

# DESIGN OF A MOBILE ISOLATION, DIAGNOSIS AND TREATMENT UNIT FOR USE IN CHOLERA EPIDEMICS



## Type of disease: "CHOLERA", potentially a public health concern in Bangladesh

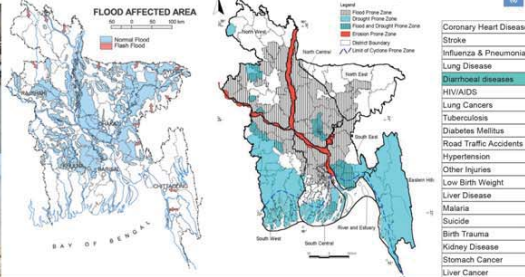
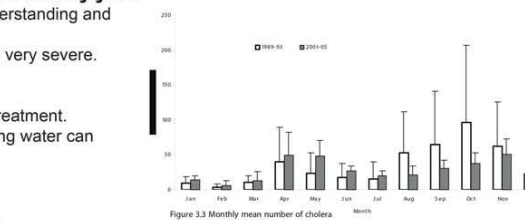
Cholera is an acute diarrhoeal infection caused by ingestion of contaminated food or water and affects children and adults. It can kill in a matter of hours due to rapid dehydration.

**Cholera remains a major public health problem in many low income countries with poor access to safe water and proper sanitation, including Bangladesh. Especially during monsoon season flood causes acute scarcity of pure drinking water in the affected areas. People drink contaminated water and falls victim to cholera almost every year.**

some key facts can make a difference in understanding and controlling the disease:

- Cholera is not ordinary diarrhea and can be very severe.
- Death can come very quickly.
- Early medical care saves lives.
- Oral rehydration solution is key to cholera treatment.
- Adding chlorine to drinking water and cooking water can prevent cholera.

A number of studies have shown that epidemic outbreaks in Bangladesh usually occur twice during a year, with the largest number of cases occurring during September to December, just after the monsoon. A somewhat smaller peak of cholera cases is also observed in the spring between March and May.



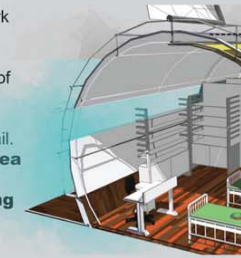
## Problems faced by cholera affected people



- there is scarcity of pure drinking water as deep tube wells go under contaminated water.
- people are forced to drink contaminated water and fall victim to cholera and diarrhoea that spreads as epidemic.
- Patients can't reach hospital as roads and streets go under water.

## Type of vehicle: Boat Boat will work best for the mobile unit in the flood affected areas

- Bangladesh is a Maritime country with vast network of inland waterways.
- Being a country with many rivers, Inland Water Transport (IWT), is a major mode for the transport of goods and people.
- IWT is important for the poor as well as it is the cheapest mode of transport compared to road or rail.
- **boat will safely reach to any affected area and units within it will give primary treatments as well as supply pure drinking water.**



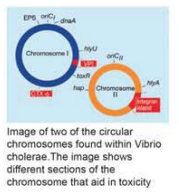
Traditional boats of Bangladesh



**Name of disease: Cholera**  
**Type of disease: Water borne**  
**Type of transport: Boat**  
**Air handling system: Natural**

## Cholera : It's nature & transmission path

**Vibrio cholerae is responsible for approximately three to five million cases and an estimated 1,20,000 deaths per annum worldwide.** more than 200 serogroups (O1–O200) of Vibrio cholerae exist in aquatic environments. Only a subset of O1 and O139 serogroups are toxigenic (Tox+) and therefore capable of causing cholera when ingested; Other strains are non-toxicogenic (Tox-)

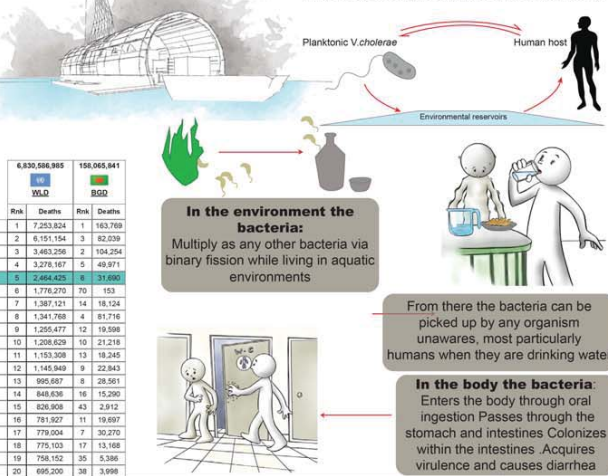


**General Description:** Vibrio cholerae are facultative anaerobes that are bacilli shaped and have one flagellum. Additionally the bacteria are Gram negative, containing a thin layer of peptidoglycan that comprises the cell wall.



## Life Cycle

The life cycle of Vibrio cholerae has two stages; an in-the-body stage and an in-the-environment stage.



**In the environment the bacteria:**  
Multiply as any other bacteria via binary fission while living in aquatic environments

From there the bacteria can be picked up by any organism unaware, most particularly humans when they are drinking water

**In the body the bacteria:**  
Enters the body through oral ingestion Passes through the stomach and intestines Colonizes within the intestines. Acquires virulence and causes diarrhea

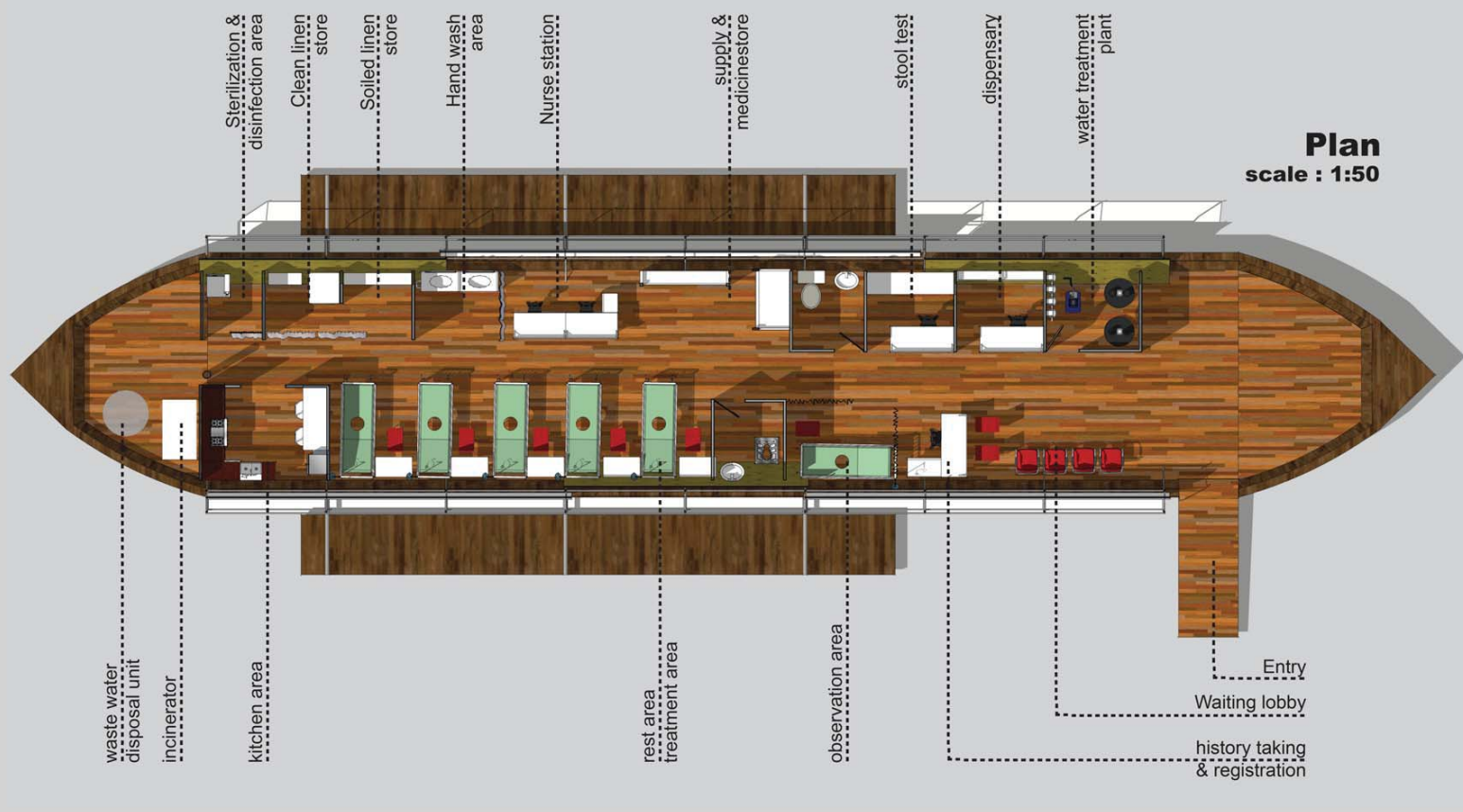
Concept

- Relieving people from Cholera.
- supply pure drinking water during cholera epidemic.
- our health facility will provide a solution to those suffering from cholera epidemic and are destituted in the flood affected area.

Because it is in these times when our people are most vulnerable and unable to get any health service.



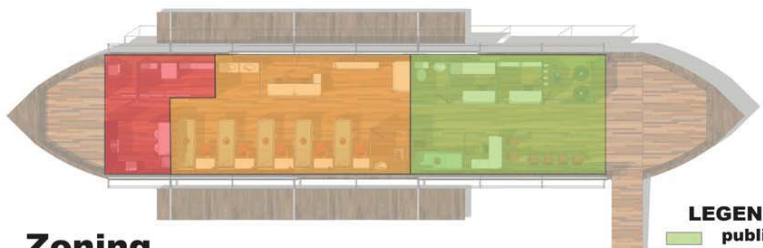
Axonometric view of interior arrangement



**Plan**  
scale : 1:150

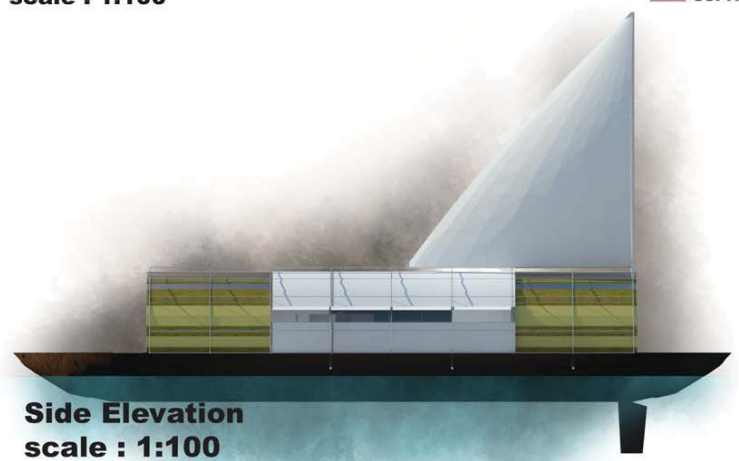
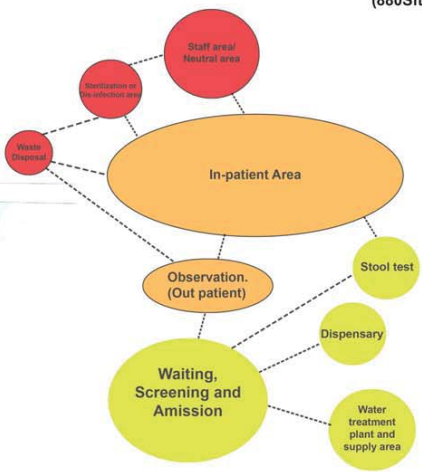
**Program analysis**

1.Waiting Screening and registration.....	13sq.m.	(140Sft.)
2.Observation. (Out patient).....	6Sq.m.	(65 Sft.)
3.Dispensary .....	2.9Sq.m.	(32Sft.)
4.Stool test .....	2.9 Sq.m	(32 sft)
5.In-patient area .....	36.04 Sq.m	(388Sft.)
6.Staff area/Neutral area.....	9 Sq.m.	(97Sft.)
(kitchen,laundry,supplies,store)		
7.Waste Disposal.....	1.3Sq.m.	(14 Sft.)
8.Sterilization or Dis-infection area.....	1.6 Sq.m.	(18Sft.)
9.Water treatment plant and supply area.....	3.06 Sq.m.	(33Sft.)
<b>Total.....</b>	<b>81.7Sq.m.</b>	<b>(880Sft.)</b>



**Zoning**  
scale : 1:100

**LEGEND**  
■ public  
■ private  
■ service



**Side Elevation**  
scale : 1:100



Light weight steel frame

Wind resistive sustainable cladding

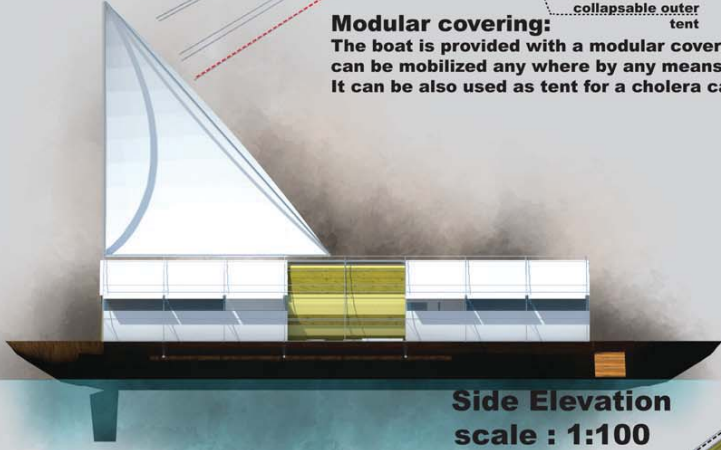
collapsible outer cover made of polyester/canvas

Light weight steel

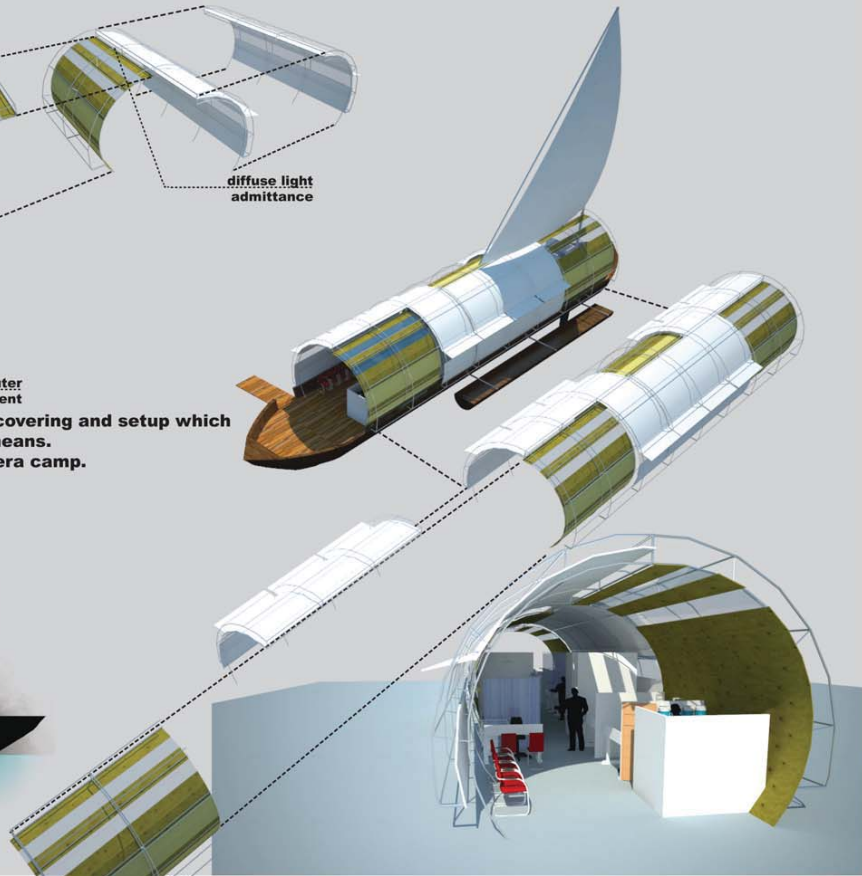
collapsible outer tent

diffuse light admittance

**Modular covering:**  
The boat is provided with a modular covering and setup which can be mobilized any where by any means. It can be also used as tent for a cholera camp.



**Side Elevation**  
scale : 1:100



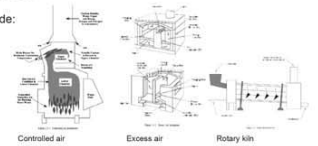
**Waste Management & Treatment**  
Medical Waste Incineration

Medical wastes include both infectious medical wastes as well as non-infectious, general housekeeping wastes.

Three main types of incinerators are used:  
-controlled air,  
-excess air,  
-and rotary kiln.

Of the incinerators identified in this study, the majority (>95 percent) are controlled air units. A small percentage (<2 percent) are excess air. Less than 1 percent were identified as rotary kiln. The rotary kiln units tend to be larger, and typically are equipped with air pollution control devices. Approximately 2 percent of the total population identified in this study were found to be equipped with air pollution control devices.

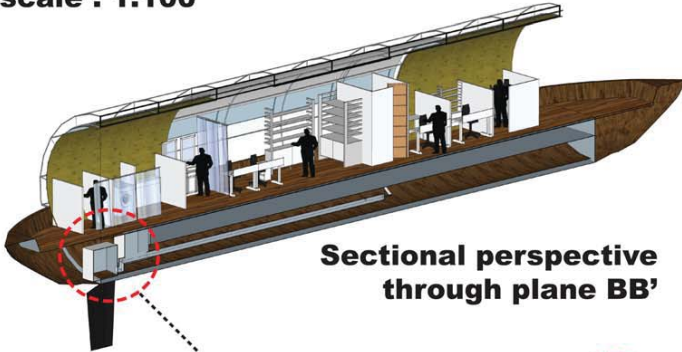
Types of incineration include:  
- Controlled air,  
- Excess air, and  
- Rotary kiln.



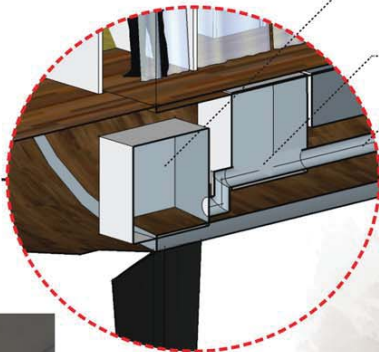
**Emergency Wastewater Treatment**  
In a Cholera Treatment Unit



**Section AA'**  
scale : 1:100

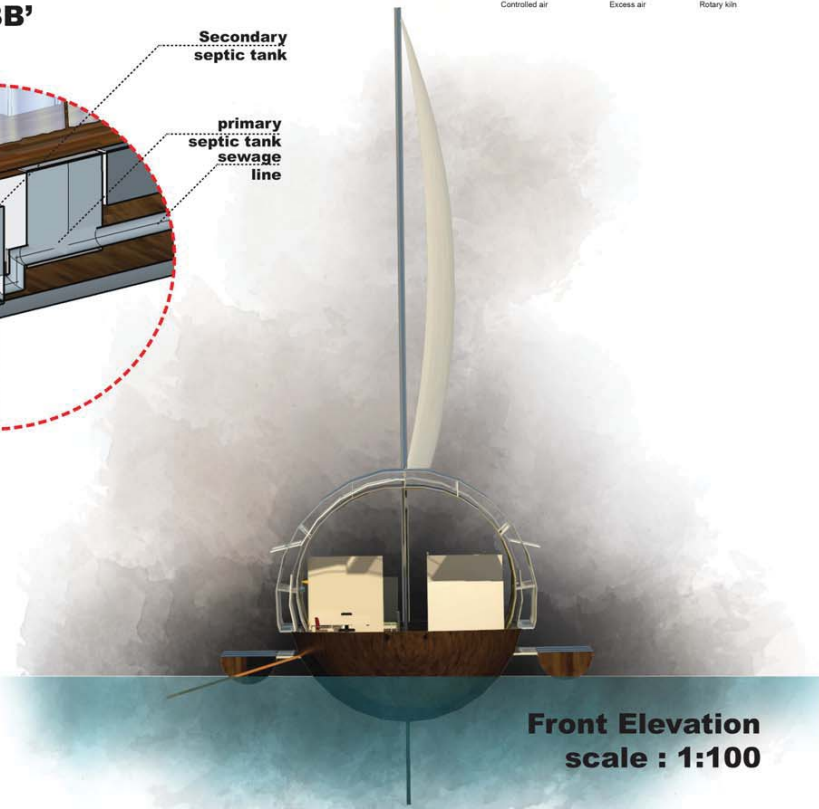
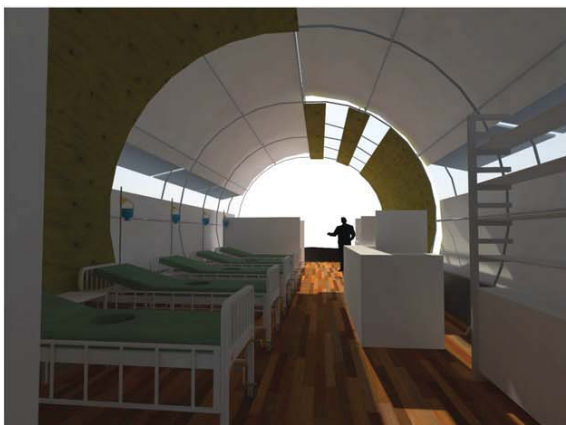


**Sectional perspective**  
through plane BB'



Secondary septic tank

primary septic tank sewage line



**Front Elevation**  
scale : 1:100