Research article

Behavior model of community-based sanitation management in coastal areas: confirmatory factor analysis

Susilawati a,b, R. Hamdani Harahap c, Miswar Budi Mulya d,e, Lita Sri Andayani e

a Doctoral Program in Natural Resources and Environment Management, Graduate School, Universitas Sumatera Utara, Medan, North Sumatra, Indonesia
b Faculty of Public Health, Universitas Islam Negeri Sumatera Utara, Indonesia
c Faculty of Social and Political Science, Universitas Sumatera Utara, Indonesia
d Faculty of Mathematics and Natural Sciences, Universitas Sumatera Utara, Indonesia
e Faculty of Public Health, Universitas Sumatera Utara, Indonesia

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ABSTRACT

Background: The research aims to analyze the factors consisting of resident status, gender role, stakeholder roles, infrastructure, socio-cultural, and socio-economic that influence the community behavior in managing the sanitation of coastal areas.

Methods: A cross-sectional design obtained 504,955 households of family heads in the Percut Sei Tuan Subdistrict. The sample size was calculated using a category survey formula of 414 households. A simple random sampling technique was used, and the questionnaire instrument was tested for validity and reliability. The data were analyzed using CFA (Confirmatory Factor Analysis) to assess the factors that influence community behavior in managing sanitation.

Results: There was a socio-cultural relationship with the behavior of managing sanitation in coastal communities with a T-statistic value of 3.268. Furthermore, gender, infrastructure, and stakeholders’ roles influence the behavior of managing sanitation with a T-statistic value of 3.310, 3.573, and 2.263, respectively.

Conclusions: Socio-cultural practices require motivation and support from various parties in creating good sanitation areas. Therefore, support from stakeholders is needed to influence the achievement of certain goals. They have the authority and budget that can be allocated to support efforts and improve sanitation.

1. Introduction

Contrary to the Sustainable Development Goals (SDGs), coastal residential areas have a low level of environmental sanitation management [1] and do not receive better attention [2]. This problem will have an impact when the community behavior in sanitation management is very low [3]. The scope of sanitation management is personal hygiene, environmental sanitation consisting of residential sanitation, garbage, and clean water. According to research [4], unsafe water, sanitation, and poor hygiene are extremely dangerous and account for more than 10,000 deaths each year. The limited supply of clean water, latrines, wastewater disposal systems, landfills, and unhealthy housing are common portraits of coastal areas [5], including Indonesia.

The sanitation facility construction is relatively low and not commensurate with the population in coastal settlements [4]. Therefore, people defecate in the open or in rivers and drainage [6]. Community groups living in slums, poverty, and low education can exacerbate this condition [7]. Additionally, the lack of ownership of household latrines and sewerage (SPAL) without health requirements impacts health and aesthetics [1].

The quality improvement of drinking water, settlements, and national sanitation of Indonesia in accordance to SDGs standards showed that only 7.42% fulfill the qualifications for safe and equitable access. Moreover, there are still 25.42% who do not have access to proper sanitation, and 9.36% of them still defecate openly [8]. The most significant percentage of sanitation coverage is in coastal areas [9]. This shows that the people do not care about the cleanliness of their environment [10], therefore, it is vital to identify and develop formulations related to sanitation behavior [11]. Referring to previous research such as study on community participation models that were applied, namely Community based environmental health promotion program (CBEHPP) training in changing behavior to stop defecation, and training to local communities [12, 13]. Other research focuses

* Corresponding author.
E-mail address: miswarbm_bio@usu.ac.id (M.B. Mulya).

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on education and infrastructure development [14, 15, 16]. The previous research still has not connected the relationship between resident status, gender role, stakeholder roles, infrastructure, socio-cultural, and socio-economic on behavior in community participation.

Previous studies have focused on socioeconomic aspects that can influence the coastal community’s behavior in managing sanitation [17, 18, 19, 20, 21, 22]. However, several factors influencing environmental problems that cannot be carried out optimally are caused by the lack of community knowledge and awareness [23]. The Percut Sei Tuan coastal area is a community with a homogeneous religion, lifestyle, behavior, and characteristics. The people live around the sea area and utilize marine resources as the foundation of their life. Furthermore, the people’s daily needs revolve around the river due to the ease of access. In waste management, the community still collects the waste in front of the house and manages garbage by throwing it into the river. This habit has been passed down from generation to generation since their ancestors. Hanging latrines that are only covered with plastic and emergency washing stations are views along the river.

To solve public health problems, it is necessary to consider all aspects that influence the problem, not just health [24]. In this study, the aspects identified to be studied were demographic, socioeconomic, cultural, gender roles, facilities, infrastructure, and stakeholder roles related to behavior of Community-Based Sanitation management in coastal areas. Therefore, it is essential to conduct a confirmatory factor analysis (CFA) to obtain a comprehensive factor specializing in coastal areas. This is because improving sanitation behavior is a critical step to improving health status and the quality of human resources [25].

2. Design and methods

2.1. Design

A quantitative research method and cross-sectional design were used to analyze demographic, socioeconomic, cultural, gender roles, facilities, infrastructure, and stakeholder roles related to sanitation management behavior. The selection of this research design is to obtain basic data that has never been studied and develop it for the modelling stage.

2.2. Location and time

The research was conducted in the coastal settlement of Sei Tuan Sub-district, Deli Serdang Regency, North Sumatra Province geographical location is at 3.7 latitude and 98.7 east longitude, 3 m above sea level, with an area of 1,060 ha (Figure 2), from January 2021 to March 2022.

2.3. Research sample

The sample consists of the people living in the coastal settlement of Percut Sei Tuan Sub-district, Deli Serdang Regency, North Sumatra Province. It was calculated based on the mapping of the population in the sub-district office, and the area consists of 5 points. Respondents were taken based on the head of the family (father) or household members from the sample household (wife of the head of the family). The categorical survey formula determines the number of households (n). Similarly, the Z value for the confidence level was 95%, and 414 households were obtained.

2.4. Sampling technique

The sampling technique was accomplished by simple random sampling. Data collection used a questionnaire that has been tested for validity and reliability. All items from the research questionnaire to be carried out are valid (r table (0.3610 < r count each question), and reliable (Cronbach alpha value (0.9000) > 0.6). Furthermore, the respondent signed the informed consent while maintaining confidentiality.

2.5. Dependent variable

The dependent variable is the community behavior in managing environmental sanitation. This consists of knowledge indicators which are the results of scores on the community understanding level related to environmental sanitation management in coastal areas, consisting of 13 questions. (see Tables 1 and 2)

Attitude is a public perception related to environmental sanitation management. The questionnaires consist of 14 questions with answer options of SD (Strongly Disagree), D (Disagree), N (Neutral), A (Agree), and SA (Strongly Agree). Finally, action results from behavior applied daily by the community related to environmental sanitation management. The questionnaires consist of 11 questions with answer options of N (Never), R (Rarely), N (Neutral), O (Often), and VO (Very Often).

Table 1. Dependent variable questions.

| Variable | Questions |
|----------|-----------|
| Knowledge | 1. Are there any consequences that will occur when using river water as drinking water without being boiled? |
|          | 1.2. When should we clean the clean water reservoir |
|          | 1.3. What is the best type of latrine? |
|          | 1.4. How is a good sewerage? |
|          | 1.5. What is the best location for landfill? |
|          | 1.6. If you throw garbage into the river, what will be the impact? |
|          | 1.7. Before eating, the habits that must be done are? |
|          | 1.8. After defecating, what is the best course of action? |
|          | 1.9. Is bathing with river water good for health? |
|          | 1.10. Reusing waste such as bottles, using empty paper scraps, and others in the 3R is? |
|          | 1.11. Recycling waste, such as making fertilizer from wet food scraps, is a term in the 3Rs, namely? |
|          | 1.12. Reducing unnecessary items so they don’t become trash that pollutes the environment is a term in the 3Rs, namely? |
|          | 1.13. Open defecation can cause a disease? |

2. Attitude

| 2.1. I should have boiled the water before drinking |
| 2.2. I should have cleaned the clean water reservoir when I remember |
| 2.3. I think people should use gooseneck latrines for every household |
| 2.4. I think that using a septic tank to avoid soil contamination |
| 2.5. I should have disposed of waste water carelessly into the ditch/ditch |
| 2.6. I support closed SPAL to avoid environmental pollution |
| 2.7. I support throwing trash anywhere |
| 2.8. I don’t need a trash can in the house |
| 2.9. I think that it should be allowed to defecate into the river |
| 2.10. I suggest that people who throw garbage into the river be punished |
| 2.11. I think open defecation has become a tradition in the environment around where I live. |
| 2.12. I suggest the need for village regulations so that the community does not defecate indiscriminately. |
| 2.13. I think that defecating in any place is detrimental to health. |
| 2.14. I support the waste management program in the tourist environment |

3. Action

| 3.1. Use clean water for bathing, washing, and toilet needs |
| 3.2. Defecate into the river |
| 3.3. Clean the toilet after defecation |
| 3.4. Throw trash in the trash can |
| 3.5. Wash hands with soap after defecation |
| 3.6. Wash hands with soap when eating |
| 3.7. Drain household waste directly into the river |
| 3.8. Throw trash into the river |
| 3.9. Does defecating in the open provide the same comfort as defecating in the toilet? |
| 3.10. Getting socialization or education related to good waste management? |
| 3.11. Will you remind others not to throw trash indiscriminately? |
Table 2. Independent variable questions.

| Variable                  | Questions                                                                 |
|---------------------------|---------------------------------------------------------------------------|
| 1. Population             | 1.1. Resident status?                                                     |
|                           | 1.2. Length of stay in this area?                                        |
| 2. Socio-Economic         | 2.1. What do you do for a living?                                        |
|                           | 2.2. What is your average income in a month?                              |
| 3. Culture                | 3.1. Do you apply religious advice such as cleanliness as part of your faith? |
|                           | 3.2. Do you gather and discuss activities after praying at the mosque?    |
| 4. Gender Role            | 4.1. Is your wife (mother) given the opportunity and willing to make decisions in providing sanitation tools or equipment in the family? |
|                           | 4.2. Is your wife (mother) involved in program planning in the community related to the environment? |
|                           | 4.3. Is your wife (mother) involved in implementing programs in the community related to the environment? |
| 5. Facilities and Infrastructure | 5.1. Toilet availability?                                               |
|                           | 5.2. What is your clean water infrastructure?                            |
| 6. Stakeholder Role       | 6.1. The Role of Stakeholders                                            |
|                           | a. The role of the village head is to invite the community to participate in environmental sanitation management |
|                           | b. The activity of the village head to be involved in environmental sanitation management |
|                           | c. The activity of the village head in every meeting on environmental sanitation management |
|                           | d. Government policies related to environmental sanitation management in the place where you live |
|                           | e. Government cooperation (village head) in environmental sanitation management with the community |
|                           | f. Cooperation of community leaders in environmental sanitation management with the community |
|                           | g. Village head socialization regarding environmental sanitation management |
|                           | h. Contribution of the village head in supporting environmental sanitation management with the community |
| 6.2. The Role of Community Leaders | a. The role of community leaders to invite the community to participate in environmental sanitation management |
|                           | b. The activity of community leaders in every meeting on environmental sanitation management |
|                           | c. The activity of community leaders to be involved in environmental sanitation management |
|                           | d. Contribution of community leaders in supporting environmental sanitation management with the community |
| 6.3. The Role of Religious Figures | a. The role of religious leaders to invite the community to participate in environmental sanitation management |
|                           | b. The activity of religious leaders in every meeting on environmental sanitation management |
|                           | c. Are religious leaders involved in environmental sanitation management? |
|                           | d. Cooperation of religious leaders in environmental sanitation management with the community? |
|                           | e. Contribution of religious leaders in supporting environmental sanitation management with the community |

2.6. Independent variable

The independent variables are demographic, socioeconomic, cultural, gender roles, facilities and infrastructure, and stakeholder roles. For example, population variables consist of indicators such as length of stay (ratio) and status of residence (ordinal), socioeconomic variables consist of indicators of monthly income in rupiah (ratio) and employment status (nominal), socio-cultural variables consist of indicators of belief values (ordinal), and cultural norms (ordinal), gender roles consist of indicators of decision making (ordinal), involvement in planning (ordinal), implementation (ordinal), facilities and infrastructure variables consist of indicators such as the availability of latrines (nominal), and the availability of clean water (nominal). Finally, stakeholder role variables consist of indicators such as the role of government (ordinal), community leaders (ordinal), and religious leaders (ordinal).

2.7. Statistical analysis

Data analysis explains each variable's demographics and frequency distribution using CFA (Confirmatory Factor Analysis) in SmartPLS version 3. PLS-SEM is used where the supporting theory is still not developed so that PLS-SEM is an alternative approach. PLS-SEM, uses proxies to represent the constructs of interest, which are weighted composites of indicator variables for a particular construct [26]. This analysis was used to test the dimensional construct of the dependent variable or behavior. The accuracy of the CFA test is used for the validity and reliability of the indicators forming the construct of behavioral variables based on the previous theory. Therefore, the right indicators are obtained for compiling behavioral variables.

2.8. Ethics approval

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

3. Results

3.1. Portrait of the coastal community of Percut village

The local community is almost entirely of indigenous people with a reasonably long length of stay as indicated in Table 3. The indigenous people of the Percut Sei Tuan coast are residents registered with the population and civil registration office. In contrast, the immigrant population is residents who have just moved from another area and have not been registered. The cultural norms are the concept of gathering and discussing activities after prayer at the mosque.

Working as a fisherman is typical in coastal areas with very low incomes. However, culture related to values and norms is always firmly held by the surrounding community. Women play an excellent role in sanitation involvement, but the facilities and infrastructure are lacking. The role of the government, community and religious leaders is only marginally effective in mobilizing the community to maintain environmental sanitation (Table 3).

3.2. Coastal community sanitation behavior

On behavioral variables, people living in coastal areas still have very low knowledge, have poor attitudes regarding environmental sanitation, and act in a low range as described in Table 4 below.

Based on the CFA (Confirmatory Factor Analysis) analysis, the variables that simultaneously affect the sanitation behavior of coastal communities are gender roles, stakeholder roles, facilities, infrastructure, and socio-culture.

There are only two variables that have no significant effect on the sanitation behavior of coastal communities, namely population and socioeconomic (Table 5) (see Figure 1).

4. Discussion

Most research respondents are indigenous people in each coastal hamlet accounting for 89.1%, and only a few are immigrants from the area. The majority of respondents were in the group of 25–32 years as shown in Table 3. The coastal area of Percut Sei Tuan is located in the coordinate range of 3.288.555354 m, latitude 3.7086403°, and longitude 98.777597° with the name Bandar Sidoras river (Figure 2).
Table 3. Identification of factors associated with sanitary behavior.

| Variable       | Indicator            | Frequency | Percentage (%) | 95% CI          |
|----------------|----------------------|-----------|----------------|-----------------|
| Population     | Resident Status      |           |                |                 |
|                | Native inhabitants   | 369       | 89.1           | 85.8–92.0       |
|                | Immigrant            | 45        | 10.9           | 8.0–14.2        |
| Length of Stay | 1–8 years            | 39        | 9.4            | 6.5–12.6        |
|                | 9–16 years           | 26        | 6.3            | 3.9–8.7         |
|                | 17–24 years          | 75        | 18.1           | 14.8–22.2       |
|                | 25–32 years          | 89        | 21.5           | 17.9–25.5       |
|                | 33–40 years          | 75        | 18.1           | 14.7–22.1       |
|                | 41–48 years          | 53        | 12.8           | 9.5–16.2        |
|                | 49–56 years          | 26        | 6.3            | 4.1–8.9         |
|                | 57–64 years          | 22        | 5.3            | 2.1–7.2         |
|                | 65–72 years          | 7         | 1.7            | 0.7–3.0         |
|                | 73–78 years          | 2         | 0.5            | 0.0–1.2         |
| Socio-Economic | Occupation           |           |                |                 |
|                | Fisherman            | 191       | 46.1           | 40.8–51.2       |
|                | Farmer               | 4         | 1.0            | 0.2–1.9         |
|                | Laborer              | 3         | 0.7            | 0.0–1.7         |
|                | Housewife            | 101       | 24.4           | 20.3–28.9       |
|                | General employees    | 20        | 4.8            | 2.9–7.0         |
|                | Teacher              | 4         | 1.0            | 0.2–1.9         |
|                | Trader               | 91        | 22.0           | 18.4–26.0       |
| Income         | Very low             | 187       | 45.2           | 40.7–49.5       |
|                | Low                  | 172       | 41.5           | 37.0–46.1       |
|                | Moderate             | 41        | 9.9            | 7.2–12.8        |
|                | High                 | 6         | 1.4            | 0.5–2.7         |
|                | Very high            | 8         | 1.9            | 0.7–3.4         |
| Culture        | Trust Value          |           |                |                 |
|                | Never                | 8         | 1.9            | 0.7–3.4         |
|                | Seldom               | 27        | 6.5            | 4.3–8.7         |
|                | Sometimes            | 70        | 16.9           | 13.3–20.7       |
|                | Often                | 101       | 24.4           | 20.5–28.7       |
|                | Always               | 208       | 50.2           | 45.4–54.7       |
| Cultural Norms | Never                | 49        | 11.8           | 8.9–15.0        |
|                | Seldom               | 98        | 23.7           | 19.6–27.8       |
|                | Sometimes            | 67        | 16.2           | 12.8–20.3       |
|                | Often                | 69        | 16.7           | 13.1–19.8       |
|                | Always               | 131       | 31.6           | 27.1–36.5       |
| Gender Role    | Decision-making      |           |                |                 |
|                | Never                | 42        | 10.1           | 7.2–13.0        |
|                | Seldom               | 12        | 2.9            | 1.4–4.3         |
|                | Sometimes            | 20        | 4.8            | 2.9–7.2         |
|                | Often                | 110       | 26.6           | 22.8–31.2       |
|                | Always               | 230       | 55.6           | 51.0–60.6       |
|                | involvement in Planning |       |                |                 |
|                | Never                | 77        | 18.6           | 15.1–22.5       |
|                | Seldom               | 27        | 6.5            | 4.3–9.1         |
|                | Sometimes            | 30        | 7.2            | 4.7–10.0        |
|                | Often                | 88        | 21.3           | 17.1–25.6       |
|                | Always               | 192       | 46.4           | 41.8–51.0       |
|                | involvement in Implementation | | | |
|                | Never                | 85        | 20.5           | 16.7–24.3       |
|                | Seldom               | 22        | 5.3            | 3.5–7.5         |
|                | Sometimes            | 40        | 9.7            | 6.8–13.0        |
|                | Often                | 77        | 18.6           | 15.1–22.7       |
|                | Always               | 190       | 45.9           | 41.2–50.7       |

(continued on next page)
The behavior of the coastal community of Percut Sei Tuan behaves in throwing garbage into the river if it continues to be left unattended will cause a decrease in aesthetics and environmental carrying capacity can result in a low quality of settlements [27], and water pollution [28], causing disease and flood [29] (Figure 3). Based on several research, some poor residents have not been able to fulfill basic needs and sanitation [30, 31, 32, 33]. For example, catching fish for a long time prevents them from contributing to environmental sanitation. They only spend a short time at home and more time on the river or the sea [34].

This condition illustrates inadequate housing and sanitation, where the Bandar Sidoras river, which empties into the sea, is an integral part of their lives.

After further investigation, local culture (p-value \(= 0.001\)), gender (p-value \(= 0.001\)), availability of facilities and infrastructure (p-value \(< 0.001\)), as well as stakeholder roles (p-value \(= 0.024\)) are factors which influence participation in sanitation management. The value of trust focuses more on the religious aspect of the cultural variable. Cultural norms such as gathering and discussing activities after prayer are sometimes, rarely, and never compared to those who answer often and always as indicated in Table 5.

Culture influences sanitation behavior [35], and provides a style of experience for individuals in society [36]. It is a set of guidelines whose operational uses are humans adapting to and dealing with specific environments [37]. The sanitation development problem is a socio-cultural challenge [38, 39, 40, 41]. The cause is the community behavior accustomed to defecating in any place and throwing garbage into the river [42]. This happens because people in the unitary tribes with their respective cultural identities develop their systems [43]. As a result of the study, cultures that have poor values beliefs and norms cause knowledge, attitudes, and actions on bad things related to environmental sanitation.

| Variable | Frequency | Percentage (%) | 95% CI |
|---|---|---|---|
| Toilet Availability | Yes | 282 | 68.1 | 63.8–73.2 |
| No | 132 | 31.9 | 26.8–36.2 |
| Clean Water Infrastructure | Dug wells | 21 | 5.1 | 2.9–7.0 |
| Drilled wells | 158 | 38.2 | 33.6–43.0 |
| Public hydrant | 8 | 1.9 | 0.7–3.6 |
| Regional Drinking Water Company | 219 | 52.9 | 47.8–57.9 |
| Rainwater Storage | 7 | 1.7 | 0.5–3.0 |
| River | 1 | 0.2 | 0.0–0.7 |

Table 3 (continued)

| Variable | Indicator | Frequency | Percentage (%) | 95% CI |
|---|---|---|---|---|
| Facilities and Infrastructure | The Role of Stakeholders | Very low | 82 | 19.8 | 16.2–23.4 |
| | | Low | 49 | 11.8 | 9.0–15.7 |
| | | Moderate | 103 | 24.9 | 20.6–29.2 |
| | | High | 147 | 35.5 | 31.2–40.2 |
| | | Very high | 33 | 8.0 | 5.6–10.6 |
| | The Role of Community Leaders | Very low | 79 | 19.1 | 15.3–22.7 |
| | | Low | 80 | 19.3 | 15.5–22.9 |
| | | Moderate | 94 | 22.7 | 18.6–27.5 |
| | | High | 138 | 33.3 | 29.5–37.9 |
| | | Very high | 23 | 5.6 | 3.1–8.0 |
| | The Role of Religious Figures | Very low | 109 | 26.3 | 22.2–30.9 |
| | | Low | 48 | 11.6 | 8.7–15.1 |
| | | Moderate | 110 | 26.6 | 22.0–31.2 |
| | | High | 114 | 27.5 | 23.2–31.9 |
| | | Very high | 33 | 8.0 | 5.4–10.9 |

Table 4. Coastal community sanitation behavior.

| Variable | Frequency | Percentage (%) | 95% CI |
|---|---|---|---|
| Knowledge | Very low | 130 | 31.4 | 26.6–36.0 |
| | Low | 57 | 13.8 | 10.6–17.6 |
| | Moderate | 79 | 19.1 | 15.2–22.9 |
| | High | 120 | 29.0 | 24.6–33.5 |
| | Very high | 28 | 6.8 | 4.3–8.9 |
| Attitude | Very low | 68 | 16.4 | 12.8–20.2 |
| | Low | 165 | 39.9 | 34.8–44.8 |
| | Moderate | 102 | 24.6 | 20.6–28.5 |
| | High | 61 | 14.7 | 11.4–18.8 |
| | Very high | 18 | 4.3 | 2.4–6.4 |

| Variable | Frequency | Percentage (%) | 95% CI |
|---|---|---|---|
| Action | Very low | 6 | 1.4 | 0.5–2.7 |
| | Low | 15 | 3.6 | 1.9–5.8 |
| | Moderate | 181 | 43.7 | 38.9–49.0 |
| | High | 147 | 35.5 | 30.8–40.1 |
| | Very high | 65 | 15.7 | 12.3–19.1 |

Table 5. Confirmatory factor analysis.

| Relationship | \(\beta\) | SD | T Statistics | P values |
|---|---|---|---|---|
| Resident Status → Behavior | 0.061 | 0.042 | 1.447 | 0.149 |
| Gender Role → Behavior | 0.182 | 0.055 | 3.310 | 0.001* |
| Stakeholder roles → Behavior | 0.111 | 0.049 | 2.263 | 0.024* |
| Infrastructure → Behavior | 0.158 | 0.044 | 3.573 | 0.000* |
| Socio-cultural → Behavior | 0.166 | 0.051 | 3.268 | 0.001* |
| Socio-economic → Behavior | 0.006 | 0.044 | 0.146 | 0.884 |
Figure 1. Coastal community sanitation behavior model.

Figure 2. The coastal area of Percut Sei Tuan.
Such bad behavior often leads to river pollution [44], defecation in rivers [45], and lack of participation in environmental management [46].

Coastal areas are also subject to gender roles. Moreover, women's role in environmental sanitation control decision making is critical. Additionally, gender has a significant relationship with sanitation behavior [47] because women need better quality basic facilities [48]. Furthermore, women are fostering sanitation-related families as wives, household managers, and mothers (successors and educators of children), additional breadwinners, and community members [49]. Women interact directly with water activities and are also the dominant users in the household [50]. This is different from the coastal men, whose job is to find fish and fulfill economic needs [51].

In terms of facilities and infrastructure, most of the population in the coastal area have private latrines and toilets represented in 68.1% (Table 3). Communities who do not have facilities and infrastructure are in people who live on the banks of the river, in stark contrast to the people who live further from the river. However, people who live near the riverbank defecate into the river, while the rest borrow and use public toilet facilities. The dominant clean water infrastructure uses Regional Drinking Water Companies, drilled wells, and dug wells as described in Table 5. Several research also investigated the same thing that non-existent facilities and infrastructure led to poor behavior in maintaining environmental sanitation [52]. Therefore, facilities and infrastructure should be provided to prevent the community from defecating into the river [53]. Moreover, people who borrow and use public toilet facilities as well as other such infrastructure lack adequate public awareness of proper sanitation management. This leads to a lack of responsibility for the correct use of these facilities and infrastructure (Table 4).

Based on the primary data of Environmental Sanitation Percut Sei Tuan Sub-District, provided by Deli Serdang Health Service in 2020, clean water sources from drinking water companies are 1%, using drilled wells at 20%, dug wells at 25%, and using rivers at 54%. For latrine ownership facilities, 57% of communities do not have latrines, while 58% of wastewater sewers (SPAL) that do not meet health requirements are channeled directly into rivers, and 52% of waste is disposed in rivers [9]. Based on data from the Province of North Sumatra, there are approximately 92% of villages in the North Sumatra region with improper access to sanitation [54]. Therefore, improving the facilities and infrastructure of environmental sanitation will ease the community to have access to support the formation of behavior change.

Apart from these three variables, the role of stakeholders can influence sanitation behavior [55]. The three stakeholders explored in the coastal area are the government, community, and religious leaders. The role of government, according to respondents, is still in the low category with a percentage of 35.5. Furthermore, the role of community leaders according to respondents is in the low-category medium. The role of community and religious leaders is high and low at 33.3% and 27.5% as revealed in Table 5. Environmental sanitation behavior is low and also influenced by unsupportive stakeholders.

Communities need motivation and support from various parties to create good sanitation areas [56]. Stakeholders as groups or individuals can influence or be influenced by the achievement of certain goals, and they have the authority and budget to improve sanitation [57]. Therefore, improving community environmental sanitation can run well with the participation.

4.1. Limitation

This study focuses on factors that influence sanitation behavior in coastal areas with general aspects, where this research is limited to surveys, not intervention aspects. Therefore, this study does not discuss hygiene practices in more detail.

5. Conclusion

This research is designed to make a basic policy strategy for environmental sanitation problems based on behavior in coastal areas. Culture, gender roles, availability of facilities and infrastructure, as well as stakeholder roles are factors that influence sanitation behavior. Meanwhile, the most appropriate model of community sanitation behavior on the coast is the mutual empowerment of men and women's role with a cultural approach. This triggers sustainable behavior change and the participation of stakeholders to promote the community and monitor infrastructure in the “community-based total sanitation” program.

Declarations

Author contribution statement

Susilawati Contributed reagents, materials, analysis tools or data; Wrote the paper.
R. Hamdani Harahap: Conceived and designed the experiments.
Miswar Budi Mulya: Performed the experiments.
Lita Sri Andayani: Contributed reagents, materials, analysis tools or data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data will be made available on request.
Declaration of interest’s statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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