impact assessment

Introduction

Waste is a symbol of triumph, modernization, and a cultural world civilization (Vergara, 2011). Economic growth, urbanization, and the people's living standards can also affect the amount and complexity of waste (Ana et al., 2011). An estimated 11.2 billion tons of waste are generated worldwide each year. This condition can be a serious threat to the environment and the health of the world's population (UNEP, 2011).

The number of city landfill waste is expected to increase five-fold by 2020. In 1995, the average amount of waste generated by urban areas in Indonesia is as much as 0.8 kg / day. This number increased in 2000 to 1.0 kg. So it can be expected that in 2020 the number of urban waste in Indonesia will increase to 2.1 kg / capita (Sucipto, 2012).

Rate of waste production continued to a significant increase was not proportional to its handling capabilities. This resulted there is a pile of waste in various corners of the city in Indonesia (Handono, 2010). It is estimated that only about 60% of the waste big cities in Indonesia, which can be transported to the place of final processing (Damanhuri, 2010).

Waste management paradigms that are widely used in Indonesia at present is the application of gathering, transport then dispose. In addition, the method is still the mainstay of a town in solving the waste problem is annihilation with hoarding (landfilling) in a landfill (Damanhuri, 2010). Therefore, to realize the optimal waste management services in Indonesia waste management paradigm must be changed (Riyanto, 2008).
The World Health Organization (WHO) states that diarrhea is the number one cause of death in children under five years old (toddlers) whole the world (WHO, 2013). Diarrhea is also a major cause of infant mortality in Indonesia in recent years. The incidence of diarrhea is spread across all age groups. The highest prevalence of diarrhea occurring in toddlers (1-4 years) (Kemenkes RI, 2011). The incidence of diarrhea tends to increase. In 2000, Incidence Rate (IR) of diarrhea is 301/1000 in habitants and in 2010 411/1000 population. Additionally outbreak of diarrhea is still often happens with High Crude Fatality Rate(CFR). In 2010 outbreak of diarrhea in 33 districts by amount of 4,204 patients with 73 deaths (CFR 1.74%) (Kemenkes RI, 2011).

Research carried out by Priyataningsih mention that one of the environmental and behavioral factors associated with the incidence of diarrhea in young children is the quality of waste disposal facilities (Priyataningsih, 2010). Risk estimates were done by Purwaningsih indicates that respondent who have physical conditions landfills that do not meet the requirement has 3,719 times greater risk of suffering from diarrhea when compared with respondents who have landfills that meet the health requirements (Purwaningsih, 2013).

The increase of population is one of the triggers increasing the amount of waste in urban areas. Total waste generation Depok also continued to increase from previous years. Based on data from Depok waste generation is estimated that every person resident of Depok produce waste as much as 2.65 liters perday. Thus, it can be calculated that the amount of waste generated every day in Depok reaches 4,770 m$^3$ ((Dinas Kebersihan dan Pertamanan Kota Depok, 2011).

Depok municipal waste transported to Cipayung landfill many as 1,140m$^3$/day, plus the amount of waste that is processed in UPS about 570 m$^3$/day so that the amount of waste that can be handled as many as 1,710 m$^3$/day. The amount of waste that can not be transported as many as 3,187 m$^3$/day. Whereas level of waste services by the government in 2006 reached 34% (Dinas Kebersihan dan Pertamanan Kota Depok, 2011).

The results of household surveys conducted in November 2007 showed that the number of sample households get waste hauling services in Depok, almost entirely (98%) did not apply the pattern 3 R about total of 28% of them still throw Waste into the street or into a river / sewer and 68% throw it to the ground / vacant land Kajian Pengelolaan Persampahan Kota Depok, n.d.). The 3R efforts did not change significantly when viewed as a whole to the city of Depok. Environmental Health Risk Assessment (EHRA) states that waste management Depok City community in 2011, covering 38.96% burned, dumped and buried in holes 33, 70%, waste transported 16.9% of polling stations, vacant land disposed to 6, 69%, discharged into rivers and left only 2.07% 0, 21%. Additionally it also mentioned that 63% of people have never done sorting waste and only 4, 99% who always do the sorting (Dinas Kesehatan Kota Depok, 2012). The condition should not occur if the public understands that the management of organic waste can be handled easily start from the household level (Handono, 2010). Organic waste decomposes rapidly by microorganisms. If not managed properly it can cause smelly waste and become a breeding ground for a wide range of disease vectors. Therefore this type of organic waste is the type of waste that is more vulnerable to cause disease for society (Tobing, 2005).

Total incidence of diarrhea which occurred in Depok from January to May 2010 reached 6989 cases. In 2010 the diarrhea disease also has caused one death in Depok (Firman, 2013). Diarrhea is a disease that generally affects people in the village Abadijaya. Based on the data obtained from Puskesmas Abadi Jaya there is increased incidence of diarrhea in the last three years. In 2010 the incidence of diarrhea as much as 1,451 cases in 2011 increased to 1,806 cases, until in 2012 the incidence of diarrhea in Puskesmas Abadijaya reached 3,417 cases (Puskesmas Abadijaya, 2012). Therefore, researchers feel the need to performed a more comprehensive study on waste management aspects of the incidence of diarrhea in toddlers. The purpose of this study was to determine the relationship of waste management on the prevalence of diarrhea in children under five who live in RW 06Kelurahan Abadijaya and RW 16 Kelurahan Bhaktijaya Depok.
Theoretical

Waste is all material generated by the activities of humans and animals are generally solid and no longer used or unwanted (Tchobanoglous & Kreith, 2002). According to Law UU No.18 tahun 2008 concerning the definition of waste management activities that waste management is a systematic, comprehensive, and sustainable which includes the reduction and handling problems. Additionally it also mandated that waste management is intended to improve public health and environmental quality and make waste as a resource (Frumkin, 2010).

Poor waste management systems can lead to various kinds of diseases, both communicable or non-communicable diseases. Some diseases are closely related to the waste management namely gastro intestinal diseases, respiratory disorders, diarrhea, dysentery, intestinal worms, malaria, elephantiasis and dengue to interruption of pregnancy as well as various types of cancer (Porta et al., 2009). Research conducted Abdeelah (2013) also suggested the same thing that the disease is mostly found in the waste management area that still has many obstacles are diarrhea, malaria, viral diseases, eye diseases and allergic skin.

WHO defines diarrhea as a condition in which patients run into defecation three times or more (more often than normal). Diarrhea can be caused by several factors. However, infections and poisoning is the most frequent cause of diarrhea was found (Kemenkes, 2002). The infection is spread among others through food or drink contaminated by feces or direct contact with the feces of patients and usually occurs in areas with sanitation and poor personal hygiene (Kemenkes, 2002). Transmission of the disease occurs through flies mechanically, where the body plume, legs and other body parts of flies is a disease where the attachment of microorganisms derived from waste, and various other sources. When flies up into human food, then the dirt will contaminate food for human consumption that are likely to arise symptoms such as abdominal pain and weakness (Dirjen PPM&PL, 2001)

Method

This study used a retrospective cohort study design. This study aimed to see the impact of waste management on the prevalence of diarrhea in children under five who live in RW 06 Kelurahan Abadijaya and RW 16 Kelurahan Bhaktijaya. In this study sample grouped by exposed and unexposed conditions to the waste management has been good. Then the samples from the two groups were traced whether there is a link between waste management with cases of diarrhea in both groups when the study was conducted.

This study uses primary data and secondary data as some supporting data. The number of samples used in each region were 60 families that have toddlers so that the total respondents in this study were 120 households with toddlers. Sampling was done by simple random sampling method. The test is used to determine the relationship between variables is a chi-square test. Then to find out the variables that most contribute to the incidence of diarrhea in toddlers performed multiple logistic regression.

Results

Based on the results, some aspects of waste management in the community is still minimal implementation are recycling bins (20%), composting (20%), waste sorting (25, 8%) and the position of the family waste containers that still tends to be placed in the home (76.7%). Chi-square test results show waste recycling efforts, composting, container position, type of container, and the container family waste have the significant relationship with the occurrence of diarrhea in toddlers (table 1).
Table 1. Results of bivariate analyzes waste management conditions with the incidence of diarrhea in children under five in research locations.

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Category</th>
<th>Diarrhea</th>
<th>Total</th>
<th>RR (95% CI)</th>
<th>AR</th>
<th>Nilai p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td>N</td>
<td>%</td>
<td>Yes</td>
</tr>
<tr>
<td>Recycle</td>
<td>Not Doing</td>
<td>79</td>
<td>17</td>
<td>96</td>
<td>100</td>
<td>1.65</td>
</tr>
<tr>
<td></td>
<td>Doing</td>
<td>12</td>
<td>24</td>
<td>36</td>
<td>100</td>
<td>1.50</td>
</tr>
<tr>
<td>Recycle-Composting</td>
<td>Not Doing</td>
<td>78</td>
<td>18</td>
<td>96</td>
<td>100</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td>Doing</td>
<td>13</td>
<td>24</td>
<td>37</td>
<td>100</td>
<td>1.50</td>
</tr>
<tr>
<td>Container position</td>
<td>Not according to the rules (inside the house)</td>
<td>79</td>
<td>14</td>
<td>93</td>
<td>100</td>
<td>2.004</td>
</tr>
<tr>
<td></td>
<td>According to the rules (outside the house)</td>
<td>12</td>
<td>28</td>
<td>40</td>
<td>100</td>
<td>1.00</td>
</tr>
<tr>
<td>Type of container</td>
<td>Not according to the rules (disposable)</td>
<td>54</td>
<td>63</td>
<td>117</td>
<td>100</td>
<td>1.32</td>
</tr>
<tr>
<td></td>
<td>According to the rules (not disposable)</td>
<td>37</td>
<td>57</td>
<td>94</td>
<td>100</td>
<td>1.276</td>
</tr>
<tr>
<td>Container</td>
<td>Not according to the rules (open)</td>
<td>48</td>
<td>56</td>
<td>104</td>
<td>100</td>
<td>1.276</td>
</tr>
<tr>
<td></td>
<td>According to the rules (closed)</td>
<td>43</td>
<td>64</td>
<td>107</td>
<td>100</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Results of multiple logistic regression analysis showed that the most influential variables on the incidence of diarrhea in toddlers is recycling efforts and the family’s waste container position. The results of the analysis can be seen in Table 2.

<table>
<thead>
<tr>
<th>Variabel</th>
<th>coefficient</th>
<th>p-value</th>
<th>RR</th>
<th>95% CI for Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Recycle</td>
<td>1.300</td>
<td>0.016</td>
<td>3.669</td>
<td>1.278</td>
</tr>
<tr>
<td>Container Position</td>
<td>1.948</td>
<td>0.000</td>
<td>7.017</td>
<td>2.620</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.086</td>
<td>0.000</td>
<td>0.111</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

1. Recycling Waste and incident of Diarrhea in Toddlers

The study found there is a significant relationship between inorganic waste recycling efforts conducted by family with prevalence of diarrhea in toddlers. Toddlers who come from families who do not make the effort of recycling inorganic waste has diarrhea risk 1.65 times greater than toddlers whose families do recycling inorganic waste. This is because through recycling efforts in directly communities have made efforts to reduce breeding sites diarrhea disease vectors such as flies. Flies transmit microorganisms, both bacteria, protozoa, eggs/larvae of worms or even a virus causing diarrhea in humans (Wijayanti, 2009).

In research conducted by Tobing (2005) stated that the waste that is not managed properly can lead to a variety of disease threats, one of which is diarrhea. A study in Sudan also shows the same thing that the highest percentage of disease experienced by the community that waste management has not been well were diarrhea (26%). Explained that the majority of the waste management carried out by communities is throwing waste out in the open (76%) (Ladu et al., 2011). These conditions will
increase vector breeding sites and pathogenic microorganisms. This would not happen if doing waste recycling efforts.

The level of recycling and composting in Indonesia is currently only 8.1% of the total urban waste production. According to estimates waste recycling opportunities (inorganic) reaches 15-25% and 30-40% for composting. Yet significant recycling of both organic and inorganic waste is partly because there is no recycling system design effort, the lack of network marketing recycled products, recycling activities are still considered a sideline, the limited budgets of local governments, lack of socialization in the community about benefits of recycling activities and lack of integrated synergy between there cycling program with urban waste management and system (Satori in Riyanto, 2008).

Recycling efforts in the waste is done by treating the residue left or can not be used again from the waste either as raw material or energy source (Damanhuri, 2010). At the study site (unexposed area) recycling effort that made by public in the form of a plastic material processing waste as an ornamental plant or place be worth selling handicrafts. Through these efforts has indirectly made efforts to break the chain of transmission oft he incidence of diarrhea. It is estimated that the exposed are a is still minimal effort because Cadre and public figures still do not have enough information about various science of household waste management. Many people that still not aware of the economic benefits that will be obtained from recycling waste. Inorganic waste which can basically bean additional source of livelihood for the people left abandoned and damage the environment.

2. Waste Containers Positions and incident of Diarrhea in Toddlers

This study found that there are significant differences between the position of the family waste containers with a prevalence of diarrhea in toddlers with RR=4.04 (95% CI: 2.23 to 7.35). This agrees with the previous studies that also found that there is a significant relationship between waste containers at home with the number of flies in the house(r =17, p<0.0001). In addition on the study also found that there is a close relationship between the incidence of diarrhea in children by the number of flies in the kitchen are particularly during periods of food processing (r =36, p<0.0001) (Boadi, 2005). This is caused waste containers that placed in the kitchen wil be a breeding ground for flies and during periods of food processing or cooking then flies will fly free and contaminate food.

Flies like a lighted and breed in the waste, left over food, and fruits. All the things is organic waste that is almost always in the kitchen waste containers. Flies also like forest near the breeding places, in the house flies will rest on the out skirts of food containers (Kemenkes RI, n.d.). The fly is one of the vector for transmission that mechanically transmitted diseases, where the body plume, legs and other body parts of flies is a disease where attachment of microorganisms derived from waste, and various other sources. When the flies a lighted to human food, then the dirt will contaminate food for human consumption that are likely to arise symptoms such as abdominal pain and weak (Dirjen PPM&PL, 2001). With these conditions, waste containers placed in the kitchen will be a breeding ground for flies as well as makes it easy potential contamination of food by flies.

The results of this study can explain that toddlers who come from families that family’s containers position are not by the rules, have a risk of diarrhea 2,004 times larger than a toddler whose family put waste containers by the rules. Waste containers should be placed in the front yard of the house. Besides helping officers for transporting waste, also to avoid breeding of flies in the house (Damanhuri, 2010). Based on another studies also mentioned that there is a trend of the incidence of diarrhea was greater in the group that did not have a waste can (51.02%) than the group that has bins (37.78%) in the house (Silva et.al, 2008).

In the study area, people tend to put the waste in the kitchen for easy access when you want to dispose of waste, especially when preparing food. This condition can essentially affect the emergence of disease-causing vectors. Such a study on some restaurant in Florida, was found that there is a relationship between health risks with the position of waste container placed near the door of the restaurant. It was found that in the fly's body derived from the waste there are many different peas of bacteria. Mentioned that if this condition is not preventable it could lead to serious risks due to the transmission of disease-causing bacteria (Butler, 2010).
Conclusion

Based on the results of the research, analysis and discussion, it can be concluded that there is a significant relationship between waste management which includes recycling efforts and composting variable as well as the position, type and condition of the family waste containers with the incidence of diarrhea in toddlers in the study site. While the most influential variables on the incidence of diarrhea in toddlers in RW 06 Kelurahan Abadijaya and RW 16 Kelurahan Bhaktijaya is family’s waste container position.

Suggestions

Suggestion of this study that the government must be improve socialization and facilities for the community to implement better waste management, especially laying waste containers outside the home. It is also necessary to trainings recycling efforts and other 3R principles that can be families applied in life.

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