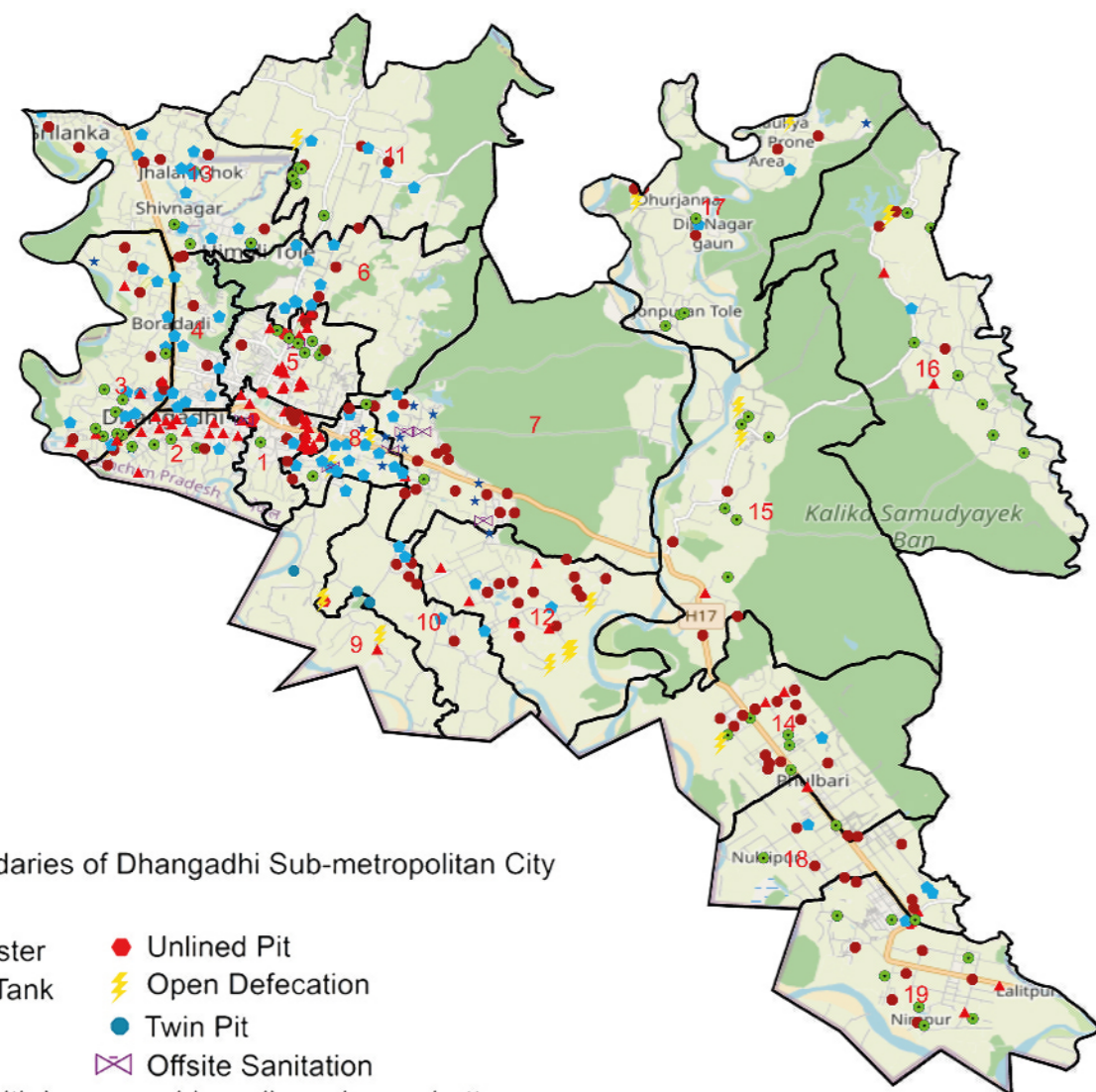


The SFD Promotion Initiative recommends preparation of a report on the city context, the analysis carried out and data sources used to produce this graphic. Full details on how to create an SFD Report are available at: [sfs.susana.org](http://sfs.susana.org)

### Sanitation technologies installed in household levels



## About

Under Municipalities Network Advocacy on Sanitation in South Asia II (MuNASS II) program, a study on situational status of Faecal sludge management in the city was carried out at 65 municipalities of Nepal along with development of intermediate level Shit Flow Diagrams (SFD) of the cities.

## Objective of the study

The main objective is to understand the current FSM status of the municipality and produce evidence-based data and information for effective FSM planning and other interventions.

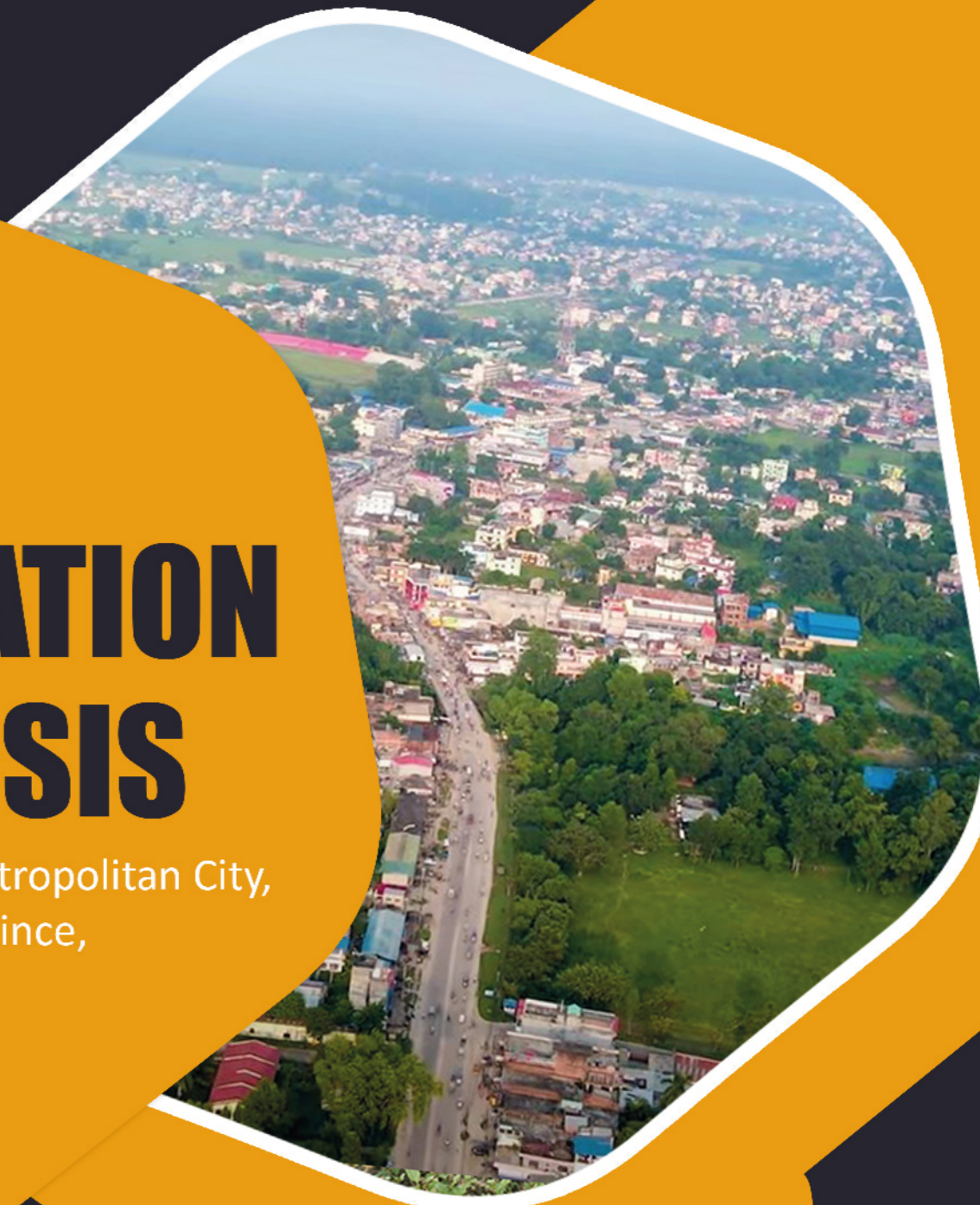
## Methodology of the study

A random questionnaire survey was conducted at household and institutional buildings using KOBO mobile application. Local enumerators selected by municipalities were mobilized for the survey. The enumerators were deployed after two days intensive training on conducting survey and collecting data from questionnaire set. The data and information were then organized and analysed computing frequency distributions; means and cross tabulations.



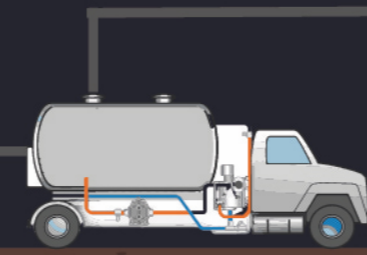
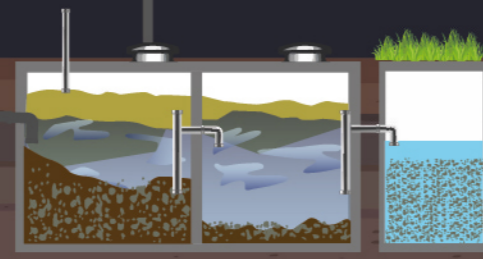
# CITY SANITATION SYNOPSIS

Dhangadhi Sub-Metropolitan City,  
Sudurpaschim Province,  
Nepal-2022



## City Profile

Dhangadhi Sub-Metropolitan City, located at the Southern belt and western part of Nepal, has 19 wards. It has a total population of 147,741 (73,462 males and 74,279 females) as per 2011 census.



संकलन  
(User Interface)

अण्डारण  
(Containment)

रिट्याउने र ढुवानी  
(Emptying & Transportation)

प्रशोधन  
(Treatment)

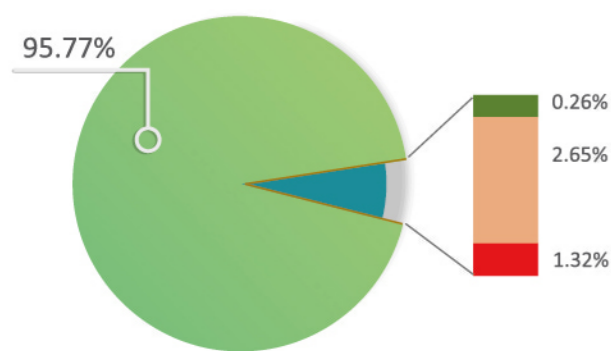
पुनः प्रयोग वा सुरक्षित विसर्जन  
(Re-use or Safe Disposal)

Sanitation service chain (SSC) is a descriptive service framework that describes the flow of waste from the point of excreta generation to final disposal. It includes five major stages i.e., capture (User Interface), containment, emptying and transport, treatment, and reuse/safe disposal.

## User Interface



User interface facility, also termed as capture or toilet, is the initial stage where waste generation takes place. The major objective of the user interface is to collect waste safely and convey to following stages of SSC. User interface facilities were studied under four categories i.e., Individual, Shared, Public and Open Defecation. In Dhangadhi Sub-Metropolitan City, 96% of the households have access to improved sanitation facility. Remaining 3% and 1% of households use shared toilet and defecate at open spaces. The city does not have sewer network although about 2% of households practice unauthorized direct discharge of effluents from their toilets into stormwater drainage.

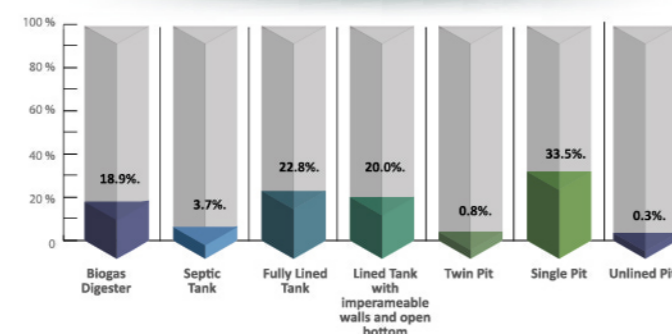


Yes  
Neighbour's Toilet  
Community/Shared Toilet  
Open Defecation

## Containment

The excreta captured in the toilet requires proper storage and transportation to avoid environment pollution as well as protect public health. The facility used for storage is termed as containment which could be safe and unsafe, and the waste thus stored is called faecal sludge. Septic tank, Biogas Digester, Eco-San Vault, Twin Pits are commonly considered as safe containments while single pit and holding tanks, which have permeable surface and no outlet, are generally taken as unsafe. Safe containment is essential to protect the environment and public health. Generally, a septic tank is recommended as safe containment particularly for urban areas while other containments are mainly feasible in rural or peri-urban context. In the city only 3.7% of households have proper septic tank. Interestingly, major share of containment is single pit, biogas digester and holding tank out of which biogas digester is only the safe containment. The holding tank and single pit is technically similar technologies as both allows percolation of leachate during the storage potentially contaminating the groundwater (contamination of groundwater is specific to local hydrogeology). Remarkably, significant households have connected the toilet waste to biogas digesters designed to manage household organic solid waste as well and generate alternative energy.

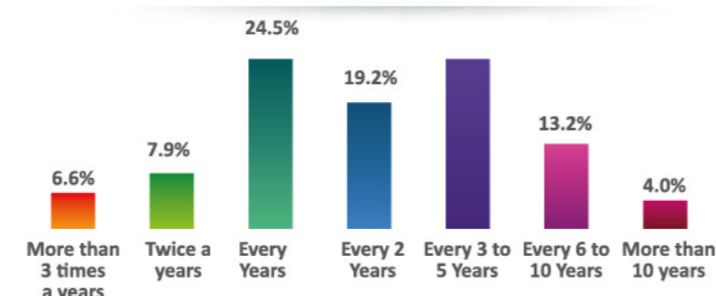
### Types of Containment



## Emptying and Transportation

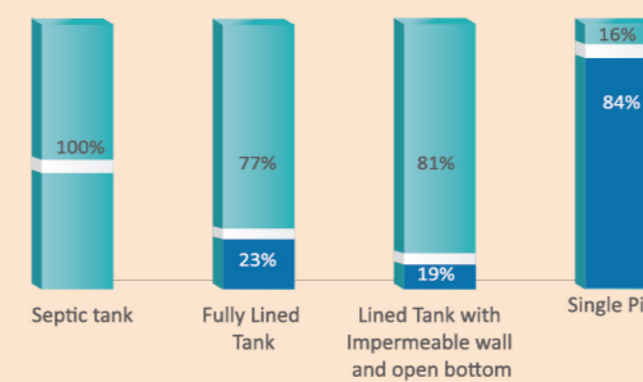
Regular emptying ensures the proper functioning of containment i.e., overflow of the sludge and blockages. For example, the septic tank which functions well until the volume of sludge in it is one-third of the total volume of the tank. Ideally proper containment is designed to empty within fixed interval, after which it overflows as the designed period crosses.

### Emptying Frequency



The survey reveals that the city practices on-demand emptying usually of which 48% of the households have emptied their containment at least once after the containment was used regardless to designed interval of the containment. It indicates inappropriateness of the containment, inflow of runoff water and groundwater intrusion. Interestingly emptying frequency i.e., once in every year, every two years and every three years are the common.

### Emptying Mechanism



42% of the households practiced mechanical desludging services. Generally, rectangular containments are being emptied which also indicates that service focused on urban areas of the sub-metropolitan city.

58% of households still practice manual desludging. Traditional sanitation workers are involved in the service and safety measures are rarely used during the process.



Service Provider	Private
No. of service provider	6
No. of Vehicles	12
No. of trips per week per vehicle	15
Average Charge per trip (NRs.)	4000

There is no emptying service being provided by Dhangadhi Sub-metropolitan city office.

### Estimation of Faecal Sludge

The volume of faecal sludge production in the city was estimated based upon the volume of containment and average emptying interval of each containment. However, the faecal sludge produced in the biogas digester is not included in the estimation as it is not required to empty.

- Total estimated actual volume of FS generation in the city: 259.99 m<sup>3</sup> per day
- Total volume of FS emptied in the city: 87.17 m<sup>3</sup> per day.
- Total volume of FS emptied in the city by mechanical desludging: 41.02 m<sup>3</sup> per day.
- Total volume of FS emptied in the city by manual desludging: 46.15 m<sup>3</sup> per day.

### Summary on faecal sludge produced, emptied, and transported

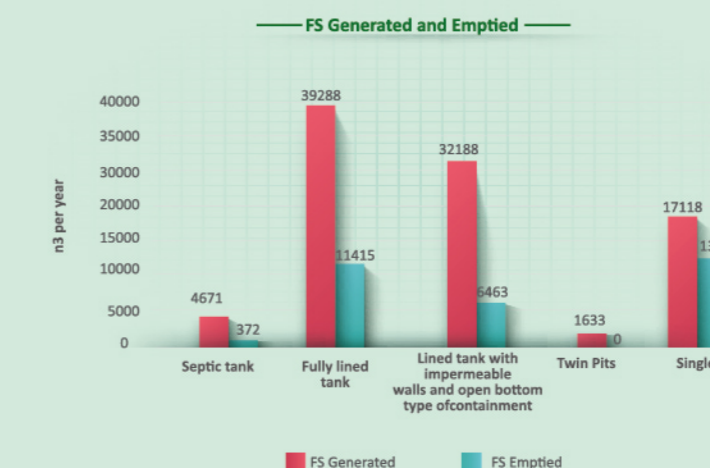


Remarkably, holding tank and single pit produces FS more than septic tank. The most probable reason for this is either infiltration of surface runoff or ground water as these containments are not sealed or it's numbers.

## Treatment



Currently, there is no FS treatment plant in the city and the private service providers are managing FS using the trenching technology. Recently, Regional Urban Development Project (RUDP) implemented by Department of Urban Development and Building Construction (DUDBC) under the Ministry of Urban Development has initiated the construction of the faecal sludge treatment plant. The project has designed a FS treatment plant with the capacity of 112 m<sup>3</sup>. The construction has been planned to be completed in four phases with completion of 28 m<sup>3</sup> capacity in each phase.



## Safe Disposal or Reuse



At present the FS emptied by the private service provider are mostly disposed in farmland from mechanical FS truck. Some of the Private service provider dispose in a trench.

### Shit Flow Diagram

Shit flow diagram (SFD) is the graphical representation of flow and fate of the wastewater and faecal sludge across the sanitation service chain. It presents the safe and unsafe management of wastewater and faecal in each stage of the chain using colour code. The Red colour represent unsafe practices and safely managed practices are indicated by green colour. Besides it also suggests the associated risk from unsafe management of the wastewater and faecal sludge

The graph indicates 54% of faecal sludge is safely managed and it is assumed that the unemptied FS is safely contained and percolation of leachate of FS is not significant risk to groundwater contamination. Beside the green proportion also includes FS managed by using biogas digester.