RESEARCH ARTICLE

Assessment of community-based sanitation management in coastal areas from an economic and financial perspective

Susilawati[1] , R. Hamdani Harahap[2] , Miswar Budi Mulya[3] , Lita Sri Andayani[4] , Reinpal Falefi[1,5]

[1] Faculty of Public Health, Universitas Islam Negeri Sumatera Utara, Indonesia
[2] Faculty of Social and Political Science, Universitas Sumatera Utara, Indonesia
[3] Faculty of Mathematics and Natural Sciences, Universitas Sumatera Utara, Indonesia
[4] Faculty of Public Health, Universitas Sumatera Utara, Indonesia
[5] Faculty of Defense Management, The Republic of Indonesia Defense University, Indonesia

Abstract

Background: Community-Based Sanitation Management (CBSM) in coastal areas requires motivation and support from various stakeholders. **Objective**: To analyse the level of CBSM based on the socio-economic status of the community and its constraints. **Method**: A cross-sectional study was conducted in the subdistrict of Deli Serdang, North Sumatra, Indonesia with a sample size of 414 households. The outcome measured in this study is the economic impact on CBSM. Data analysis was performed using the Kruskal-Wallis test with variable tests of economics and the level of CBSM. **Result**: Most communities living in coastal settlements have inadequate sanitation knowledge and skills, which poses an inhibiting factor for management. **Conclusion**: Community participation in sanitation management in coastal areas is significantly low (low=27.7%, medium=65.0%). Therefore, support from stakeholders is needed. This study recommends that early and continuous education alongside training is required to increase knowledge on clean, healthy, and sustainable sanitation management.

Introduction

The limited supply of clean water, latrines, wastewater disposal systems, landfills, and unhealthy housing are general portraits of coastal areas (Heynnor, 2021), including Indonesia. Coastal residential areas have also not received adequate attention from the government, which poses a significant problem in sanitation management. According to Croitoru and colleagues (2019), unsafe water, poor sanitation, and poor hygiene are health problems that cause over 10,000 deaths annually.

A lack of ownership of household latrines and sewerage (HLS) causes unfulfilled health requirements, which impacts health and aesthetics (Misdayanti & Suwanti, 2021). The standard for improving the quality of drinking water, settlements, and national sanitation with SDGs standards is only 7.42% which fulfils the qualifications for safe and equitable access. Furthermore, 25.42% do not have access to proper sanitation, and 9.36% still carry out open defecation (NAWASIS, 2020). Among these data, coastal areas have the largest percentage of sanitation coverage. This shows that people in coastal areas are not concerned about the cleanliness of their environment.

Health behaviour in Percut Sei Tuan Sub-district is closely related to demographics such as gender, educational level, occupation, and economic status (Hasibuan et al., 2022). The low level of the economy is related to education and community knowledge about environmental remediation management. Some of these conditions are thought to be inhibiting factors in implementing and managing environmental sanitation.

This study aimed to determine the relationship between demographic characteristics such as gender, age, education level, occupation, and family income, with the knowledge and management of clean, healthy, and sustainable sanitation. Several previous studies focused on the socio-economic aspects that influence community behaviour in sanitation management (Sekarningrum & Yunita, 2019; Gondo et al., 2020; Rossouw & Ross, 2021). However, these socio-economic aspects are only general and related to behaviours. It is necessary to conduct studies that focuses on the participation in sanitation management, and community economy in the coastal area.

Methods

Design

This was a quantitative study with a cross-sectional design that analysed socio-economic variables related to community-based sanitation participation.

Place and time

The study location was carried out in a coastal settlement, Sei Tuan Sub-district, Deli Serdang Regency, North Sumatra, Indonesia. The study was conducted from January 2021 to March 2022.

Sample

The sample in this study is a community living in a coastal settlement and was calculated based on the mapping of the population in the sub-district office. This coastal area consists of five points which constitute the closest areas to the river. The respondents by household were the head of the family (husband/father) or household members from the sample household (wife). Moreover, a sample size of 414 households was needed to achieve a power of 95%, while the alpha was set at 5%. The sample size in this study is explained by the categorical survey formula:

$$n = \frac{Z\alpha^2 \, p \, (1-p)}{d^2}$$

"n" is the number of samples, "Zα" is the Z value for the 95% confidence level, p is the proportion of previous studies (52%) (Crocker *et al.*, 2016), and "d" is the precision of the study.

Sampling technique

A purposive sampling technique was utilised to select the participants among the desired population, where the sample was representative. Data was collected using a questionnaire previously tested for validity and reliability. Furthermore, the respondent signed the informed consent form while maintaining data confidentiality.

Variable

The dependent variable in this study is community participation. Variables and questions were asked are shown in Table I. Each question from the variables was given a score with a minimum value of 1 (never) to a maximum of 5 (very often). This classification of variables is calculated based on the tendency of the variables, low (6 <X ≤8 scores), medium (8 <X ≤10 scores), high (10 <X ≤12 scores), and very high (X> 12 scores). The independent variable is socio-economic, which was measured based on income and classified according to four categories referring to previous studies (Rakasiwi & Kautsar, 2021). These include low or less than IDR. 1,500,000, medium ranging between IDR. 1,500,000 – IDR. 2,400,000, high between IDR. 2,500,000 – IDR 3,500,000, and very high which is above IDR 3,500,000).

Table I: Independent variables and questions

Variables	Questions
Age	What is your age? (Years old)
Gender	What is your gender? (Male, female)
Education	What is your last education?
Socio-economic status	What is your average income in a month?
Community participation in sanitation management	Are you excited when there is an environmental improvement from the government in your area?
	Do you participate in helping when there is a SPAL/Sewer construction?
	Do you participate in joint contributions for the maintenance of shared facilities?
	Do you take advantage of the sanitation facilities that have been built?
	Do you participate in the supervision phase of the development of environmental infrastructure in your environment?
	Do you take care of the shared facilities?
	Do you participate in repairing public facilities if they are damaged or disturbed?
	Do you participate in the evaluation process or the evaluation of activities that have been carried out together?
	Can the community provide suggestions for the improvement of environmental development?
	Does the community need to participate in the evaluation of development activities?
	Is the evaluation of community activities necessary?
	Do you provide input at the evaluation meeting of an activity?

Statistical analysis

The results of the data normality test, it was obtained that the variables of community participation and socioeconomic status of significance value of 0.000 showed that the data were not normally distributed (Table II). Data analysis using nonparametric Kruskal-Wallis's test, due to data not being normally distributed. The economic status was categorised into low, middle, high, and very high, while the community participation was coded into low, medium, high, and very high.

Table II: Normality test of community-based sanitation management

Variable	Socio-economic status	Statistics	df[l]	Significance
Community participation in sanitation management	Low	0.326	94	0.000
	Medium	0.337	269	0.000
	High	0.291	43	0.000
	Very high	0.513	8	0.000

[l]df: degree of freedom

Ethics approval

This study passed ethics no. 254/EC/KEPK.UISU/IV/2022 at the Faculty of Medicine, Islamic University of North Sumatra.

Results

Table III shows the respondents' characteristics profile of the participants. Most of the participants were aged 20-60 years old (91.3%) and male (54.6%). In addition, the educational level of the majority was an elementary school (35.5%) and was mostly the medium socioeconomic category (65%).

As illustrated in Table IV, community participation in sanitation management was mostly in the medium (62.8%), followed by high (23.9%) and low (13.3%) categories. Statistical test-results in Table V obtained a *p*-value of 0.092 at 5% alpha which signifies that there is no significant difference in community participation in sanitation management based on low, medium, high, and very high socioeconomic status.

Table III: Frequency distribution of respondent's characteristics

Age	Frequency	Percentage (%)
Less than 20 years old	7	1.7
20 – 60 years old	378	91.3
More than 60 years old	29	7.0
Gender		
Male	226	54.6
Female	188	45.4
Education		
No school	43	10.4
Elementary school	147	35.5
Junior high school	115	27.8
Senior high school	93	22.5
University	16	3.9
Socio-economic status		
Low	94	22.7
Medium	269	65.0
High	43	10.4
Very high	8	1.9

Table IV: Frequency distribution of community participation in sanitation management

Community participation	Frequency	Percentage (%)
Low	55	13.3
Medium	260	62.8
High	99	23.9
Very high	55	13.3
Total	**414**	**100**

Table V: Kruskal-Wallis test results on the distribution of mean community participation in sanitation management

Community participation in sanitation management	N	Mean rank	*p*-value
Low	94	187.57	
Medium	269	215.31	0.092
High	43	209.95	
Very high	8	165.815	

Discussion

More than half of the research population participates substantially in sanitation management and fall within the low-medium socioeconomic status. This will have an impact on the delayed development of sanitation in

coastal regions. Slow CBSM progress will cause environmental problems to deteriorate, even though local community engagement may be leveraged to deliver monetary gains in the form of targeted development projects while also leading to higher social development for those impacted. Local community engagement is critical to ensuring access to safe drinking water and sanitation (Nkue Nouwezem & Tomićević-Dubljević, 2021).

Currently, many people do not care and are unaware of the facility provision related to basic sanitation aspects (Aksy *et al.*, 2021). The habit of throwing garbage in the river and not maintaining environmental sanitation has been carried out for generations by the community, thereby creating a slum impression on the environment around the river (Raimulan *et al.*, 2022). This is because the longer people live on the river border, the more it threatens the river's sustainability.

In a letter issued by the Minister of Health (2014), STBM consists of five pillars, namely 1) Stop open defecation; 2) Wash hands with soap (CTPS); 3) Safe Food and Drinking Water Management (PAMM-RT); 4) Household waste disposal site (PS-RT); and 5) Household Liquid Waste Management (PLC-RT). Due to all STBM programme activities being community-based, the community must try to establish latrines, and even fund their own. Moreover, it is also a challenge for health workers to act as intermediaries between the community and the government in implementing programmes to encourage the community to conduct self-assessments.

Sanitation development using a community empowerment approach with the CLTS method was originally developed by Khamal Khar in Sri Lanka. The Indonesian Ministry of Health in the STBM National Strategy Guidebook (2008) state that STBM is an approach to changing basic hygiene and sanitation behaviour by empowering the community through public awareness to access better sanitation facilities.

The economic level in this study is in line with other studies (Abidin *et al.*, 2021; Hasanah, 2021; Padati *et al.*, 2021). Low-income levels are generally insufficient to fulfil basic needs, therefore there is no ability to fulfil higher needs such as health care (Padati *et al.*, 2021). A high level of income allows the community to accommodate factors that support good sanitation. Most of the communities live in limitations and poverty, where the existing income is not able to cover the needs of daily life such as clean water and proper sanitation. This causes a low level of ability and willingness in the construction and maintenance of sanitation facilities (Wahyuni, 2021).

The behavioural habit of dumping garbage into the river if left unchecked will cause a decrease in aesthetics and the environmental carrying capacity, (Putri *et al.*, 2019) due to water pollution, diseases, and flooding. Based on several studies, some communities that experience limitations and poverty, have not fulfilled basic needs and sanitation (Riski, 2021).

Data from the local Province shows that 92% of villages still lack proper access to sanitation(Indonesian Ministry of Health, 2021). This shows that an improvement in environmental sanitation facilities and infrastructure will enable the community to change the conventional behaviour towards sanitation. Communities require motivation and support from various parties such as stakeholders, as they possess the authority and budget that can be allocated to support efforts to improve sanitation. Improving community environmental sanitation will also enhance community participation.

Generally, poor and inadequate access to sanitation will affect the level of community health. This is supported by Nafsiah (2012) who found that poor sanitation has a direct impact on children's health, such as the risk of diarrhoea, polio, skin diseases, and even other dangerous diseases.

Conclusion

Coastal communities' socioeconomic position is largely moderate (65%), and community engagement in sanitation management is mostly medium (62.8%), followed by high (23.9%) and low (13.3%) categories. The statistical test results revealed a *p*-value of 0.092 at 5% alpha indicating there is no significant difference in community engagement in sanitation management depending on socioeconomic status (low, medium, high, and very high). Therefore, the community requires motivation and support from various parties such as stakeholders necessary to create a good sanitation area.

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