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Research Article

AN ASSESSMENT OF HEALTH AND SANITATION FACILITES IN VIZHINJAM COASTAL PANCHAYAT OF KERALA STATE BY USING GIS

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ABSTRACT

Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and faeces. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. The word 'sanitation' also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal. Lack of sanitation kills, it degrades health - especially that of children - and undermines education. It affects whole communities but consistently those most severely affected are the poor and disadvantaged. It is estimated that about 2.6 billion people lack sanitation worldwide. In Kerala, the prevalence of water and sanitation-related diseases are high, in the coastal belt and hilly regions of the state. The paper aims to analyse the lack of basic amenities, high population density and poor sanitation are the acute problem in the study area. As a social problem, Sanitation and water availability are crucially important to human health and well being, and their indispensable role as engine to the regional development. This study will attempt to analyze the sanitation status and the spatial distribution of available health facilities by using GIS.

Keywords: Sanitation, deterioration, human health, coastal belt, pathogen load, communicable diseases ,households, periphery, fish catch, municipality, hygiene, commercial activities, Diarrhea ,magnititude.

INTRODUCTION

The term “Sanitation” not only refers to construction of latrines but it also includes the whole field of managing the living environment with a view to prevent diseases and promote health. The standard of living of people has changed drastically over the past 10 years, which have lead to new problems such as lack of better housing facilities and deterioration of natural resources. The demographic change and the rapid urbanization have acted as a catalyst in accentuating this problem. By providing healthy environment and healthy sanitation facilities the problems can be solved to an extent (Park,2007).

There is a positive co-relation between sanitation and incidence of diseases. .By providing a sanitation barrier the rate of recurrence of the diseases can be controlled to a large extent. Sanitation barrier includes construction of latrines and personal hygiene. Proper sanitation not only improves health but it also provides secondary benefits such as increasing school attendance and in the empowerment of women (WHO 2004). Water and sanitation improvements affect health primarily by interrupting or reducing the transmission of disease agents. This occurs through a variety of mechanisms. Of primary importance is the safe disposal of human feces, thereby reducing the pathogen load in the ambient environment. Increasing the quantity of water allows for better hygiene practices. Raising the quality of drinking water reduces the ingestion of pathogens. With less disease, children can eat and absorb more food, thereby improving their nutritionalstatus(.Aravindan, K. P,1989)

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OBJECTIVES

The over all aim of this study is to understand the sanitation facilities, incidence of communicable diseases and to find the occurrence of health problems in Vizhinajm Panchayat. The objectives of the study are:

- To evaluate the current sanitation facilitates in different wards of Vizhinjam Panchayat
- To assess the facilities provided by the Non Governmental Organization (NGO) and the government for improving the sanitation and reducing the incidence of communicable diseases.
- To investigate the disease incidence rate in different wards
- To examine the association of health problems with the current sanitation facilities.

METHODOLOGY AND DATA COLLECTION

For fulfilling the above mentioned objectives the following methodology was adopted. Primary data was collected through field survey with the means of structured questionnaire survey. Stratified Random sampling was used for this purpose. Out of 20 wards, 10 were selected on the basis of their proximity to sea. They were classified into coastal wards (less than 500 meters from sea), central wards (500-1000 meters from sea) and periphery wards (more than 1000 meters from sea).From the selected 10 wards, 5 % of the total households was surveyed. Questions relating to sanitation behavior, i.e. toilet and bathing facilities and practices, waste water and solid waste practices, awareness level of people, and basic health facilities and their health status were surveyed. Women were chosen for the survey because they know more details pertaining to households.

Secondary data was collected from Census office, Kerala Water authority, Panchayat office, Economics and Statistics Planning and Land use board. The collected data through questionnaire survey was analyzed in SPSS (Statistical Package for Social Science) using simple analysis. Total mean was calculated and was plotted using appropriate cartographic technique-Comparative analysis.

Ward wise data was obtained and different thematic maps were prepared. ARC GIS was used to prepare various thematic maps to full fill the given objectives. For the purpose of data collection, stratified random sampling was taken. Wards in Vizhinjam panchayat was divided into coastal, central and periphery wards based on their proximity to sea. Out of 20 wards 10 wards were selected, 5 % of the sampled household was surveyed for conducting the analysis and to understand community's sanitation behavior. Primary data has been collected through household survey and by interviewing the representative sample households. Women were chosen for sampling because they know more about the households.

ANALYSIS OF SOCIO-ECONOMIC DATA IN THESTUDY AREA

The location of the study area is between the latitude 8 º 21'9'' to 8º 23 '9''North and 76 º 58'5'' to 77 º 1'0.7''E longitude. The panchayat is situated along the Vizhinjam Harbour which is on the western side of Thiruvanathapuram city (16 kms away from the city). The panchayat covers an area of 12.62 sq.km.with population density of 3361 persons and has 8094 households (2001 census).Total population of the area is 47170 which consist of 23922 females and 23248 males .

Out of total 215 houses surveyed, about 14 % women had no schooling and 84 % women had access to education primary schooling and more. 60 % of men were engaged in fishing and its allied activities, 20% were collies, 16% were working in gulf countries and the rest of 5 % were working in private firms. The average family size is found to be 6 and the average family income was found to be less than Rs.1500/- per month. Since most of the respondents were engaged in fisher related activities. It was found in the field survey, that there earnings mainly dependent upon the fish catch and it differed from Rs.500/- to Rs.5000/- per day.

Status of Coastal wards-The main occupation of people is fishing. The monthly income is less than 1500. The fisher community settlements are largely high-density hutments with total lack of sanitation and hygiene. The fishers predominantly depend of firewood and combustible sold-waste (plastics, paper, etc.) to meet their cooking energy needs. The huts are poorly ventilated and smoke is a common cause for ill health and discomfort. The women are involved with domestic responsibilities, besides processing and drying fish and door-to-door sales of fish in nearby towns. The men are either at sea fishing or working as part-time labourers in the harbour. Water is manually hauled from wells and there is seasonal availability of water from Town water supply.(During the summer, season water taps water is only available once in 6 days). This water is used predominantly for household purposes. Drinking water is purchased from water tankers (private providers).The water is taken from Vellayini Lake which is situated 12 kms from Vizhinjam. The tanker lorries provide drinking water for these areas they come in two shifts i.e. twice in two days. They use this water for drinking and cooking. People store their water in pots (1 pot can approximately hold up to 15 litres of water) or in tanks.. This water if kept more than two days mud residue can be seen at the bottom of the vessel. As a result, they buy water for the daily use. The stored water is often a breeding spot for mosquitoes. Water for personal hygiene and washing clothes and utensils is procured from shallow wells or water-points provided by the local municipality.

Sanitation and proper hygiene in the area are non-existent; the men and children prefer to squat along the sea-shore. In the morning hours, also do the same and they go in a group, but at other times women prefer to use pay-and-use toilets situated outside the fishing harbour. Though accessing such facilities is inconvenient (nearly300 m from the hutments) the women find it a safer option. Pay-and-use toilet facilities for men have been unsuccessful.

Household wastes are generated into 2 types- wastewater from bathrooms and toilets and solid waste. All waste is dumped into open pucca drains that run along the sides of the street and which leads to the sea shore. Fish-waste is a serious concern for the local fishers and no-mechanisms exist for their cost-effective and environment friendly handling and disposal. These areas also receive hinterland-based pollution, viz., discharge of raw sewage and dumping of solid-waste. There is a requirement for strong scientific intervention in providing a sanitation package for coastal settlements that address the safe handling and disposal of fish-waste and accessible, hygienic sanitary facilities for women and children in particular.

Central and Periphery wards- The sanitation scenario changes as one move away from the coast. In the central and periphery wards, the buildings vary from thatched, tiled and concrete. The men are mostly masons and farmers. Women look after the house and children but they are also engaged in allied activities such as dairy farming or weaving. All households in this zone kept livestock. The density of people living along the periphery wards is less compared to that of coastal wards. Most of the houses have adequate sanitation facilities. Water is manually drawn from a well or from town supply. They use well water for drinking and cooking purposes.

Sanitation and proper hygiene facilities are better in these areas. Each house has their own toilet but bathroom facilities are not available. They have no proper solid waste disposal techniques but the grey water is collected in open pucca drains leading into the sea. Usually it gets clogged and puddles of grey water can be seen along the roads. In some of the residential areas, the drains are closed with cement slabs. Most of the drains have been connected with individual houses without gully pits .As a result, during the rainy season, there is mixed flow in the sewers. Although the streets are swept on a daily basis by the residents, the garbage is not removed, causing foul smell and serves as a breeding ground for mosquitoes and rodents.

COMPARITIVE ANALYSIS OF WARDS FOR ASSESSING THE SANITATION FACILITITES

Sanitation facilities and practices - The first category for assessing the sanitation facilities in Vizhinjam panchayat is sanitation itself. It consists of 10 factors which poses questions such as access to latrine facility, to their practices in their day to day life. Coastal ward has low mean of 15 followed by central and periphery wards which has mean of 16.Means of different factors of sanitation facilities and practices are given below

Table1

Sanitation facilities and practices	Coastal wards	Central wards	Periphery wards
Access to latrine facility	1.13	1.3	1
Type of latrine facility	1.81	1.59	2
Specify which type	1.05	1.16	1.1
Frequency of cleaning toilets	2.45	3.05	2.1
Disinfectants used	1.69	2	2.1
Children use of toilets	1.54	1.58	1.28
Current sanitation facilities	2	1.55	2.15
Use of slippers	1.06	1.14	1.16
Children defecate in open	1.22	1.27	1.57
Latrines located water source	1.48	1.55	1.22
TOTAL MEAN	15	16	16

Bathing facilities and practices

For assessing sanitation facilities, communities' personal hygiene practices are also considered- bathing practices and facilities throws light into their daily hygiene practices. Bathing facilities and practices, which forms the second category is calculated with the help of 8 factors ranging from the accessibility and type of bathroom facility and their daily practices of men, women and children. Coastal wards depict a low mean of 11 where as periphery and central wards shows mean of 13 each. Table explains means of different factors under Bathing facilities and practices:

Table2

Bathing facilitates and practices	Coastal wards	Central wards	Periphery wards
Access to bathroom facility	1.13	1.73	1.71
If no specify	2.5	1.85	1.97
Separate structure	1.02	1.26	1.4
Water source	2.35	3.27	2.74
Bathing frequency men	1.21	1.52	1.66
Bathing frequency women	1.37	2.29	1.93
Bathing frequency children	1.14	1.52	1.69
TOTAL MEAN	11	13	13

Water availability

The third and the most important category affecting the sanitation facilitates of Vizhinjam panchayat is water availability in the area. Coastal wards shows a low mean of 10 followed by periphery wards having a mean of 11 and central wards having mean if 13. Central wards are a hub of transport and communication activities and the commercial activities of fishing and its allied activities being concentrated around central wards provided with adequate water facility. Commuter population is mainly dominating around these areas and shops and other business are found around central wards. Means of different factors pertaining to Water availability are described below

Table3

Water availability	Coastal wards	Central wards	Periphery wards
Source of drinking water	1.24	2.75	3.65
Many litres of water per day	1.84	1.73	1.54
Drinking water good	1.17	1.16	1.31
Treat drinking water	1.75	2.24	2.27
Water storing facility	1.24	1.14	1.14
Frequency of cleaning water storing facility	2.27	2.07	1.92
TOTAL MEAN	10	11	13

Awareness Level of People

Awareness level of People was included in assessing the sanitation facilities because the mindset of the people also plays an important role in their day to day practices. Fourth category defining sanitation facilities are the awareness level of people which in turn plays an important role in determining the rest of the categories. Awareness level of people was assessed through questions pertaining to their daily habits and about the health facilities available in the area and by their knowledge of certain alignments. Coastal and central wards have a low mean of 12 each where as periphery wards showed a slight increase in mean of about 13.The following table describes the means of different factors coming under Awareness level of people:

Table4

Awareness level of people	Coastal wards	Central wards	Periphery wards
Wash their hands	1.36	1.51	1.02
Health Centres	1.54	1.67	1.4
Preventive medicine	1.46	1.59	1.86
Awareness classes	2.11	1.8	2.21
Funds from government agencies	2.27	2.53	2.63
Funds from Ngo's	1.82	1.69	2.24
Spit in open	1.06	1.1	1.02
TOTAL MEAN	12	12	13

Solid and wastewater disposal

Solid and waste water disposal is one of the main factors affecting the sanitation facilities. The results also establish these facts the coastal wards have a mean of about 11 followed by periphery wards 16 and central wards 18. Along periphery wards people had open pits and enough space for the storm drain where as in central wards most of the storm drains were closed with cement slab and the accessibility to coast makes it easier for dumping the wastewater along shorelines. The table given below gives a detailed data of means procured by each factor under Solid and waste water disposal

Table5

Solid and waste water disposal	Coastal wards	Central wards	Periphery wards
Grey water drained	1.01	1.12	1.03
Proper draining for rain water	1.47	1.41	1.44
Biodegradable	1.13	3.51	2.83
Non degradable	1.64	3.35	2.71
Medical waste	1.06	3.35	2.67
Wastewater in human contact	1.13	1.25	1.25
Wastewater polluting drinking water	1.64	1.51	1.81
Water logged areas near settlement	1.06	1.1	1.13
Presence of mosquitoes	1.03	1.12	1.11
TOTAL MEAN	11	18	16

Health problems

Health problem is an outcome of the above given factors-Sanitation and bathing facilities, Solid and Wastewater Disposal, Water Availability and Awareness level of People. Health problems were an insight in the common alignments affecting the people in Vizhinjam Panchayat. Since data pertaining to health problem was unavailable

health problems mainly concentrated on the aliments found during the survey time and it does not show any time periods. A low mean of 8 was found in coastal wards followed by central and periphery wards having a mean of 9 and it's given in detailed in the table below.

Table6

Health problems	Coastal wards	Central wards	Periphery wards
Incidence of fever	1.56	1.57	1.54
Cough-prolongers	1.55	1.65	1.54
Incidence of Diarrhea	1.77	1.84	1.94
Stomach Pain or Abdominal Pain	1.65	1.65	1.81
Urinary Infection	1.88	1.9	2
TOTAL MEAN	8	9	9

Source of data: Vizhinjam Panchayat Office and Health Centre - 2012

Analysis of wards for vizhinjam panchayat

Qualitative Comparative Analysis (QCA) is a technique, developed by Charles Ragin in 1987, for solving the problems that are caused by making causal inferences on the basis of only a small number of cases. .Comparative analysis answers questions about how and why a system will react to perturbations of its parameters. A comparative analysis on the driving factors which influence the sanitation facilities helped in analyzing the worst affected wards. The following figure shows the relative magnititude of each factor in the coastal, central and periphery wards.

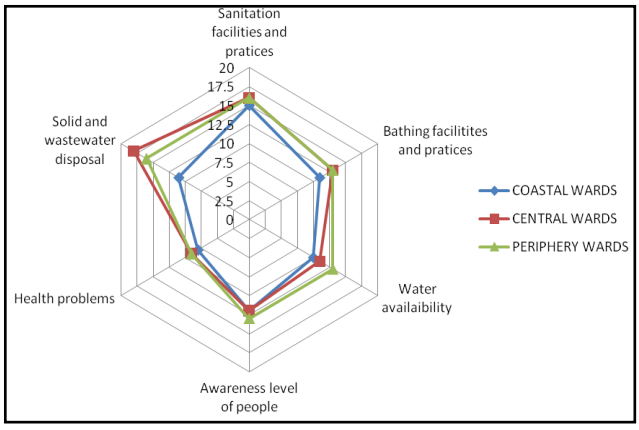
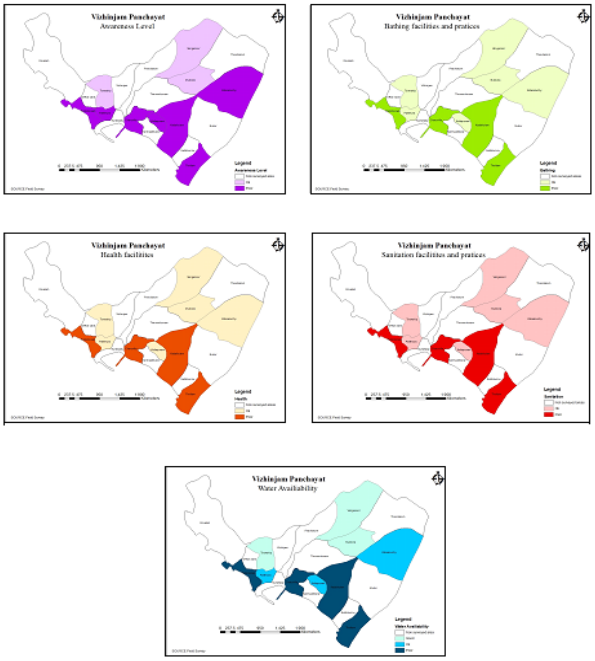


Figure1: Comparative analysis of factors

Coastal wards have shown low mean for solid and waste water disposal, sanitation practices and facilities, Bathing practices and facilities, water availability and health problems. This area is in urgent need for intervention for a healthy community with healthy people, so sanitation facilities should be addressed. Awareness level of people is same as those of central wards but the awareness level itself is not enough for a healthier community. The communities in accessibility to these socio-economic factors affecting sanitation should be provided. In central wards the magnitude of each factors is seen more or less equivalent to coastal and periphery wards. Awareness level of people is on par with the coastal wards where as all other factors are having value near to the periphery wards. In periphery wards water availability is the major deciding factor for sanitation facilities, this mainly implies the pipe water from municipality. Most of the houses have access to open wells. Since this questionnaire was collected in April-May the hottest month water scarcity seemed to be the major problem affecting the people along these wards.



Comparative thematic maps showing sanitation and its influencing factors using GIS

Figure 2

CONCLUSION

This paper concludes the worst affected ward through simple analysis by calculating the mean of respondents' .Data was collected through field interview from a structured questionnaire. The questionnaire was prepared and collected in April-May hottest month of the year. This analysis is based on the hypothesis that means of each ward and their values for each variable under each factor is examined to examine relationship between the six factors Sanitation facilities and practices, Bathing facilities and practices, Solid and wastewater disposal, water availability, Awareness level of people and Health problems affecting sanitation assessment and wards (Coastal, central and periphery wards).Thus, means for each wards for individual variables was calculated. Means of respondents showed a direct relationship with the wards from coastal to periphery wards. The values were plotted in comparative analysis. Coastal wards (Thottam, Kadaikulam, Charuvilla and Pullorkonam) revealed low mean for solid and waste water disposal, sanitation practices and facilities, Bathing practices and facilities, water availability and health problems. Awareness level of people was more or less same in all the wards.

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