FACTORS ASSOCIATED WITH THE RISK OF DIARRHEA IN CHILDREN UNDER FIVE IN BANDUNG, WEST JAVA

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ABSTRACT

Background: Diarrhea cases account for 1 in 9 child deaths worldwide, making it the second leading cause of death among children under five. About 88% of diarrhea-associated deaths are attributable to unsafe water, inadequate sanitation, and insufficient hygiene. This study aimed to determine the factors associated with the risk of diarrhea in children under five in Bandung, West Java.

Subjects and Method: This was a case-control study conducted in Bandung, West Java. A total of 244 children under five was selected for this study. The dependent variable was diarrhea. The independent variables were household clean water facility, latrine, lavatory, piped sewer system, and waste management. The data were collected by questionnaire and analyzed using odds ratio as a measure of association.

Results: Of 244 households, 75.8% had clean water facility, 45.9% had household lavatory, 41.0% had piped sewer system, and 32.4% had household waste management. Household lavatory (OR= 4.59; 95% CI= 2.68 to 7.89; p ≤0.001), piped sewer system (OR= 2.13; 95% CI= 1.27 to 3.58; p= 0.006), and household waste management (OR= 0.35; 95% CI= 0.20 to 0.62) were associated with diarrhea case.

Conclusion: Household latrine, piped sewer system, and household waste management are associated with the risk of diarrhea among children under five.

Keywords: basic sanitation facility, household, diarrhea, children under five

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BACKGROUND

Diarrhea is a major public health problem with high morbidity and mortality rates in developing countries. Diarrhea is the second leading cause of infant mortality after pneumonia caused by bacterial, viral and parasitic infections through food and beverage intermediaries contaminated with feces. Diarrhea can also be caused by poor water supply, food handling and personal health (Prüss et al., 2002; Kemenkes, 2011; CDC, 2013).

Based on Health Profile of Bandung District, the cases of diarrhea had increased twice as in 2011 compared to 2012; moreover, the ownership of basic sanitation facilities in Puskesmas Baleendah Sub-district was lower than Kabupaten percentages it showed by the percentages of the ownership heathy latrines was 61% and garbage dumps was 48.2%.

Several factors related to the incidence of diarrhea include clean water, sanitation, latrines, and sewerage channels, bacteriological quality of water and housing conditions.

These environmental factors both directly and indirectly can be a dri-
SUBJECTS AND METHOD

1. Study Design
This was case-control study used and intended to the toddler (children under 5 y.o.) on households who stayed along at Citarum River flow, in Andir district Bandung.

2. Population and Sampling
A total of 122 infant were selected for this study by simple random sampling. In obtaining data, cases group involved the households that have toddler under with history profile of diarrhea at puskesmas, while control group involved the households that have toddler without history profile of diarrhea disease who living close to the case. A method was employed and involved six Community Associations (RW) to be samples, while the samples that obtained from primary data collection amounted to 247 with 125 cases and 122 controls. In 125 cases, there are 3 respondents who refused to participate in this study, consequently 3 cases must be removed from this study. So that 244 samples were selected with 122 cases and 122 samples. The three samples released were not analyzed and it's not part of the research study (Figure 1).

3. Study Variables
The dependent variable was diarrhea. The independent variables were the household clean water facility, latrine, lavatory, piped sewer system, and waste management.

4. Study Instrument
The instruments in this study was questionnaires, observation sheets and measuring instruments.

5. Data Analisys
The data was analyzed by using the chi-square test with a degree of significance (α) of 0.05 and Confidential Interval (CI) of 95%.

RESULTS

1. Characteristic of Study Subjects
This study categorized basic household sanitation facilities as improved and unimproved. Most of the basic household sanitation facilities categories are unimproved household lavatories, 54.1% as well as an unimproved piped sewer system, 59.0%, and unimproved household waste management, 67.6 %. However, the rate of improved clean water facilities is higher than the unimproved clean water facilities with 75.8% (Table 1).

Table 1. Characteristics of the Study Subjects

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Cases</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Household clean water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>facilities</td>
<td>Improved</td>
<td>89</td>
<td>48.1</td>
</tr>
<tr>
<td></td>
<td>Unimproved</td>
<td>33</td>
<td>55.9</td>
</tr>
<tr>
<td>Household lavatories</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved</td>
<td>34</td>
<td>30.4</td>
</tr>
<tr>
<td></td>
<td>Unimproved</td>
<td>88</td>
<td>66.7</td>
</tr>
<tr>
<td>Piped sewer system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved</td>
<td>39</td>
<td>39.0</td>
</tr>
<tr>
<td></td>
<td>Unimproved</td>
<td>83</td>
<td>57.6</td>
</tr>
<tr>
<td>Household waste management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved</td>
<td>26</td>
<td>32.9</td>
</tr>
<tr>
<td></td>
<td>Unimproved</td>
<td>96</td>
<td>58.2</td>
</tr>
</tbody>
</table>
2. **Bivariate Analisys.**
The correlation between households’ clean water facilities and the history of diarrhea was not statistically significant, although both of odds ratio was showed in the expected direction and the confidence interval was very wide with 95 % (improved vs. Unimproved: OR= 1.37, 95% CI= 0.76 to 2.47).

However, household lavatories have a significant correlation with a history of diarrhea, (improved vs. Unimproved: OR= 4.59, 95% CI= 2.68 to 7.89). The correlation between the piped sewer system and the history of diarrhea was also statistically significant (improved vs. Unimproved: OR= 2.13, 95% CI= 1.27 to 3.59). Similarly, a significant correlation was found between household waste management and history of diarrhea on toddlers (improved vs. unimproved: OR= 0.35, 95% CI= 0.20 to 0.62) (Table 2).

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household clean water facilities</td>
<td>1.37</td>
<td>0.76 to 2.47</td>
<td>0.370</td>
</tr>
<tr>
<td>Household lavatories</td>
<td>4.59</td>
<td>2.68 to 7.89</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Piped sewer system</td>
<td>2.13</td>
<td>1.27 to 3.59</td>
<td>0.006</td>
</tr>
<tr>
<td>Household waste management</td>
<td>0.35</td>
<td>0.20 to 0.62</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

### DISCUSSION
1. **Effect of household clean water facilities and history of diarrhea**
Although sanitation has known to be important for infection of diarrheal disease, it has been unclear whether sanitation facility has correlation with diarrheal infection risk in childhood or not. We have not found statistically significant association between clean water facilities with a history of diarrhea on the toddler.

2. **Effect of household lavatories and history of diarrhea**
Household lavatories have a significant correlation with number of cases of diarrhea history in toddler. The ownership of improved household latrines was related to the incidence of diarrhea. The number of unimproved household latrines (gooseneck latrines with a septic tank) is one of the risk factors for diarrhea (Ibrahim, 2003; Pebrian et al., 2013; Sinaga et al., 2013). Garn et al., (2017) suggested that most sanitation interventions have a modest effect on adding latrine facility inclusion and usage; Further information of how unique sanitation distinguishing and interventions affect its coverage and usage is a crucial way to more successfully gain sanitation access for all, knock out open defecation, and yet improving health status.

3. **Effect of piped sewer system and history of diarrhea**
In our study, it was found that the piped sewer system was correlated with the history of diarrhea among toddlers. The household in the river area as subject in our study does not make the sewage as the main concern, so there many sewerage channels were still open. Our studies suggest that there is a correlation between the incidences of diarrhea in infants with ownership of unimproved sewerage system so that it
becomes one of the risk factors for diarrhea (Kamilla et al., 2012).

4. **Effect of household waste management and history of diarrhea**

In line with our hypothesis, we found that household waste management was statistically significantly associated with and history of diarrhea among toddlers. Our results may be supported by those of a previous study showing that good waste management in the household can reduce the incidence of diarrheal infections (Elfiatri, 2008; Angeline et al., 2013). Residential areas in this study were adjacent to the river and it causes not many households to have household waste facilities and their management.

In the light of finding, it suggested that ownership of improved basic sanitation facilities households is important and in accordance with findings that resulted in some facilities have a correlation with the incidence of diarrhea in toddlers.

In conclusion, our results showed there was an evidence and correlation between three basic household sanitation facilities ownership as Household latrine, piped sewer system, and household waste management with the risk of diarrhea among children under five.

**REFERENCES**


