SFD Report

Patan Municipality
Nepal

Final Report

This SFD Report - SFD level 2 - was prepared by
Environment and Public Health Organization (ENPHO)

Date of production: 30/11/2022

Last update: 19/12/2022

SFD Report Patan Municipality, Nepal, 2022

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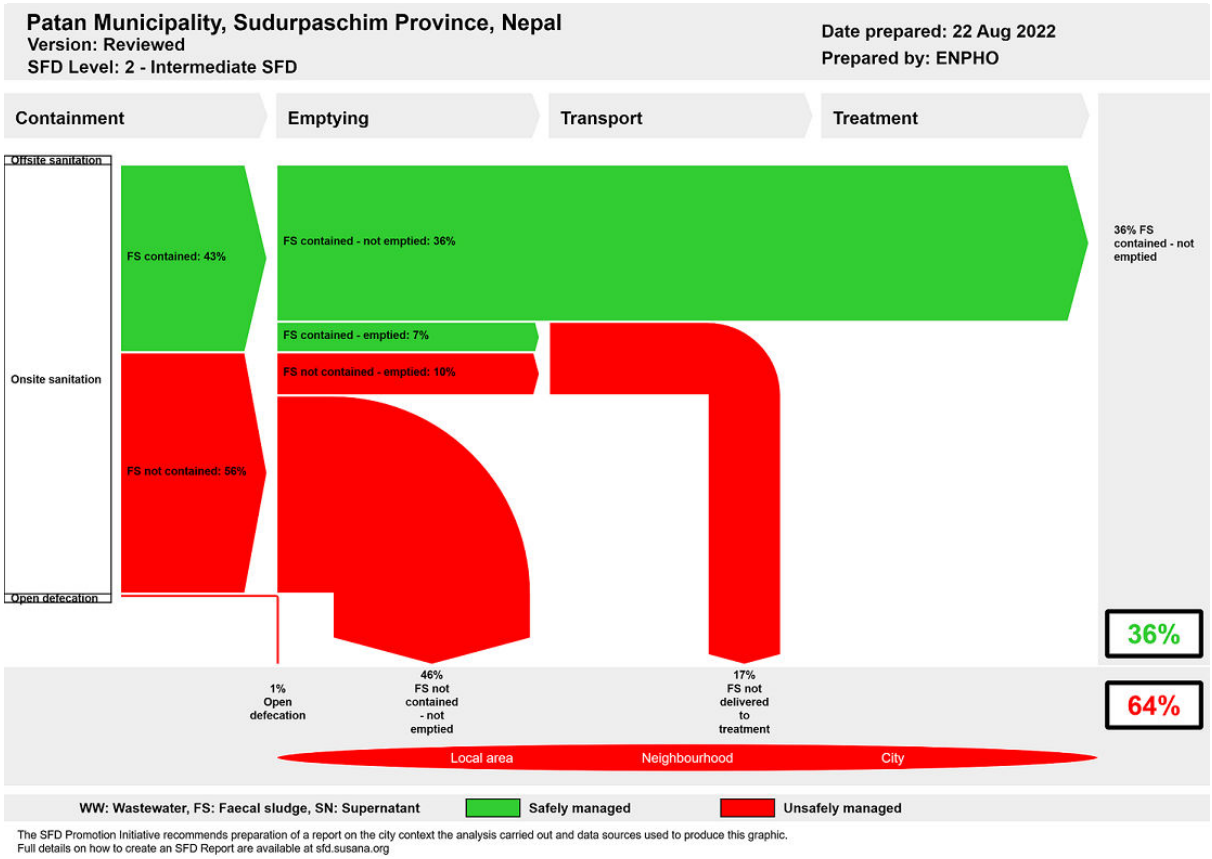
1. The SFD Graphic



The SFD Promotion Initiative recommends preparation of a report on the city context the analysis carried out and data sources used to produce this graphic.
Full details on how to create an SFD Report are available at sfd.susana.org

2. Diagram information

SFD Level:

This SFD is a level 2 - Intermediate report.

Produced by:

Environment and Public Health Organization (ENPHO).

Collaborating partners:

Patan Municipality, Municipal Association of Nepal (MuAN), United Cities and Local Government- Asia Pacific (UCLG- ASPAC).

Status:

Final SFD report.

Date of production: 30/11/2022

3. General city information

Patan Municipality is in Baitadi District, Sudurpaschim Province of Nepal. The municipality is extended to 219.26 km^2. It is divided into 10 wards. The municipality is surrounded by Sigas rural municipality in the east, Dashrathchand municipality and Melauli in the west, Surnava and Dogada rural municipality in north and Dadeldhura district in the south.

According to Census 2011, the municipality has a total population of 30,435 with 13,991 males and 16,444 females residing in 5,767 households. Ward number 6 consisting of the core urban area has the largest population of 5,217, while ward 9 has the least population with 2,065. Also, ward number 6 has the most households with a total of 1,134, while ward 9 has the least number of households with a total of 344. The population density of the municipality is 138.81 people per square kilometre (CBS, 2011).

4. Service outcomes

The overview of different sanitation technologies across the sanitation value chain in the municipality is briefly explained in this section. 99% of the households in the municipality have constructed a toilet. The households without toilet defecate in nearby farm and forest.

The municipality has public toilets in a bus park and premises of the municipal building. These toilets are constructed by Patan Municipality. The lined tank with impermeable walls and open bottom is a popular containment in the municipality. 63% of toilets are connected to lined tanks with impermeable walls and open bottom while 35% of toilets are connected to unlined pita. Remaining toilets are connected to fully lined tanks.

18% of containments have been emptied at least once since the installation. Among the containments that have been emptied at least once after the installation, 97% of containments have been emptied manually. Remaining 3% of the containments have been openly emptied during the rainy season. 13.24% of households which have emptied the containment practised composting whereas 42.65% adopted a dig and dump practice. The remaining emptied sludge is applied to farm land directly and disposed of on the ground openly.

The main water supply service provider in the municipality is *Patan Bazar Brihat Khanepani Yojana.* There are many small water supply schemes in all wards. Water Supply and Sanitation Division Office (WSSDO), Baitadi has supported for construction of water supply schemes in many wards of the municipality.

5. Service delivery context

Access to drinking water and sanitation has been defined as fundamental rights to every citizen by the constitution of Nepal. To respect, protect and implement the rights of citizen embedded in the constitution, the Government of Nepal (GoN) has passed the Drinking Water and Sanitation Act, 2022 which has emphasized on a right to quality sanitation services and prohibited direct discharge of wastewater and sewage into water bodies or public places (MoWS, 2022a).

Several policies have been in place to accomplish the sanitation needs of people. Particularly, the National Sanitation and Hygiene Master Plan (NSHMP) 2011 has proved as an important strategic document for all stakeholders to develop uniform programs and implementation mechanism at all levels. It strengthens institutional set up with the formation of water and sanitation coordination committee at every tier of government to actively engage in sanitation campaigns. The document adopted sanitation facilities as improved, basic, and limited in line with WHO/UNICEF guidelines. The draft Sector Development Plan (SDP) has envisioned the delineation of roles and responsibility of federal, provincial, and local government in an aim to initiate sustainability of Open Defecation Free (ODF) outcomes.

Patan municipal council has enforced the Health and Sanitation Act, 2018 and Environment and Natural Resource Conservation Act, 2021 as per the local governance operation act 2017. It was endorsed to ensure the right to live in a clean environment along with providing basic sanitation services to people. As per Act, the municipality is responsible to manage solid waste, liquid waste, and hazardous waste generated within the territory (Patan Municipality, 2021).

Patan municipality has drafted a Water, Sanitation and Hygiene Bill, 2022 which has prohibited the discharge of faecal sludge/ wastewater directly into rivers, springs, lakes, or public land (Patan Municipality, 2022).

6. Overview of stakeholders

Based on the regulatory framework for Faecal Sludge Management (FSM) (MoWS, 2017a), the major stakeholders for effective and sustaining service delivery in the municipality are as presented in Table 1.

Table 1: Overview of Stakeholders.

Key Stakeholders	Institutions / Organizations
Public Institutions at Federal Government	Ministry of Water Supply Department of Urban Development and Building Construction Water Supply and Sanitation Division Office (WSSDO)
Public Institutions at Local Government	Patan Municipality Office New Town Project Office, Baitadi,
Non-governmental Organizations	Environment and Public Health Organization (ENPHO)
Private Sector	Public toilet operators.
Development Partners, Donors	MuAN, BMGF, UCLG ASPAC

7. Credibility of data

The major data were collected from random household sampling. Altogether, 380 households and 62 institutions were surveyed from 10 wards of the municipality on 14 - 24 June, 2022. Primary data on current sanitation practices in the municipality are triangulated from Key Informant Interviews (KIIs) with municipal officials, public toilet operators and water supply committee. The overall data and findings were shared with the stakeholders of the municipality and validated through a sharing program.

8. Process of SFD development

Data on sanitation situation were collected through household and institutional surveys. The local enumerators from each wards of the municipality were trained on all aspects of sanitation service chain starting from user interface, containment, emptying, transport, treatment, end use or safe disposal of excreta and the use of mobile application; *KoboCollect* was used for collection of data from households and institutions. Moreover, KIIs were conducted with officers and the engineer of the municipality, public toilet operators and engineers of New Town Project to understand the situation practices across the service chain.

Types of sanitation technologies used in different locations were mapped using ARCGIS. To produce the SFD graphic, initially a relationship between sanitation technology used in questionnaire survey and SFD PI methodology was made. Then, data were fed in SFD graphic generator to produce the SFD graphic.

8. List of data sources

The list of data sources to produce this executive summary is as follows:

- CBS. (2011). National Census 2011. Government of Nepal, National Planning Commission, Central Bureau of Statistics:
- Patan Municipality. (2021). Environment and Natural Resource Conservation Act. Retrieved from Patan Municipality: https://patanmun.gov.np/ne
- Patan Municipality. (2022). Water Quality Monitoring of Water Supply Schemes; Patan municipality. Unpublised data.
- MoWS. (2017a). Institutional and Regulatory Framework for Faecal Sludge Management in Urban Areas of Nepal. Kathmandu,Nepal: Ministry of Water Supply.
- MoWS. (2022a). Drinking Water and Sanitation Act. Ministry of Water Supply; Goverment of Nepal.

SFD Patan Municipality, Nepal, 2022

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Abbreviations

CFU	Colony Forming Unit
DUDBC	Department of Urban Development and Building Construction
DWSSM	Department of Water Supply and Sewerage Management
ENPHO	Environment and Public Health Organization
FS	Faecal Sludge
FSM	Faecal Sludge Management
HH	Household
IRF	Institutional and Regulatory Framework
KII	Key Informant Interview
KM	Kilometres
MoUD	Ministry of Urban Development
MoWS	Ministry of Water Supply
MuAN	Municipal Association of Nepal
NGO	Non-Governmental Organization
NMICS	Nepal Multiple Indicator Cluster Survey
NPC	National Planning Commission
NRS	Nepali Rupees
ODF	Open Defecation Free
SDP	Sector Development Plan
SFD PI	Shit Flow Diagram Promotion Initiative
SFD	Shit Flow Diagram
UCLG ASPAC	United Cities and Local Governments Asia Pacific
UNICEF	United Nations Children's Education Fund
WASH	Water, Sanitation and Hygiene (WASH)
WHO	World Health Organization
WSP	Water Supply Providers
WSUC	Water Supply and Users Committee
WSSDO	Water Supply and Sanitation Division Office
WW	Wastewater

1. City context

Patan Municipality is in Baitadi District, Sudurpaschim Province of Nepal. The municipality was formed on 2nd December 2014. The municipality is divided into 10 wards. The municipality is extended to 219.26 square kilometres. It is surrounded by Sigas rural municipality in the east, Dashrathchand municipality and Melauli in the west, Surnava and Dogada rural municipality in north and Dadeldhura district in the south. The municipality is characterized by urban and rural settlements. Patan Bazar is the core urban area which includes a market and commercial area together with residential area. It has a domestic airport located in the core urban area.

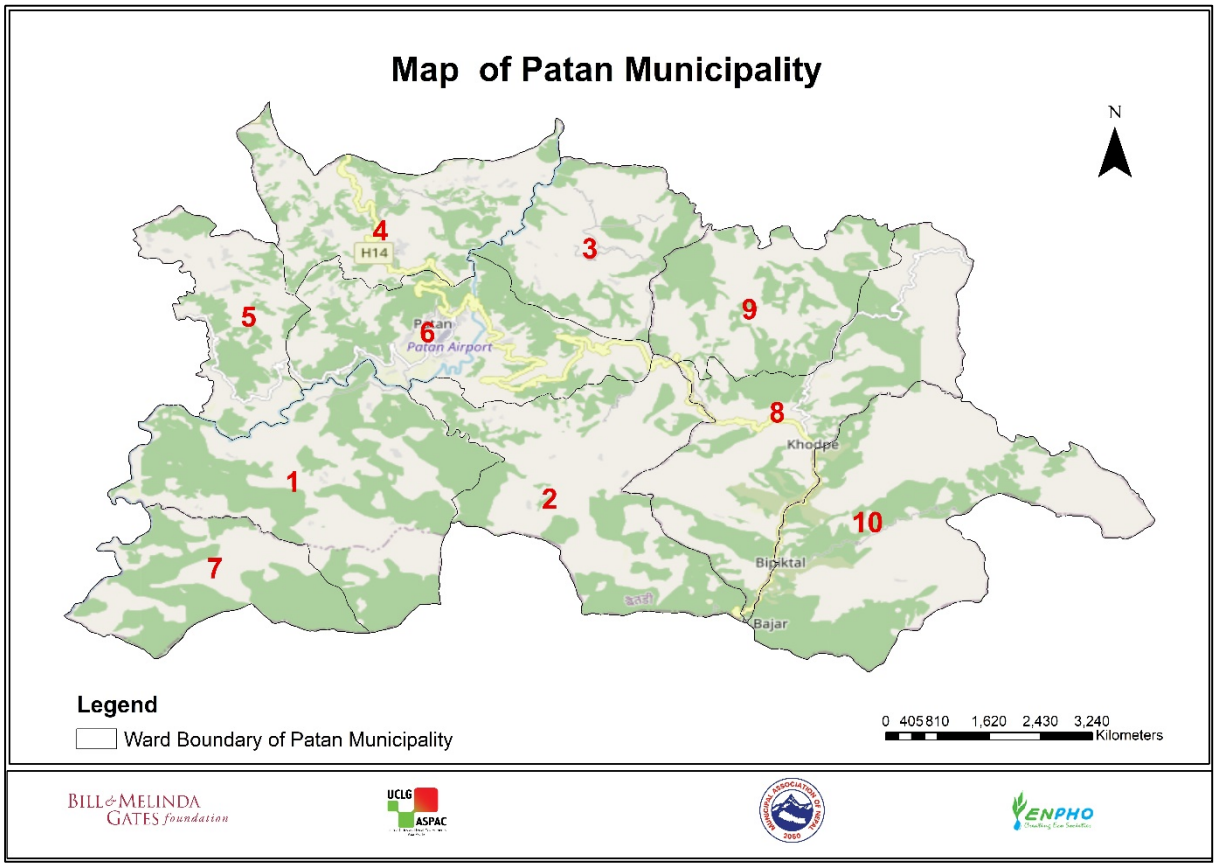

Figure 1: Map of Patan municipality with ward boundaries.

1.1. Population

According to Census 2011, the municipality has a total population of 30,435 with 13,991 males and 16,444 females residing in 5,767 households. Out of total wards, ward number 6 is the core urban area of the municipality and has the largest population of 5,217. Ward 9 has the least number of population with 2,065. Also, ward number 6 has the most households with a total of 1,134, while ward 9 has the least number of households with a total of 344 households. The population density of the municipality is 138.81 people per square kilometre. The population growth rate of the municipality is 1.35 % (CBS, 2011).

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1.2. Climate

The municipality lies in the mid-hill region of the country, and it has a temperate climate. The temperature varies from 5ºC to 26.5 ºC throughout the year (DHM, 2018) . The climate is diverse due to variation in the altitude of the district. In the plain area and along the Surnaya River, the climate is tropical whereas in the hills it is sub-temperate. The yearly average temperature is 22.87ºC. It typically receives about 172.04 millimetres of average precipitation and has 146 rainy days annually (Weather and Climate, 2022).

1.3. Topography

Patan municipality is situated in the mid-hill region of the Mahabharat range. It is located on 29° 31' 5" S latitude and 80° 43' 14" E longitude. The elevation of the municipality ranges between 780 m to 2,420 m above mean sea level (Patan Municipality, 2018). Surnaya River which flows along Northwest boundaries is the major river of the region. The municipality is newly formed region as per the geographic history of Nepal. The area is vulnerable to soil erosion. Also, the lowland areas of the municipality are highly productive land for agricultural purposes. Most of the population lives in the hilly region of the municipality which consists of layers of rock with soil (Patan Municipality, 2018)

2. Service Outcomes

2.1. Overview

2.1.1 Household Level Sanitation System

The availability of toilets is viewed as a fundamental indicator of sanitation as per WHO / UNICEF Joint Monitoring Programme. Particularly over the past 20 years, sanitation has been promoted in Nepal, which led to the nation as Open Defecation Free (ODF) nation on September 30, 2019, with the combine effort of the 3 tiers of the government (MoWS, 2020). Patan municipality was declared as Open Defecation Free zone on 12th July, 2016 shifting from the unsanitary practice of open defecation toward regular and safe use of toilets by everyone (KII_1, 2022). However, the household survey reveals that 0.8% of the households in the municipality have no access to toilet and defecate openly in nearby farm and forest.

A sanitation system is a context-specific series of technologies and services for their collection, containment, transport, transformation, utilization or disposal of wastes which includes the management, operation and maintenance (O&M) required to ensure that the system functions safely and sustainably (Elizabeth Tilley, 2014) . Sustainable sanitation services require proper management of containment, emptying, transport, treatment and end use or disposal of excreta (WHO, 2018).

Onsite sanitation technologies include pit latrines, septic tanks, fully lined tanks and containments where the faecal sludge is collected, stored, or treated (Strande et. al., 2014). The household survey reveals that 99% of households in the municipality have connected to onsite sanitation technologies. According to Nepal Multiple Indicator Cluster Survey (NMICS) 2019, 1.3% of rural areas and 3.5% of urban areas of Sudurpaschim province have been connected to piped sewer system. However, there are no piped sewer system i.e., offsite sanitation system existing in the municipality. But there is planning to construct 500m sewer system under New Town Project by Department of Urban Development and Building Construction (DUDBC) (KII_5, 2022).

2.1.2. Containment

The containment refers to a container, located below ground level, to which a toilet is connected (WHO, 2018).

A fully lined tank is an onsite sanitation technology which is used to safely store faecal sludge. The walls and bottom of the tank are totally lined and sealed (Linda Strande, 2014). A lined tank with impermeable walls and open bottom is an onsite sanitation technology where the walls of the tank are lined, and the bottom of tank is not lined and allows infiltration of leachate. An unlined pit is a containment constructed with mud mortar stone or brick wall or dry-stone walls and open bottom. An unlined pit with dry stone wall is popular in the rural areas of the municipality while, in the urban area,s fully lined tanks are being constructed. Figure 2 shows the percentage of households with the types of containment in the municipality.

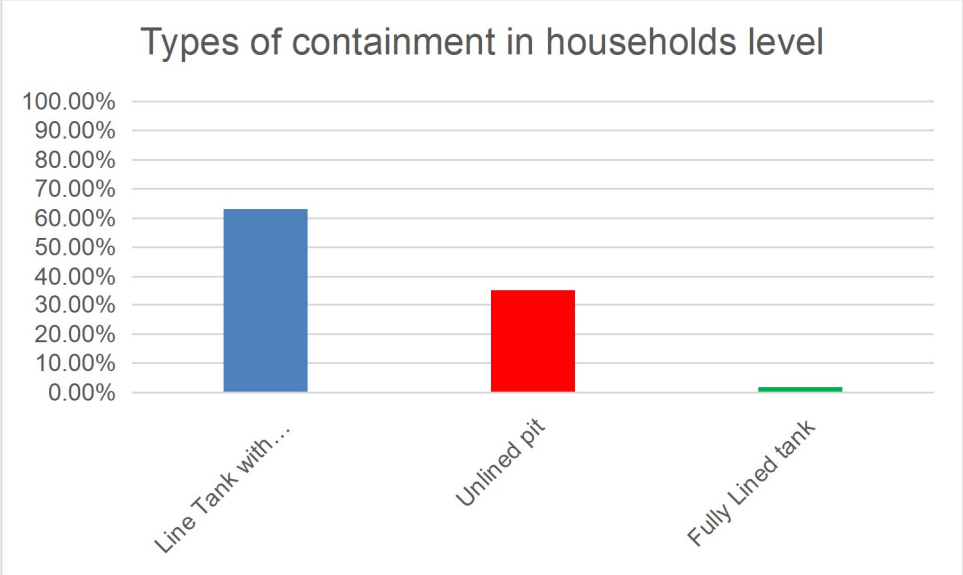

Figure 2: Types of containment in households in Patan municipality.

Figure 3 shows a map of the households with the types of containment observed in the survey.

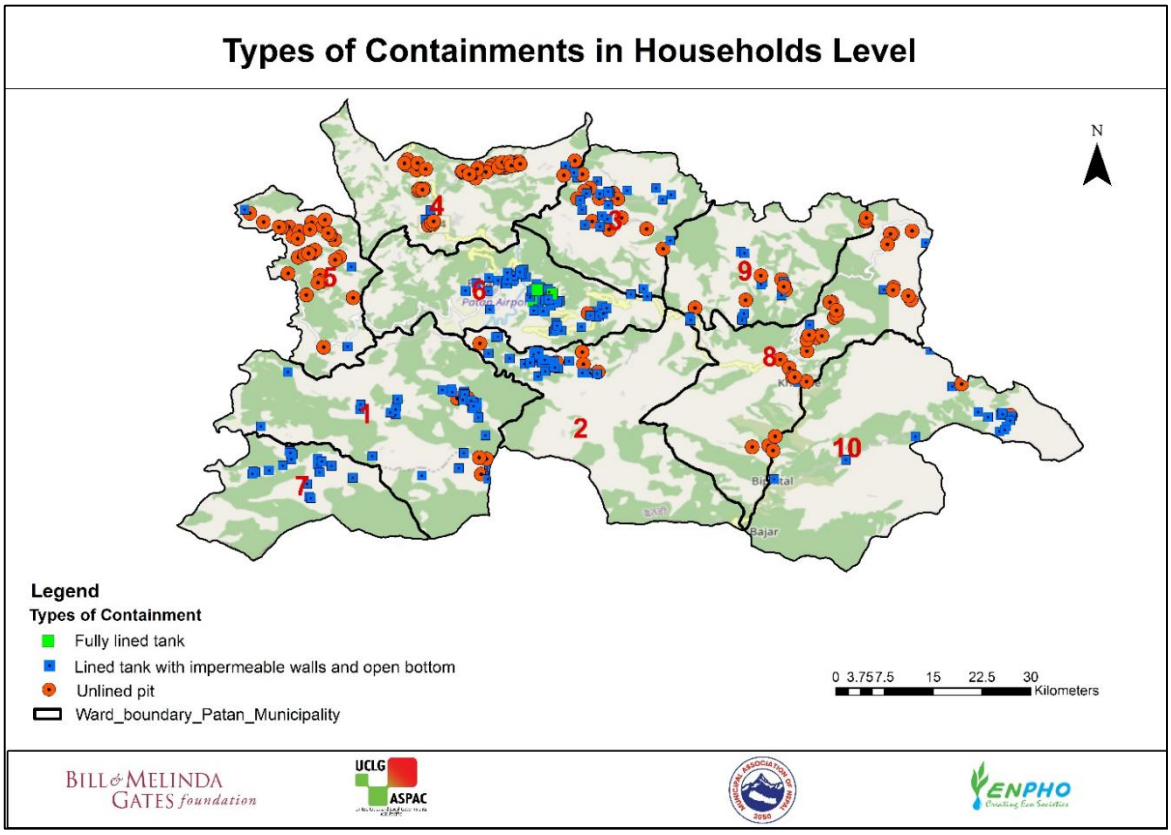

Figure 3: Map showing the households with the types of containments in Patan municipality.

Figure 4 shows some examples of the types of containment available in households of Patan municipality.

Fully lined tank.

Unlined pit covered with soil.

Lined tank with impermeable wall and open bottom.

Lined pit with impermeable wall and open bottom.

Figure 4: Pictures of the types of containment available in households of Patan municipality.

2.1.3. Emptying and Transport

Emptying and transporting faecal sludge is an essential service for proper functioning of onsite sanitation technologies (Linda Strande, 2014) . 18% of the households in the municipality have emptied the containments at least once since the containment was used. Among them, 97% of households have emptied it manually. The remaining 3% have directly discharged or disposed of the faecal sludge into the open environment during rainy season (Figure 5).

There is no mechanical emptying and transport of faecal sludge. Thus, most of the households have emptied the containment themselves while 3% of households hired traditional labor to empty their sanitation systems. Poor emptying practices can lead to direct exposure of person involved in emptying activities to pathogens (WHO, 2018).

Figure 5: Open emptying of faecal sludge.

2.1.4. Treatment and Disposal

Among the 18% of the households which have emptied their containment, 13.24% have practised composting. Composting is biological decomposition of organic matter; naturally degrades organic matter into dark and humus-like matter that can be used as a soil amendment (Strande et. al., 2014) . At least two months of composting is essential to deactivate helminth eggs for safe use of the compost (Cofie and Kone, 2009). However, in the municipality, the faecal sludge emptied is mixed in the organic solid waste without following any precautions and methodology.

42.65% of households have adopted dig and bury practice for managing faecal sludge after emptying. The faecal sludge is buried with other crop residues and left for a few months prior to use. The dig and bury practice is a traditional practice for treatment of faecal sludge in the municipality.

Moreover, 36.76% of the households have applied faecal sludge in farmland directly after emptying manually their containments whereas 7.35% of households have disposed of the faecal sludge to open ground. If raw faecal sludge is applied in farmland during the dry season, it is spread into fields when crops are planted during the rainy season and has potential health hazard (Cofie et. al., 2005). The direct use of faecal sludge has the highest level of risk for human health, therefore not recommended to practice it (Strande et. al., 2014).

2.1.5. Institutional Level Sanitation System

All the toilets of 62 surveyed institutions have been connected to onsite sanitation technologies. Figure 6 shows the different onsite sanitation technologies available in the institutions of Patan municipality. The lined tank with impermeable walls and open bottom is popular onsite sanitation technology in institutions of the municipality.

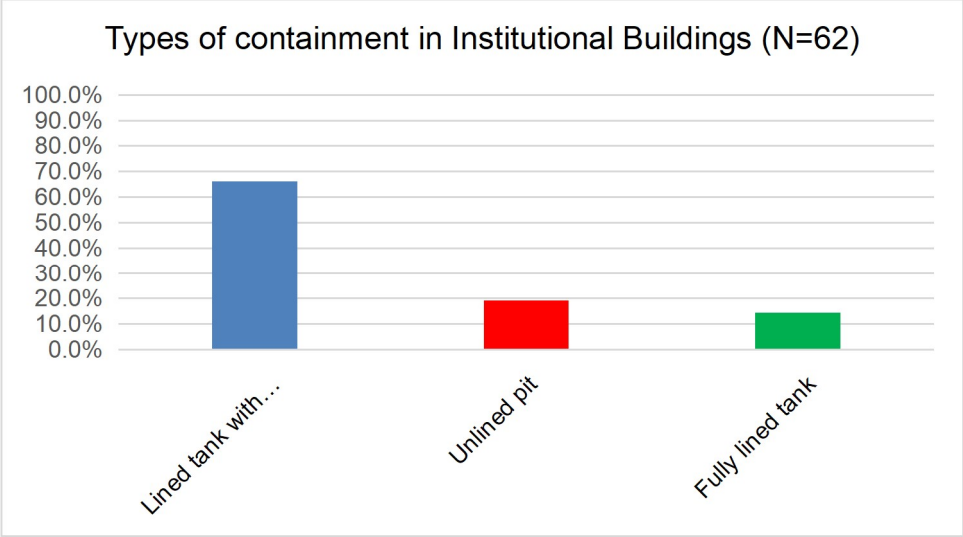

Figure 6: Types of containment in institutional building.

Figure 7 shows a map with the types of containments found in institutional buildings in the municipality.

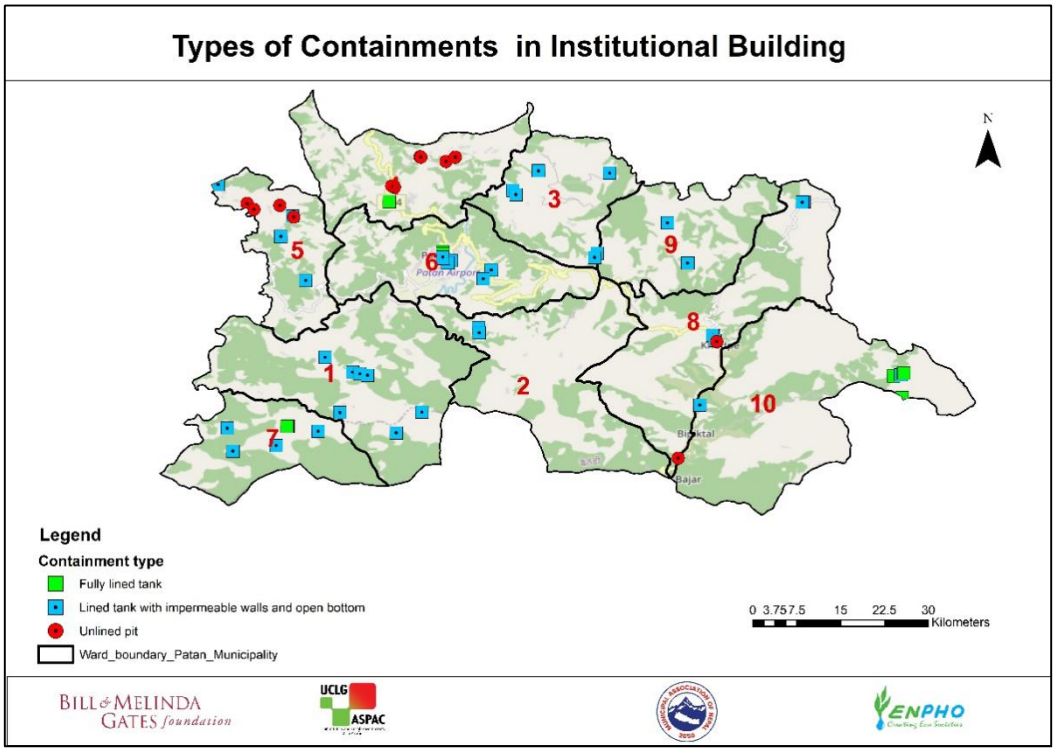

Figure 7: Map locating institutional buildings with their types of containments.

2.1.6. Public Toilets

There are two public toilets in the municipality (Figure 8). One public toilet is located at the bus stop of *Khodpe Bazar* in Mahakali highway. It was constructed by the municipality. The water in the public toilet is supplied by pipeline but water supply is irregular. The second one is a newly constructed public toilet located in ward 6, Patan Bazar,which has been operating since July 2022. Descriptions of public toilets are listed in Table 1.

Table 1: Public toilets available in Patan municipality.

S.N	No. of Urinal	No. of Toilet Seat/Pan in		No. of users per day	Size of Containments (m^3)	Constructed by
		Male	Female			
Khodpe Bazar, Bus station	4	1	1	200	10	Municipality
Patan Bazar	0	1	1	150	10	Municipality Ward 6
(Source: KII 2, Observation)						

Figure 8: Photographs of components of the public toilet in *Khodpe Bazar.*

2.2. SFD Matrix

2.2.1. SFD Selection Grid

The first step in the SFD graphic generator is SFD selection grid. The SFD selection grid consists of the types of containment technologies in vertical column in List A, while top horizontal row (List B) consists of a list where each of containment technologies are connected to. The existing containment technology was classified to fit in the SFD grid. The various types of sanitation technologies selected for the SFD graphic generator are shown in the SFD selection grid, as shown in Figure 9 and explained in Table 2.

List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)									
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow
No onsite container. Toilet discharges directly to destination given in List B					Significant risk of GW pollution Low risk of GW pollution					Not Applicable
Septic tank					Significant risk of GW pollution Low risk of GW pollution					
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					T1A3C10
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution		T1A4C7	T1A4C8		T2A4C10 T1A4C10
Lined pit with semi-permeable walls and open bottom	Not Applicable									Significant risk of GW pollution Low risk of GW pollution
Unlined pit										T2A6C10 T1A6C10
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										
Toilet failed, damaged, collapsed or flooded										
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded										
No toilet. Open defecation	Not Applicable							T1B11 C7 TO C9		Not Applicable

Figure 9: SFD selection grid of Patan municipality.

Table 2: Explanation of different variables and containment technologies selected in the SFD selection grid (SuSanA, 2018).

SFD Reference Variable	Containment Technologies	Explanation
T1A3C10	Fully lined tank (sealed), no outlet or overflow	This is a correctly designed, properly constructed and well maintained fully lined tank with impermeable walls and base. Since the tank is not fitted with a supernatant/effluent overflow, the excreta of this system are considered **Contained.**
T1A4C7	Lined tank with impermeable walls and open bottom, connected to a water body	This is a correctly designed, properly constructed and well maintained lined tank with sealed, impermeable walls and an open, permeable base, through which infiltration can occur. Since the tank is connected to a water body, the excreta in this system are considered **Not contained.**
T1A4C8	Lined tank with impermeable walls and open bottom connected to open ground	This is a correctly designed, properly constructed and well maintained lined tank with sealed, impermeable walls and an open, permeable base, through which infiltration can occur. Since the tank is connected to open ground, the excreta in this system are considered **Not contained.**
T1A4C10	Lined tank with impermeable walls and open bottom, no outlet or overflow	This is a correctly designed, properly constructed and well maintained lined tank with sealed, impermeable walls and an open, through which infiltration can occur. Since there is not a 'significant risk' of groundwater pollution, the excreta of this system are considered **Contained.**
T1A6C10	Unlined pit, no outlet or overflow	This is a correctly designed, properly constructed and well-maintained lined tank with sealed, impermeable walls and an open, permeable base, through which infiltration can occur. Since the tank is not fitted with a supernatant/effluent overflow, the excreta in this system are considered **Contained.**
T1B11C7 TO C9	Open defecation	With no toilet, users defecate in water bodies, on open ground and to don't know where; consequently, the excreta are considered **Not contained.**
T2A4C10	Lined tank with impermeable walls and open bottom, no outlet or overflow where there is a significant risk of groundwater pollution	This is a correctly designed, properly constructed and well maintained lined tank with sealed, impermeable walls and an open, through which infiltration can occur. Since there is a 'significant risk' of groundwater pollution, the excreta of this system are considered **Not contained.**
T2A6C10	Unlined pit, no outlet or overflow, where there is a significant risk of groundwater pollution	This is a correctly designed, properly constructed and well maintained unlined pit with permeable walls and base, through which infiltration can occur. Since there is a 'significant risk' of groundwater pollution, the excreta of this system are considered **Not contained.**

2.2.2. Risk of Groundwater Pollution

Piped drinking water supply is the major source of drinking water in the municipality. Approximately 76% of the households are served with piped drinking water supply in the municipality (Patan Municipality, 2018). Water Supply and Sanitation Division Office, Baitadi has supported the construction of water supply schemes in many wards of the municipality. Many water supply users committee such as Silanga, Garta, Bahun Nala, Ratimati, Chamradi, Udayadev,Gairakhola, Goldeu, Thuli khola, Thakali, Timlagair and Thuli khola are providing drinking water with yard connection in households.

Patan Bazar Brihat Khanepani Yojana is the largest water supply scheme in the municipality which was recently constructed and tested. The scheme will serve the population residing at the ward 6. The water supply scheme was constructed with the support from the federal government with 25% contribution by municipality and community people. The deep boring system has been installed nearby Surnaya River. The water has been pumped to the collection tank at the top of the Patan Bazar and it has been supplied to different reservoir tanks in gravity flow system. It has 4 reservoir tanks of about 30,000 litres and a reservoir tank with a capacity of 35,000 litres. Slow sand filter has been installed to treat water (KII_3, 2022).

The water quality monitoring data of ward 5, 7, 8, 9, and 10 conducted by the municipality in 2022 reflects that most of samples from the intake (90.9%) have been polluted with faecal matter. Moreover, 44.9% of tap, 41.9% of the reservoir and 37.5% of the household's vessels were contaminated (Pata Municipality, 2022a) . WHO drinking water quality guideline has mentioned *E. coli* as indicator organism for the potential presence of faecal contamination in water. As per National Drinking Water Quality Standard 2022, *E. coli* should be absent in drinking water i.e., 0 CFU/100 ml which represents that the drinking water should be free from the faecal contamination (MoWS, 2022c).

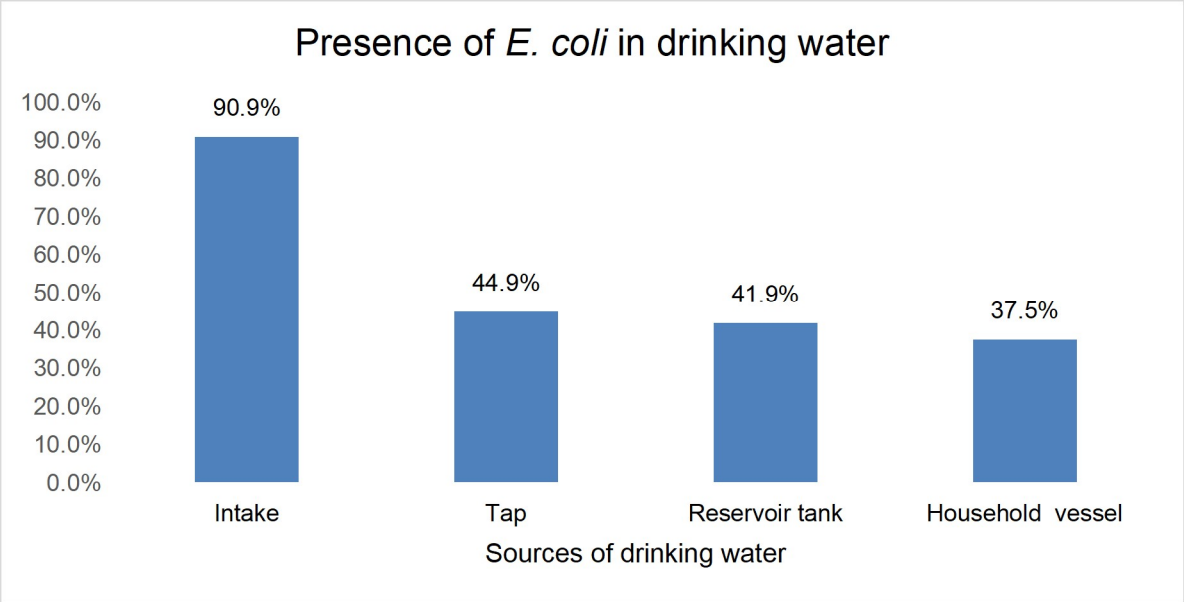

Figure 10: Faecal contamination in sources of drinking water.

2.2.3. Proportion of the contents of each type of onsite container which is faecal sludge

A detailed instruction from the SFD PI was used as guide to calculate the proportion of the contents of each type of onsite container which is faecal sludge. It stated that the default "100%" value should be used where onsite containers are connected to soak pits, to water bodies or to open ground.

This will model the contents as 100% faecal sludge and a proportion of this may be emptied periodically. The remaining not emptied fraction is made up of one or more of the following: faecal sludge which remains in the container, supernatant (when discharging to water bodies or to open ground), and infiltrate. Where onsite containers are connected to a sewer network or to open drains, a value of "50%" is used which means that half the contents are modelled as faecal sludge; a proportion of this may be emptied periodically. The remaining not emptied fraction will comprise faecal sludge which remains in the container and, in the case of open bottomed tanks, infiltrate. The other half of the contents is modelled as supernatant discharging into the sewer network or to open drains. The formula used for Faecal Sludge (FS) proportion calculation is shown below:

$$\frac{(onsite\ container\ connected\ to\ soak\ pit,\ \ no\ outlet\ ,\ \ water\ bodies\ or\ \ \ open\ ground) * 100 + (onsite\ container\ connected\ to\ sewer\ network\ or\ open\ drain) * 50}{onsite\ containner}$$

2.2.4. SFD matrix

The SFD matrix is a table which contains the values of the variables for each of the sanitation systems chosen in the SFD selection grid. It comprises of list of possible containment technologies in the first column and list of all possible places to which the containment technology could be connected in the top rows. Figure 10 shows the SFD matrix of Patan municipality.

Patan Municipality, Sudurpaschim Province, Nepal, 22 Aug 2022. SFD Level: 2 - Intermediate Population: 30435 Proportion of tanks: septic tanks: 0%, fully lined tanks: 100%, lined, open bottom tanks: 100				
Containment				
System type	**Population**	**FS emptying**	**FS transport**	**FS treatment**
	Pop	**F3**	**F4**	**F5**
System label and description	Proportion of population using this type of system (p)	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated
T1A3C10 Fully lined tank (sealed), no outlet or overflow	1.8	0.0	0.0	0.0
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	22.9	14.5	0.0	0.0
T1A4C7 Lined tank with impermeable walls and open bottom, connected to a water body	0.5	0.0	0.0	0.0
T1A4C8 Lined tank with impermeable walls and open bottom, connected to open ground	2.9	84.0	0.0	0.0
T1A6C10 Unlined pit, no outlet or overflow	18.7	20.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	0.8			
T2A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	36.3	12.2	0.0	0.0
T2A6C10 Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	16.1	19.3	0.0	0.0

Figure 11: SFD matrix of Patan municipality.

2.2.5. Summary of Assumptions and Calculation of Variables

i. Calculation of proportion of FS in each containment

The proportion of FS in septic tanks was set to 0%, the proportion of FS in fully lined tanks was set to 100% and the proportion of FS in lined tanks with impermeable walls and open bottom and all types of pits was set to 100 % according to the relative proportions of the systems in the municipality, as per the guidance provided by SuSanA.

ii. Calculation of proportion of FS emptied from containment (Variable F3)

84% of total faecal sludge from the containments is emptied during manual emptying mechanism as per household survey and triangulation with KII 2. Thus, actual emptied proportion of faecal sludge was taken 84% of the emptied containment and hence, the proportion of FS emptied from the sanitation systems is calculated as 84% on the sanitation technology emptied. Table 3 shows the calculation of variable F3.

Table 3: Actual emptying proportion for existing containment technologies.

SN	Containment Technologies	SFD Reference Variable	Percentage of emptied containment (%)	Emptied proportion of FS	Actual proportion of emptied FS (F3)
1	Fully lined tank (sealed), no outlet or overflow	T1A3C10	0	84%	0%
2	Lined tank with impermeable walls and open bottom, connected to a water body	T1A4C7	0	84%	0%
3	Lined tank with impermeable walls and open bottom, connected to open ground	T1A4C8	100	84%	84%
4	Lined tank with impermeable walls and open bottom, no outlet or overflow	T1A4C10	17.24	84%	14.5%
5	Unlined pit, no outlet or overflow	T1A6C10	23.94	84%	20.0%
6	Open defecation	T1B11 C7 TO C9		84%	0%
7	Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	T2A4C10	14.49	84%	12.2%
8	Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	T2A6C10	22.95	84%	19.3%

iii. Calculation of FS emptied delivered to treatment plant and treated (Variables F4 and F5)

The emptied faecal sludge from improved containments and buried in a covered pit is classified as ‘safely disposed in situ’ and meets the SDG criteria for a ‘safely managed’ sanitation service (NMICS, 2019) . However, the traditional practice of composting and dig and bury of the FS after emptying in the municipality is not considered to be as a safely practice of managing emptied faecal sludge, as stated in section 2.1.4.

Moreover, the city does not have any designated faecal sludge treatment plant (KII_1, 2022). Therefore, variables F4 and F5 are both set to 0% for all sanitation systems. Table 4 shows the disposal practices of each types of containment that have been emptied.

Table 4: Disposal practices of each type of containment that have been emptied.

Containment	Population	Emptied	Disposal Practices					
			Composting	Dig and Dump	Direct application to farm	Dispose of in open ground	F4	F5
Lined tank with impermeable walls and open bottom, no outlet or overflow	22.9%	14.5%	33.3%	33.3%	33.3%		0%	0%
Lined tank with impermeable walls and open bottom, connected to open ground	2.9%	84%				100%	0%	0%
Unlined pit, no outlet or overflow	18.7%	20.1%	5.8%	52.9%	29.4%	11.7%	0%	0%
Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	36.3%	12.1%	15.0%	50%	35%		0%	0%
Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	16.1%	19.2%		35.7%	42.8%	21.4%	0%	0%

2.2. SFD Graphic

The SFD graphic is the graphical representation of the sanitation service outcomes in terms of flow and fate of the excreta along the sanitation service chain in particular areas. Figure 12 represents the SFD graphic for Patan municipality. The green arrows moving from left to right represent those excreta which are safely managed along the sanitation service chain, while red arrows represent the unsafely managed excreta. The unsafe discharge of excreta represented by red arrows turn towards bottom while safely managed excreta flow along the service chain. The width of each arrow is proportional to the percentage of the population whose excreta contribute to that flow.

In Patan municipality, 99% of the population have access to basic sanitation facilities, relying on onsite sanitation systems.

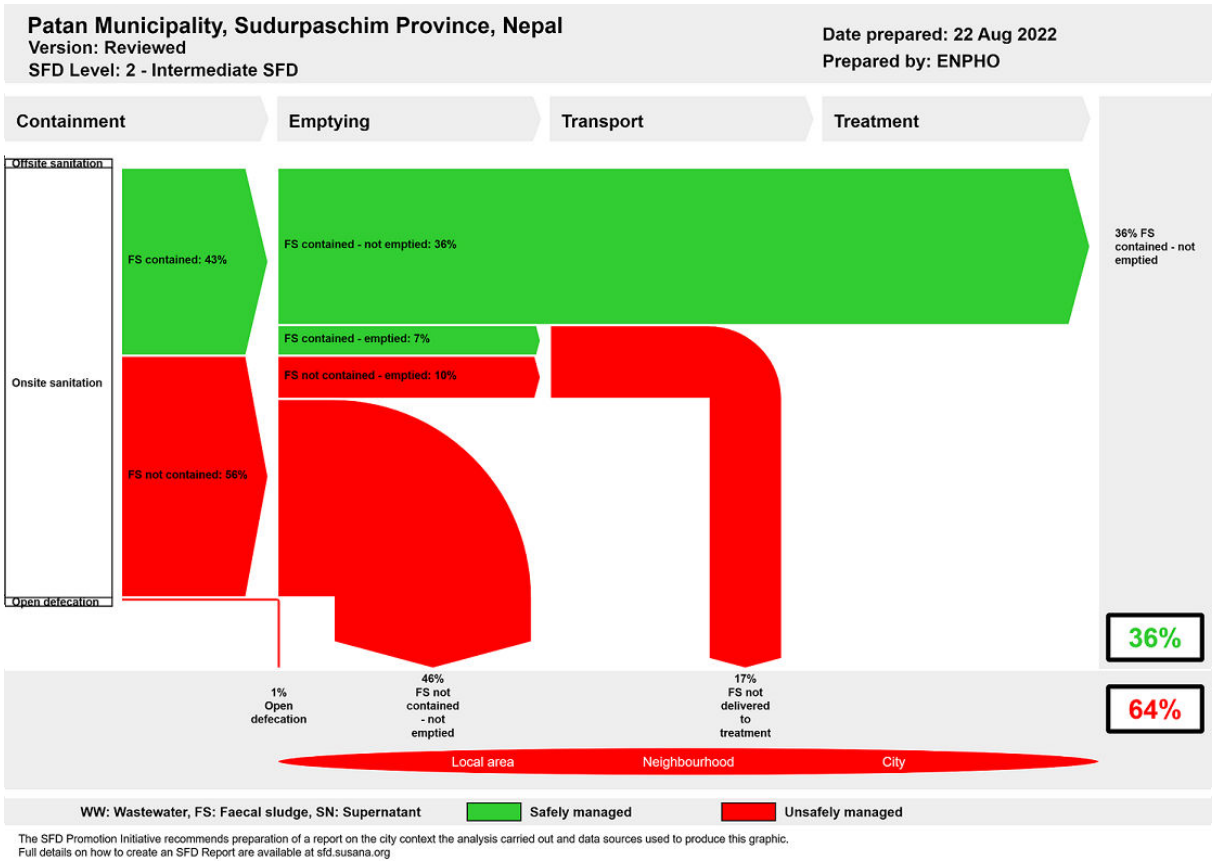

Figure 12: SFD graphic of Patan municipality.

The safely managed excreta originates from FS contained - not emptied (36%) while the unsafely managed excreta come from: FS emptied but not delivered to treatment (17%), FS not contained - not emptied (46%) and people practising open defecation (0.8%).

The FS from 43% of those having access to basic sanitation facilities are contained. Here, FS contained means that the excreta or faecal sludge are hygienically separated from human contact through either direct contact or consumption of contaminated drinking water from the infiltration of FS from the containment. The percentage of the population whose FS is contained is the sum of the percentages of population using fully lined tanks (sealed), no outlet or overflow (1.8%), lined tanks with impermeable walls and open bottom, no outlet or overflow (22.9%) and unlined pits, no outlet or overflow (18.7%).

The FS from 56% of the population is not contained. The percentage of the population whose FS is not contained is the sum of the percentage of population using lined tanks with impermeable walls and open bottom, connected to a water body and open ground (0.5% and 2.9%), lined tanks with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution (36.3%), unlined pits, no outlet or overflow, where there is a 'significant risk' of groundwater pollution (16.1%) and people practising open defecation (0.8%).

The description on flow of FS from the onsite sanitation system as shown in the SFD graphic is explained in Table 5.

Table 5: Description of the percentages of the SFD graphic.

Classification	Description	Percentage
FS contained	Faecal sludge that is contained within an onsite sanitation technology which is technically effective. These containments are systems T1A3C10, T1A4C10 and T1A6C10.	43%
FS not contained	Faecal sludge that is stored in an unsafe onsite sanitation technology. These containments are systems T1A4C7, T1A4C8, T2A4C10, T2A6C10 and T1B11 C7 TO C9.	56%
FS contained not emptied	FS that is contained within an onsite sanitation technology and not removed where there is no significant risk to groundwater pollution.	36%
FS contained - emptied	FS that is contained in onsite sanitation technology and emptied either mechanically or manually.	7%
FS not contained - emptied	FS that is removed from an onsite sanitation technology where FS is not contained which is emptied using manual emptying equipment	10%
FS not contained - not emptied	FS that is not contained within an onsite sanitation technology and not removed which may either remain in the containment or infiltrate to ground polluting groundwater.	46%
FS not delivered to treatment	FS emptied from an onsite sanitation system is either FS contained or not but is not delivered to the treatment plant.	17%
Open defecation	With no toilet, users defecate in water bodies, on open ground and to 'don't know where'	1%

The municipality was declared as an open defecation free municipality in 2016. However, 0.8% of the households are practising open defecation at open ground. The toilets have not been constructed by some people because of their ignorance along with extremely low economic status (KII_2, 2022).

3. Service Delivery Context

3.1. Policy, Legislation and Regulation

3.1.1. Policy

The Constitution of Nepal 2015 in Article 35 related to right to health recognizes citizen's rights to 'access to clean drinking water and sanitation'. In addition, Right to Clean Environment, Article 30 recognizes that every person shall have the right to live in a healthy and clean environment (GoN, 2015). To respect, promote and fulfil the provisions related to right on water and sanitation, Government of Nepal (GON) has passed Drinking Water and Sanitation Act in 2022 through Ministry of Water Supply. The act elaborates right to clean water as to receive affordable, sufficient, and quality drinking water regularly as well as access to sanitation as affordable access to quality sanitation services (MoWS, 2022a).

Historically, the National Sanitation Policy (1994) was the guideline for the planning and implementation of sanitation programs. The policy had promoted sanitation issues together with issues on water supply in rural communities. Also, Rural Water Supply and Sanitation National Policy (RWSSNP) 2004, has set a new target to provide safe, reliable, and affordable water supply with basic sanitation facilities. The policy focused on delivering quality services on water and sanitation in the marginalized and vulnerable groups. Participatory approach, community leadership project development, optimization of local resources and installation of locally appropriate technologies were major principles in the policy (DWSSM, 2004). However, it was unable to address the complex operational issue of urban water supply and sanitation service delivery (DWSSM, 2009) .Thus, National Urban Water Supply and Sanitation Sector Policy (NUWSSSP) was formulated and enforced in 2009. It focused on achieving coherent, consistent, and uniform approaches of development in urban areas with the involvement of different agencies and institutions. Cost recovery principles, public private partnership, and sector effectiveness for improved service delivery are key principles of the policy (DWSSM, 2009) . Both these policies were limited to addressing emerging issues and challenges in the rural and urban areas. Thus, National Water Supply and Sanitation Policy (NWSSP) was formulated in 2014 by the GON to address the emerging challenges and issues with the adoption of new approaches and resolve the inconsistency in RWSSNP and NUWSSSP. The goal of the NWSSP was to reduce urban and rural poverty by ensuring equitable socio-economic development, improving health and the quality of life of the people and protection of environment through the provision of sustainable water supply and sanitation services. It adopted innovative technologies and knowledge emerged in the sector. Remarkably, it was the first official document that recognized discharge of untreated wastewater and dumping of septic sludge heavily polluted the surface water sources in urban areas.

Recently, National Water, Sanitation and Hygiene Policy, 2022 has been drafted and undergone the process for endorsement. The draft policy is updated policy till date which has included the wide range of the sanitation services including treatment, reuse/ safe disposal of faecal sludge / wastewater. It emphasizes on the preparation of the municipal level Water, Sanitation and Hygiene (WASH) plan with the local leadership to ensure the WASH services for all (MoWS, 2022b).

Nepal is a signatory of the historical resolution of 2010 United Nations General Assembly on the Human Right to Water and Sanitation (UNGA, 2010) . Nepal committed to Millennium Development Goals (MDGs) for 2000- 2015. The goal was accomplished through declaration of the country as free from open defecation on 30th September 2019. National Sanitation and Hygiene Master Plan, 2011 was developed for coordinated planning and implementation of National Sanitation Campaign. The campaign strengthened institutional set-up tier of government in a participatory approach. In an alignment total sanitation campaign was initiated formally to sustain the ODF status. The guideline set various indicators to assess the sustainability of sanitation services. Remarkably, it extended sanitation definition as management of services and facilities to safely dispose of/reuse faecal sludge, collection and treatment of solid waste and wastewater to establish the hygienic environment and promote public health (NPC, 2017).

Similarly, Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (SDP 2016-2030) was formulated in 2016 for sector convergence, institutional and legal reforms, capacity development and establishing coordination and harmonization in the sector. The SDP classified service system and delineated roles and responsibilities for effective and sustainable service delivery. The SDP highlighted that majority of households rely on onsite sanitation system (70%) that requires effective treatment of faecal sludge. However, there is lack of concrete policies, guidelines, and indicators on Faecal Sludge Management (FSM) in the sector for effective planning, implementation, and service delivery. In alignment, Ministry of Water Supply through its Department of Water Supply and Sewerage Management (DWSSM) articulated and endorsed Institutional and Regulatory Framework (IRF) for Faecal Sludge Management in Urban Areas of Nepal in 2017. The main objective of the IRF is to define the specific roles and responsibilities of key institutions for the effective management and regulation of FSM. It is framed upon existing laws such as Environmental Protection Act (2019) and Environmental Protection Rules (2020), Self-Local Governance Act and Rules 1999, Environmental Standards on Effluent Discharge 2000, Nepal National Building Code 2003, and Land Acquisition Act amendment 2010 (MoWS, 2017a). The framework primarily envisioned featuring FSM in the national policy and issuing policy directives into local government to incorporate FSM in their urban planning along with strengthening and enhancing the capacity of the local government to deliver effective services. A local government has been endowed with overall responsibility to plan, implement, and regulate the FSM services within its jurisdiction. The provision of the ability to engage the private sector and other relevant stakeholders such as Water and Sanitation Users Committee (WSUC) in the framework reflects a participatory approach that would help in sustaining the interventions.

The constitution of Nepal has provided the right for local government to form acts, rules and regulation based on the national policies and laws. Local Governance Operation Act 2017 has been formed to implement the right of local government and promote co-operation, co-existence, and co-ordination among federal, provincial, and local government. The act has mentioned the right, roles and responsibility of municipalities along with provision and procedure for approving laws and regulations at local level.

Patan municipality municipal council has approved Health and Sanitation Service Act in 22 May, 2018 to ensure the right to get basic health and sanitation based on Local Governance

Act and published in local gazette (Patan Municipality, 2018b) . Patan municipality municipal council has approved Environment and Natural Resource Conservation Act 2021 in 18 April, 2021 to ensure the right to live in clean and healthy environment. The municipality should bear the responsibility to manage the any kinds of waste such solid waste, liquid waste, hazardous waste generated within the territory (Patan Municipality, 2021).

3.1.2. Institutional Roles

Federal, provincial, and local government are entitled for implementation of water and sanitation programs to ensure the rights on access to safe water and sanitation.

At Federal Level

National Planning Commission: At the federal government, the National Planning Commission (NPC) is the specialized and apex advisory body for formulating a national vision, developing policy, periodic plans, and sectoral policies. The NPC assesses resource needs, identifies sources of funding, and allocates budget. It serves as a central agency for monitoring and evaluating development policy, plans and programs. It supports, facilitates and coordinates with federal, provincial, and local government for developing policy plans and implementation.

Ministry of Water Supply: Ministry of Water Supply (MoWS) is the lead ministry responsible for planning, implementation, regulation, and monitoring and evaluation of sanitation programs in the country (GoN, 2015). Under the MoWS, Department of Water Supply and Sewerage Management (DWSSM) plan and implement water and sanitation projects funded by foreign donors or inter provincial projects or serves at least 15,000, 5,000 and 1,000 people in terai, hilly and mountain region respectively (GoN, 2015). The organizational structure of DWSSM is shown in Figure 13.

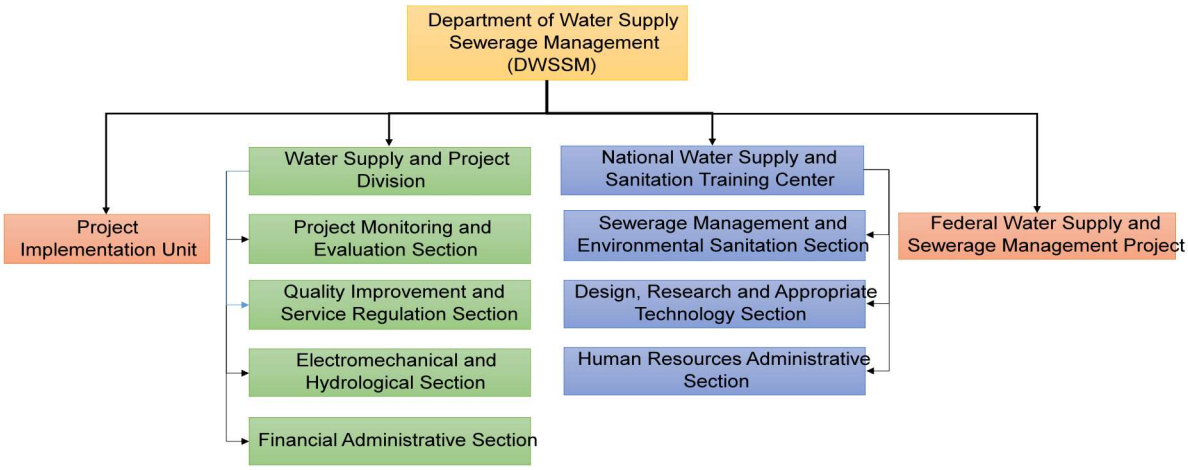

Figure 13: Organizational Structure Department of Water Supply and Sewerage Management.

Ministry of Urban Development: The Ministry of Urban Development (MoUD) works on integrated urban planning and development in municipalities, including faecal sludge management. DUDBC under MoUD is implementing body and sets standards for safe, affordable building construction and implementation for managed residential environment.

At Provincial Level

Ministry of Physical Infrastructure: Ministry of Physical Infrastructure of provincial government in Sudurpaschim is the major executing body in the province. Planning and implementation of water supply and sanitation infrastructure is the province is executed through Water supply and Sanitation Divisional Office (WSSDO). WSSDO implements the water and sanitation programs meeting the following criteria:

- Inter local government projects.
- Beneficiaries between 5,000 to 15,000 in terai region, 3,000 to 5,000 in hilly region and 5,00 to 1,000 in Himalayan region.

There is no separate section or unit of water supply and sanitation management till date in Patan municipality. Patan municipality has set provision to establish separate WASH section/ unit in the municipality to implement the planning and decision of WASH management committee. The Patan Municipality has drafted Water, Sanitation and Hygiene (WASH) Bill 2022 which has prohibited to discharge faecal sludge/ wastewater directly into river, springs, lakes, or public land (Patan Municipality, 2022b).

3.1.3. Service Standards

The sanitation service standards have been set by Nepal Water Supply, Sanitation and Hygiene Sector Development Plan (2016-2030). It classifies sanitation services as high, medium, and basic based on sanitation facilities in place. The sanitation service levels with indicators are shown in Table 6. However, FSM specific standards have yet to be developed and implemented.

Table 6: Sanitation Service Level and its Components.

S.N.	Service Components	Service Level		
		High	Medium	Basic
1	Health and Hygiene Education	✓	✓	✓
2	Household Latrine	✓	✓	✓
3	Public and School Toilets	✓	✓	✓
4	Septic tank sludge collection, transport, treatment, and disposal	✓	✓	✓
5	Surface drains for collection, transmission, and disposal of greywater	✓	✓	✓
6	Small-bore sewer collection for toilet and septic tank effluent, low-cost treatment, and disposal		✓	
7	Sanitary sewers for wastewater collection, transmission, non-conventional treatment, and disposal	✓		
8	Sanitary sewers for wastewater collection, the transmission of conventional treatment and disposal	✓		
9	Limited solid waste collection and safe disposal	✓	✓	✓

4. Stakeholder Engagement

4.1. Key Informant Interviews

Key Informant Interviews (KIIs) are qualitative in-depth interviews with people who know what is going on in the community. The purpose of key informant interviews is to collect information from a wide range of people who have first-hand knowledge about the concerned topic. KIIs were conducted with environment and sanitation related stakeholders. The KIIs were conducted with municipal officials, local elected bodies, water supply service provider, and public toilet service provider. The face-to-face interview was conducted and called after the interview to get more required information. The information was collected from Rajendra Prasad Bhatt, Chief Administration Officer, Rajendra Singh Thagunna, Engineer of Patan municipality. KIIs were further conducted with Keshab Prasad Khatri, member, *Patan Bazar Brihat Khanepani Yojana Committee* about the status, access and operation of the water supply schemes.

There was not a designated person for operating public toilet of *Khodpe bazar*. Thus, KII was conducted with shopkeeper nearby public toilet to understand the overall status of the public toiler. List of key informant stakeholders from the municipalities along with their organization and purpose are as shown in Table 7.

Table 7: List of key stakeholders for KIIs.

KII code	Name	Designation	Organization	Purpose	Date
KII-1	Rajendra Pd Bhatta	Chief Administrative Officer	Patan Municipality	Sanitation Status of Patan municipality	13 June, 2022
KII-2	Rajendra Thagunna	Engineer	Patan Municipality	Sanitation Status of Patan municipality	13 June, 2022
KII-3	Keshab Prasad Khatri	Member	Patan Bazar Brihat Khanepani Yojana	Water supply, coverage, treatment	13 June, 2022
KII-4		Public Toilet Caretaker	Khodpe Bazar	Status of public Toilet	13 June, 2022
KII-5	Maya Bhattarai	Sub-Engineer	New Town Project Baitadi, Department of Urban Development and Building Construction	Planned Activities under New Town Project	13 June, 2022

4.2. Household Survey

In each ward of the municipality, a random household survey was conducted. The two-day orientation was provided to local enumerators chosen by municipality representing each ward. They were oriented on each component of the sanitation service chain, starting from user interface to reuse / safe disposal along with the use of mobile application for data collection. They were mobilized in the community level to gather data from households and institutional level. The data were collected using the *KoboCollect* application.

Determining Sample Size

The sample size for the household survey in Patan municipality was determined by using Cochran (2963:75) sample size formula $n_0 = \frac{z^2pq}{e^2}$ and its finite population correction for the proportions:

$$n = \frac{n_0}{1+\frac{(n_0-1)}{N}}$$

Where,

n_0		Sample size
z	1.96	z value found in z table at 95 % of the confidence level
p	0.5	Assuming that about 50% of the population should have some sanitation characteristics that need to be studied (this was set as 50% since this percentage would yield the maximum sample size as the percentage of the population practising some form of sanitation is not known at the intervention)
q	1-p	
e	± 5 %	desired level of precision or sampling error
n		Reduced sample size
N	5,767	Total number of population (households in the municipality)

This is followed by proportionate stratification random sampling such that each ward in the municipality is considered one stratum. The sample size required in each ward of the municipality was calculated as $n_h = \frac{N_h}{N} \times n$ where, N_h is total population of each ward of municipality.

Thus, 380 households out of 5,767 households distributed in 10 wards were sampled using proportionate stratification random sampling. The number of ward wise sample size has been attached in appendix 2. The distribution of sampling points in the municipality are shown in Figure 14.

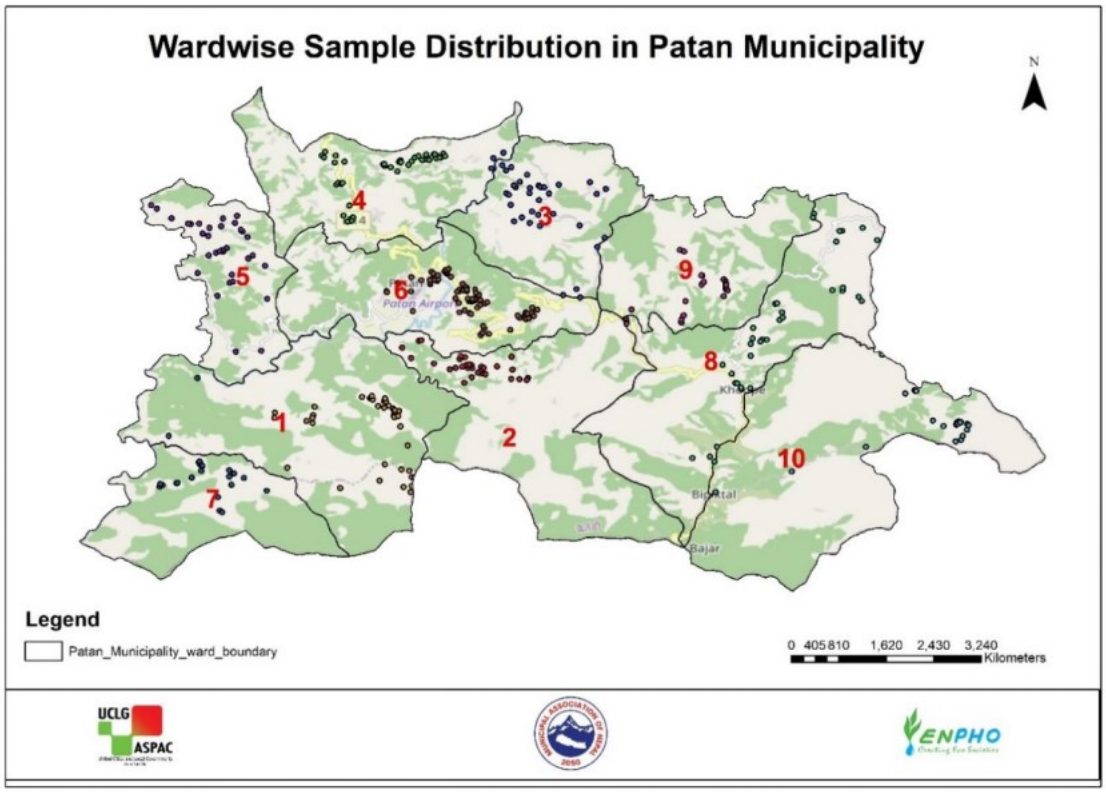

Figure 14: Distribution of sampling points in all wards of Patan municipality.

4.3. Institutional survey

The survey was conducted at 62 institutions of the municipality. The number of education institutions, government offices, healthcare facilities, hotels and commercial buildings are shown in Figure 15.

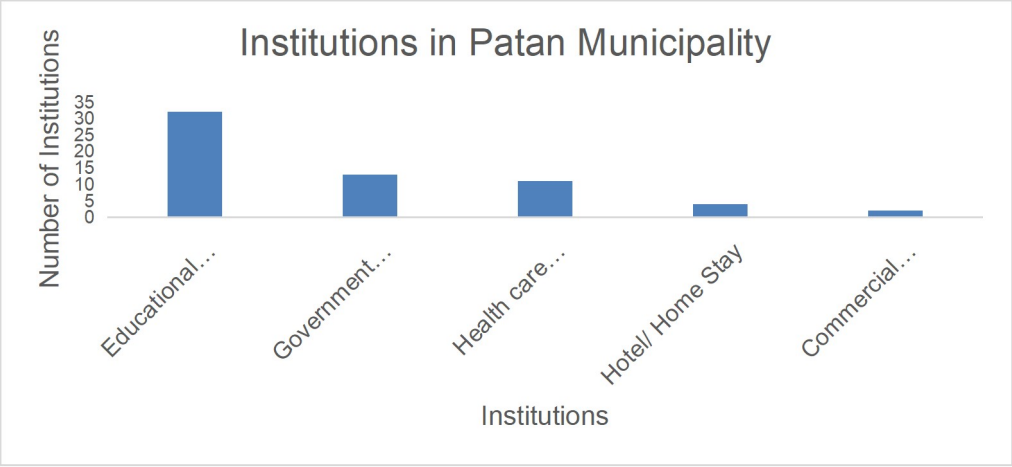

Figure 15: Surveyed institutions in the Patan municipality.

4.4. Sharing and Validation of Data

The *SFD Sharing and Validation* workshop was conducted on 1 September, 2022 in Patan municipality (Figure 16). The workshop's main objective was to share the sanitation situation from the findings of the surveys and receive the suggestion from municipal stakeholders. Altogether, 43 participants including the Mayor, Deputy Mayor, ward chairpersons, other members from municipal executive council, sectoral staffs etc. actively participated on the workshop and provided the valuable suggestions.

Mayor Gauri Singh Rawal said that they will work on water quality testing to understand the faecal contamination in various sources of drinking water. They are also planning the interventions for quality improvement and would prepare FSM By-Laws based on the data obtained. Kamal Singh Bohara, Deputy Mayor added that they would be promoting traditional FS treatment practices with safety measures and use it as manure. Further for the action, they would be collaborating with agriculture institution and organization supporting farmers for safely management of FS to use as organic manure. The list of participants with their designation is attached in Appendix 4.

Figure 16: SFD Sharing and Validation Workshop in Patan municipality.

5. Acknowledgements

We would like to acknowledge the executing agency, United Cities Local Government – Asia Pacific (UCLG ASPAC) and implementing agency Municipal Association of Nepal (MuAN) of the Municipalities Advocacy on Sanitation in South Asia – II (MuNASS-II) for coordination with the sub-metropolitan city.

We offer our sincere gratitude to Mr. Gauri Singh Rawal, Mayor, Mr. Kamal Singh Bohara, Deputy Mayor and Mr. Rajendra Pd Bhatta, Chief Administrative Officer of Patan municipality. We would also like to thank Mr. Rajendra Thagunna, Engineer, Mahesh Raj Bhatt, Information Officer, and entire staffs of sub-metropolitan city for their remarkable support during the study.

We would like appreciate Dr. Roshan Raj Shrestha, Deputy Director of Bill and Melinda Gates Foundation (BMGF), Dr. Bernadia Irawati Tjandradewi, Secretary General and Mr. Satish Jung Shah, Knowledge Management Officer, UCLG ASPAC. Similarly, we are very much obliged to Mr. Ashok Kumar Byanju Shrestha, President and Mr. Kalanidhi Devkota, Executive Director, Mr. Muskan Shrestha, Sanitation Advocacy Specialist, MuAN for their gracious support during the study.

We are very much grateful to Ms. Bhawana Sharma, Executive Director and Mr. Rajendra Shrestha, Program Director of Environment and Public Health Organization (ENPHO) for tremendous support and guidance during the entire process of the study. Together, we would like to thank entire team of ENPHO for their gracious support and MuNASS-II team without whom the study would not have been possible.

We are grateful towards the enumerators Mr. Ram Datt Bhattarai, Mr. Chakra Bahadur Air, Mr. Gopal Singh Bist, Ms Tulasi Air Bista, Mr. Jay Singh Thagunna, Mr. Deepak B.K., Mr. Ashok B. Chad, Mr. Rajendra Bhatt, Mr. Shiv Raj Bhatt, Mr. Keshab Raj Bhatta for their support during the survey.

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7. Appendix

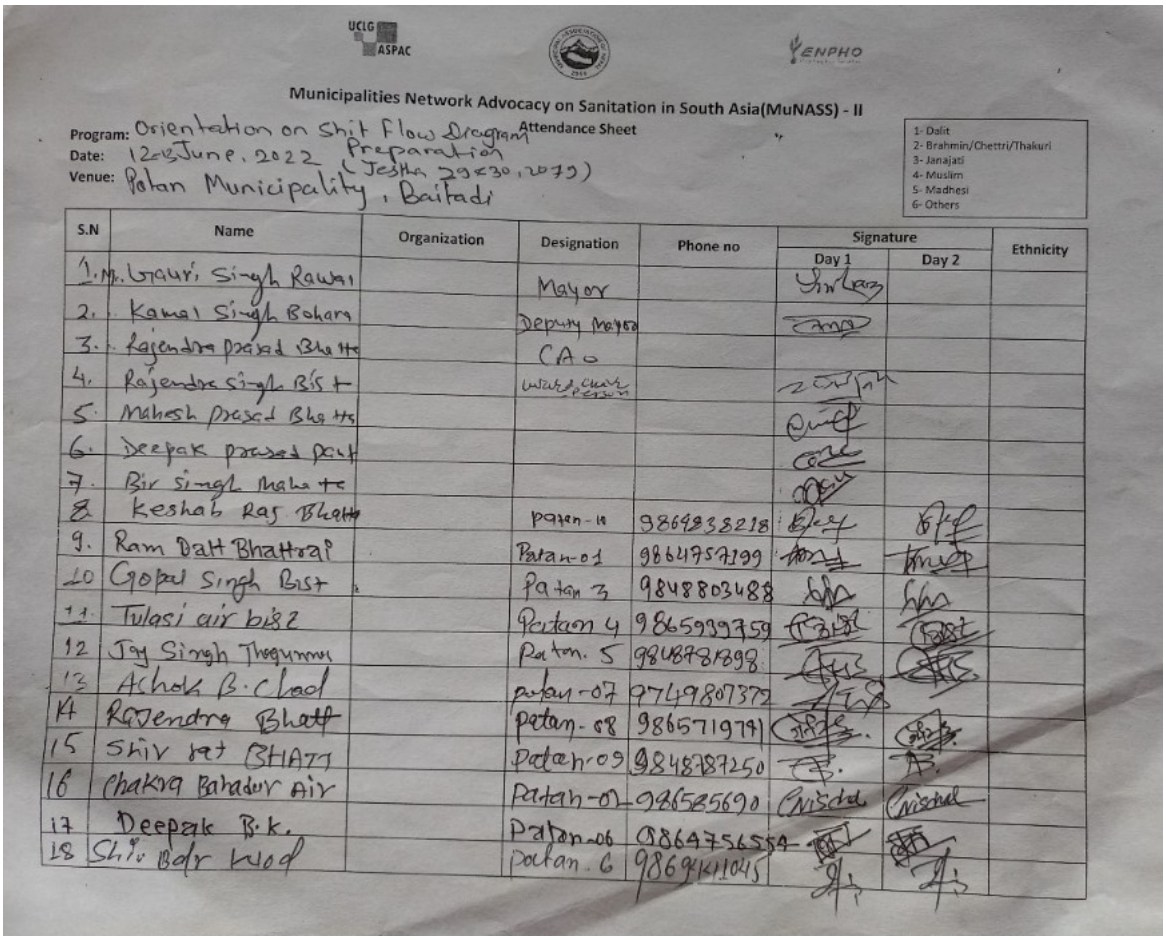
Appendix 1: Roles and Responsibility of Various Tiers of Governments Delineated in Drafted SDP 2016 – 2030

System Classification		Minimum Key HR Required	Regulation & Surveillance	Financing & Construction	Ownership of System	Service Delivery	
Size	Sanitation					Provision	Production
Small	Onsite sanitation	Water Supply and Sanitation Technician (WSST)	Federal and or Provincial Government	User+/ community+/ other			
Medium	Septage Management	Sub-engineer	Federal and or Provincial Government	Provincial+/ Local Govt+/ Community+/ Private Sector		Local Govt	Users committee/ Utility manager
Large	Septage or FSM Management	WASH Engineer + finance & admin staff	Federal and or Provincial Government	Provincial+/ Local Govt+/ Community+/ Private Sector		Local Govt	Utility Manager
Mega	Septage/ FSM Management	WASH Engineer + finance & admin staff	Federal and or Provincial Government	Provincial+/ Local Govt+/ Community+/ Private Sector		Local Govt	Utility Manager

Appendix 2: Ward wise Sample size distribution in Patan municipality

Ward	Population	Households	Proportion	Required Sample	Sample Distance
1	3,945	697	12%	46	15
2	2,603	474	8%	31	15
3	2,795	565	10%	37	15
4	3,462	644	11%	42	15
5	2,557	512	9%	34	15
6	5,217	1,134	20%	75	15
7	2,406	433	8%	29	15
8	2,882	553	10%	36	15
9	2,065	344	6%	23	15
10	2,503	411	7%	27	15
	30,435	5,767	100%	380	15

Appendix 3: List of participants of SFD orientation



UCLG ASPAC | ENPHO

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

Program: Orientation on Shit Flow Diagram Preparation Attendance Sheet
Date: 12th June, 2022 (Jestha 29 & 30, 2079)
Venue: Patan Municipality, Baitadi

1- Dalit
2- Brahmin/Chettri/Thakuri
3- Janajati
4- Muslim
5- Madhesi
6- Others

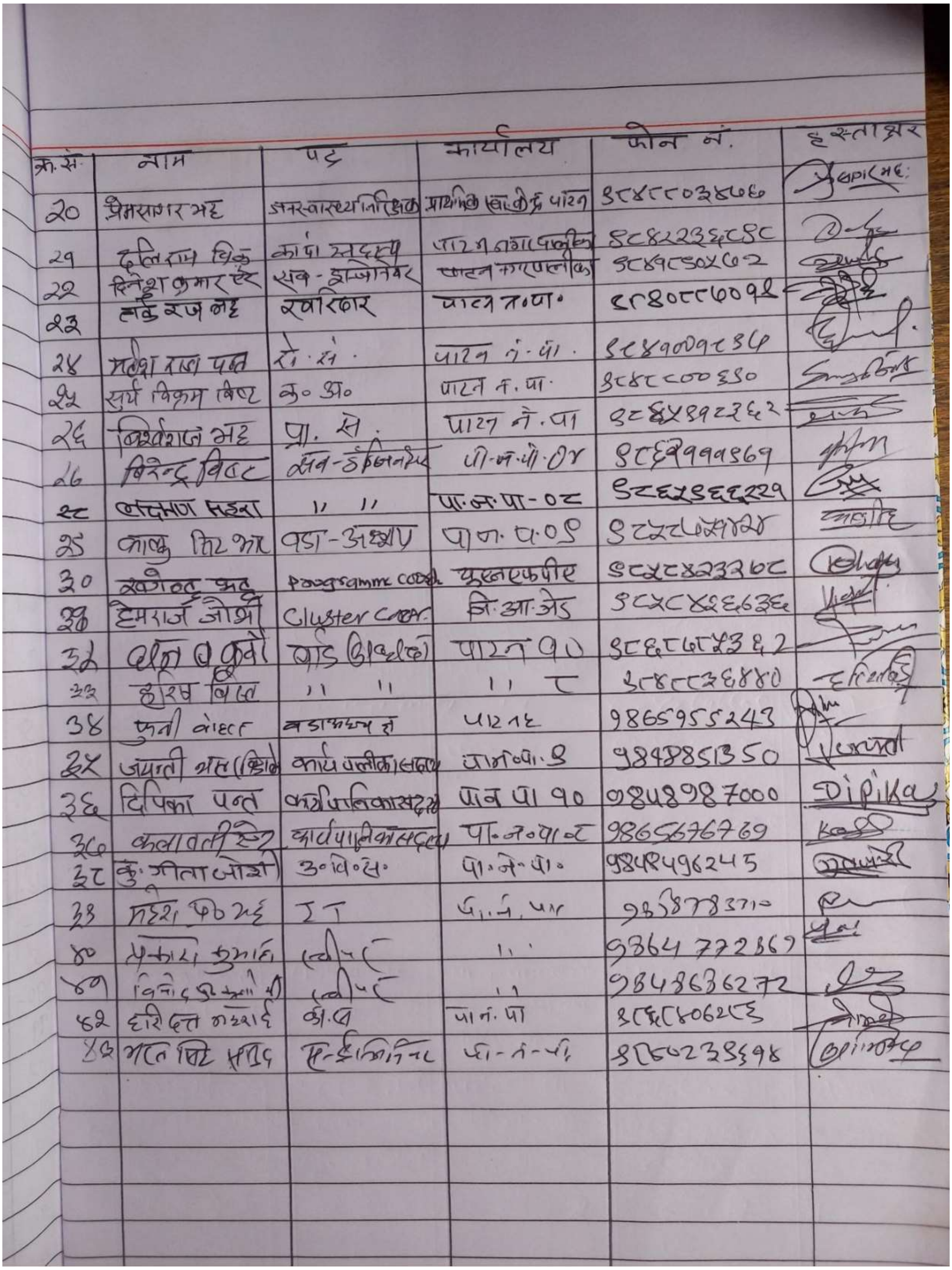
S.N	Name	Organization	Designation	Phone no	Signature Day 1	Signature Day 2	Ethnicity
1.	M. Gauri Singh Rawat		Mayor				
2.	Kamal Singh Bohara		Deputy Mayor				
3.	Rajendra Prasad Bhatta		CAO				
4.	Rajendra Singh Bisht		Ward Chairperson				
5.	Mahesh Prasad Bhatta						
6.	Deepak Prasad Pant						
7.	Bir Singh Mahatta						
8.	Keshab Raj Bhatta		patan-11	9869838218			
9.	Ram Dutt Bhattrai		Patan-01	9864757199			
10	Gopal Singh Bist		Patan 3	9848803488			
11.	Tulasi air bist		Patan 4	9865999759			
12	Jay Singh Thagunna		Patan. 5	9848787898			
13	Ashok B. Chand		patan-07	9749807372			
14	Rajendra Bhatt		patan-08	9865719791			
15	Shiv Dat BHATT		Patan-09	9848787250			
16	Chakra Bahadur Air		Patan-01	9865785690			
17	Deepak B.K.		Patan-06	9864756554			
18	Shiv Bdr Wod		Patan. 6	9869411045			

Appendix 4: List of participants present in Sharing and Validation meeting

आज मिति २०७९ साल भाद्र महिना १६ गतेका दिन नेपाल नगरपालिका संघको आयोजनामा वातावरण र जनस्वास्थ्य संस्था (एन्फो) को प्राविधिक सहयोग र The United Cities and Local Government Asia Pacific (UCLG ASPAC) को सहकार्यमा Municipalities Network Advocacy on Sanitation in South Asia (MuNASS) II कार्यक्रम अन्तर्गत पाटन नगरपालिकामा Shit Flow Diagram (SFD) सम्बन्धी अन्तरक्रिया कार्यक्रममा निम्न अनुसारको उपस्थिति रहेको छ ।

उपस्थिति

क्र.सं.	नाम	पद	कार्यालय	फोन नं.	हस्ताक्षर
१.	गौरी सिंह रावल	नगर प्रमुख	पाटन नगरपालिका	९८६५८७२६४४	[illegible]
२.	कमल सिंह बोहरा	नगर उप प्रमुख	पाटन नगरपालिका	९८४८८६०५२५	[illegible]
३	ललित जोशी	" " सचिवालय	"	९८४८६९६६०९	[illegible]
४	महेश प्र. पन्त	वडा अ	पाटन २	९८४८७९६२२०	[illegible]
५.	कल्याण भट्ट	वडा अध्यक्ष	पाटन ३	९८६३४६०३६८	[illegible]
६.	दिपक सिंह बिष्ट	वडा अध्यक्ष	पाटन ३	९८४९५९६८०९	[illegible]
७.	महेश प्रसाद अवस्थी	कृषि शाखा प्रमुख	पाटन न.पा.	९८४८८३६७५८	[illegible]
८.	वीर ब. खाती	स्वास्थ्य शाखा	पाटन न.पा.	९८४८४५४८९७	[illegible]
९	जंगबीर सिंह	[illegible]	[illegible]	९८४६७५९४५६०	[illegible]
१०.	हेमन्ती के.सी.	CPSW संयोजक	पा.न.पा. का.	९८६८८५६९१९८	[illegible]
११	बिसना बिष्ट	अधिकृत छैठौं	पा.न.पा.का.का.	९८४८८०३०९५	[illegible]
१२.	रमिता विष्ट भण्डारी	उ.नि.स.	पा.न.पा.का.	९८६५६६०६००	Ramita
१३	हेमन्ती रोकर	ज.स्वा.नि.	पा.न.पा	९८५८७८३३१४	[illegible]
१४	मेनका उपाध्याय	पोषण सहजकर्ता	पा.न.पा.	9865844976	[illegible]
१५	खेमराज जोशी	अ.पा. सचिव	पा.न.पा.६	९८३८४३००५६६	[illegible]
१६.	पार्वती चन्द	का.पा. सदस्य	पा.न.पा.२	९८४८७९१३८२	[illegible]
१७	राजेन्द्र सिंह बिष्ट	वडा अध्यक्ष	पा.न.पा.०६	9848802087	[illegible]
१८.	दीपक पु. पन्त	ना.सु.	पाटन नगरपालिका	9848710008	[illegible]
१९	दान सिंह बिष्ट	अधिकृत	पा.न.पा. [illegible]	9868879722	[illegible]



क्र.सं.	नाम	पद	कार्यालय	फोन नं.	हस्ताक्षर
२०	प्रेमसागर भट्ट	जनस्वास्थ्य निरीक्षक	प्राथमिक स्वा.के.न्द्र पाटन	९८४८८०३४७०६	
२१	दलिराम थिक	कां.पा. सदस्य	पाटन नगरपालिका	९८४२२३६८९८	
२२	दिनेश कुमार ऐर	सब-इन्जिनियर	पाटन नगरपालिका	९८४९८५०५७०२	
२३	हर्क राज भट्ट	खरिदार	पाटन न.पा.	९८४०८८७०९१	
२४	महेश राज पन्त	रो.सं.	पाटन नं.पा.	९८४९००९८३७	
२५	सूर्य विक्रम बिष्ट	क.अ.	पाटन न.पा.	९८४८८००३३०	
२६	विश्वराज भट्ट	प्रा. स.	पाटन न.पा	९८६४५१२३६२	
२७	बिरेन्द्र बिष्ट	सब-इन्जिनियर	पा.न.पा.०४	९८६२९११३६९	
२८	लक्ष्मण सहरा	" "	पा.न.पा-०८	९८६५३६६२२१	
२९	कालु सिंह भाट	वडा-अध्यक्ष	पा.न.पा.०९	९८५८७५४१४४	
३०	रवीन्द्र भट्ट	Programme coord.	[illegible]	९८५८४२३२७८	
३१	हेमराज जोशी	Cluster Coor.	[illegible]	९८५८४६६३६	
३२	[illegible]	वडा अध्यक्ष	पाटन १०	९८६८७८५३६२	
३३	हरिश बिष्ट	" "	" ८	९८४८८३६४४०	
34	[illegible]	वडा अध्यक्ष	पाटन	9865955243	
३५	जयन्ती भट्ट	कार्यपालिका सदस्य	पा.न.पा. ९	9848851350	
३६	दिपिका पन्त	कार्यपालिका सदस्य	पाटन पा १०	9848987000	
३७	कलावती ऐर	कार्यपालिका सदस्य	पा.न.पा.८	9865676769	
३८	कु. गीता जोशी	उ.वि.से.	पा.न.पा.	9848496245	
३९	महेश [illegible]	IT	पा.न.पा	9858783710	
४०	[illegible]	[illegible]	"	9864772367	
४१	[illegible]	[illegible]	"	9848636272	
४२	हरिदत्त [illegible]	का.स	पा.नं.पा	९८६८४०६२५३	
४३	[illegible]	सब-इन्जिनियर	पा.न.पा	९८६०२३५५९८	

SFD Patan Municipality, Nepal, 2022

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SFD Promotion Initiative