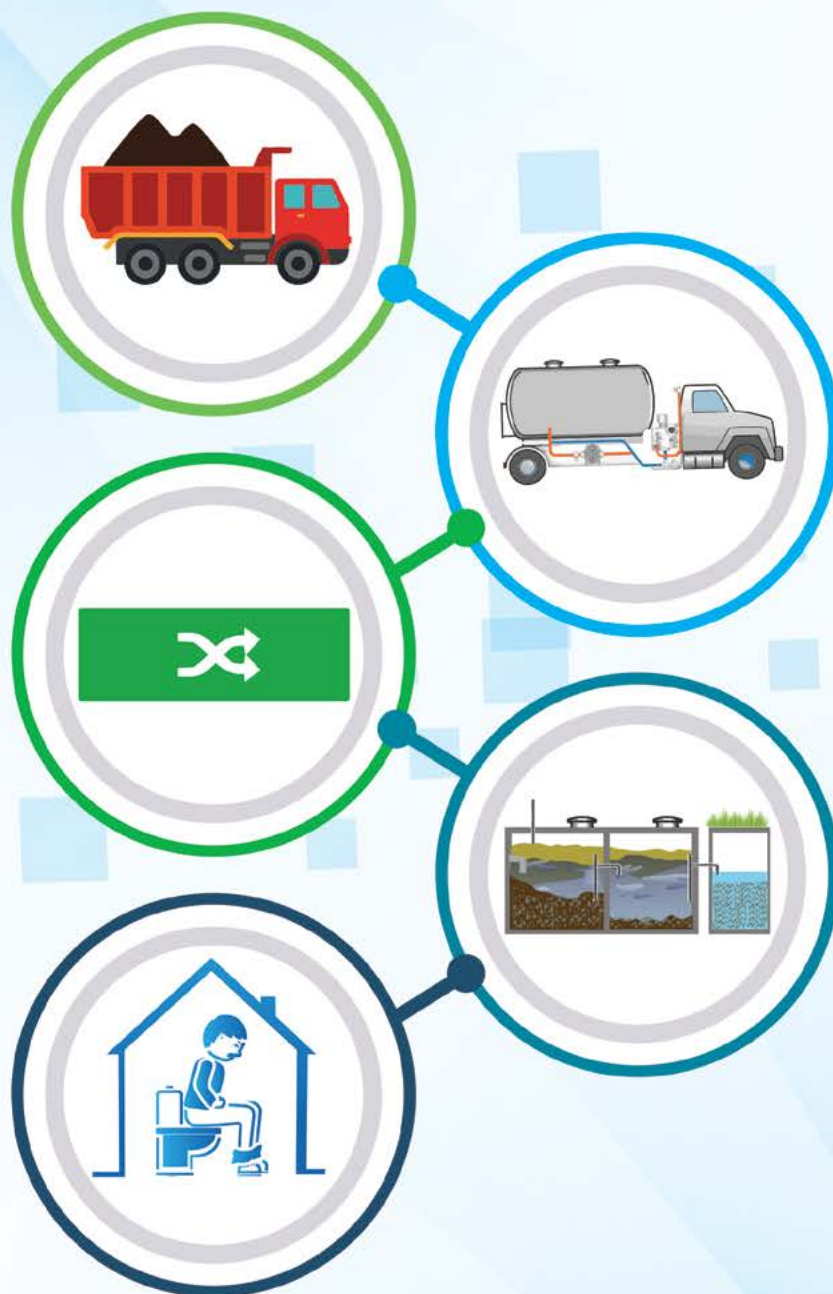


# Municipal Sanitation Synopsis of Koshi Province, Nepal -2023



Municipalities Network Advocacy on Sanitation in South Asia Phase II (MuNASS-II)

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Municipal Association of Nepal (MuAN)

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United Cities and Local Governments Asia-Pacific (UCLG ASPAC)

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**Disclaimer:** The content presented in the Municipal Sanitation Synopsis relies on the data available (on the date of the survey) and further validated with respective municipalities. Please note that the information and suggestions may be revised due to dynamic circumstances, updated surveys, or alterations in municipal policies. It is recommended that readers validate and compare the data with the most recent sources to ensure precision and accuracy. While the overviews strive to offer a broad perspective and recommendations, it is important to recognize that specific local conditions can differ, and stakeholders are encouraged to undertake additional research or seek guidance from local authorities for thorough decision-making.

# ACKNOWLEDGEMENT



We extend our sincere gratitude to Mr. Dil Prasad Rai, Mayor of Belbari Municipality; Mr. Kailash Kumar Ale, Mayor of Bhojpur Municipality; Mrs. Pabitra Mahara Prasai, Mayor of Birtamod Municipality; Mr. Chintan Tamang, Mayor of Dhankuta Municipality; Mr. Kedar Thapa, Mayor of Ilam Municipality; Mr. Mahesh Thapaliya, Mayor of Khandbari Municipality; Mr. Mitra Prasad Kafle, Mayor of Phidim Municipality; Mr. Amir Maden, Mayor of Phungling Municipality; Mr. Namgyal Jangbu Sherpa, Mayor of Solududhkunda Municipality, Mr. Tejan Khanal, Mayor of Siddhicharan Municipality; Mr. Ganga Prasad Kharel, Mayor of Uurlabari Municipality along with all deputy mayors, ward chairpersons, and municipal staffs, for their unwavering support and valuable feedback throughout the study. Special thanks to respective Chief Administrative Officers (CAO), for efficiently coordinating and mobilizing the team during the study.

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Furthermore, we are thankful to Mr. Bhim Prashad Dhungana, President of Municipal Association of Nepal (MuAN) for the gracious support.



Orientation program to conduct household survey for the enumerators appointed by the respective municipalities during SFD survey



Enumerator conducting household survey using mobile application

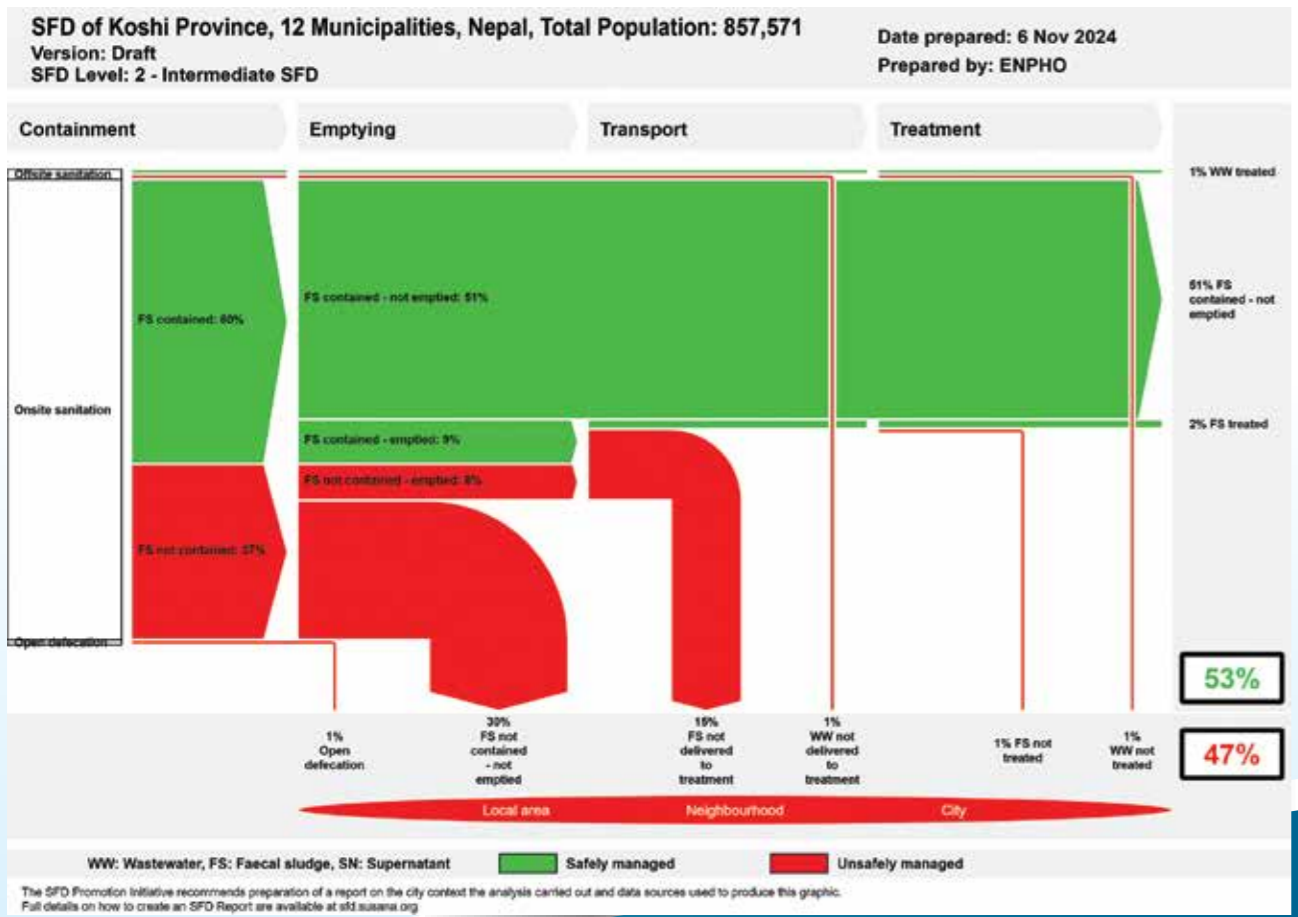
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## SHIT FLOW DIAGRAM (SFD)

The shit flow diagram (SFD) of Koshi Province represents the sanitation status of the province across the sanitation value chain. FS generated by 53% of the municipality's population is safely managed (Green). Initially, 60% of the FS is safely contained but the percentage decreases to 51% when FS generated by 9% of the population is emptied. This implies that 51% of FS are considered safely managed and remains safe until emptied. Furthermore, 1% of WW is considered treated in WWTP and 2% of FS are considered treated primarily from biogas digesters and FSTP. The emptied FS remains safe depending on the emptying mechanism and the available treatment options/facilities.

Further, FS generated by 47% of the population is managed unsafely (Red). This includes 1% WW not treated, 1% WW not delivered to treatment plant, and 1% FS not treated. Additionally, 15% emptied FS (9%-FS contained, 8%-FS not contained) is not delivered to treatment plant. Likewise, 30% of FS is neither safely contained nor emptied which possess the increased environmental risks. Furthermore, 1% of the population still practice open defecation, exacerbating sanitation challenges. These findings highlight critical gaps that must be addressed to mitigate environmental contamination and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Infrastructure Upgrade:**
- Retrofit and replace unsafe containment systems with appropriate techniques and technologies such as septic tanks, biogas digesters, and twin pits.
- Promote Mechanical Desludging:**
- Advocate for providing desludging services within the municipality, along with its formal registration and proper regulation.
- Regulate Sanitation Service:**
- Promote regular emptying of containments, ideally at least once every 3 to 5 years, to prevent overflow and ensure proper functioning.
  - Formulate and enforce policies and regulations mandating the use of safe sanitation technologies in new construction or renovations.
  - Ensure safe disposal by establishing FS treatment facilities and ensuring proper operation and maintenance of the facilities.



# SANITATION SYNOPSIS OF KOSHI PROVINCE, NEPAL -2024

Koshi Barrage

## DEMOGRAPHICS

**AREA : 25,905 KM<sup>2</sup>**

**HOUSEHOLDS (HHs) : 1,191,556**

**POPULATION : 4,961,412**  
 MALE : 2,417,328  
 FEMALE : 2,544,084

**POPULATION GROWTH RATE : 0.86%**

**MUNICIPALITIES : 46**  
 METROPOLITAN : 1  
 SUB METROPOLITAN : 2

**STUDIED MUNICIPALITIES : 12**

SOURCE: CENSUS, 2021

## ABOUT

A study on faecal sludge management is being conducted in 65 municipalities of Nepal as part of the Municipalities Network Advocacy on Sanitation in South Asia II (MuNASS II) program. The study was carried out in 12 municipalities which are Belbari, Bhojpur, Birtamod, Dhankuta, Ilam, Khandbari, Phungling, Phidim, Siddhicharan, Solududhkunda, Triyuga, and Uurlabari Municipality of Koshi Province.

## OBJECTIVE OF THE STUDY

The study aims to assess the sanitation conditions with a focus on the faecal sludge management (FSM) and develop Shit Flow Diagram (SFD) for these 65 municipalities in Nepal.

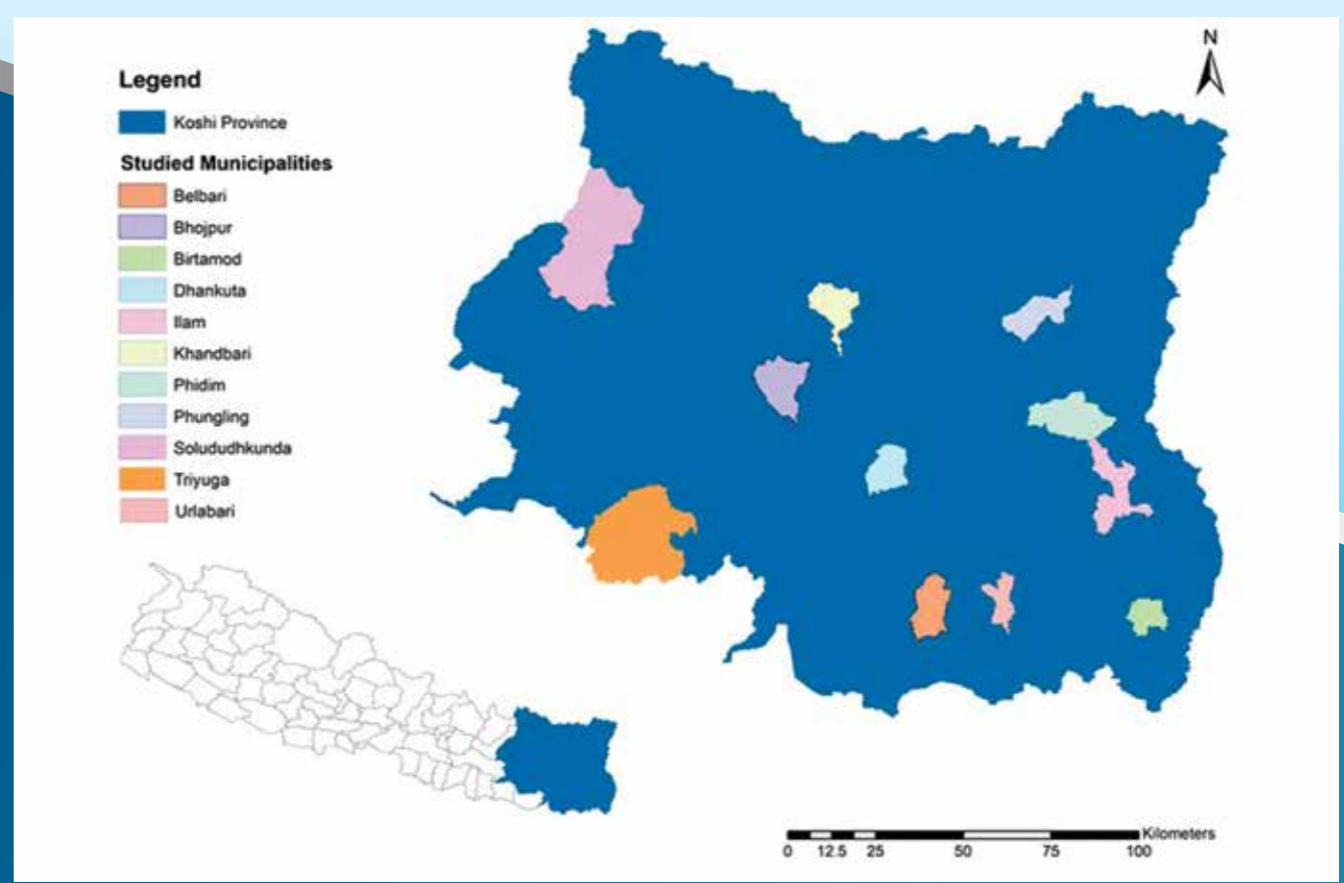
## METHODOLOGY OF THE STUDY

The methodology involved conducting a random questionnaire survey using the Kobo mobile application. Proportionate stratified random sampling was employed to determine the sample size of the households. Local enumerators selected by respective municipalities were mobilized for the survey. The enumerators, trained intensively for two days, were deployed by respective municipalities to collect survey data. Additionally, the Key Informant Interview (KII) was done with concerned stakeholders of the municipalities. Analysis included computing frequency distributions, means and cross tabulations.

## PROVINCE PROFILE

Koshi province spans from the Himalayas to the hills and the plains, covering 14 districts. It borders West Bengal (India) to the east, Bihar (India) to the south, China to north, and Madhesh and Bagmati province to the west. It has geographical coordinates ranges between 26°20'51" to 28°6'49" North latitude and 86°9'19" to 88°12'5" East longitude and area of 25,905 square kilometres.

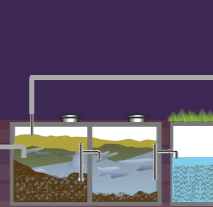
## MAP LOCATING STUDIED MUNICIPALITIES IN KOSHI PROVINCE



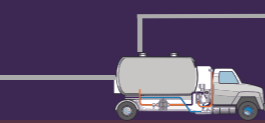


संकलन  
(User Interface)

The Sanitation Service Chain (SSC) is a comprehensive service framework delineating the sequential stages



भण्डारण  
(Containment)



रिचार्जने र ढुवानी  
(Emptying & Transportation)

of faecal sludge management from excreta generation to safe disposal. It encompasses five key phases:



प्रशोधन  
(Treatment)

collection, containment, emptying and transportation, treatment, and reuse/safe disposal.



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

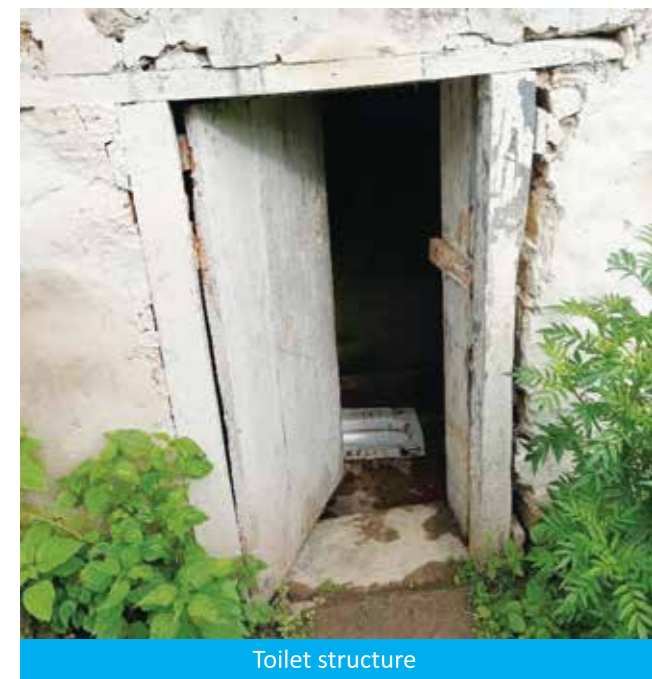
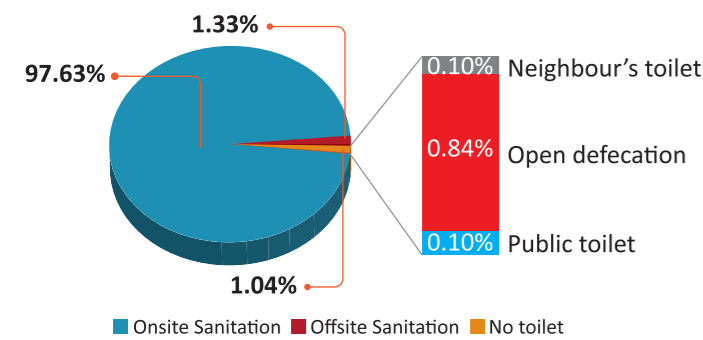


## USER INTERFACE FACILITY

The sanitation facility, commonly referred to as toilet, serves as collection points for human waste and directs it to either offsite or onsite sanitation system. In the Koshi Province 1.04% of households (HHs) lacks access to improved sanitation facilities.

About 97.63% of the HHs toilets are connected to onsite sanitation systems. Notably, there is no sewerage sanitation system and despite laws prohibiting the direct connection of blackwater to stormwater/open drains, 1.33% of toilets have such illegal connections.

### Sanitation Facilities

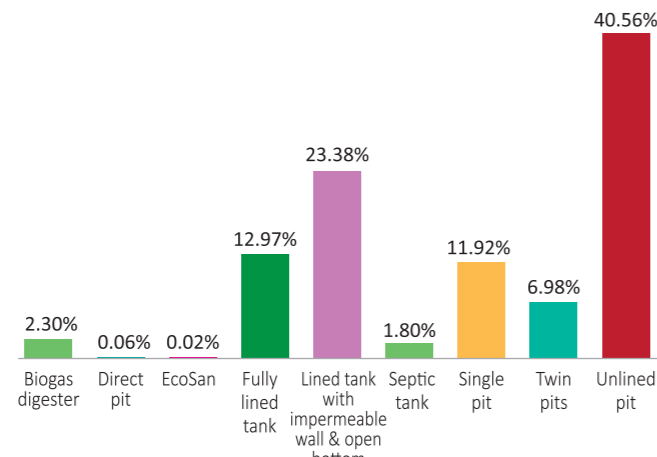


## CONTAINMENT

The human waste collected from toilet is stored in different types of tanks for certain time period, known as containment, and the accumulated human waste in it is termed as faecal sludge (FS).

In the province, most of the HH have built unsafe containments as unlined pit, followed by a lined tank with impermeable walls and open bottom, and single pit. Additionally, direct pit is installed by a smaller proportion of HH. These containments are considered unsafe as it holds high risk of groundwater contamination due to leachate percolation through their permeable bases. Fully lined tank is installed by significant proportion of the HH. Only a small proportion of HHs have installed safe containment, such as septic tanks, EcoSan, biogas, and twin pits.

### Types of Containments



## EMPTYING AND TRANSPORTATION

Regular emptying is essential for maintaining the functionality of these containments. The survey reveals that only 20.31% of the HHs have emptied their containments at least once since installation. The containments are being emptied in different time intervals, where 25.87% are emptied in an interval of 3 to 5 years. The emptying mechanism varies as per the containment types.

The private desludging services are available in Birtamod Municipality, Belbari Municipality, Uurlabari Municipality and Triyuga Municipality whereas in Dhankuta Municipality, Ilam Municipality, and Phidim municipality the desludging service is provided by the municipality itself. Notably, in Bhojpur Municipality, both private and municipal desludging services are available.



33.58% of HHs emptied FS mechanically (Municipal and private desludging service providers).

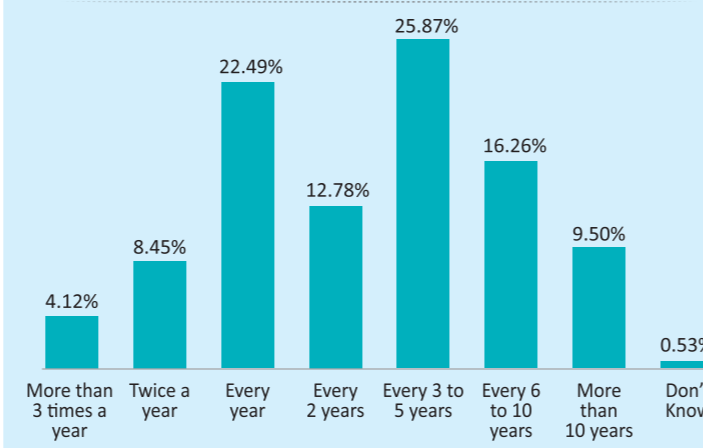


64.94% of HHs emptied FS manually (Self or using traditional sanitation workers).

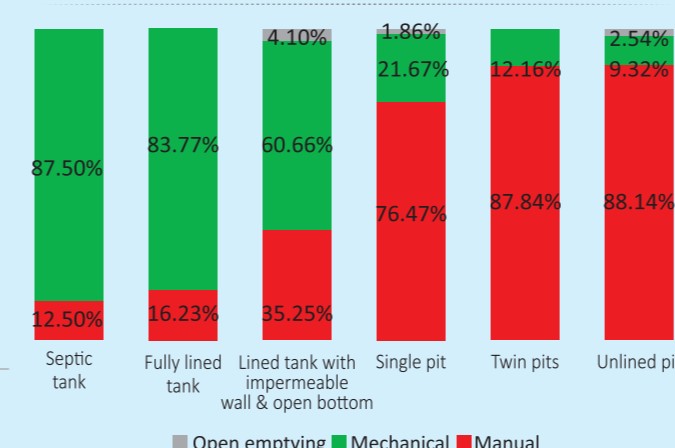


1.48% practice open emptying where, FS is disposed into open drain, water bodies, and open ground.

### Emptying Interval



### Emptying Mechanism



## TREATMENT

Biogas digesters, if functioning properly, are regarded as safe and considered capable of treating faecal sludge. However, FS stored in other types of containments requires treatment. During the study period, 1 WWTP in Solududhkunda Municipality, serving ward no. 4, Phaplu was functioning while the 2 WWTPs in ward no. 5 and 6 are yet to be completed. Additionally, the Charali treatment plant treats FS collected mainly from 3 municipalities: Mechinagar Municipality, Birtamod Municipality and Buddhashanti Rural Municipality. The remaining 10 studied municipalities don't have any form of treatment plant.



### Status of desludging services in surveyed municipalities

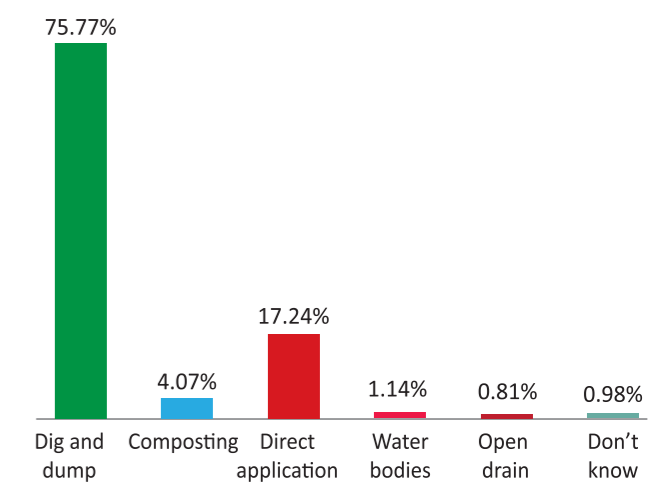
Service Provider	Municipality	Private
No. of service provider	4	12
No. of vehicles	4	13
Capacity of vehicles (litres)	5,000	4,000-9,000
Average number of trips per week per vehicle	2	7
Service charge per trip (NPR)	4,000-6,000	2,500-6,000

## SAFE DISPOSAL OR REUSE

In the municipalities where the treatment plant is nonfunctional or not available, the mechanically collected FS is disposed in an open environment or water bodies. The majority of the HHs that have manually emptied the containments practice dig and dump method. A small proportion of HHs practice composting. Meanwhile, significant proportion of HH directly apply the FS into farmland, and some illegally dispose of the FS into water bodies, and nearby open or stormwater drains. This practice of direct disposing in farmland, water bodies, and open drain can't be considered safe as it possesses risks to the environment and public health.



### Disposal practice of FS after manual emptying



## ESTIMATION OF FAECAL SLUDGE

The estimation of faecal sludge production in the Koshi province was derived based on containment volume and average emptying frequency. Notably, faecal sludge from biogas digesters which does not require emptying like other containments, was excluded from the calculation.

Total estimated volume of FS generation in the 49 municipalities of Koshi Province: 1,617,633 m<sup>3</sup> per year which is 443,187 m<sup>3</sup> per day.

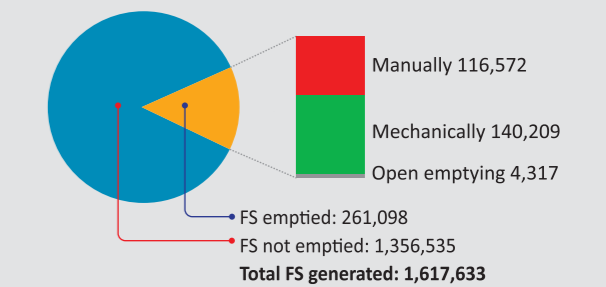
Total estimated volume of FS emptied: 261,098 m<sup>3</sup> per year which is 715.34 m<sup>3</sup> per day.

Total estimated volume of mechanically emptied FS: 140,209 m<sup>3</sup> per year which is 384.13 m<sup>3</sup> per day.

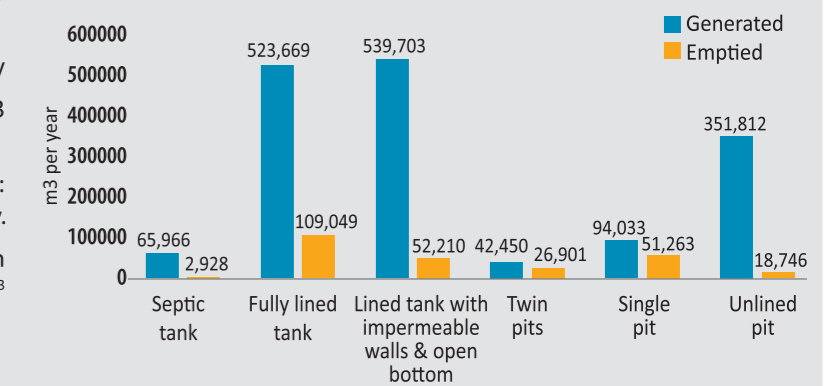
Total estimated volume of manually emptied FS: 116,572 m<sup>3</sup> per year which is 319.38 m<sup>3</sup> per day.

Total estimated volume of FS emptied by open emptying: 4,317 m<sup>3</sup> per year which is 11.83 m<sup>3</sup> per day.

### Summary on faecal sludge produced, emptied, and transported in Koshi province (cubic metre)



### FS Generated and Emptied



Conducting key informant interview with desludging service providers



Municipal council members and stakeholders participating in SFD validation workshop to review and discuss findings.





# BELBARI MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2023

Betana lake, Belbari

## DEMOGRAPHICS



Area : 132.79 km<sup>2</sup>



Household : 20,459



POPULATION : 81,771  
Male : 38,297  
Female : 43,474



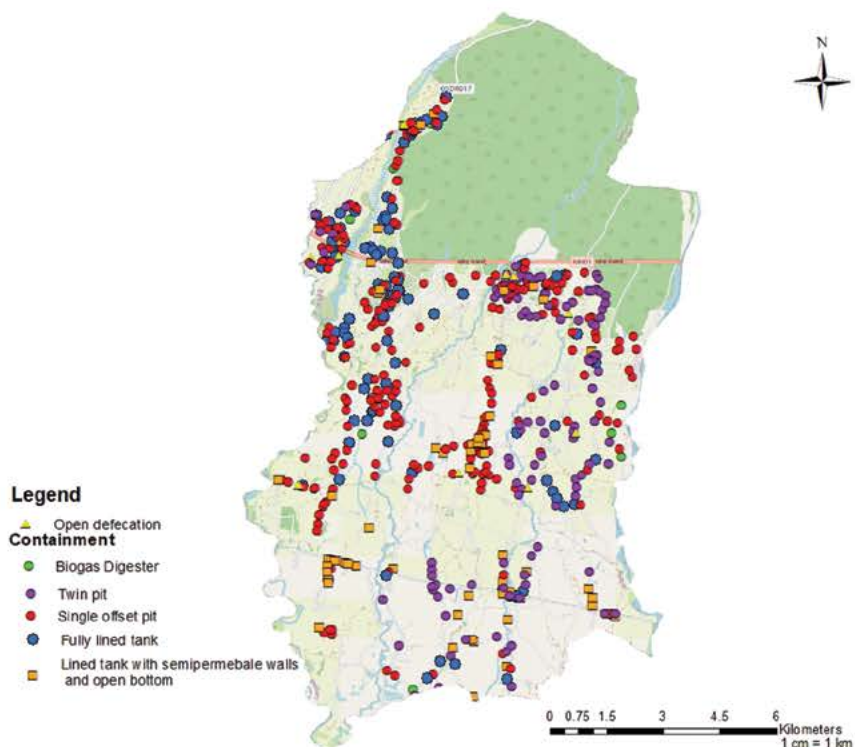
Wards : 11

Source: Census 2021

## CITY PROFILE

Belbari Municipality is in Morang District of Koshi Province, Nepal. It lies at an altitude of 112 to 116 meters above sea level and has geographical coordinates ranging from 26° 36'16" North to 27°32'26" North latitude and 78°43'33" East to 78°28'42" East longitude.

### Sanitation technologies installed at household level in Belbari Municipality





संकलन  
(User Interface)



अण्डारण  
(Containment)

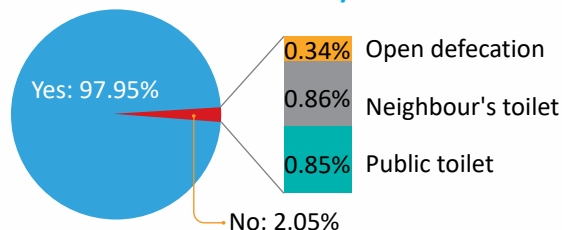


रिचार्जने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

Belbari Municipality has already attained Open Defecation Free (ODF) status. However, a HH survey reveals that 2.05% of HHs still lack access to toilets and practice open defecation, while some use neighbour's and public toilets.

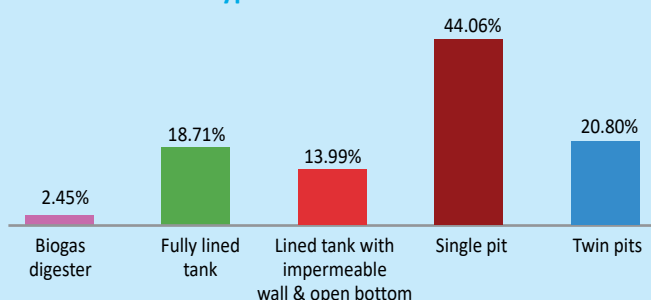
### Sanitation Facility



## CONTAINMENT

The survey showed that most of the HHs use unsafe containments as single pit, while few proportion of HH have installed lined tanks with impermeable walls and open bottom. These types of containments allow leachate percolation possessing a risk to groundwater contamination. Thus, they are considered unsafe. Meanwhile, the safe containment as twin pits have been installed in significant proportion of HH, and some HH have opted for biogas. Biogas can be considered safe as they are capable of treating FS.

### Types of containment



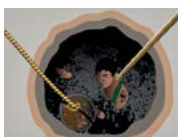
Twin pit installed in sampled HH

## EMPTYING AND TRANSPORTATION

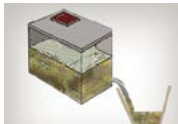
The findings show that 53.94% of HHs have emptied their containments at least once after installation. The containments are emptied at different time intervals, where usually 29.79% empty on interval of every year. The emptying mechanisms varies as per the containment type. The desludging service is provided by private desludging service providers.



22.26% of HHs emptied mechanically by private desludging service providers.

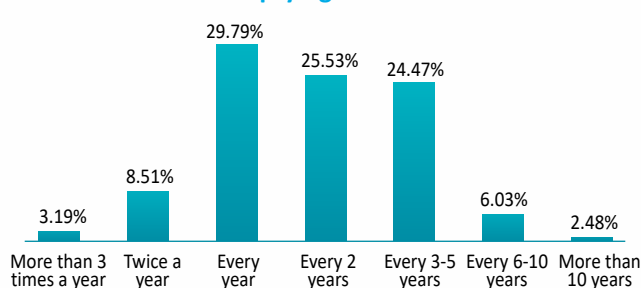


75.42% of HHs emptied manually: self-emptying or traditional sanitation workers.

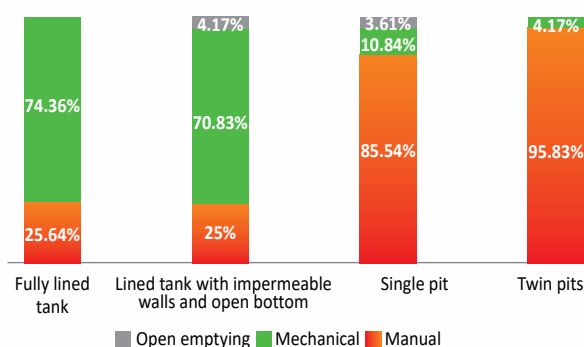


2.32% of HHs use open emptying.

### Emptying Interval



### Emptying mechanism of containments



### Details of desludging service providers

Service Provider	Private
No. of service provider	4
No. of vehicles	4
Capacity of vehicle (Litres)	5,000
No. of trips per day per vehicle	1
Average charge per trip (NPR)	1,000-3,500



प्रशोधन  
(Treatment)

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

## ESTIMATION OF FAECAL SLUDGE

Total estimated volume of FS generated in the municipality: 67,565m<sup>3</sup> per year which is 185.11m<sup>3</sup> per day.

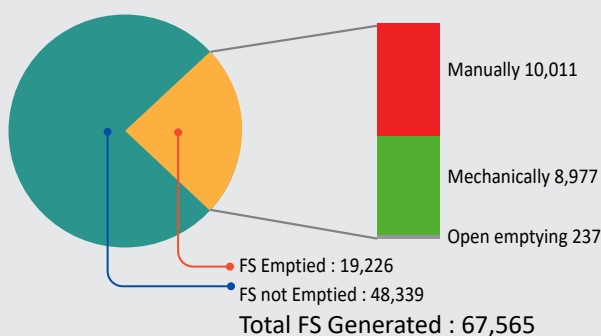
Total volume of FS emptied in the municipality: 19,226 m<sup>3</sup> per year which is 52.67 m<sup>3</sup> per day.

Total volume of mechanically emptied FS in the municipality: 8977 m<sup>3</sup> per year which is 24.60 m<sup>3</sup> per day.

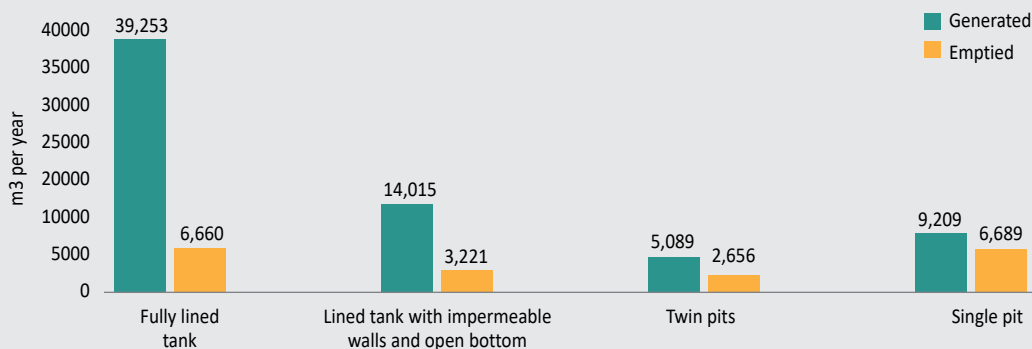
Total volume of manually emptied FS in the municipality: 10,011 m<sup>3</sup> per year which is 27.43 m<sup>3</sup> per day.

Total estimated volume of FS emptied by open emptying: 237 m<sup>3</sup> per year which is 0.65 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Belbari Municipality (cubic meter)



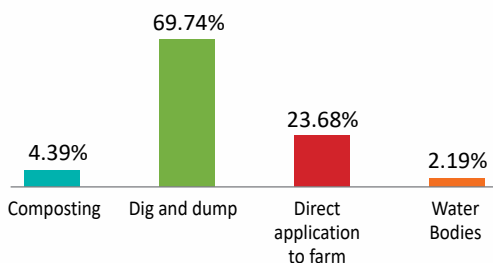
### FS Generated and Emptied



## SAFE DISPOSAL OR REUSE

The municipality doesn't have FSTP. Mechanically emptied FS are generally disposed of in the designated farmland on demand. While the majority of manually emptied FS are dig and dump and very few practice composting. Some HH directly apply the FS to farms, and some discharge it in water bodies possessing direct risk to the environment and public health.

### Disposal practice after manual emptying

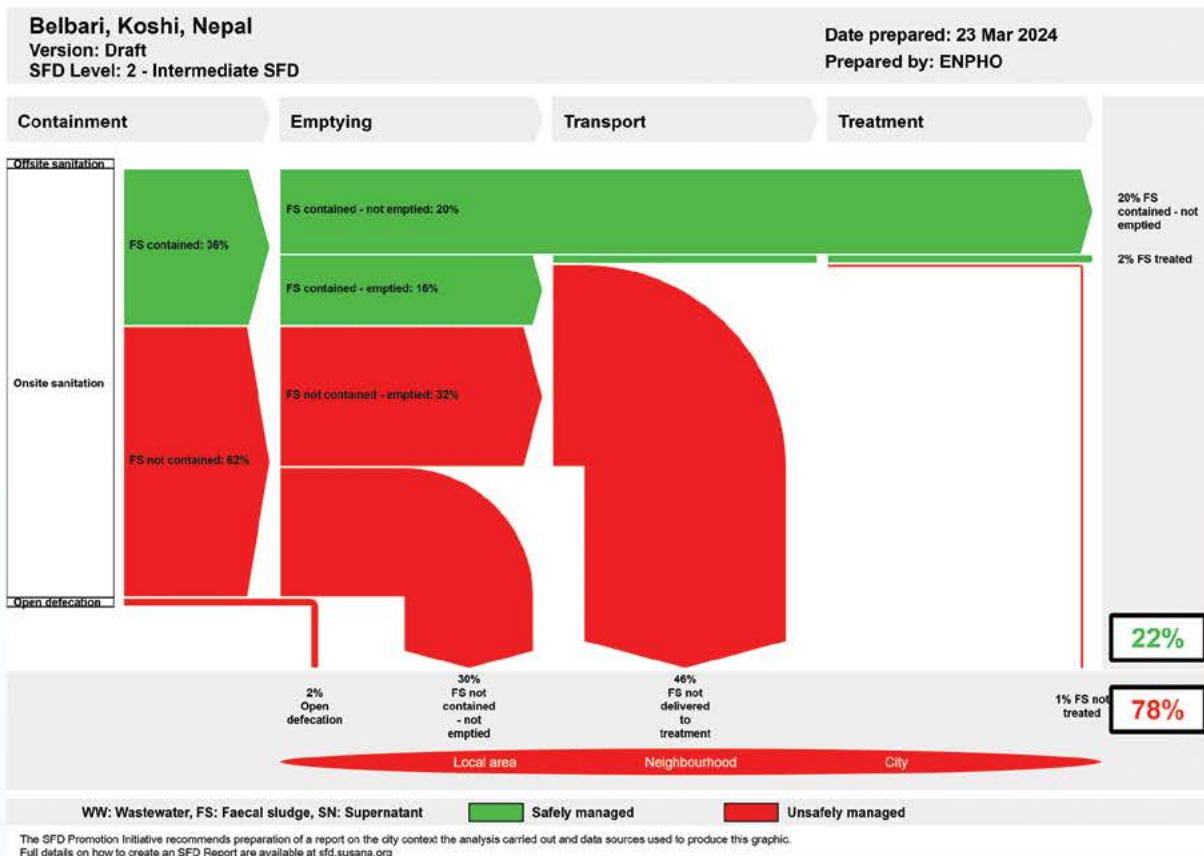


Disposal of FS in farmland.

## SHIT FLOW DIAGRAM (SFD)

The SFD of Belbari Municipality visually represents the status of sanitation practices of the municipality across the entire sanitation value chain. It shows that FS generated by 22% of the population is safely managed (Green). Initially, FS generated by 36% of the population is safely contained. However, this proportion drops to 20% which can be considered safe until emptied. Out of the 16% of safely contained FS which have been emptied, only 2% is considered treated, primarily coming from biogas digesters. The emptied FS remains safe depending upon the nature of the emptying mechanism and available treatment facilities.

Overall, FS generated by 78% of the population is unsafely managed (Red). It includes 1% of FS not treated, and 30% FS which is neither contained nor emptied. Additionally, 46% of emptied FS (14%-FS contained, 32% FS not contained) is not delivered to treatment plant, and 2% openly defecates. This highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Replace and retrofit the unsafe containment systems to safer techniques and technologies such as septic tanks, biogas digesters and twin pits.
- Formalize and regulate the private desludging service within the municipality.
- Increase promotion and accessibility of mechanized emptying services to reduce the practice of manual emptying.
- Construct a faecal sludge treatment plant to manage FS effectively, reduce environment pollution, and safeguard public health.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.

# BHOJPUR MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2024

Khukhuri Chowk, Bhojpur



## DEMOGRAPHICS



Area : 159.52 km<sup>2</sup>



Household : 6,744



POPULATION : 26,007  
Male : 12,645  
Female : 13,362



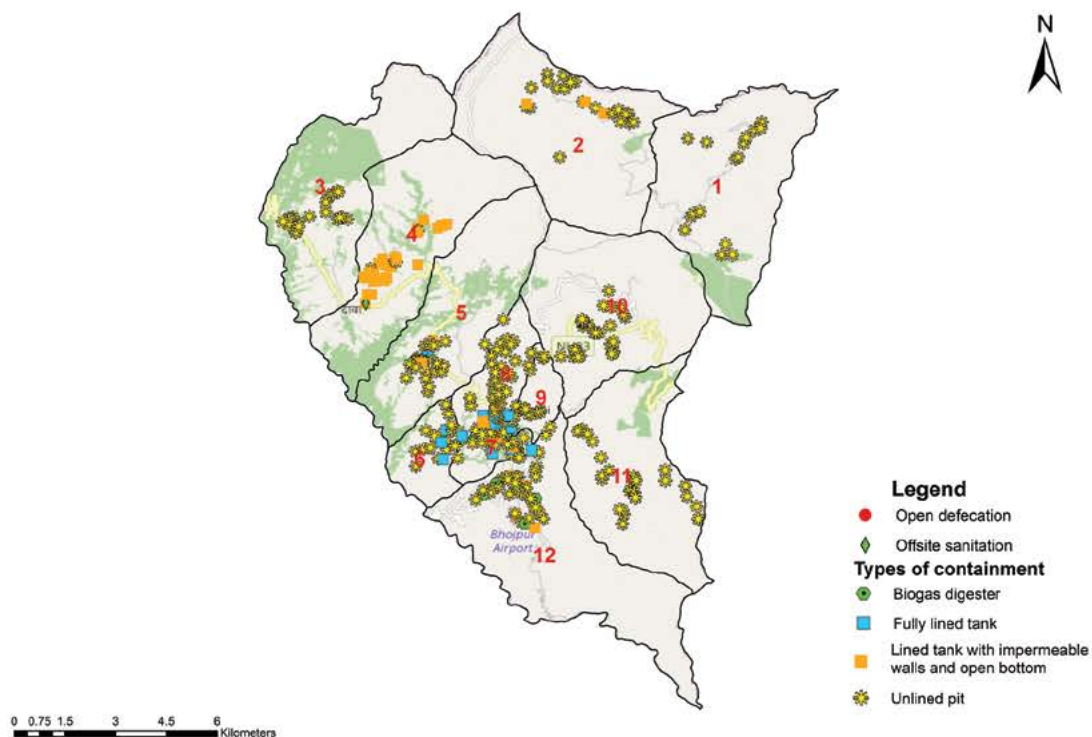
Wards : 12

Source: Census 2021

## CITY PROFILE

Bhojpur Municipality is located in Bhojpur District of Koshi Province, Nepal. It ranges from 28°52'60" to 27°45'60" N latitude and 86°52'60" to 87°16'60" E longitude, and at an altitude of approximately 1,550 meters above mean sea level.

### Sanitation technologies installed at the household level in Bhojpur Municipality





संकलन  
(User Interface)



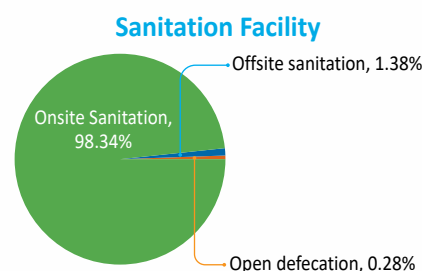
अण्डारण  
(Containment)



रिक्त्याउने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

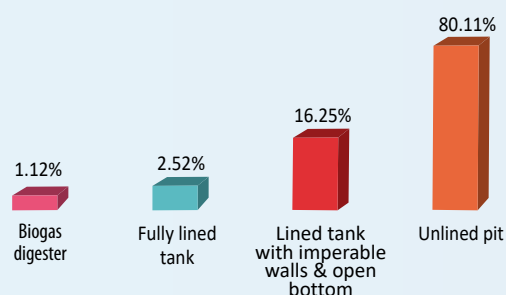
Bhojpur Municipality attained ODF status on 21 September 2019 A.D. However, a HH survey revealed that 0.28% of HHs still lack access to toilets and practice open defecation. In addition, 1.38% of HH rely on offsite sanitation systems connected to sewer network and disposal to an open ground.



## CONTAINMENT

The survey shows that the majority of the HHs use unlined pit followed by lined tanks with impermeable walls and open bottom. These types of containments have open bottoms, allowing leachate percolation and possessing a risk to groundwater contamination. Thus, containments are considered unsafe. Besides, very few HHs use fully lined tanks, and limited HHs use safer technologies such as biogas digester.

### Types of containment



## EMPTYING AND TRANSPORTATION

As per findings, 20% of HHs have emptied their containments at least once after installation. Most containments are emptied at an interval of 3 to 5 years. The emptying mechanism of the containment is shown in graph.

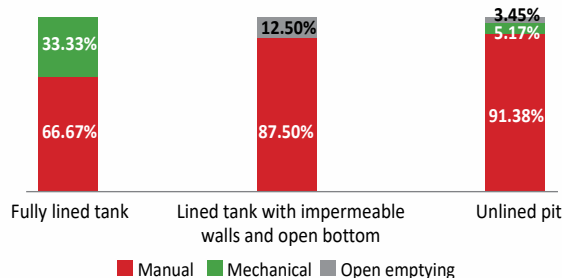
The municipality has an FS desludging vehicle however, it is currently not in use. Hence, private desludging service is available for mechanical emptying and transport of FS.

### Details of desludging service providers

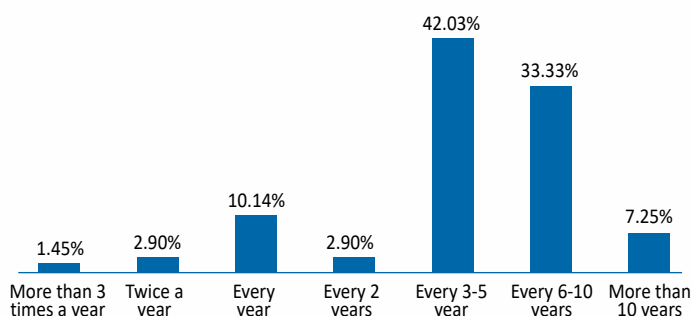
Service Provider	Private
No. of service provider	1
No. of vehicles	1
Capacity of vehicle (Litres)	5,000
Average number of trips per month per vehicle	2
Average Service Charge per trip (NPR)	4,000-5,000

- 6% of HHs emptied FS mechanically (Private desludging service providers).
- 90% of HHs emptied FS manually (Self or traditional sanitation workers).
- 4% of HHs practice open emptying (Disposed into open drain during rainy season).

### Emptying Mechanism



### Emptying Frequency



Private desludging vehicle



प्रशोधन  
(Treatment)



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

## ESTIMATION OF FAECAL SLUDGE

Total estimated volume of FS generated in the municipality: 14,809 m<sup>3</sup> per year which is 40.57 m<sup>3</sup> per day.

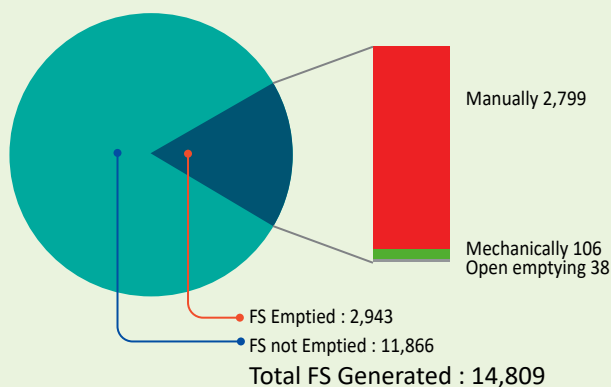
Total volume of FS emptied in the municipality: 2,943 m<sup>3</sup> per year which is 8.06 m<sup>3</sup> per day.

Total volume of mechanically emptied FS: 106 m<sup>3</sup> per year which is 0.29 m<sup>3</sup> per day.

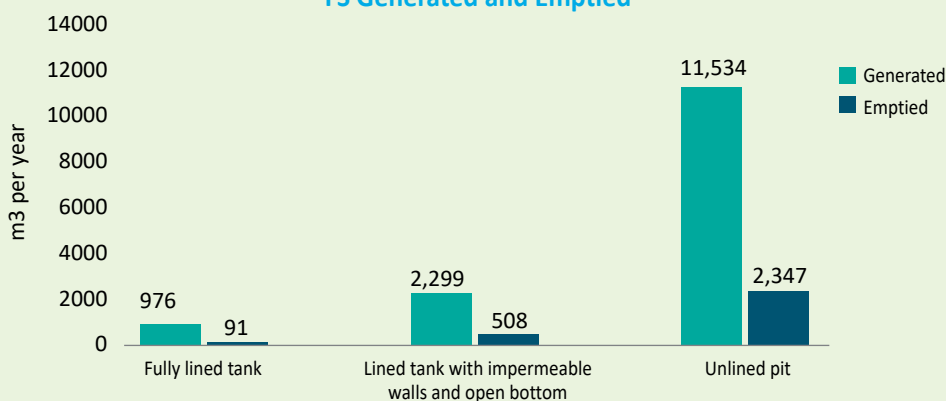
Total volume of manually emptied FS: 2,799 m<sup>3</sup> per year which is 7.67 m<sup>3</sup> per day.

Total estimated volume of FS emptied by open emptying: 38 m<sup>3</sup> per year which is 0.10 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Bhojpur Municipality (cubic meter)



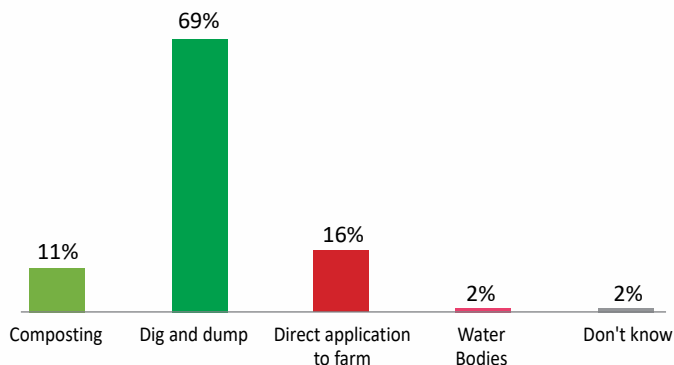
### FS Generated and Emptied



### Disposal practice after manual emptying

## SAFE DISPOSAL OR REUSE

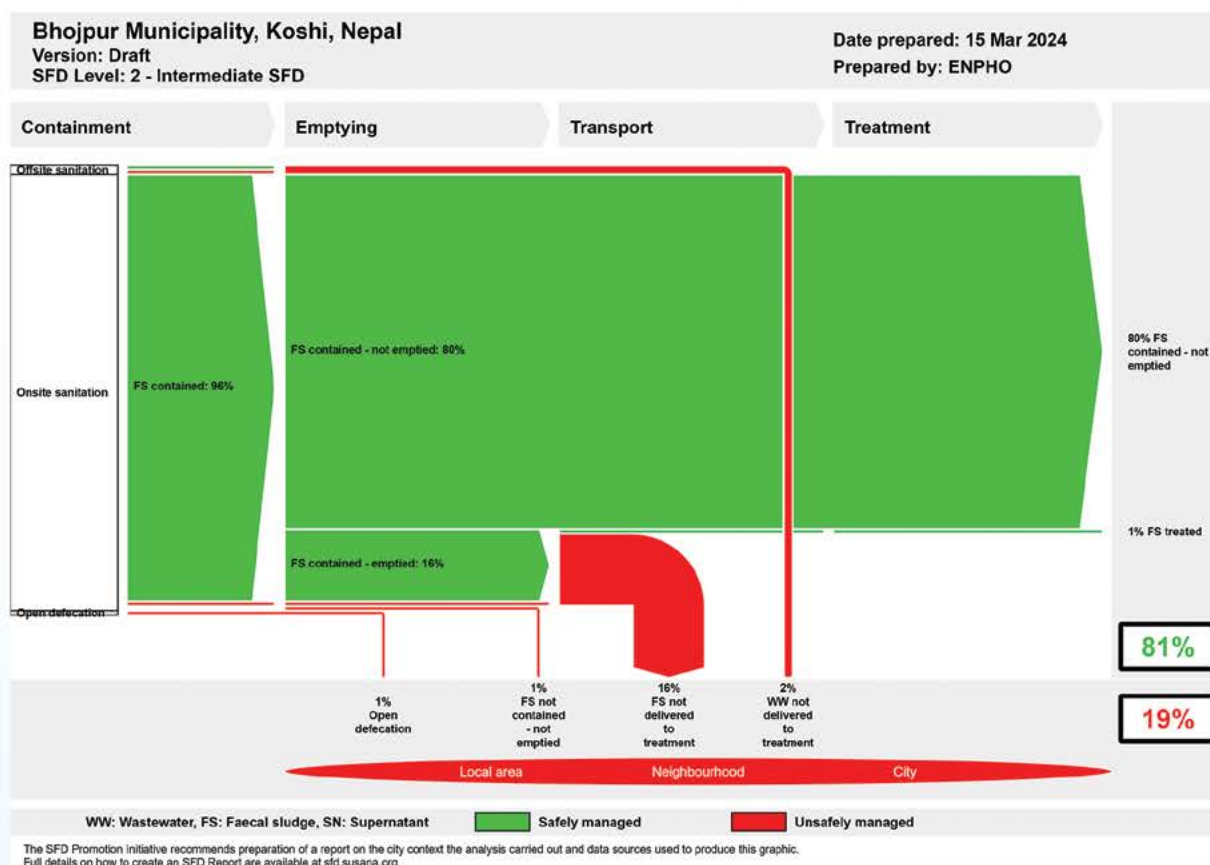
Mechanically emptied FS is applied on private farmland by service providers. While manually emptied FS is mostly dig and dump and composted. Moreover, few HHs directly apply to farmland and illegally dispose in water bodies. The direct application to farmland and disposal to water bodies possesses significant risk to environment and public health.



## SHIT FLOW DIAGRAM (SFD)

The SFD of Bhojpur Municipality visually represents the status of sanitation practices across the entire sanitation value chain. It shows that FS generated by 81% of the population is safely managed (Green). Initially, FS generated by 96% of the population is safely contained. However, this proportion drops to 80% which can be considered safe until emptied. Out of the 16% safely contained FS which has been emptied, only 1% is delivered to treatment plant and treated, and this comes from a biogas digester. The emptied FS remains safe depending upon the nature of the emptying mechanism and available treatment facilities.

Furthermore, FS generated by 19% of the population is unsafely managed (Red). It includes 1% FS which is neither contained nor emptied, 16% of FS not delivered to treatment plant and 2% wastewater (WW) not delivered to treatment plant. Additionally, 1% of the population practice open defecation that exacerbates the environmental risks. This highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Replace and retrofit the unsafe containment systems to safer techniques and technologies such as septic tanks, biogas digesters and twin pits.
- Promote and regulate mechanical desludging services in the municipality to address the current gap in sanitation value chain.
- Construct a faecal sludge treatment plant as required to manage FS effectively.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.



# BIRTAMOD MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2024



Birtamod Bazaar

## DEMOGRAPHICS



Area : 78.24 km<sup>2</sup>



Household : 29,852



POPULATION : 116,192  
Male : 56,105  
Female : 60,087



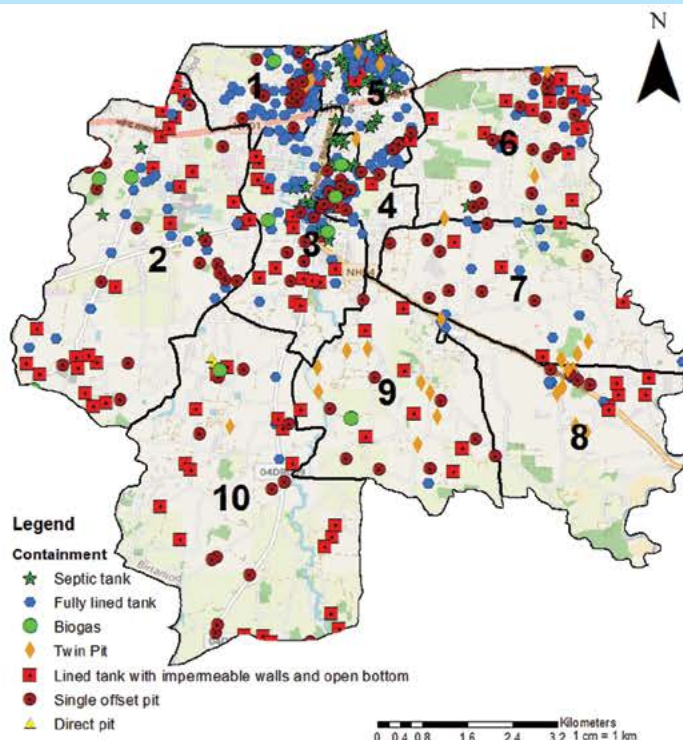
Wards : 10

Source: Census 2021

## CITY PROFILE

Birtamod Municipality located in Jhapa District of Koshi Province, is a major commercial center of Nepal. Topographically, the Birtamod Bazaar and the surrounding area lie on flat land in the Terai at 163 meters above sea level, and geographic coordinates between 26°37'45" North latitude and 87°58'57" East longitude.

### Sanitation technologies installed at household level in Birtamod Municipality





संकलन  
(User Interface)



अण्डारण  
(Containment)



रिचार्जने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

Birtamod Municipality attained ODF status on 24 August 2018. This survey also reveals that all the sampled HH have access to toilets, relying on onsite sanitation technology.

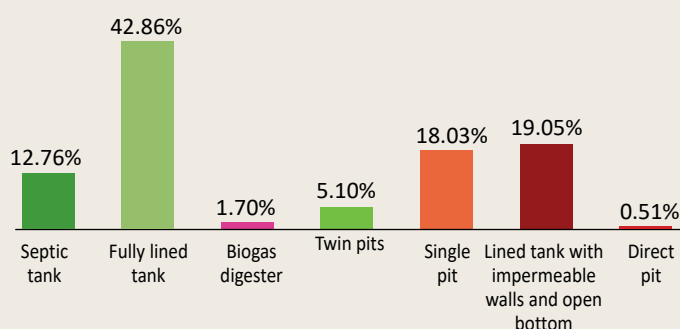


Direct pit installed in one of the sampled HH

## CONTAINMENT

Safe sanitation systems such as septic tanks, biogas and twin pits are installed in small proportions of households, while fully lined tanks are installed in higher proportion of the HH. Moreover, unsafe containments such as lined tanks with impermeable walls and open bottom, and single pit are installed by significant proportion of HH. The direct pit is installed by a few HH. These are considered unsafe as they lead to groundwater pollution from leachate percolation.

### Types of containment



## EMPTYING AND TRANSPORTATION

About 33.22% of the HHs have emptied their containments at least once since installation. Most of these containments are emptied in an interval of 3 to 5 years. The septic tanks are mechanically emptied, while the emptying mechanism of other containments varies as shown in graph.

### Details of desludging service providers

Service Provider	Private
No. of service provider	4
No. of vehicles	5
Capacity of vehicles (litres)	9,000
Average trips per vehicle per day	1
Average service charge per trip (NPR)	3,000-4,000

Note: 3-4 desludging vehicles from Surunga and Mechinagar Municipality also provides the service.



60.42% of FS are mechanically emptied by private desludging vehicle.

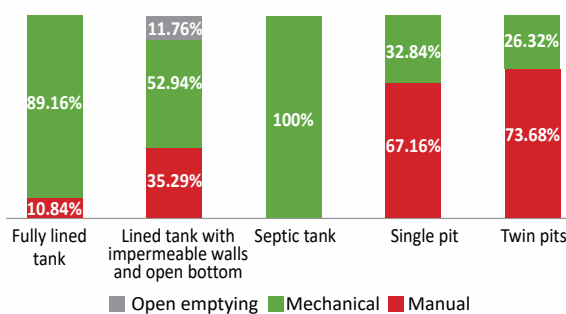


38.54% of FS are manually emptied - self - emptying or traditional sanitation workers.

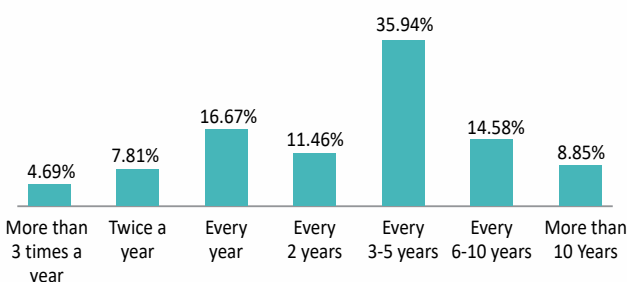


1.04% practiced open emptying where, FS is disposed into open drain.

### Emptying mechanism



### Emptying Interval



KII with private desludgers



प्रशोधन  
(Treatment)



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

## ESTIMATION OF FAECAL SLUDGE

Total estimated volume of FS generation in the municipality: 112,657 m<sup>3</sup> per year which is 308.65 m<sup>3</sup> per day.

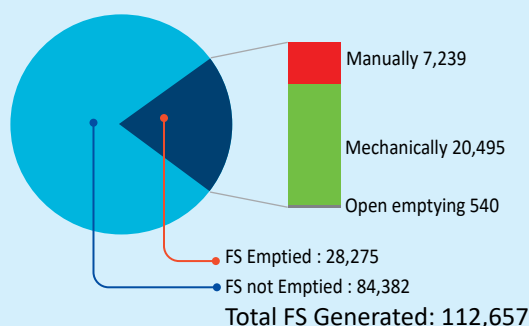
Total volume of FS emptied in the municipality: 28,275 m<sup>3</sup> per year which is 77.46 m<sup>3</sup> per day.

Total volume of mechanically emptied FS: 20,495 m<sup>3</sup> per year which is 56.15 m<sup>3</sup> per day.

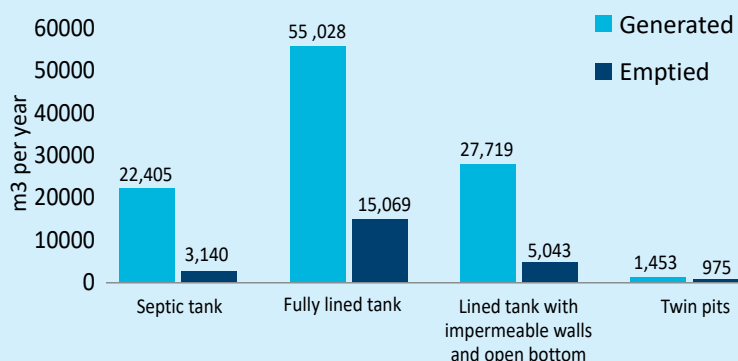
Total volume of manually emptied FS: 7,239 m<sup>3</sup> per year which is 19.83 m<sup>3</sup> per day.

Total volume of FS emptied by open emptying: 540 m<sup>3</sup> per year which is 1.48 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Birtamod Municipality (cubic meter)



### FS Generated and Emptied



## TREATMENT

The Faecal Sludge Treatment Plant (FTSP), located in Charali within Mechinagar Municipality, was constructed in 2020 A.D and has a capacity of treating 27 m<sup>3</sup>/day. The operation and maintenance of the FTSP is currently managed by Charali Water Supply and Sanitation User's Committee. This FTSP serves Mechinagar Municipality, Birtamod Municipality, Buddashanti Rural Municipality and other peripheral municipalities

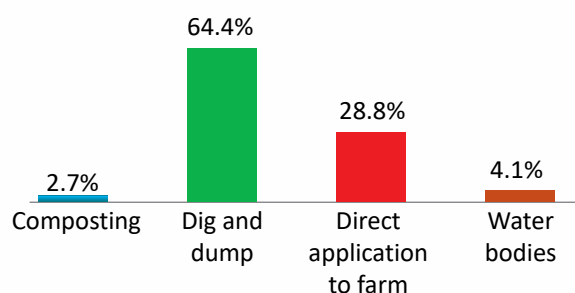


Charali FTSP

## SAFE DISPOSAL OR REUSE

During the study period very few private desludgers discharged the collected FS at the Charali FTSP. Mechanically collected FS is taken to treatment plants predominantly during the rainy season. Meanwhile, the majority of manually emptied FS is dig and dump in available land, followed by direct application to farm, composting and illegal disposal in water bodies. The direct application to farm and disposal in water bodies can't be considered safe as they possess risks to environment and public health.

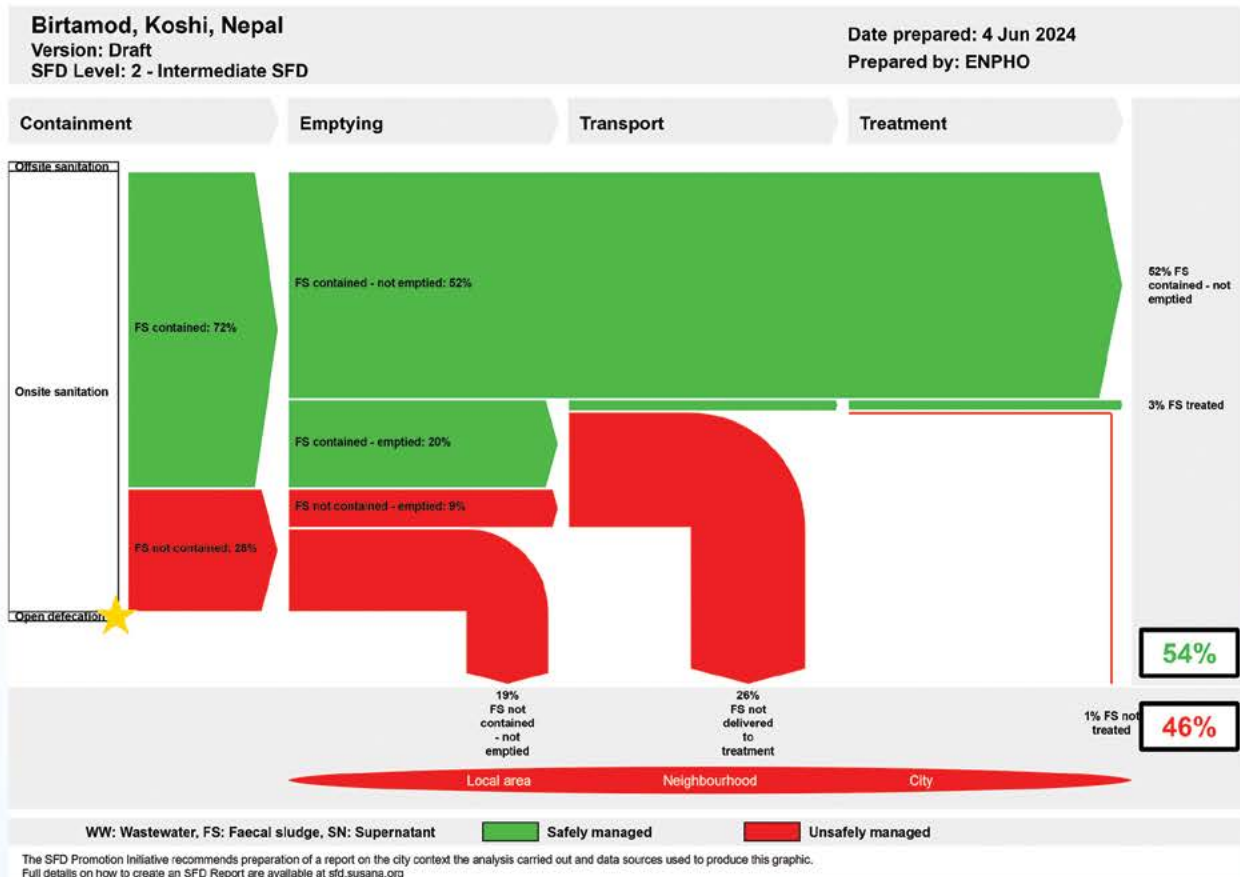
### Disposal practice after manual emptying



## SHIT FLOW DIAGRAM (SFD)

The SFD of Birtamod Municipality visually represents the status of sanitation practice of the municipality across the entire sanitation value chain. It shows that FS generated by 54% of the population is safely managed (Green). Initially, FS generated by 72% of the population is safely contained. However, this proportion drops to 52% which can be considered safe until emptied. Out of the 20% of safely contained FS which has been emptied, only 3% is treated at FSTP and biogas digester. The emptied FS remains safe depending upon the nature of the emptying mechanism and available treatment facilities.

Overall, FS generated by 46% of the population is unsafely managed (Red). It includes 1% of FS not treated, and 26% of emptied FS (17%-FS contained, 9%-FS not contained) not delivered to treatment plant. Further, 19% of FS is neither contained nor emptied. This highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Replace and retrofit the unsafe containment systems to safer techniques and technologies such as septic tanks, biogas digesters and twin pits.
- Promote and regulate mechanical desludging services in the municipality to address the current gap in sanitation value chain.
- Ensure safe disposal by regulating the disposal of FS in treatment facilities only.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.

# DHANKUTA MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2024



Orange City, Dhankuta

Source: Census 2021

## DEMOGRAPHICS



Area : 111 km<sup>2</sup>



Household : 9,637



POPULATION : 35,983  
Male : 17,192  
Female : 18,791

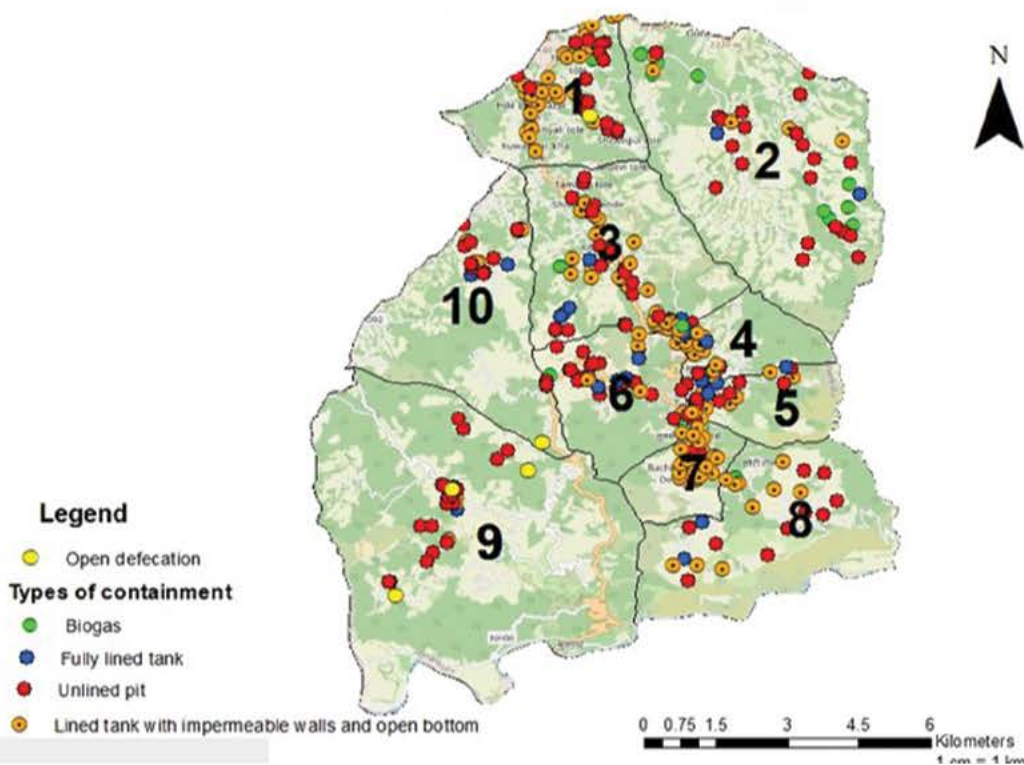


Wards : 10

## CITY PROFILE

Dhankuta Municipality is located in Dhankuta District of Koshi Province, eastern side of Nepal. The municipality is recognized as the "Cleanest City" in the country. It lies between an elevation of 250 m to 2144 m above sea level and has geographical coordinates of 26°59'0" North latitude and 87°20'0" East longitude.

### Sanitation technologies installed at household level in Dhankuta Municipality





संकलन  
(User Interface)



अण्डारण  
(Containment)

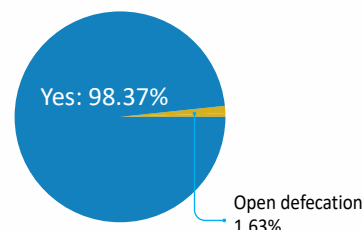


रिचार्जने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

Dhankuta Municipality attained ODF status in 12/29/2014 AD (2071/09/14 B.S). However, the survey reveals that 1.63% of the HHs in the municipality do not have access to toilets and practice open defecation.

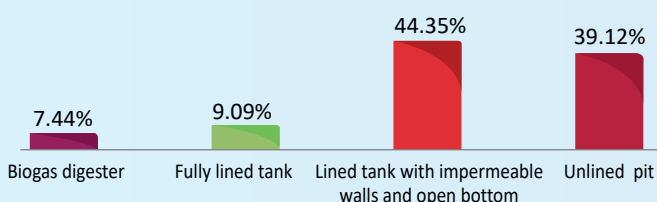
### Sanitation Facility



## CONTAINMENT

Most of the HHs have installed unsafe containments such as lined tanks with impermeable walls and open bottoms, and unlined pit. These unsafe containments lead to groundwater pollution due to leachate percolation. Meanwhile the fully lined tanks, and safe sanitation system as biogas has been installed in lower proportion of HH. Biogas can be considered as safe as it is capable of treating FS.

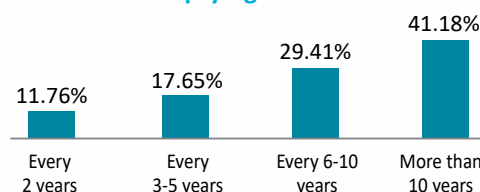
### Types of containments



## EMPTYING AND TRANSPORTATION

The survey findings show that 12.12% of the HHs have emptied their containments at least once since installation. Most of these containments are emptied in an interval of more than 10 years. The emptying mechanism varies as per containment type which is illustrated in the graph.

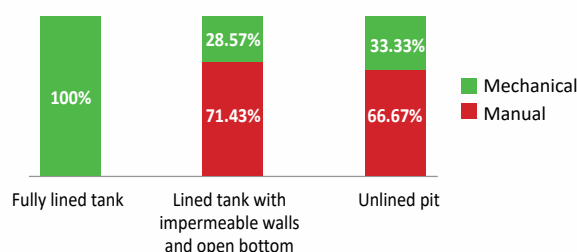
### Emptying Interval



### Details of desludging service providers

Service Provider	Municipality
No. of service provider	1
No. of vehicles	1
Capacity of vehicle (Litres)	5,000
Average trips per month per vehicle	3
Average Service Charge (NPR) per trip	6,000

### Emptying Mechanism



35.29% emptied mechanically by municipal desludging vehicle.



64.71% emptied manually (Self or using traditional sanitation workers)



**Municipal desludging vehicle**



प्रशोधन  
(Treatment)



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

## ESTIMATION OF FAECAL SLUDGE

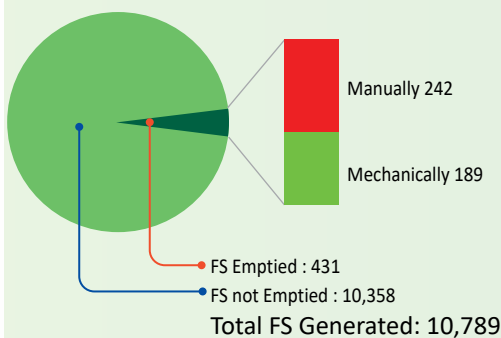
Total estimated volume of FS generation in the municipality: 10,789 m<sup>3</sup> per year which is 29.56 m<sup>3</sup> per day.

Total volume of FS emptied in the municipality: 431 m<sup>3</sup> per year which is 1.18 m<sup>3</sup> per day.

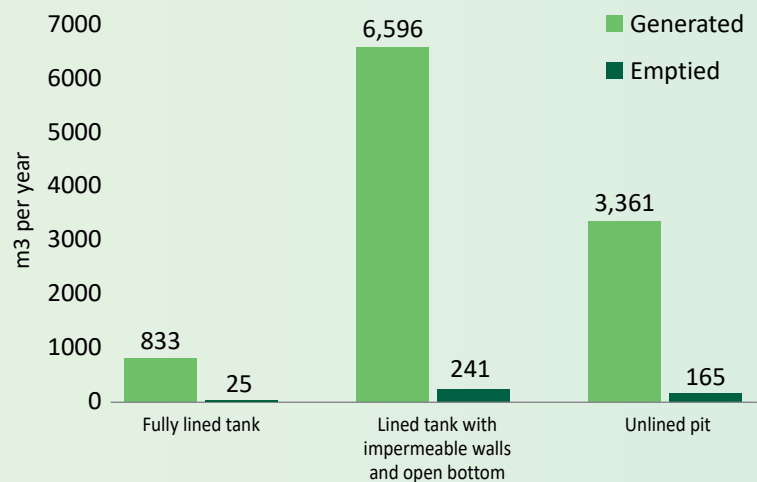
Total volume of mechanically emptied FS: 189 m<sup>3</sup> per year which is 0.52 m<sup>3</sup> per day.

Total volume of manually emptied FS: 242 m<sup>3</sup> per year which is 0.66 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Dhankuta Municipality (cubic meter)



### FS Generated and Emptied



## TREATMENT

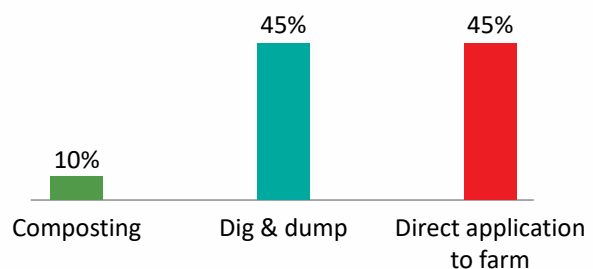
In the municipality, there's a FS drying bed constructed on premises of the Municipal Solid waste management Centre. The mechanically collected FS by municipal desludging vehicle is treated in this component. The effluent produced from the sludge drying bed gravitates to stone masonry-lined soak pit.



## SAFE DISPOSAL AND REUSE

The manually emptied FS is disposed of using dig and dump method, and small percentage are used for composting. Similarly, almost half proportion of FS are directly applied to farmland which can't be considered safe as it possesses a direct risk to environment and public health.

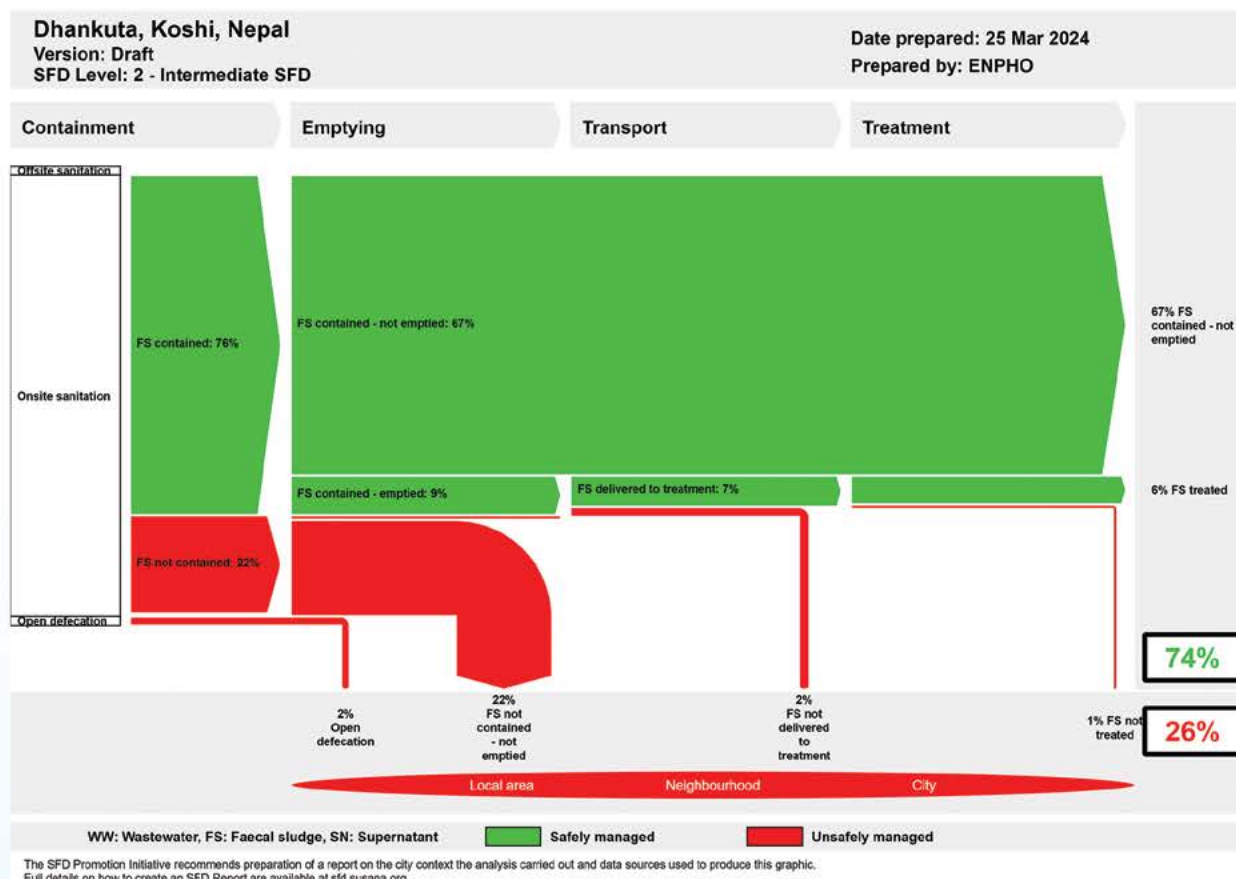
### Disposal practice after manual emptying



## SHIT FLOW DIAGRAM (SFD)

The SFD of Dhankuta Municipality visually represents the status of sanitation practice of municipality across the entire sanitation value chain. It shows that FS generated by 74% of the population is safely managed (Green). Initially, FS generated by 76% of the population is safely contained. However, this proportion drops to 67% which can be considered safe until emptied. Out of the 9% safely contained FS which has been emptied only 7% is delivered to treatment plant and 6% is treated. The emptied FS remains safe depending upon the nature of the emptying mechanism and available treatment facilities.

Overall, FS generated by 26% of the population is unsafely managed (Red). It includes 2% of emptied FS not delivered to treatment plant, and 22% FS which is neither contained nor emptied. Additionally, 2% of the population practice open defecation that exacerbates the environmental risks. This highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Replace and retrofit the unsafe containment systems to safer techniques and technologies such as septic tanks, biogas digesters and twin pits.
- Ensure safe disposal by upgradation of FSTP and ensure proper operation and maintenance of the facilities.
- Formulate and enforce comprehensive sanitation policies and regulations to ensure safer sanitation practices in the municipality.



# ILAM MUNICIPALITY

Municipal Sanitation Synopsis, Study Year-2022

Ilam Tea Garden

## DEMOGRAPHICS



Area : 173.32 km<sup>2</sup>



Household : 12,952



POPULATION : 50,085  
Male : 24,411  
Female : 25,674



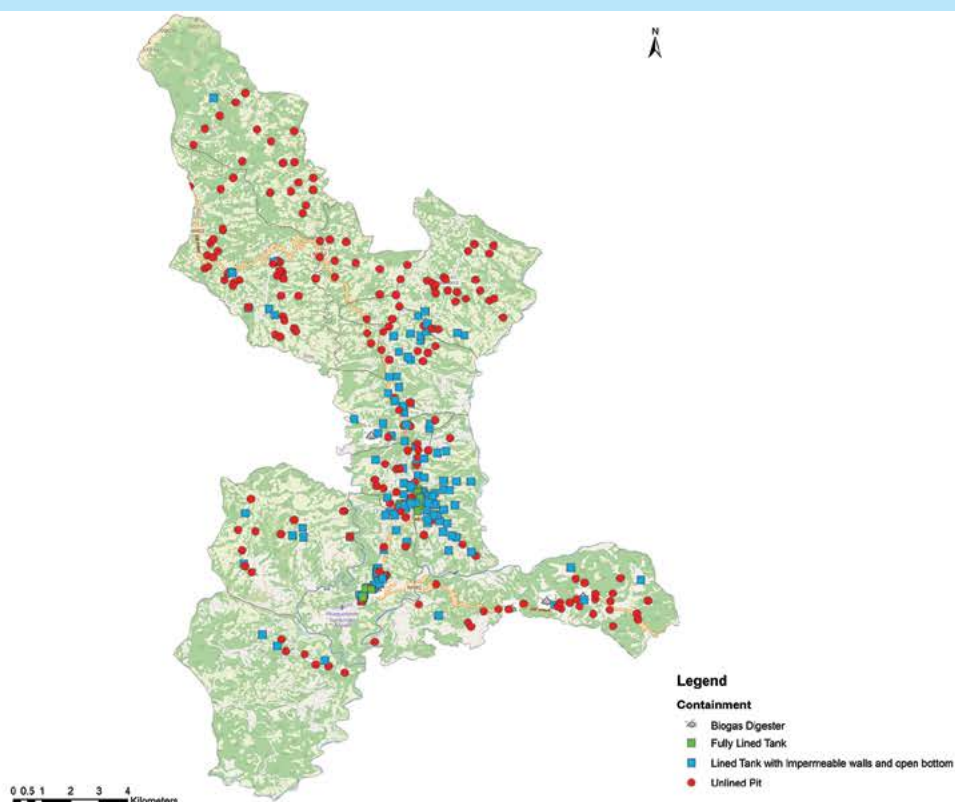
Wards : 12

Source: Census 2021

## CITY PROFILE

Ilam Municipality is in Ilam District, Koshi Province. It is one of the oldest municipality in Nepal which extended from 87°53'30" to 87°57'46" E longitude and 26°51'58" to 26°56'46" N latitude. The elevation of the Ilam ranges between 140 meters to 3,636 meters above mean sea level.

### Sanitation technologies installed at the household level in Ilam Municipality





संकलन  
(User Interface)



अण्डारण  
(Containment)

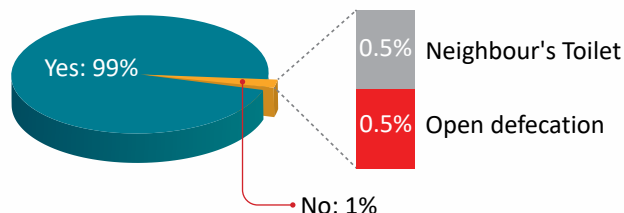


रिच्याउने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

Ilam Municipality was declared as an open defecation free municipality. However, the HH survey reveals that 1% of the HHs in the municipality still do not have access to toilets, resorting to open defecation and use of neighbour's toilet.

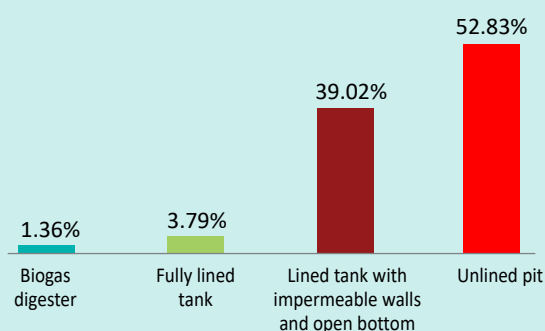
### Sanitation Facility



## CONTAINMENT

The survey shows that the majority of the HHs in the municipality have opted for unlined pit followed by lined tanks with impermeable walls and open bottoms which possess high risk of leachate percolation and potential groundwater/spring source contamination. Only a small proportion of HHs have constructed fully lined tanks and biogas digester that can be considered safe.

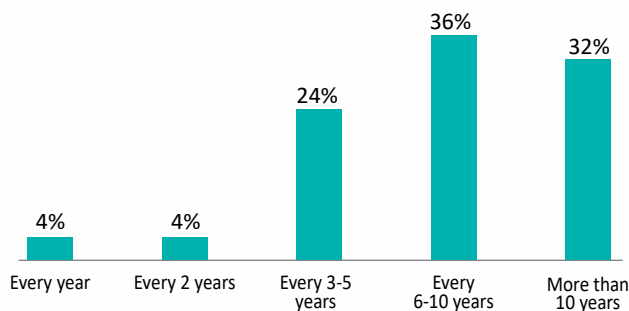
### Types of containments



## EMPTYING AND TRANSPORTATION

The survey reveals that 8.13% of HHs have emptied their containments at least once since installation. The containments are usually emptied at an interval of 3 to 10 years. The emptying mechanism of the containment varies as per the containment types.

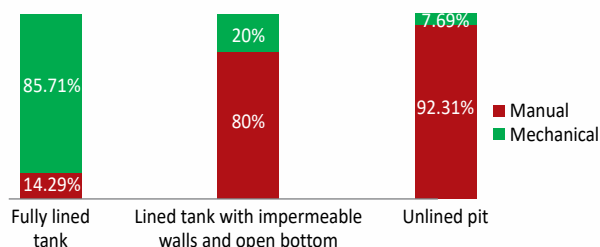
### Emptying Interval



### Details of desludging service provider

Service Provider	Municipality
No. of service providers	1
No. of vehicles	1
Capacity of vehicle (Litres)	4,000
Average trips per vehicle per month	20
Average Service Charge (NPR) per trip	3,500

### Emptying Mechanism



26.67% of HHs empty FS mechanically by municipal desludging service provider.



73.33% of HHs empty FS manually (self or traditional sanitation workers)



Desludging by municipal service provider



प्रशोधन  
(Treatment)

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

## ESTIMATION OF FAECAL SLUDGE

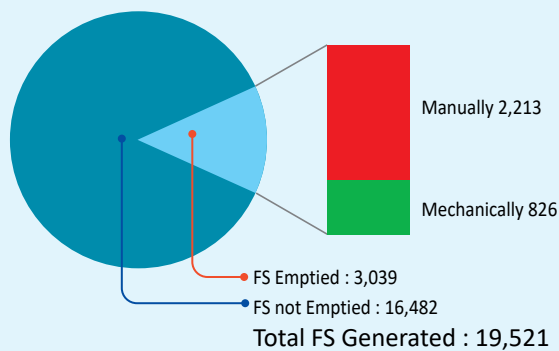
Total estimated volume of FS generation in the municipality: 19,521 m<sup>3</sup> per year which is 53.48 m<sup>3</sup> per day.

Total volume of FS emptied in the municipality: 3,039 m<sup>3</sup> per year which is 8.33 m<sup>3</sup> per day.

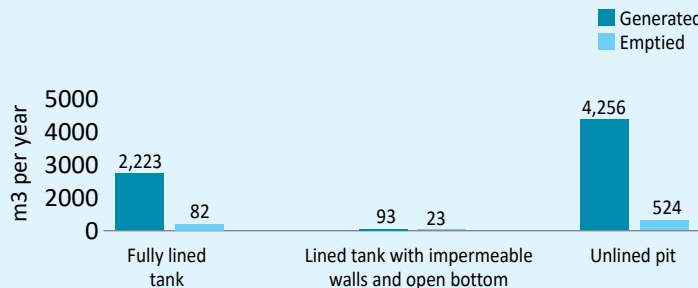
Total volume of mechanically emptied FS: 826 m<sup>3</sup> per year which is 2.26 m<sup>3</sup> per day.

Total volume of manually emptied FS: 2,213 m<sup>3</sup> per year which is 6.07 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Ilam Municipality (cubic meter)



### FS Generated and Emptied



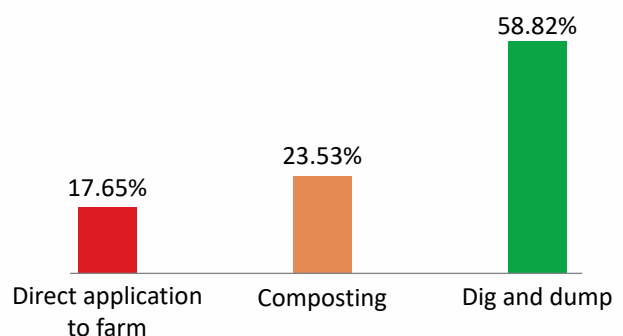
## SAFE DISPOSAL OR REUSE

The municipality does not have FSTP. Mechanically emptied FS is disposed in the designated disposal site near the solid waste disposal site within the municipality. Manually emptied FS is mostly dig and dumped, some HH practice composting while some are directly applied in farmland. However, direct application to farms poses a risk to the environment and public health.



Solid waste and FS disposal site

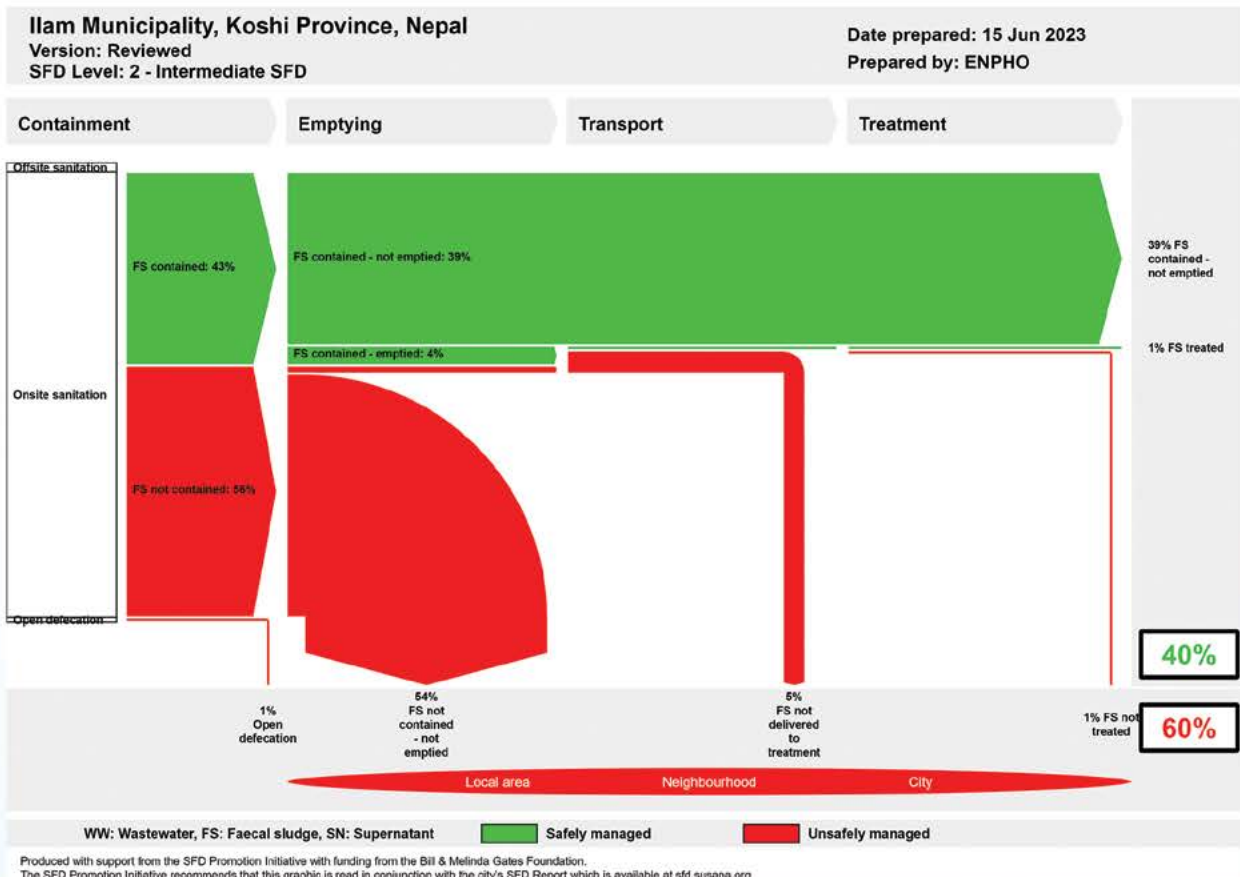
### Disposal practice after manual emptying



## SHIT FLOW DIAGRAM (SFD)

The SFD of Ilam visually represents the status of sanitation practices across the municipality through the entire sanitation value chain. The diagram illustrates overall FS generated by 40% of the population is safely managed (Green). Initially, 43% of FS is safely contained, and this proportion drops to 39% which can be considered safe until emptied. Furthermore among 4% emptied FS, 1% is considered treated primarily from biogas digesters. The emptied FS remains safe depending on the nature of the emptying mechanism and available treatment facilities.

Furthermore, FS generated by 60% of the population is unsafely managed (Red). It includes 1% FS not treated, 5% of emptied FS (2%-not contained, 3%-contained) not delivered to treatment plant, and 54% of FS that is neither safely contained nor emptied. Additionally, 1% of the population still practice open defecation exacerbating sanitation challenges. It highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Retrofit and replace unsafe containment systems with appropriate techniques and technologies such as septic tanks, biogas digesters and twin pits.
- Promote the use of municipal mechanical desludging services in accessible areas.
- Construct a faecal sludge treatment plant to manage FS effectively, reduce environmental pollution, and safeguard public health.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.

# KHANDBARI MUNICIPALITY

Municipal Sanitation Synopsis, Study Year-2024

Arun river, Bank of Manakamana Temple

## DEMOGRAPHICS



Area : 122.78 km<sup>2</sup>



Household : 9,309



POPULATION : 35,565  
Male : 17,356  
Female : 18,209



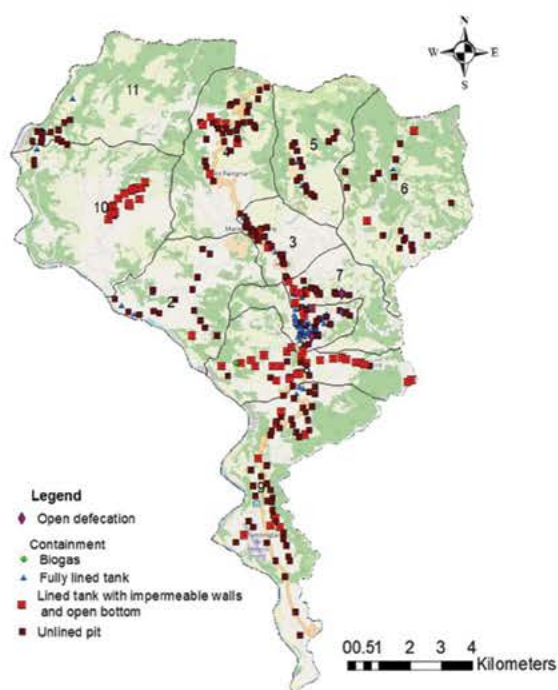
Wards : 11

Source: Census 2021

## CITY PROFILE

Khandbari Municipality is in Sankhuwasabha District of Koshi Province in Nepal. It lies at the Northern belt of the country at altitude of 278 meters to 2171 meters above mean sea level. Geographically it extends from 27°16'14" N to 27°27'44" N latitude and 87°14'27" E to 87°07'26" E longitude at Nepal's hill region.

### Sanitation technologies installed at household level in Khandbari Municipality





संकलन  
(User Interface)



अण्डारण  
(Containment)

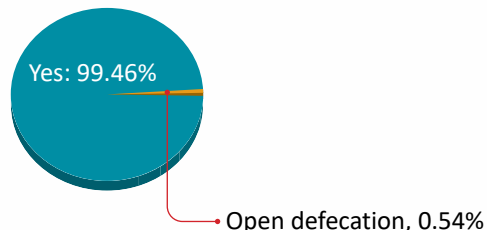


रिट्याउने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

Khandbari Municipality has already attained ODF status. However, a HH survey reveals that 0.54% of HHs still lack access to toilets and practice open defecation.

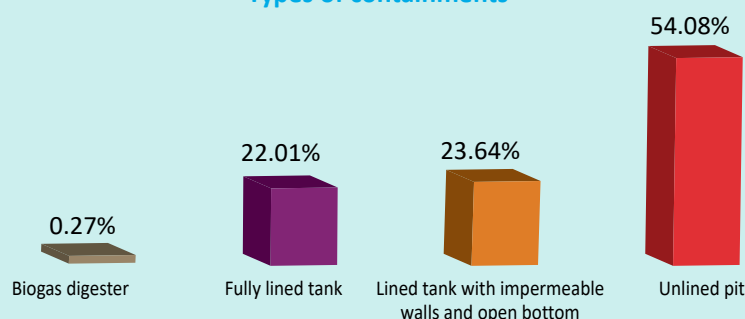
### Sanitation Facility



## CONTAINMENT

The majority of HHs have built unlined pits, followed by lined tanks with impermeable walls and open bottoms which are considered as unsafe containments. These containments have open bottoms, allowing leachate percolation and possessing a risk to groundwater contamination. Only a minimal proportion of HH have built biogas digesters which can be considered safe and capable of treating FS if functioning properly.

### Types of containments



Lined tank installed in sampled HH

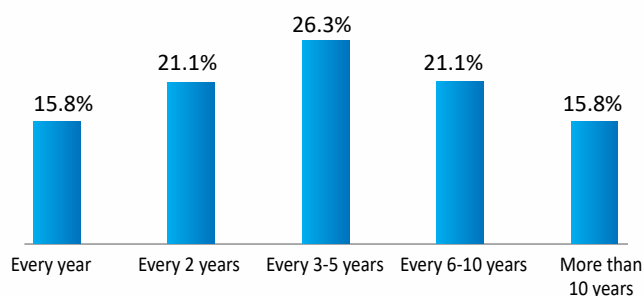


Unlined pit installed in sampled HH

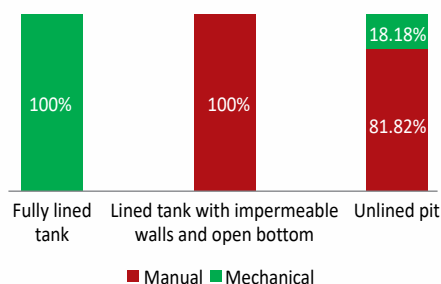
## EMPTYING AND TRANSPORTATION

According to the survey findings, only 5.2% of the HHs have emptied their containments at least once since installation. The containments are emptied in different time intervals depending on the type of containments used. Usually, they are emptied in intervals of between 3 to 10 years. The emptying mechanism of the containment is shown in graph. There is no private desludging service available in municipality, whereas on demand service is being provided by nearby municipality of Dhankuta district.

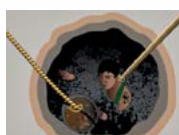
### Emptying Interval



### Emptying Mechanism



42.11% emptied mechanically by private desludging service providers from neighbouring municipality.



57.89% emptied manually either by self or traditional sanitation workers.



प्रशोधन  
(Treatment)

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

## ESTIMATION OF FAECAL SLUDGE

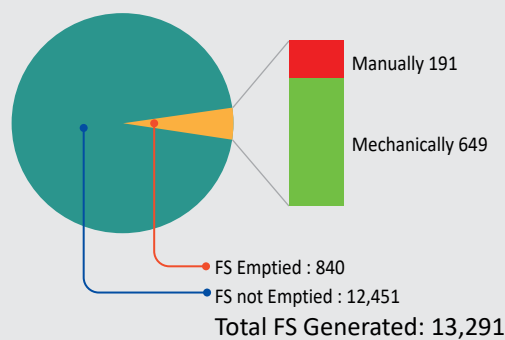
Total estimated volume of FS generation in the municipality: 13,291 m<sup>3</sup> per year which is 36.4 m<sup>3</sup> per day.

Total volume of FS emptied in the municipality: 840 m<sup>3</sup> per year which is 2.3 m<sup>3</sup> per day.

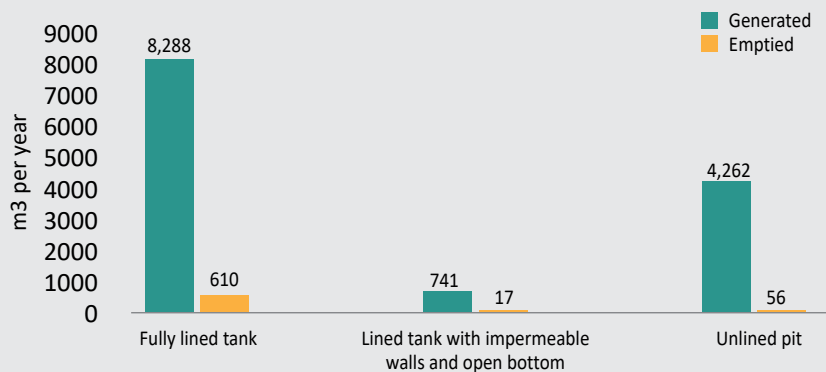
Total volume of mechanically emptied FS in the municipality: 649 m<sup>3</sup> per year which is 1.8 m<sup>3</sup> per day.

Total volume of manually emptied FS in the municipality: 191 m<sup>3</sup> per year which is 0.5 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Khandbari Municipality (cubic meter)



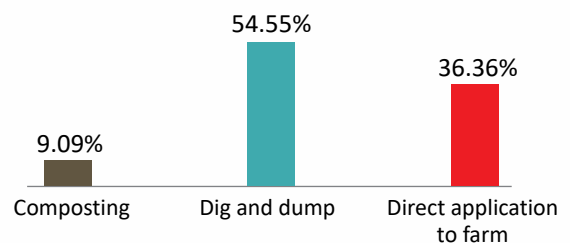
### FS Generated and Emptied



## SAFE DISPOSAL OR REUSE

The municipality does not have mechanical desludging service. The majority of manually emptied FS is dig and dump, followed by direct application to farm, and some FS used in composting. However, direct application to farms can't be considered safe as they possess a direct risk to the environment and public health.

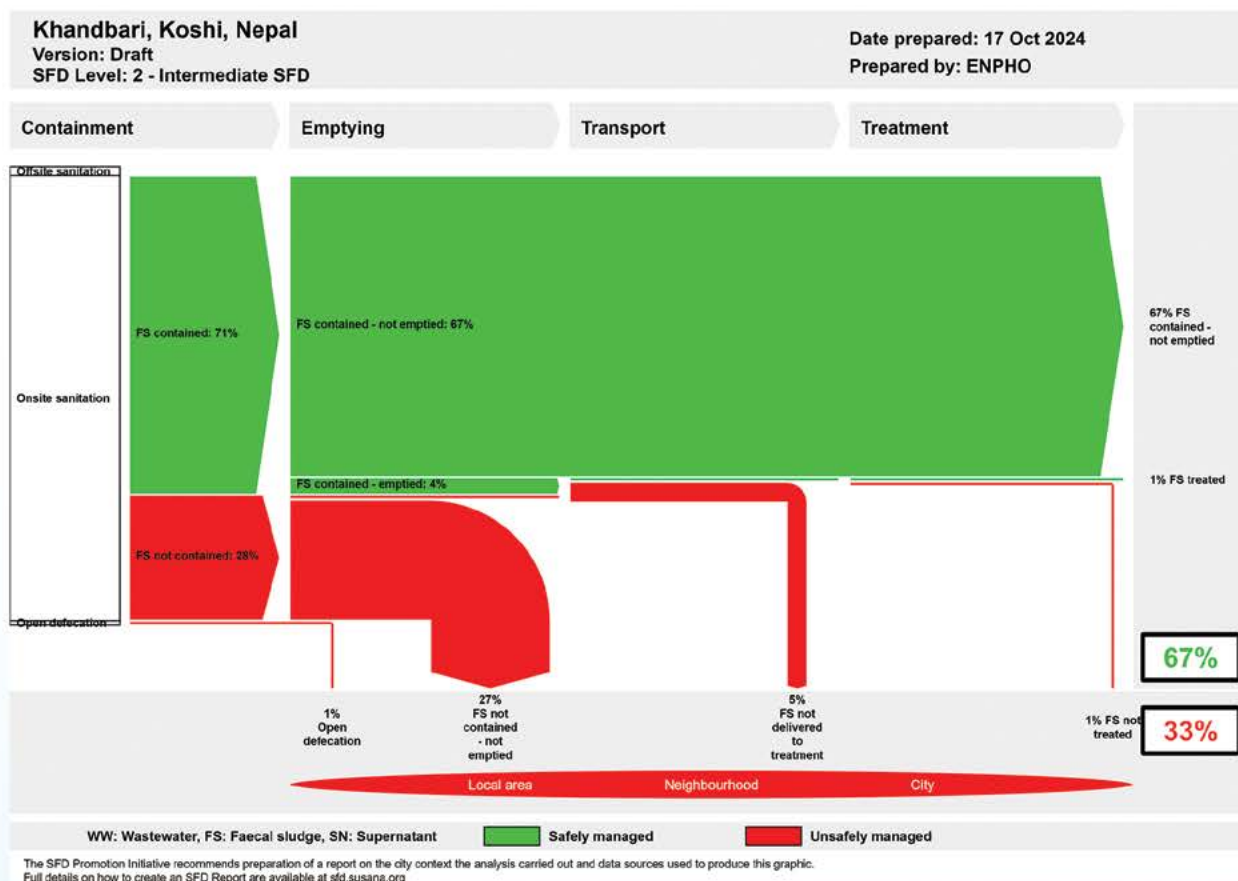
### Disposal practice after manual emptying



## SHIT FLOW DIAGRAM (SFD)

The SFD of Khandbari Municipality visually represents the status of sanitation practices across the municipality through the entire sanitation value chain. The diagram illustrates that FS generated by 67% of the population are safely managed (Green). Initially, 71% of FS was safely contained. However, this proportion drops to 67% after emptying which can be considered safe until emptying. Out of the remaining 4% of FS which are contained and emptied, only 1% of FS undergoes proper treatment, primarily from biogas digester. This highlights that FS remains safe depending upon the nature of the emptying mechanism and availability of treatment facilities.

Additionally, FS generated by 33% of the population is unsafely managed (Red). It includes 1% of FS not treated, 27% of FS is neither contained nor emptied. Moreover, 5% of FS are delivered untreated into the environment, possessing risks of pollution and 1% of the population still practices open defecation exacerbating sanitation challenges. This highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Retrofit and replace unsafe containment systems with appropriate techniques and technologies such as septic tanks, biogas digesters, and twin pits.
- Advocate for providing desludging services within the municipality, along with its formal registration and proper regulation.
- Ensure safe disposal by establishing FS treatment facilities and ensuring proper operation and maintenance of the facilities.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.



# PHIDIM MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2022



## DEMOGRAPHICS



Area : 193 km<sup>2</sup>



Household : 12,336



POPULATION : 48,495  
Male : 23,679  
Female : 24,816



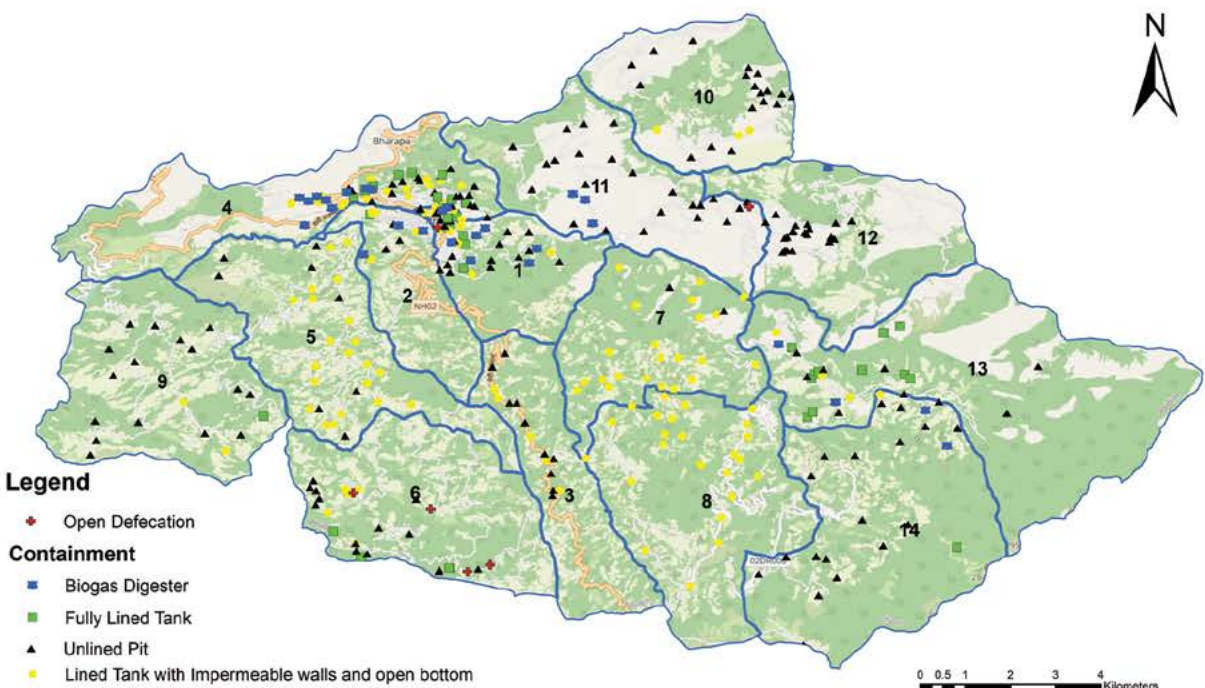
Wards : 14

Source: Census 2021

## CITY PROFILE

Phidim Municipality is in Panchthar District, Koshi Province of the eastern Nepal established on 18<sup>th</sup> May 2014. It has geographical coordinates located at 27°8'39" N latitude, 87°45'58" E longitude with an elevation range of 1,756.48 meters above sea level.

### Sanitation technologies installed at the household level in Phidim Municipality





संकलन  
(User Interface)



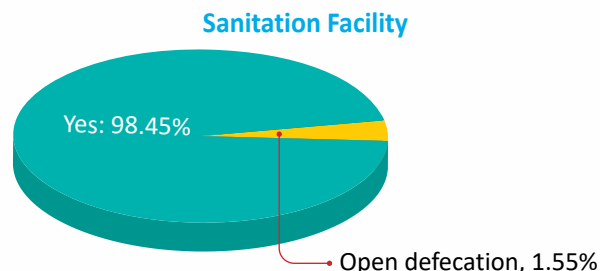
अण्डारण  
(Containment)



रिच्याउने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

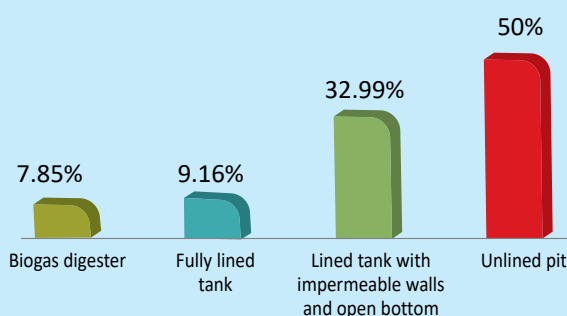
Phidim Municipality has already been declared as ODF zone. However, the HH survey shows that 98.45% of HHs in the municipality have access to basic sanitation coverage while the remaining households still practice open defecation.



## CONTAINMENT

About half of the HHs rely on unlined pit followed by lined tanks with impermeable walls and open bottoms allowing leachate percolation, possessing a risk to groundwater contamination. Moreover, a few proportions of HHs have opted for fully lined tanks, and safe technologies such as biogas digesters.

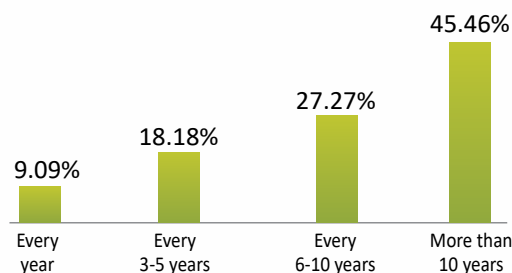
### Types of containments



## EMPTYING AND TRANSPORTATION

About 10.57% of the surveyed households have emptied the containment at least once since installation. Almost half of the containments are emptied after more than 10 years period. The detail of the emptying mechanism is shown in the graph.

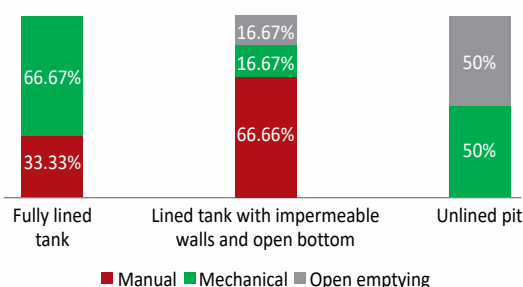
### Emptying Interval



### Detail of desludging service providers

Service Provider	Municipality
No. of service providers	1
No. of vehicles	1
Vehicle Capacity (Litres)	5,000
Average trips per vehicle per week	1
Average Service Charge per trip (NPR)	6,000-7,000

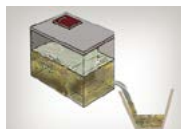
### Emptying Mechanism



45.45% of HHs emptied mechanically by municipal desludging service providers.



36.37% of HHs emptied manually: self-emptying or traditional sanitation workers.



18.18% of HHs practice open emptying.



Municipal desludging vehicle



## ESTIMATION OF FAECAL SLUDGE

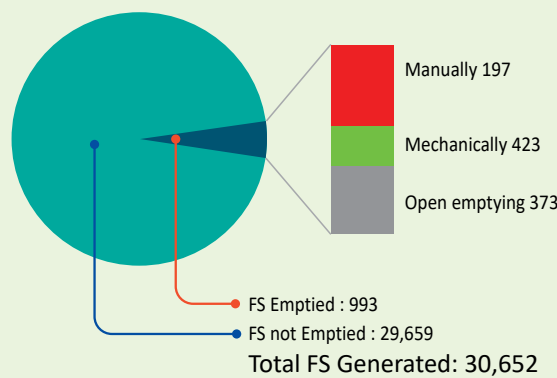
Total estimated volume of FS generation in the municipality: 30,652 per year which is 84 m<sup>3</sup> per day.

Total volume of FS emptied in the municipality: 993 m<sup>3</sup> per year which is 2.71 m<sup>3</sup> per day.

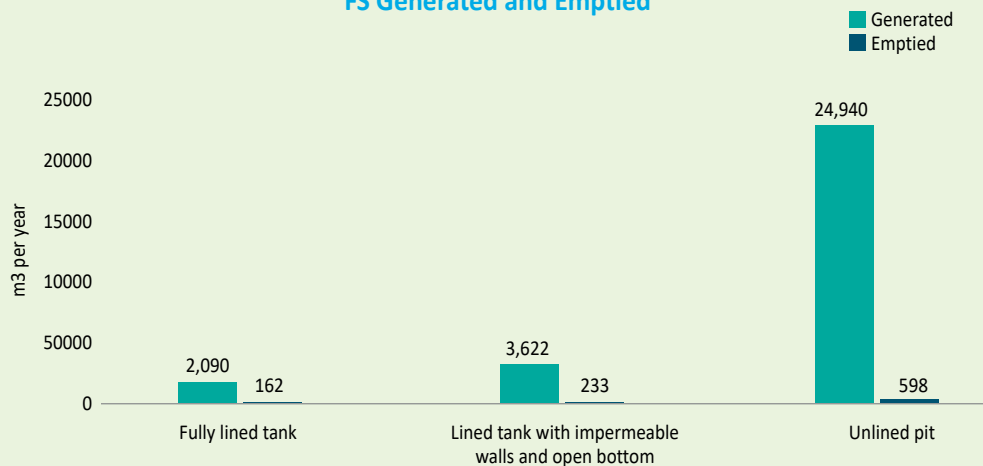
Total volume of mechanically emptied FS in the municipality: 423m<sup>3</sup> per year which is 1.15 m<sup>3</sup> per day.

Total volume of manually emptied FS in the municipality: 197 m<sup>3</sup> per year which is 0.53m<sup>3</sup> per day.

Total volume of FS emptied by open emptying: 373 m<sup>3</sup> per year which is 1.03 m<sup>3</sup> per day.



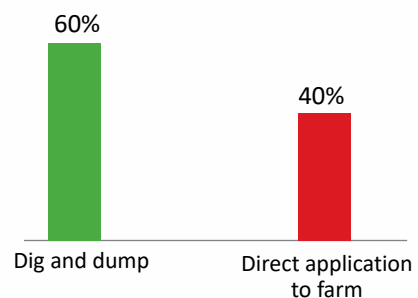
### FS Generated and Emptied



## SAFE DISPOSAL OR REUSE

The municipality does not have FSTP. However, the municipality has its own dumping site far from the human settlement where mechanically collected FS is dumped through trenching method. Meanwhile the majority of manually emptied FS are managed by digging and dumping methods, and direct application to farm. The direct application to farms can't be considered safe as it possesses risk to the environment and public health.

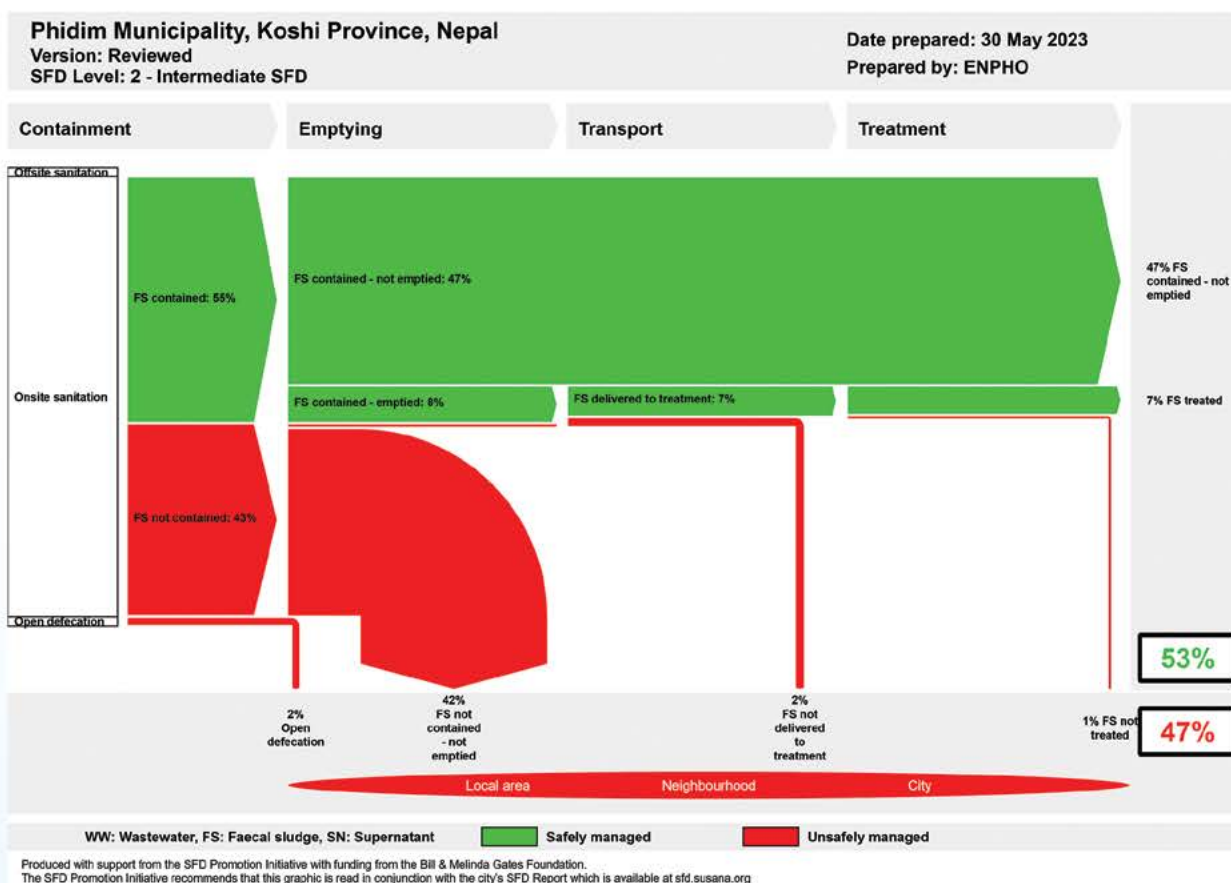
### Disposal practice after manual emptying



## SHIT FLOW DIAGRAM (SFD)

The SFD of Phidim Municipality visually represents the status of sanitation practices across the municipality through the entire sanitation value chain. The diagram illustrates that FS generated by 53% of the population are safely managed (Green). Initially, 55% of FS was safely contained. However, this proportion drops to 47% after emptying which can be considered safe until emptying. Out of the remaining 8% of FS which are contained and emptied, only 7% of FS undergoes proper treatment, primarily from biogas digester. This highlights that FS remains safe depending upon the nature of the emptying mechanism and availability of treatment facilities.

Additionally, FS generated by 47% of the population is unsafely managed (Red). 42% of FS is neither contained nor emptied, and 2% of the population still practices open defecation exacerbating sanitation challenges. Moreover, 1% of FS remains untreated in treatment plants, and 2% of emptied FS (1%-FS contained, 1%-FS not contained) are directly delivered into the environment without any treatment, possessing risks of pollution. This highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Retrofit and replace unsafe containment systems with appropriate techniques and technologies such as septic tanks, biogas digesters, and twin pits.
- Construct a faecal sludge treatment plant to manage FS effectively, reduce environmental pollution, and safeguard public health.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.

# PHUNGLING MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2022



Phungling Municipality building

## DEMOGRAPHICS



Area : 125.57 km<sup>2</sup>



Household : 6,898



POPULATION : 28,449  
Male : 13,981  
Female : 14,468



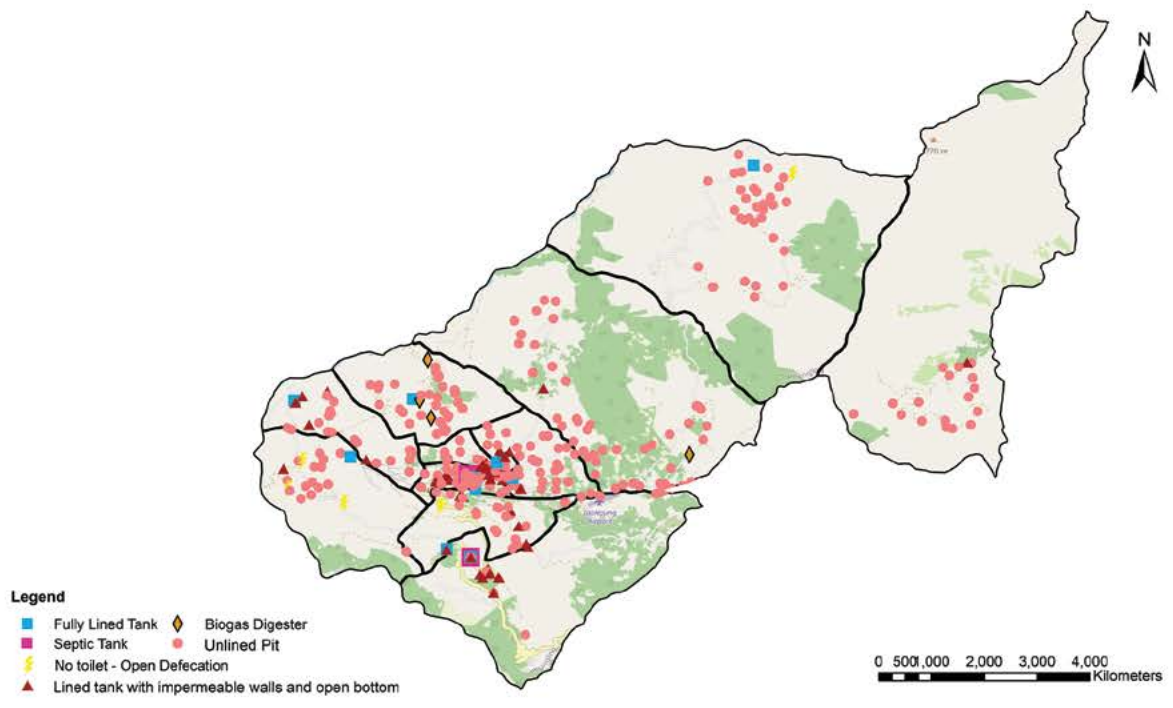
Wards : 11

Source: Census 2021

## CITY PROFILE

Phungling Municipality is situated in Taplejung District of eastern Nepal. The municipality is located at an altitude of 1,571 metre above sea level and geographical coordinates of 27°21'44"N latitude and 87°39'58"E longitude.

### Sanitation technologies installed at the household level in Phungling Municipality





संकलन  
(User Interface)



अण्डारण  
(Containment)

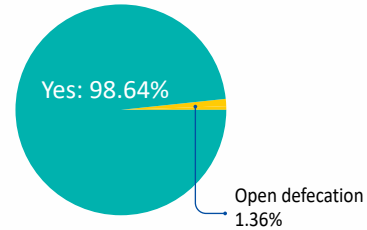


रिचार्जने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

Phungling Municipality has already attained ODF status in 2019 A.D. However, the survey reveals that 1.36% of the HH in the municipality still don't have access to toilet resorting to open defecation.

### Sanitation Facility



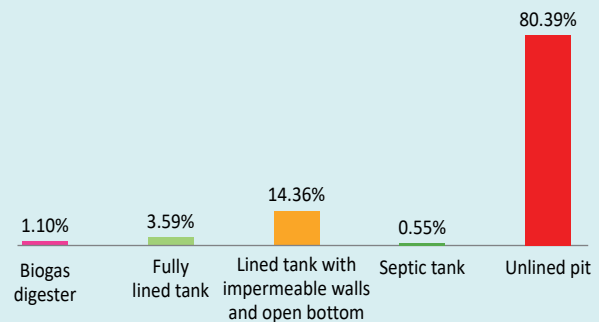
## CONTAINMENT

The majority of HHs rely on unlined pit, followed by lined tanks with impermeable walls and open bottoms. These containments allow leachate percolation, possessing a risk to groundwater contamination making it unsafe. Fully lined tanks have been installed in small proportion of HH, while safe containments such as biogas digesters and septic tank have been installed in very small proportion of HH.



Unlined pit installed in sampled HH

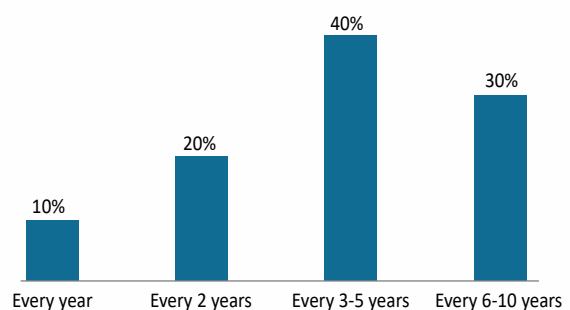
### Types of containment



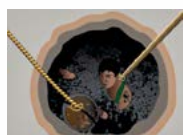
## EMPTYING AND TRANSPORTATION

According to the survey, only 2.79% of the HHs have emptied their containments at least once since installation. Usually, the containments are emptied at an interval of 3 to 5 years. There are no FS desludging services in the municipality. Private desludgers from a neighbouring municipality, Phidim, provide this service once a few months upon the request of household owners.

### Emptying Interval

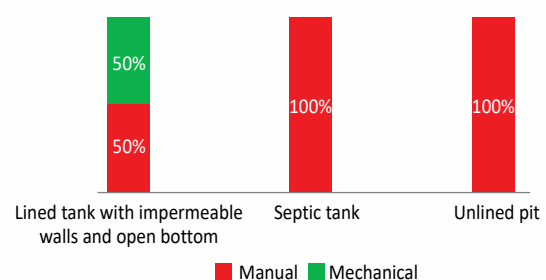


10% emptied mechanically by private desludging service providers from neighbor municipality.



90% emptied manually (self or traditional sanitation workers)

### Emptying Mechanism





प्रशोधन  
(Treatment)

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

## ESTIMATION OF FAECAL SLUDGE

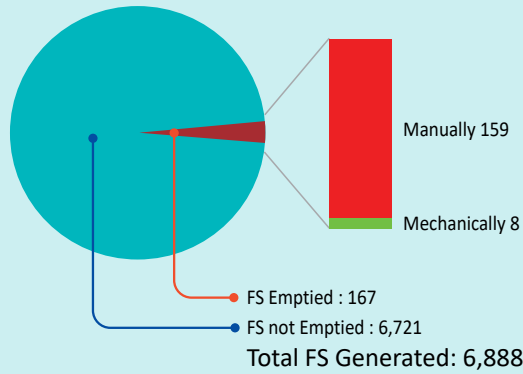
Total estimated volume of FS generation in the municipality: 6,888 m<sup>3</sup> per year which is 18.87 m<sup>3</sup> per day.

Total volume of FS emptied in the municipality: 167 m<sup>3</sup> per year which is 0.45 m<sup>3</sup> per day.

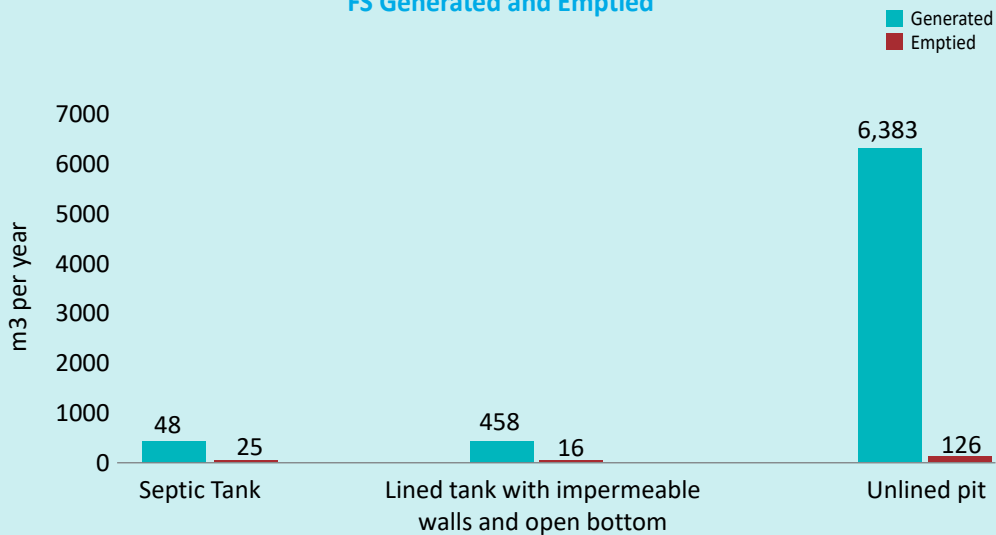
Total volume of mechanically emptied FS: 8 m<sup>3</sup> per year which is 0.02 m<sup>3</sup> per day.

Total volume of manually emptied FS: 159 m<sup>3</sup> per year which is 0.43 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Phungling Municipality (cubic meter)



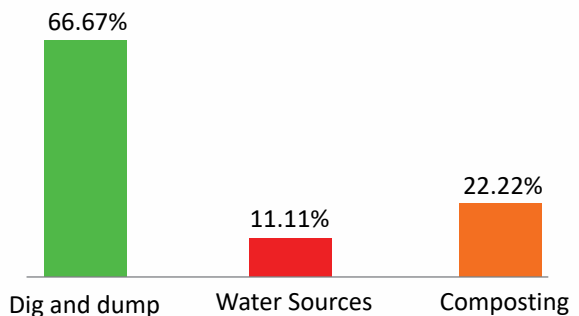
### FS Generated and Emptied



## SAFE DISPOSAL OR REUSE

The municipality does not have FSTP. The majority of manually emptied FS are dig and dumped. Some are used in composting and a few percentages of the FS are disposed of into nearby water bodies. However, disposal in nearby water bodies possess direct threats to environment and public health.

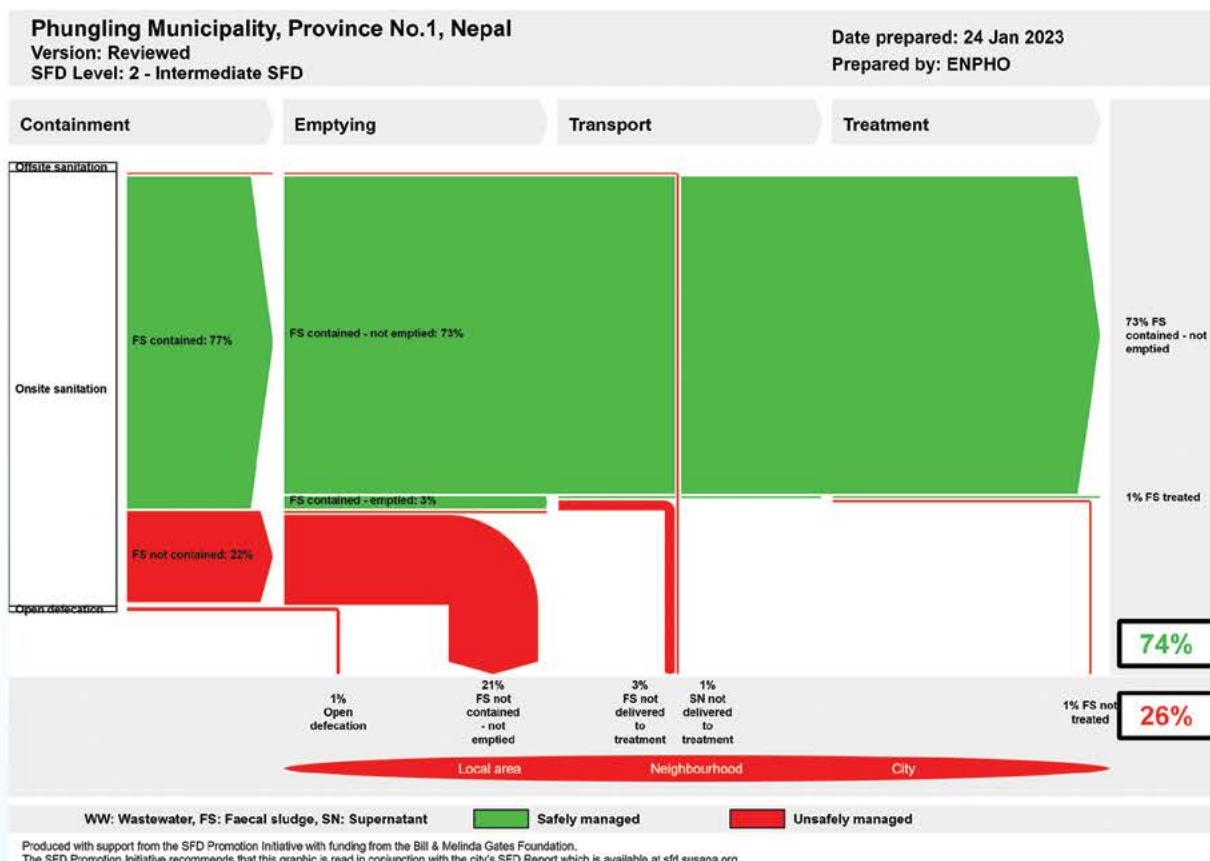
### Disposal practice after manual emptying



## SHIT FLOW DIAGRAM (SFD)

The SFD of Phungling Municipality visually represents the status of sanitation practices across the municipality through the entire sanitation value chain. The diagram illustrates that FS generated by 74% of the population is safely managed (Green). Initially, 77% of FS is safely contained. However, this proportion drops to 73% considering the unemptied FS is safe. Out of 3% of emptied FS, 1% of FS undergoes proper treatment primarily from biogas digesters. The emptied FS remains safe depending upon the nature of the emptying mechanism and available treatment facilities.

Overall, FS from 26% of the population is unsafely managed (Red). It includes 1% FS not treated, 1% SN not delivered to treatment plant, 3% emptied FS (2%-FS contained, 1%-FS not contained) not delivered to treatment plant, and 21% FS that are neither contained nor emptied. Additionally, 1% of the population still practices open defecation, exacerbating the sanitation challenges. These findings highlight critical gaps that must be addressed to mitigate environmental contamination and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Retrofit and replace unsafe containment systems with appropriate techniques and technologies such as septic tanks, biogas digesters, and twin pits.
- Formalize and regulate private desludging service within the municipality.
- Construct a faecal sludge treatment plant to manage FS effectively, reduce environmental pollution, and safeguard public health.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.



# SIDDHICHARAN MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2024

Okhaldhunga bazaar, Siddhicharan

## DEMOGRAPHICS



Area : 167.88 km<sup>2</sup>



Household : 7,126



POPULATION : 27,351

Male : 13,097

Female : 14,254



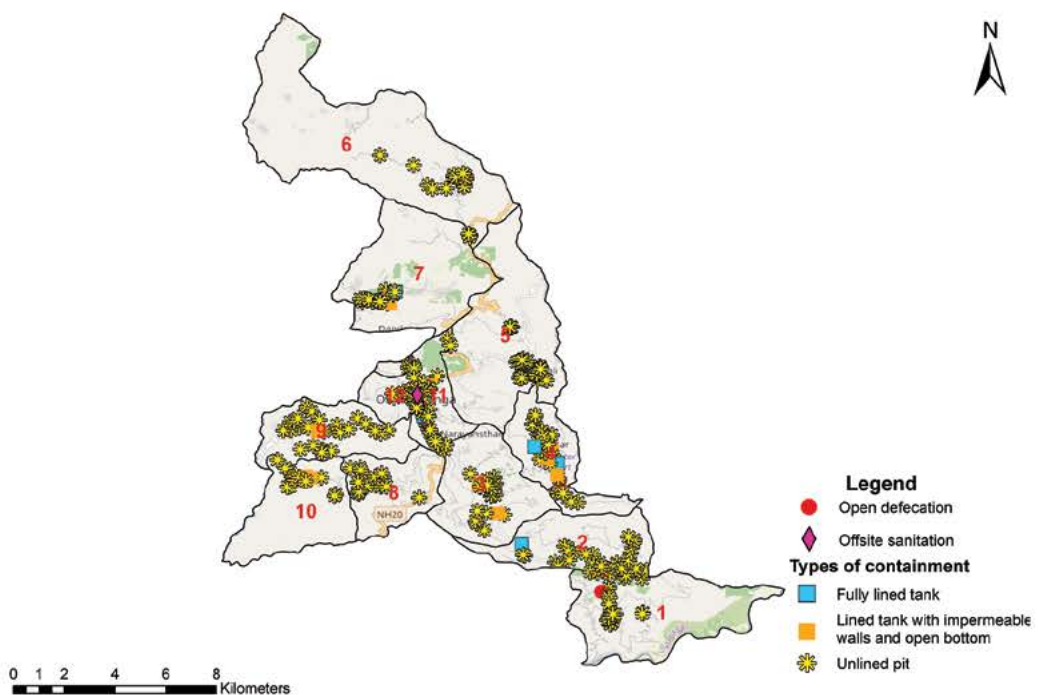
Wards : 12

Source: Census 2021

## CITY PROFILE

Siddhicharan Municipality is located in Okhaldhunga District of Koshi Province in Nepal. It spans from 27°06'00" to 27°31'60" N latitude and 86°09'60" to 86°31'60" E longitude. The municipality lies approximately at an altitude of 1,841 meters above mean sea level.

### Sanitation technologies installed at the household level in Siddhicharan Municipality





संकलन  
(User Interface)



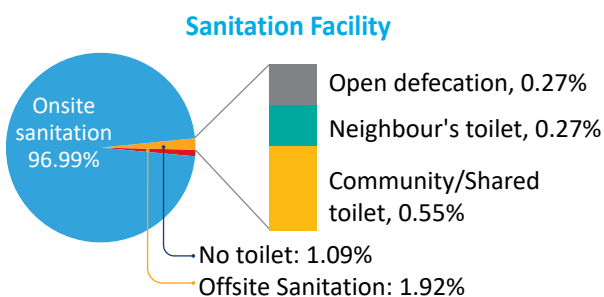
अण्डारण  
(Containment)



रिच्याउने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

Siddhicharan Municipality attained ODF status on 17 July 2017. However, the survey reveals that 1.09% of HHs still lacks access to toilet and practice open defecation. Additionally, 1.92% of HHs have offsite sanitation systems connected to sewer network.

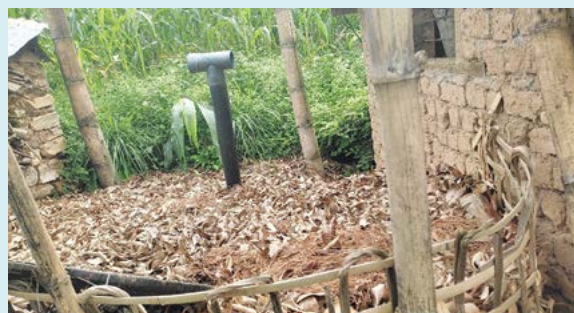
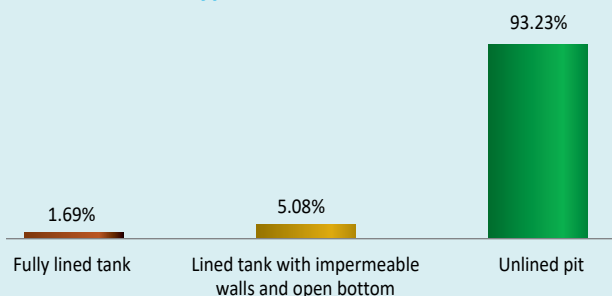


Offsite connection in market area.

## CONTAINMENT

The majority of HHs rely on unlined pit followed by lined tanks with impermeable walls and open bottom. These both types of containments have open bottoms, allowing leachate percolation and possessing a risk to groundwater contamination. In addition, few HHs opted for fully lined tanks which can at least store FS safely. However, there are better options for safer technologies such as septic tanks, biogas digester and twin pits.

### Types of containment

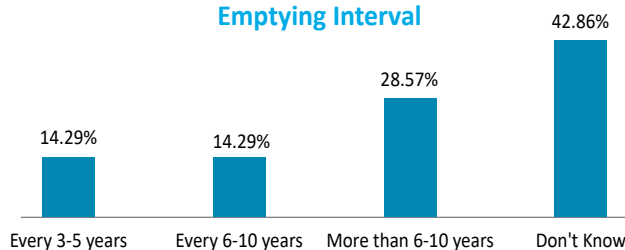


Unlined pit

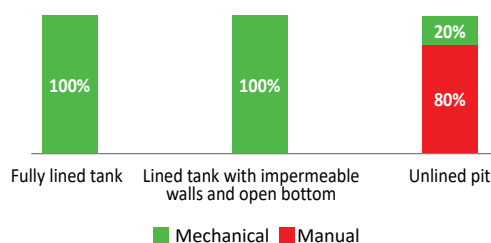
## EMPTYING AND TRANSPORTATION

According to the survey, about 2% of the HHs have emptied their containments at least once since installation. These containments are usually emptied over an interval of more than 10 years. The mechanical desludging service is provided by private desludger from neighboring municipality.

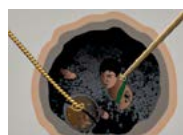
### Emptying Interval



### Emptying Mechanism



43% of HHs emptied FS mechanically (Private desludging service providers from neighboring municipality).



57% of HHs emptied FS manually (Self or traditional sanitation workers).



प्रशोधन  
(Treatment)



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

## ESTIMATION OF FAECAL SLUDGE

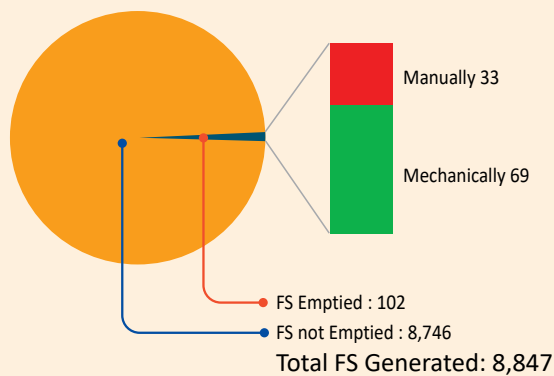
Total estimated volume of FS generation in the municipality: 8,847 m<sup>3</sup> per year which is 24.2 m<sup>3</sup> per day.

Total volume of FS emptied in the municipality: 102 m<sup>3</sup> per year which is 0.3 m<sup>3</sup> per day.

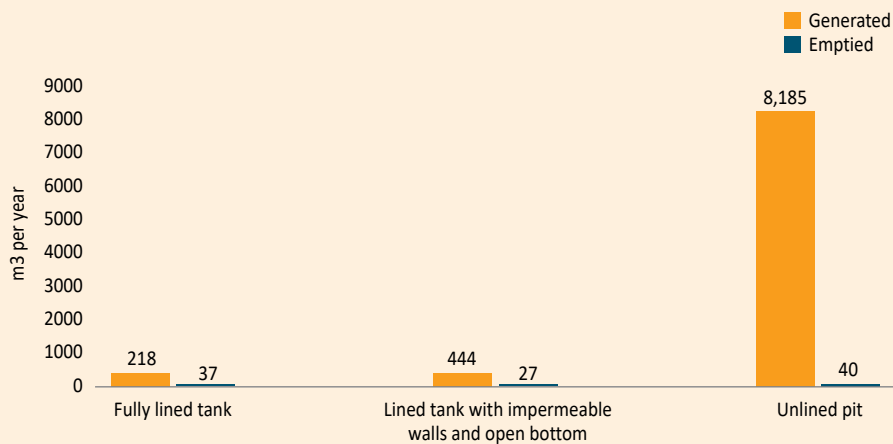
Total volume of mechanically emptied FS: 69 m<sup>3</sup> per year which is 0.2 m<sup>3</sup> per day.

Total volume of manually emptied FS: 33 m<sup>3</sup> per year which is 0.1 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Siddhicharan Municipality (cubic meter)



### FS Generated and Emptied



## SAFE DISPOSAL OR REUSE

In the municipality, mechanically emptied FS is applied to farmlands. While manually emptied FS is dig and dump.

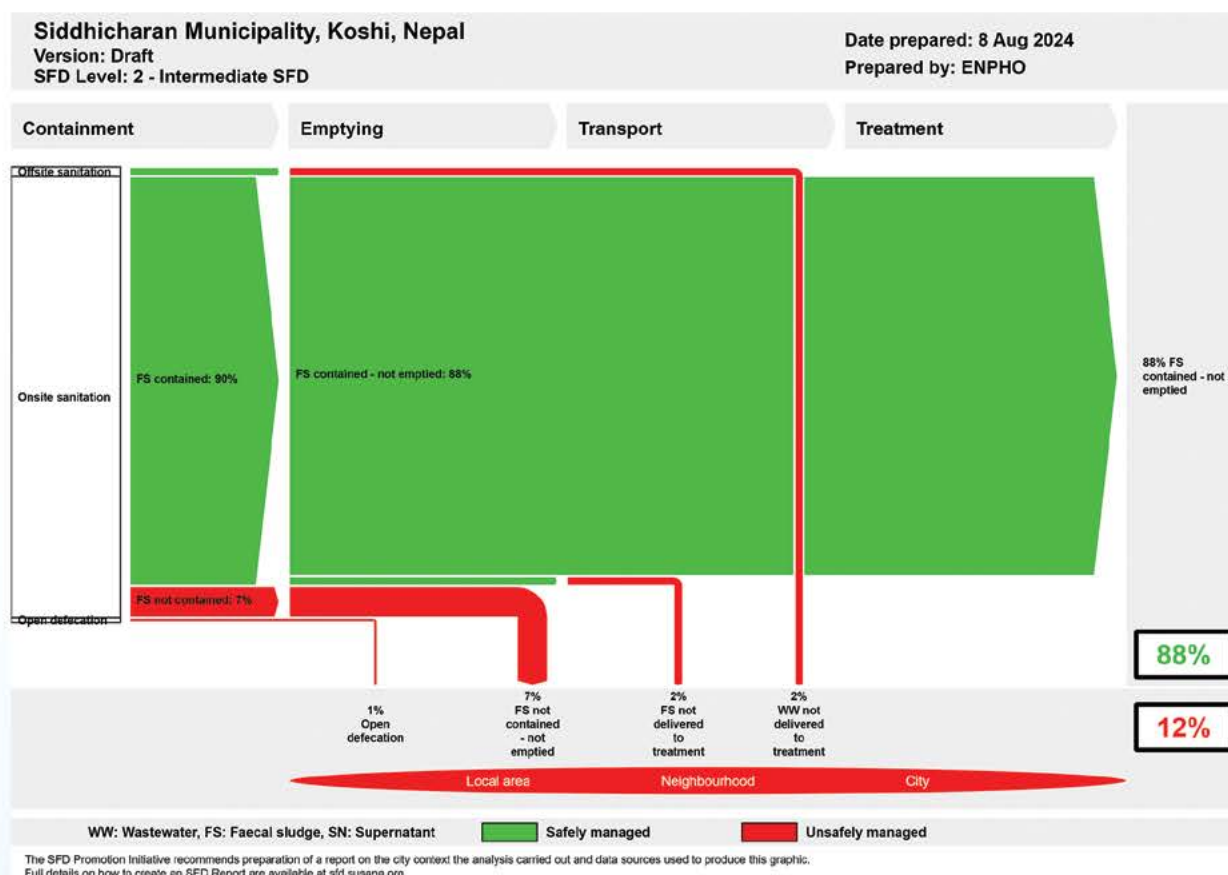
### Disposal practice after manual emptying



## SHIT FLOW DIAGRAM (SFD)

The SFD of Siddhicharan Municipality visually represents the status of sanitation practices across the entire sanitation value chain. It shows that FS generated by 88% of the population is safely managed (Green). Initially, FS generated by 90% of the population is safely contained. However, this proportion drops to 88% which can be considered safe until emptied. The emptied FS remains safe depending upon the nature of the emptying mechanism and available treatment facilities.

Furthermore, FS generated by 12% of the population is unsafely managed (Red). It includes 2% of WW not delivered to treatment plant, 2% of FS not delivered to treatment plant and 7% of FS which is neither contained nor emptied. Additionally, 1% of the population practice open defecation that exacerbates the environmental risks. This highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Replace and retrofit the unsafe containment systems to safer techniques and technologies such as septic tanks, and twin pits.
- Promote mechanical desludging services in the municipality to address the current gap in sanitation value chain.
- Construct a faecal sludge treatment plant to manage FS effectively.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.

# SOLUDUDHKUNDA MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2024

Phaplu Airport, Solududhkunda

## DEMOGRAPHICS



Area : 565.06 km<sup>2</sup>



Household : 6,744



POPULATION : 25,678  
Male : 12,672  
Female : 13,006



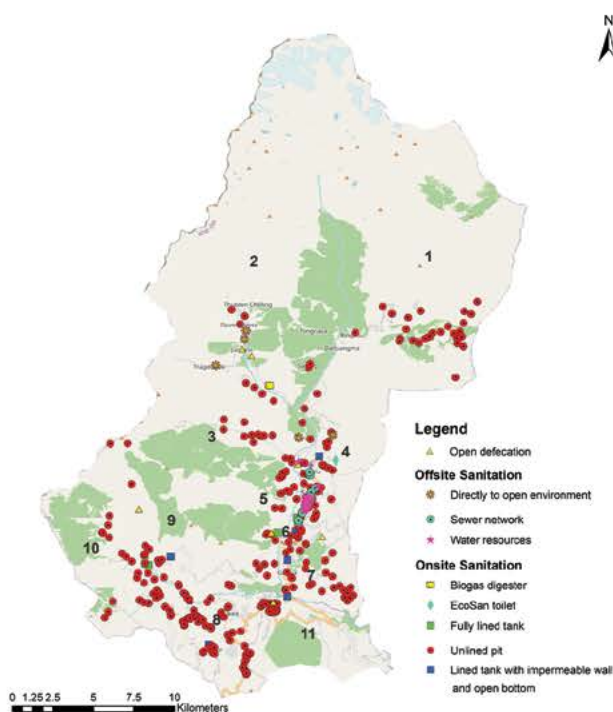
Wards : 11

Source: Census 2021

## CITY PROFILE

Solududhkunda Municipality is in Solukhumbu District, Koshi Province established on December 3, 2014. It is located at latitude 27°30'7" N and longitude 86° 35' 10"E and at an elevation of 2,661 meters above mean sea level.

### Sanitation technologies installed at the household level in Solududhkunda Municipality





संकलन  
(User Interface)



अण्डारण  
(Containment)



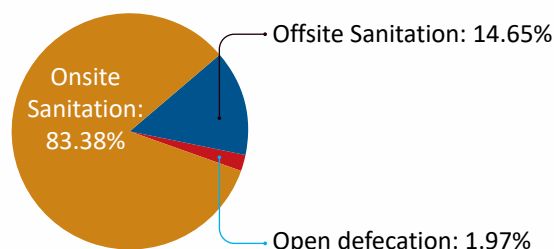
रिच्याउने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

The HH survey of Solududhkunda municipality reveals that 1.97% of the HHs still do not have access to toilets, resorting to open defecation.

Among HHs with offsite sanitation systems, 5.63% are connected to sewer network while 1.69% and 7.32% are connected to open ground and water resource respectively.

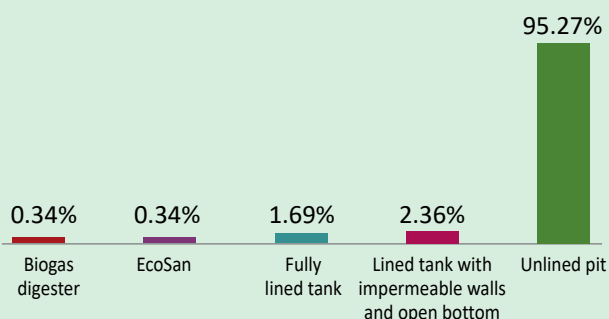
## Sanitation Facility



## CONTAINMENT

The majority of HHs rely on unlined pit, while some rely on lined tank with impermeable walls and open bottom. These are considered unsafe as it allows leachate percolation, possessing a risk to groundwater contamination. Only a few proportion of HHs have opted for safe technologies such as biogas digesters and dry EcoSan toilet.

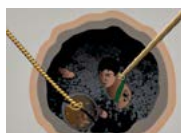
### Types of containment



Dry ECOSAN Toilet

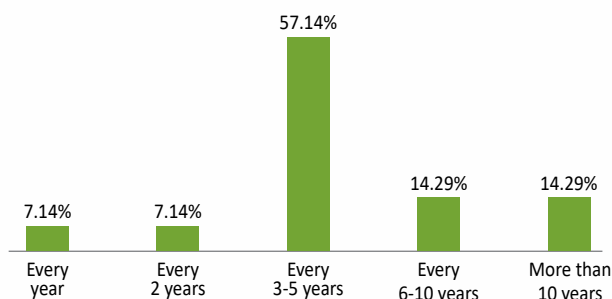
## EMPTYING AND TRANSPORTATION

According to the survey, 3.94% of the HHs have emptied their containments at least once since installation. Usually, the containments are emptied at an interval of 3-5 years. There are no desludging service available in the municipality, all the containments are manually emptied.



100 % emptied manually (self or traditional sanitation workers)

### Emptying Interval



## TREATMENT

There are 3 WWTP each in ward 4, 5 and 6. However, during the study period it was found that 1 WWTP in Solududhkunda Municipality, serving ward no. 4, Phaplu was functioning while the 2 WWTPs in ward no. 5 and 6 are yet to be completed.



Phaplu WWTP, Solududhkunda Municipality



प्रशोधन  
(Treatment)

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

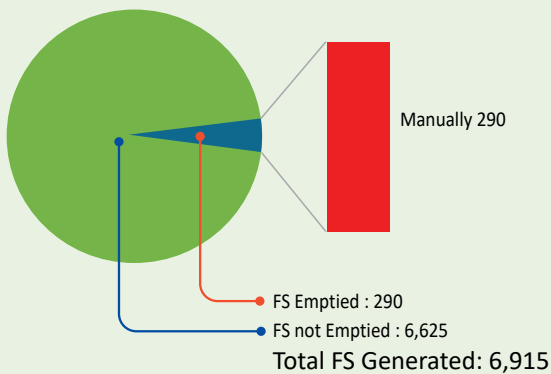
## ESTIMATION OF FAECAL SLUDGE

Total estimated volume of FS generation in the municipality: 6,915 m<sup>3</sup> per year which is 18.95 m<sup>3</sup> per day.

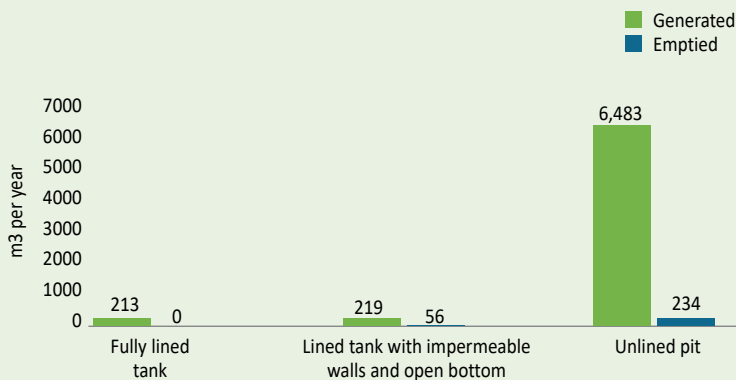
Total volume of FS emptied in the municipality: 290 m<sup>3</sup> per year which is 0.8 m<sup>3</sup> per day.

Total volume of manually emptied FS: 290 m<sup>3</sup> per year which is 0.8 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Solududhkunda Municipality (cubic meter)



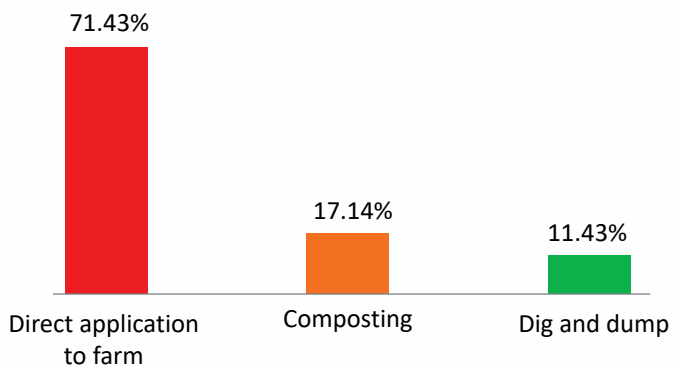
### FS Generated and Emptied



### Disposal practice after manual emptying

## SAFE DISPOSAL OR REUSE

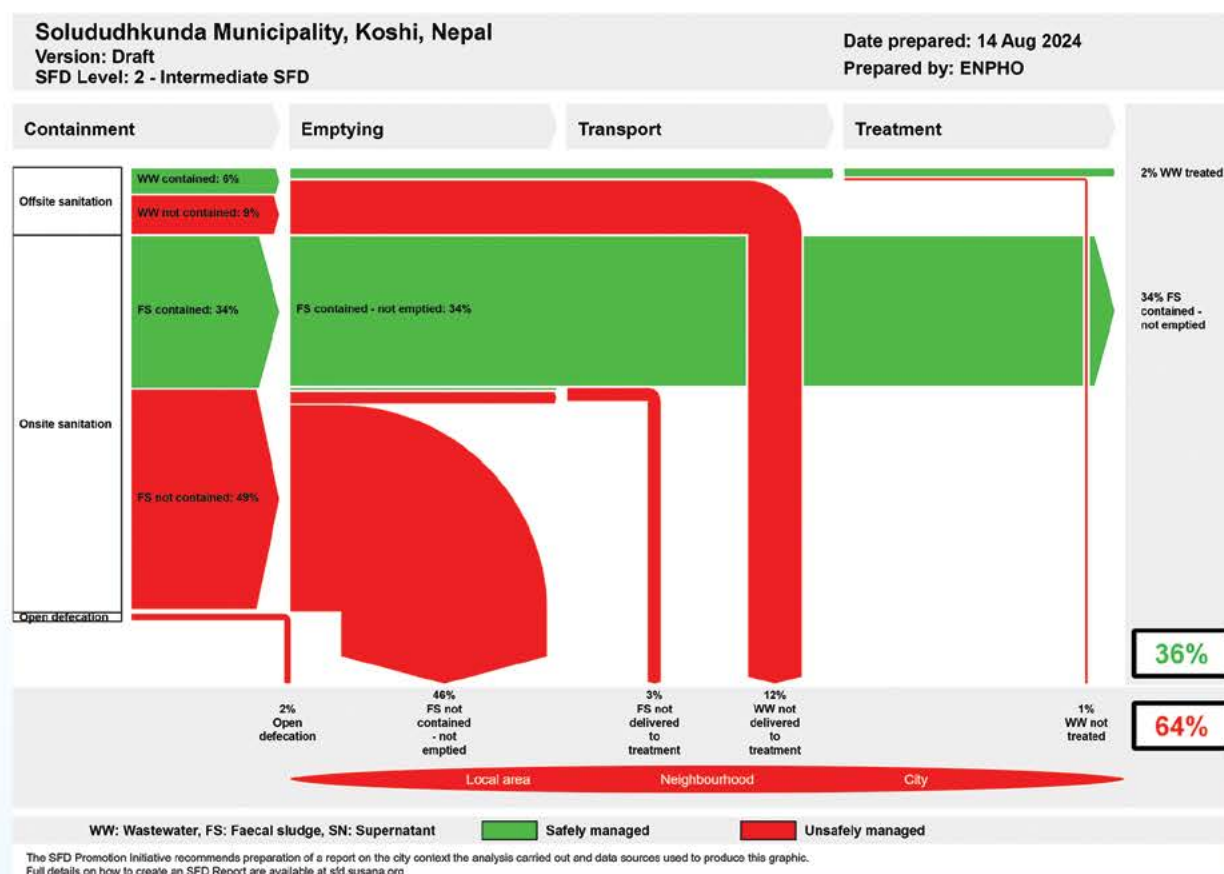
The majority of manually emptied FS is applied in farmlands without treatment, while some are dig and dump and composted. However, direct application to farms possesses risks to the environment and public health.



## SHIT FLOW DIAGRAM (SFD)

The SFD of Solududhkunda Municipality visually represents the status of sanitation practices across the municipality through the entire sanitation value chain. The diagram illustrates that overall FS generated by 36% of the population is safely managed (Green). Initially, 34% of FS is safely contained, which can be considered safe until emptied. Furthermore, 2% of the WW is treated at the wastewater treatment facility. The emptied FS remains safe depending on the nature of the emptying mechanism and available treatment facilities.

Furthermore, FS generated by 64% of the population is unsafely managed (Red). It includes 3% of emptied FS not delivered to treatment plant, and 46% of FS that is neither safely contained nor emptied. 12% of WW not delivered to treatment and 1% of WW not treated. Additionally, 2% of the population still practice open defecation, exacerbating sanitation challenges. It highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate WW and FS management practices.



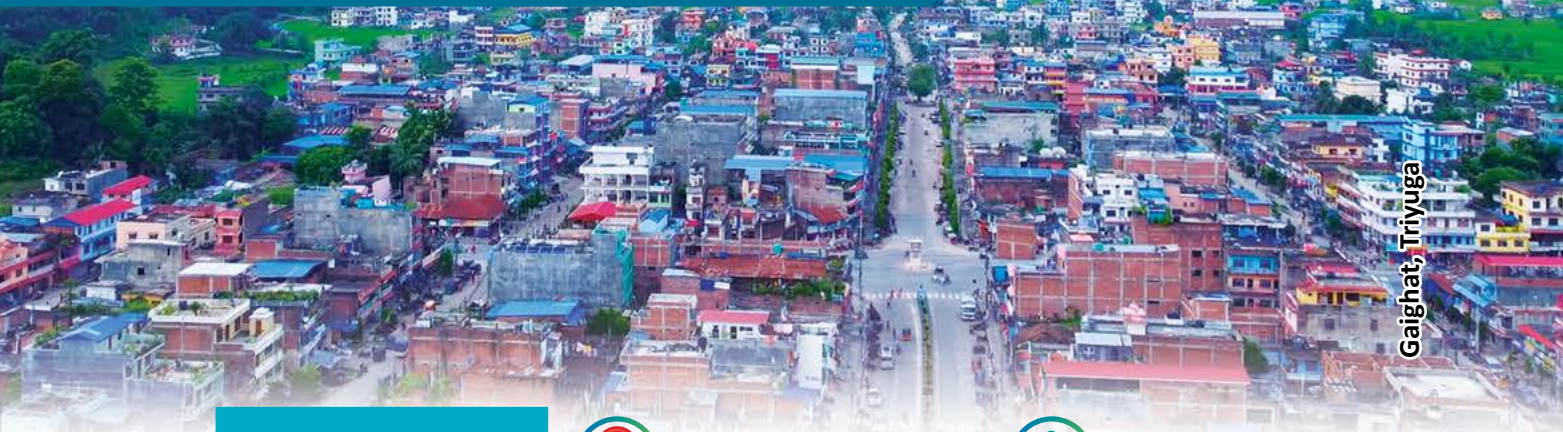
## RECOMMENDATIONS

- Connect the sewer networks to the treatment plant, ensuring the proper operation and maintenance of the facility.
- Retrofit and replace unsafe containment systems with appropriate techniques and technologies such as septic tanks, ecosan, and twin pits.
- Initiate mechanical FS desludging service identifying the appropriate mechanical desludging technique within the municipality.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.



# TRIYUGA MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2023



Gaighat, Triyuga

## DEMOGRAPHICS



Area : 547.43 km<sup>2</sup>



Household : 25,623



POPULATION : 1,02,725

Male : 48,463

Female : 54,262



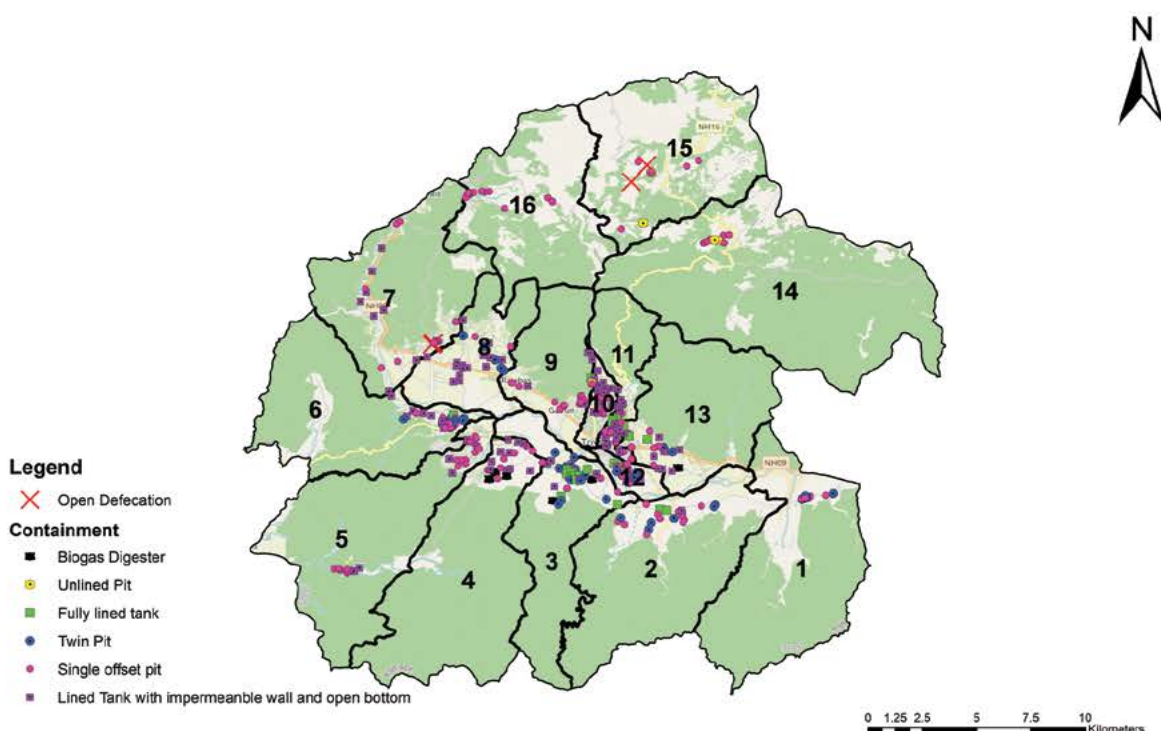
Wards : 16

Source: Census 2021

## CITY PROFILE

Triyuga Municipality is located in Udayapur District, Koshi Province of Nepal. It ranges from 26°41'17" N to 26°56'42" N latitude and 86°32'11"E to 86°50'29" E longitude, and at an altitude of 70 metre to 2509 metre above sea level.

### Sanitation technologies installed at household level in Triyuga Municipality





संकलन  
(User Interface)



अण्डारण  
(Containment)

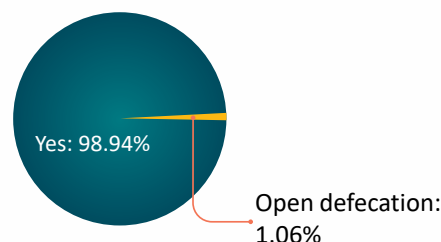


रिचार्जने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

Triyuga Municipality has already attained ODF status. However, the findings show that still 1.06% of the HH lacks basic sanitation facilities, resorting to open defecation.

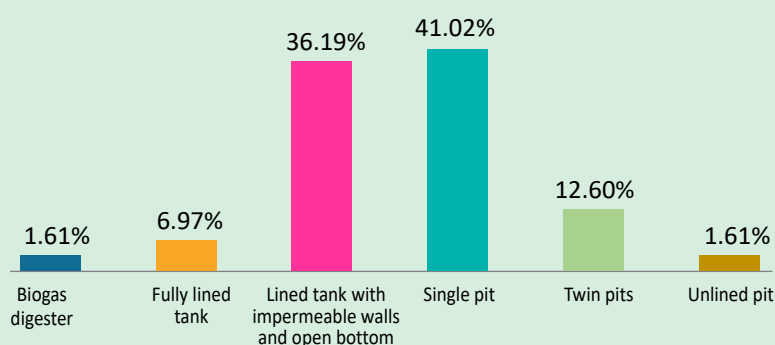
### Sanitation Facility



## CONTAINMENT

The higher proportion of HHs in the municipality rely on single pit, followed by lined tank with impermeable walls and open bottoms. Meanwhile, smaller proportion opt for unlined pit. These containments are considered unsafe as they allow leachate percolation that possess a risk to groundwater contamination. Moreover, a few proportion of HHs have opted for safe technologies such as twin pit and biogas digesters.

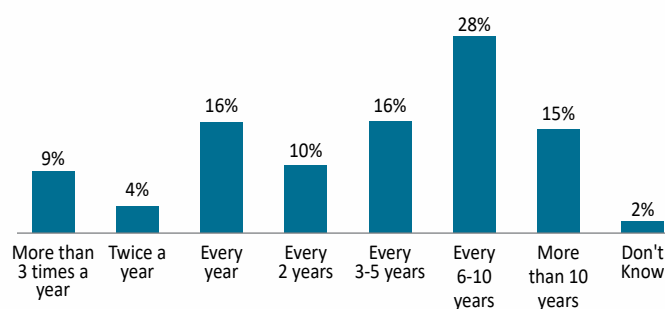
### Types of containment



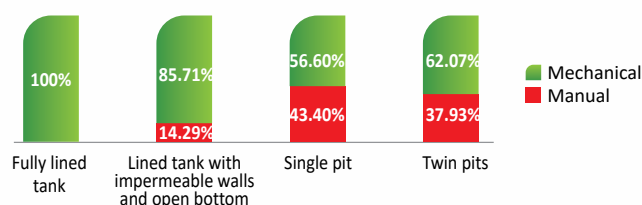
## EMPTYING AND TRANSPORTATION

About 28.42% of the HHs have emptied the containment at least once since installation. Usually, the containments are emptied at an interval of 6 to 10 years. The emptying mechanism varies as per the containment types which is shown in the graph.

### Emptying Interval



### Emptying Mechanism



36% of HHs empty FS mechanically by private desludging service provider.



64% of HHs empty FS manually (self or traditional sanitation workers)

### Details of desludging service providers

Service Provider	Private
No. of service providers	2
No. of vehicles	2
Capacity of vehicle (Litres)	4,000-6,000
Average trips per vehicle per day	1
Average Service Charge (NPR) per trip	3500



KII with private desludgers



प्रशोधन  
(Treatment)



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

## ESTIMATION OF FAECAL SLUDGE

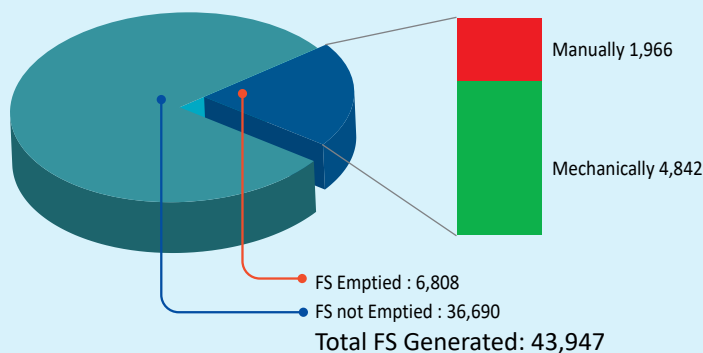
Total estimated volume of FS generation in the municipality: 43,947 m<sup>3</sup> per year which is 119.2 m<sup>3</sup> per day.

Total volume of FS emptied in the municipality: 6,808 m<sup>3</sup> per year which is 18.6 m<sup>3</sup> per day.

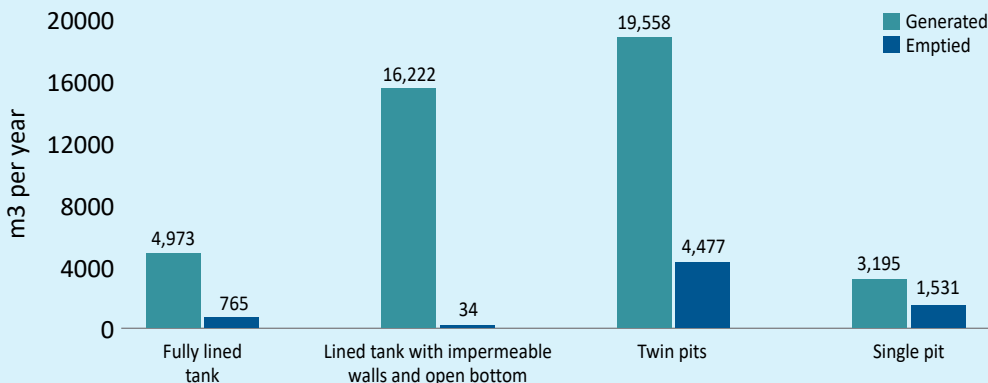
Total volume of mechanically emptied FS: 4,842 m<sup>3</sup> per year which is 13.2 m<sup>3</sup> per day.

Total volume of manually emptied FS: 1,966 m<sup>3</sup> per year which is 5.4 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Triyuga Municipality (cubic meter)



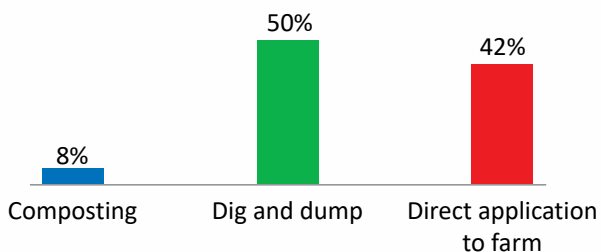
### FS Generated and Emptied



## SAFE DISPOSAL OR REUSE

The municipality does not have FSTP. The mechanically emptied FS are dump directly into the farmland. Meanwhile, the majority of manually emptied FS are managed by dig and dumped method, and small proportion practice composting method. The direct application of FS to farm has direct effects on environment and public health.

### Disposal practice after manual emptying

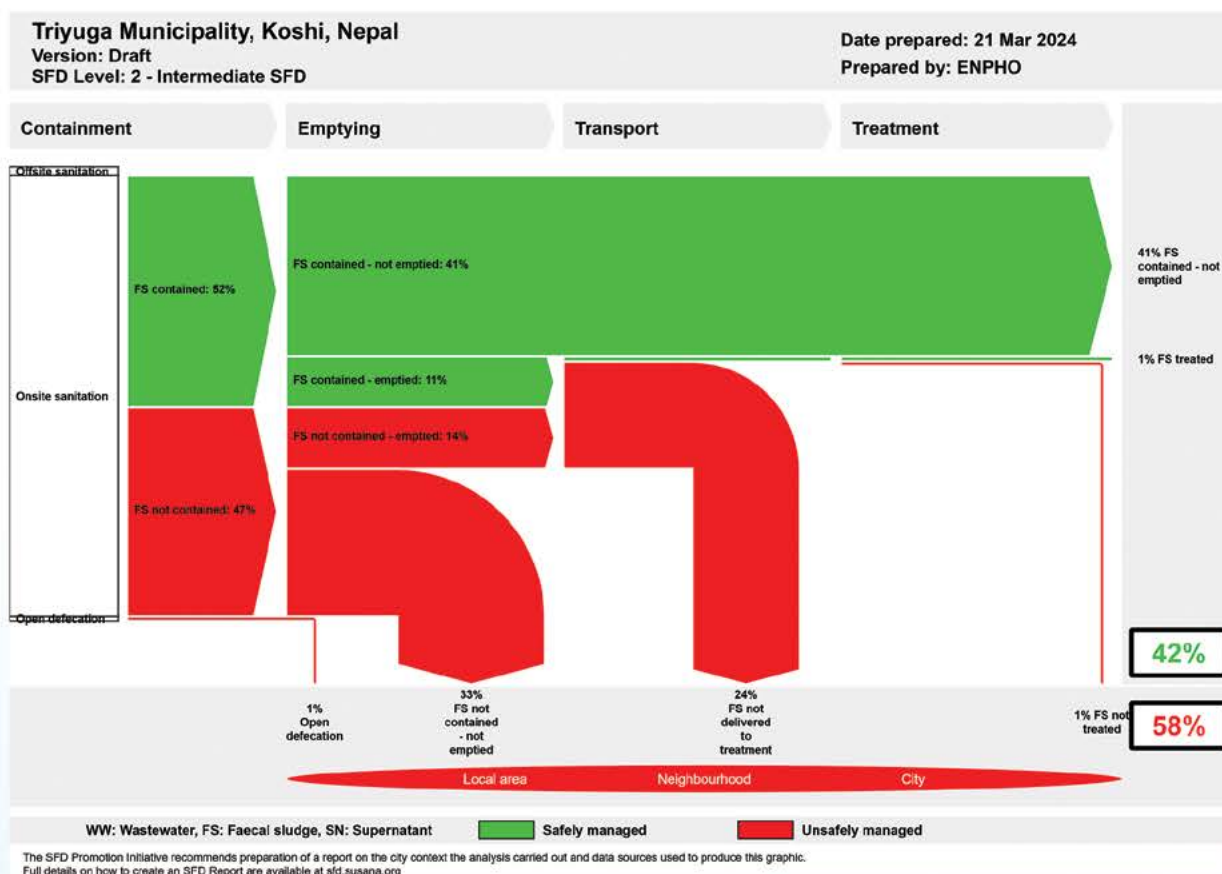


Disposing FS in farmland

## SHIT FLOW DIAGRAM (SFD)

The SFD of Triyuga Municipality visually represents the status of sanitation practices across the municipality through the entire sanitation value chain. The diagram illustrates that FS generated by 42% of the population are safely managed (Green). Initially, 52% of FS was safely contained. However, this proportion drops to 41% after emptying which can be considered safe until emptying. Out of the remaining 11% of FS which are contained and emptied, only 1% of FS undergoes proper treatment, primarily from biogas digester. The emptied FS remains safe depending upon the nature of the emptying mechanism and availability of treatment facilities.

Overall, FS generated by 58% of the population is unsafely managed (Red). It includes 1% of FS not treated, and 24% of FS emptied (14%-FS not contained, 10%-FS contained) not delivered to treatment plant. Moreover, 33% of FS is neither contained nor emptied, exacerbating sanitation challenges. This highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate FS management practices.



## RECOMMENDATIONS

- Retrofit and replace unsafe containment systems with appropriate techniques and technologies such as septic tanks, biogas digesters, and twin pits.
- Construct a faecal sludge treatment plant to manage FS effectively, reduce environmental pollution, and safeguard public health.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.

# URLABARI MUNICIPALITY

Municipal Sanitation Synopsis, Study Year -2022

Urlabari Bazaar

## DEMOGRAPHICS



Area : 75 km<sup>2</sup>



Household : 17,650



POPULATION : 70,908

Male : 33,356

Female : 37,552



Wards : 9

Source: Census 2021

## CITY PROFILE

Urlabari Municipality is located in Morang District, Koshi Province of Nepal. The Municipality lies at 26°39'36" N latitude and 87°36'49" E longitude, and at an elevation of 116-164 metre from the sea level.

### Sanitation technologies installed at household level in Urlabari Municipality

#### Legend

● Offsite

#### Containment

■ Biogas Digester

■ Fully Lined Tank

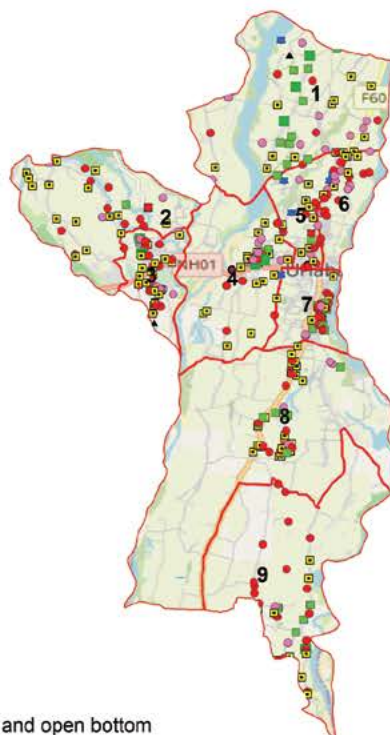
■ Septic Tank

● Single Pit

● Twin Pit

▲ Unlined Pit

■ Lined Tank with Impermeable walls and open bottom



0 0.5 1 2 3 4 Kilometers



संकलन  
(User Interface)



अण्डारण  
(Containment)

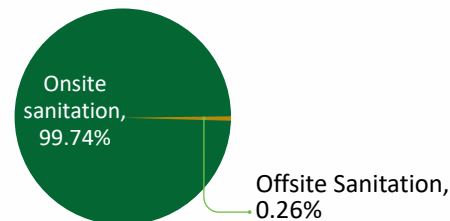


रिच्याउने र ढुवानी  
(Emptying & Transportation)

## USER INTERFACE FACILITY

Urlabari Municipality has already attained ODF status. The findings also show that 100% of the surveyed households in the municipality have access to basic sanitation coverage. Meanwhile, 0.26% HHs have illegally connected their toilets to river and open drain, and remaining HHs rely on onsite sanitation systems.

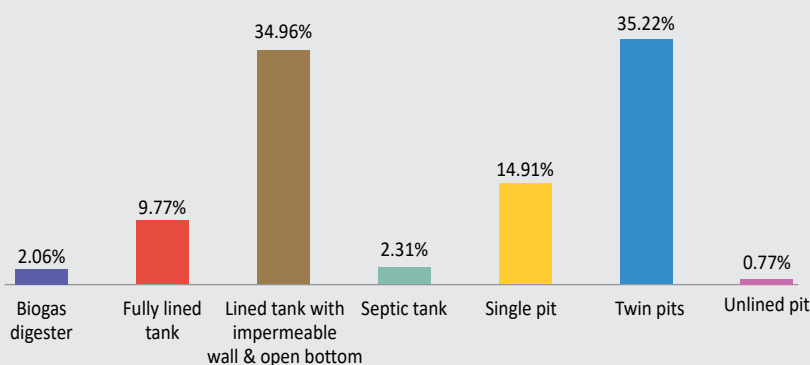
## Sanitation Facility



## CONTAINMENT

Among HH relying on onsite sanitation technology, only minimal HH connect their toilet to septic tank, and biogas which can be considered as safe containments. The majority of HHs in the municipality rely on twin pits and lined tanks with impermeable walls and open bottoms. Moreover, a few proportion of HHs have opted for single pit and unlined pit.

## Types of containment



## EMPTYING AND TRANSPORTATION

About 48.84% of the HHs have emptied their containment at least once since installation. The containments are usually emptied in an interval of a year. The emptying mechanism of the containments varies as per the containments type.



20.33% of HHs empty FS mechanically by private desludging service provider.

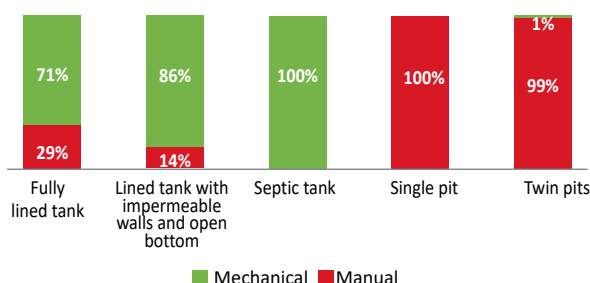


79.67% of HHs empty FS manually (self or traditional sanitation workers)

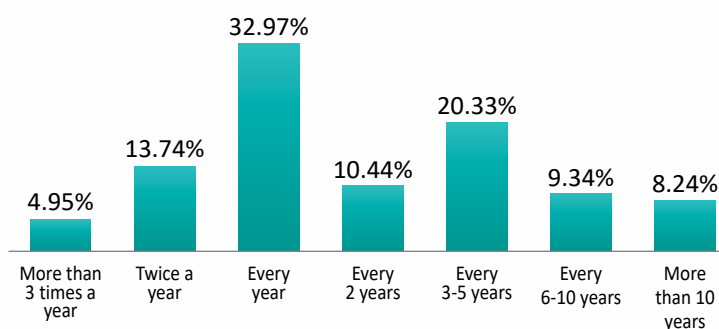
### Details of desludging service providers

Service Provider	Private
No. of vehicles	1
Capacity of vehicle (Litres)	8,000
Average trips per vehicle per day	1
Average Service Charge (NPR) per trip	For circular ring-200-500 per ring. For rectangular containments-2,500-3,000

## Emptying Mechanism



## Emptying Interval



Private desludging vehicle



प्रशोधन  
(Treatment)



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

## ESTIMATION OF FAECAL SLUDGE

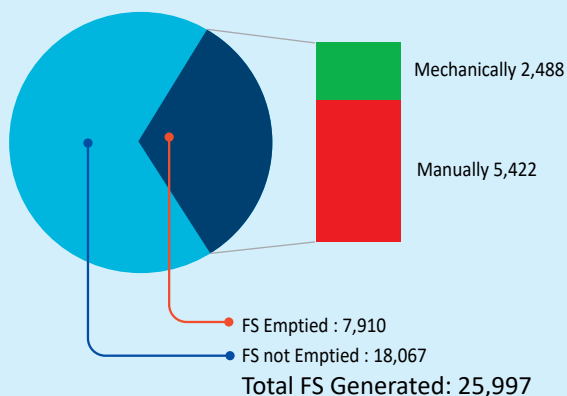
Total estimated volume of FS generation in the municipality: 25,997 m<sup>3</sup> per year which is 71.2 m<sup>3</sup> per day.

Total volume of FS emptied in the municipality: 7,910 m<sup>3</sup> per year which is 21.6 m<sup>3</sup> per day.

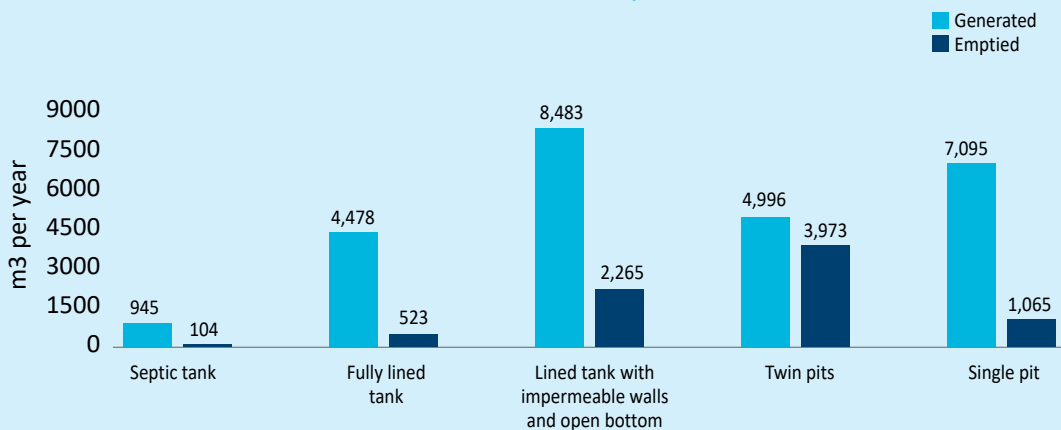
Total volume of mechanically emptied FS in the municipality: 2,488 m<sup>3</sup> per year which is 6.8 m<sup>3</sup> per day.

Total volume of manually emptied FS in the municipality: 5,442 m<sup>3</sup> per year which is 14.8 m<sup>3</sup> per day.

### Summary of faecal sludge produced, emptied and transported in Urlabari Municipality (cubic meter)



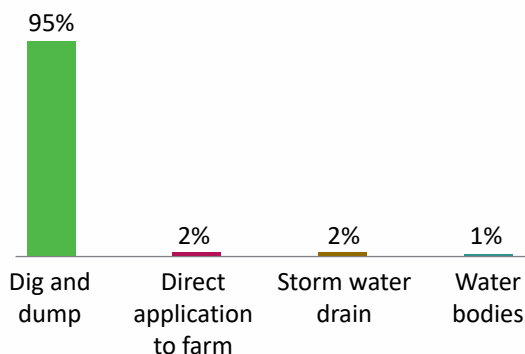
### FS Generated and Emptied



## SAFE DISPOSAL OR REUSE

The municipality does not have FSTP. The mechanically emptied FS are dump directly into the farmland. Meanwhile the majority of manually emptied FS are managed by dig and dump method. A small proportion of HH practice methods as direct application to farm, disposal in water bodies and stormwater drain which can't be considered safe as it possesses direct risk to environment and human health.

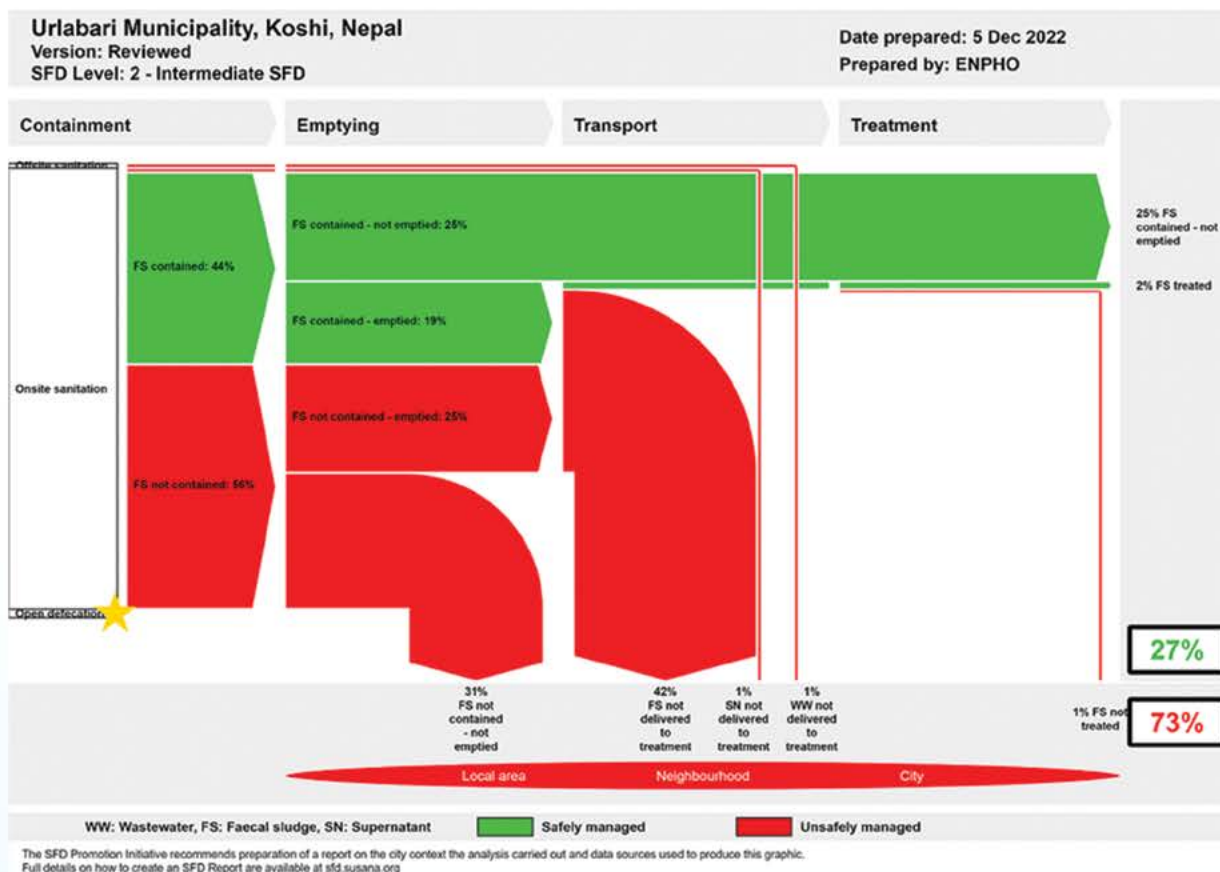
### Disposal practice after manual emptying



## SHIT FLOW DIAGRAM (SFD)

The SFD of Urlabari Municipality visually represents the status of sanitation practices across the municipality through the entire sanitation value chain. The diagram illustrates that overall FS generated by 27% of the population is safely managed (Green). Initially, 44% of FS is safely contained, however this proportion drops to 25% when emptied. Only 2% of the FS is treated primarily by the population using biogas. The emptied FS remains safe depending on the nature of the emptying mechanism and available treatment facilities.

Furthermore, FS generated by 73% of the population is unsafely managed (Red). It includes 1 % of WW not delivered to treatment, 1 % of SN not delivered to treatment, and 1% of FS not treated. Further, 42% of emptied FS (25%-FS not contained, 17%-FS contained) were not delivered to treatment plant, and 31% of FS is neither safely contained nor emptied. It highlights the significant gaps that must be addressed to mitigate environmental and public health risks associated with inadequate WW and FS management practices.



## RECOMMENDATIONS

- Retrofit and replace unsafe containment systems with appropriate techniques and technologies such as septic tanks, biogas digesters, and twin pits.
- Construct a faecal sludge treatment plant to manage FS effectively, reduce environmental pollution, and safeguard public health.
- Formulate and enforce sanitation policies and regulations to ensure safe sanitation practices in the municipality.



## ABOUT THE PROJECT:

Municipalities Network Advocacy on Sanitation in South Asia phase II (MuNASS-II)

- Funded By** : Bill & Melinda Gates Foundation (BMGF)
- Executing Agency** : United Cities and Local Governments Asia-Pacific (UCLG ASPAC)
- Implementing Agency** : Municipal Association of Nepal (MuAN)
- Technical Partner** : Environment and Public Health Organization (ENPHO)
- Program Duration** : November 2021 – December 2024

In 2017, phase I of “MuNASS program” was implemented to support the roll-out of the Institutional and Regulatory Framework (IRF) for Faecal Sludge Management in Nepal. After implementation of Phase I of the MuNASS program, a need to scale up the program was recognized. In this prospective Phase II of MuNASS program was launched to support meet SDG target 6.2. The project was initiated with the objectives to determine the sanitation status of 65 municipalities and to generate national and provincial level SFD, to enhance knowledge and skill of municipal staffs on installation and operation of FSTP and to enhance capacity of elected representatives and municipal officials regarding the need for FSM/CWIS.

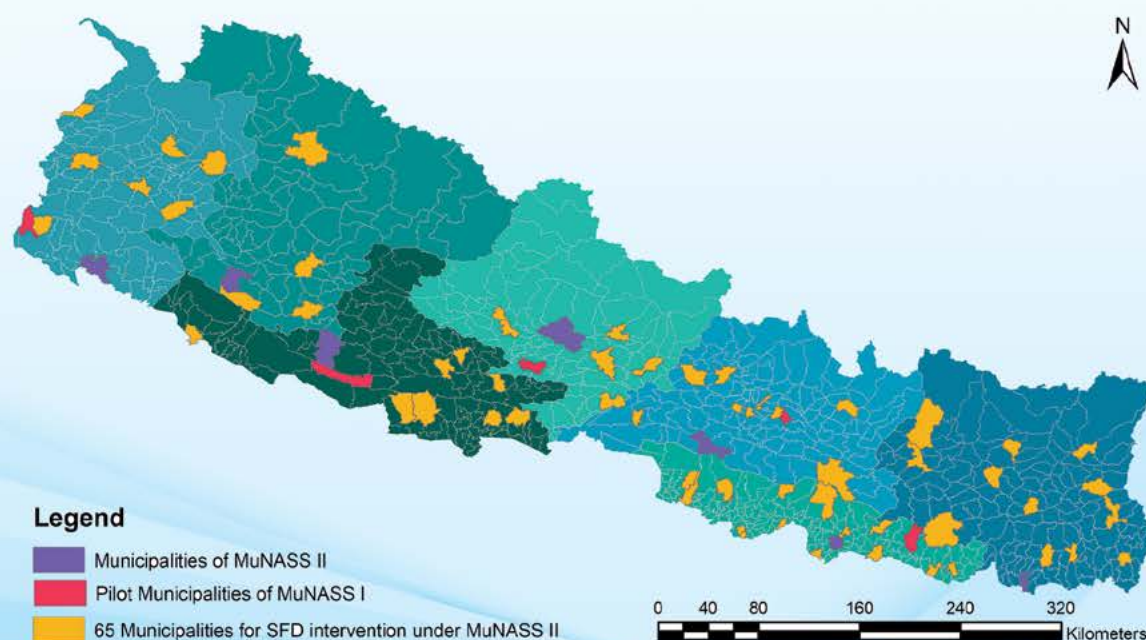
## GOAL

The goal of MuNASS Phase II is to develop and demonstrate innovation on safely managed sanitation to achieve SDG 6.2 and mainstream into regional agenda, paying special attention to the needs of women and girls and those in vulnerable situations.

## OUTCOMES/OBJECTIVES:

- Demonstrate innovation on SDG 6.2 measurement by mobilizing cities in South Asia
- Documentation of the Municipal-led investment for CWIS and FSM in South Asia is available
- SDG 6.2 is mainstreamed into the regional agenda through advocacy, knowledge exchange and joint activities among municipalities in the Asia-Pacific region.

## Program Locations of MuNASS I and MuNASS II in Nepal





## FOR FURTHER INFORMATION

### **Municipal Association of Nepal (MuAN)**

P.O.Box: 14286, 530  
Pandol Marga, Lazimpat, Kathmandu, Nepal  
Tel: +977-1-4425692, 4420559  
Email: [info@muannepal.org.np](mailto:info@muannepal.org.np)  
Website: [www.muannepal.org.np](http://www.muannepal.org.np)

### **Environment and Public Health Organization (ENPHO)**

G.P.O Box No. : 4102, 110/25 Adarsa Marg-1,  
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E-mail: [enpho@enpho.org](mailto:enpho@enpho.org)  
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### **United Cities and Local Governments Asia-Pacific (UCLG ASPAC)**

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Website: [uclg-aspac.org](http://uclg-aspac.org)