SFD Report

Chhayanath Rara Municipality
Nepal

Final Report

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

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SFD Report Chhayanath Rara Municipality, Nepal, 2025

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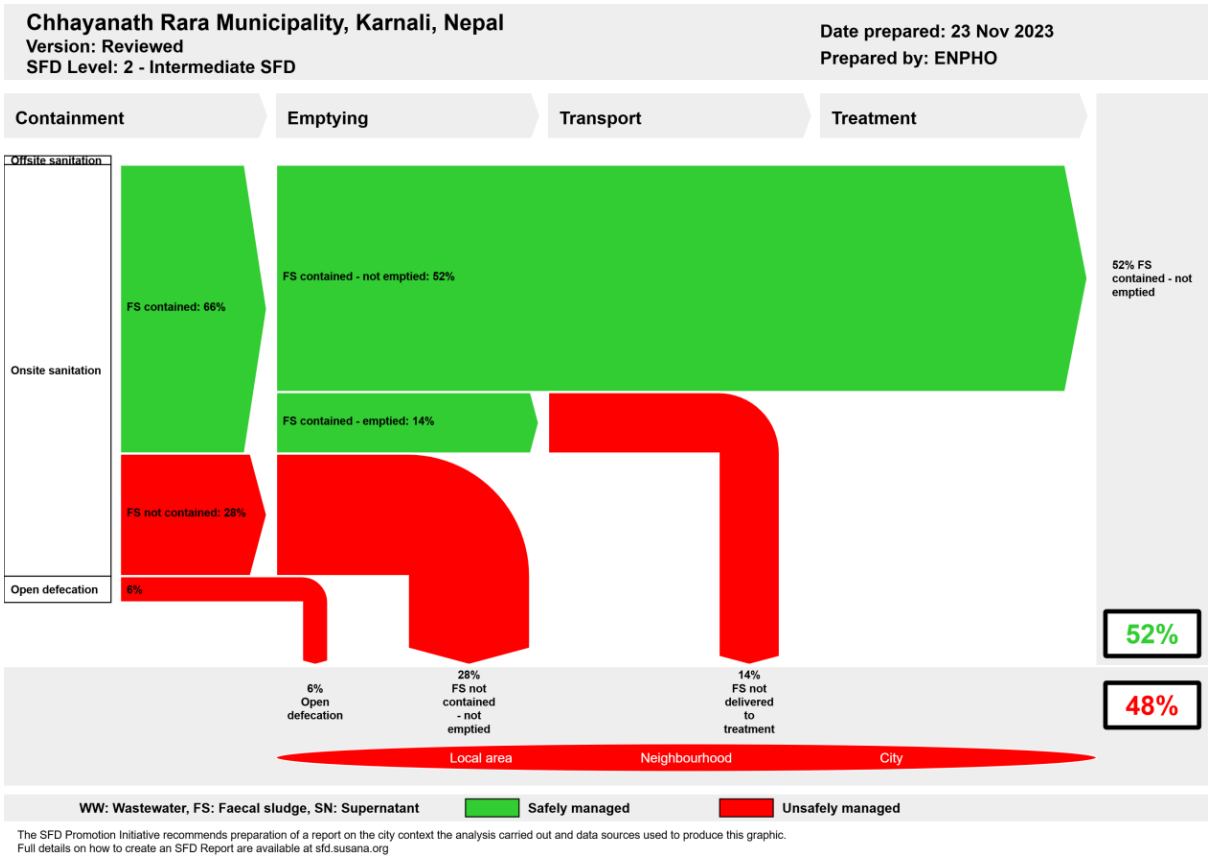
1. The SFD Graphic



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.

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Environment and Public Health Organization (ENPHO)

Collaborating partners:

Chhayanath Rara Municipality

Municipal Association of Nepal (MuAN)

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

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3. General city information

Chhayanath Rara is an urban municipality located in the Mugu district of the Karnali Province, Nepal and covering an area of 480.67 km^2. The municipality is divided into 14 wards and is home to four major religious sites: Baraha area, Pasupati, Muktinath, Rishikes, and Chhayanath itself.

As per the 2021 National Population and Housing Census, Chhayanath Rara Municipality recorded a population of 24,527 individuals residing in 4,952 households, with 12,390 males and 12,137 females. The municipality has seen an annual growth rate of 1.8%, leading to a population density of 51.03/km^2. Rara experiences a subarctic, dry winter, and cool summer climate, with an average annual temperature of 7.1ºC, It receives around 242.38 mm of precipitation annually. The topography of Chhayanath Rara Municipality is diverse, ranging from lowland areas to hills and possibly higher elevations,

including Rara Lake, one of Nepal's largest lakes, with an elevation of around 2,990 metres above sea level.

4. Service outcomes

This section provides a quick summary of the various sanitation technologies used across the municipality's sanitation value chain. All data in this section are from the household and institutional surveys conducted for this study (ENPHO, 2023). Despite municipality being declared as Open Defecation Zone (ODF), 6% of the total population are still deprived of access to improved sanitation facilities and defecate in open places.

Containment:

In the municipality, 94% of the population has access to improved sanitation facilities and 6% resort to open defecation. Among those households with containment, all 100% rely on onsite sanitation technology. Within the municipality, 3% of households have installed fully lined tanks with a single or double chamber, without provision for soak pits. Additionally, 3% of households have constructed lined tanks with impermeable walls and an open bottom, while 88% of households utilize unlined pits. The prevalent use of unlined pits in the area is primarily due to the easy accessibility of dry stones and the challenging geographical terrain, making it difficult to access other materials required for constructing proper sanitation technology.

All 48 surveyed institutions in the municipality have access to improved sanitation facilities. The findings indicate that 29% of institutional buildings have fully lined tanks, 35% have tanks with impermeable walls and open bottoms, and 36% have unlined pits.

Emptying and transportation:

Notably, among the 94% of households with containment, 17% have emptied their containments due to sludge overflow, all done manually as mechanical desludging services are unavailable. High costs and the use of sludge as fertilizer contribute to manual emptying. Data indicates that 8% of lined tanks with impermeable walls and open bottoms and 18% of unlined pits have been emptied, with none of the fully lined tanks emptied. Upon detailed analysis, the recently constructed containments built in the period of last 5 years were not emptied. The unlined pits may not need emptying for long periods, but lined tanks and fully lined tanks might need it soon in upcoming years.

Treatment and Disposal:

None of the faecal sludge is treated due to the absence of treatment plant and mechanical desludging services. The primary reason for manual emptying is the absence of desludging services and a lack of knowledge about whom to contact. Additionally, the high cost of mechanical desludging leads people to resort to manual emptying, applying sludge on farms or opting for dig and dump practices. Disposal methods in manual emptying include direct application to farms, dig and dump, and composting methods.

Risk Assessment:

The survey found that 63.41% of households rely on spring water, 21.57% have private taps, and 15.08% use public taps. Households who have installed lined pits and tanks with semi permeable walls and open bottom are at high risk of groundwater contamination. Further water quality test report was also observed and analyzed accordingly to assess the drinking water contamination risk.

The SFD graphic shows that 52% of the excreta generated are safely managed while 48% are unsafely managed. The safely managed Faecal Sludge (FS) generated by 52% of the population is temporary as this FS is only contained. So, once the containment gets filled and the FS from the containment is emptied, the percentage of unsafely managed FS would increase.

5. Service delivery context

Access to safe 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 endorsed the Water Supply 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.

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 setting up with the formation of water and sanitation coordination committee at every tier of government to actively engage in sanitation campaigns.

The municipality has acknowledged their responsibility on managing the faecal sludge and providing the equipments, machinery and transportation materials including the separate land for FS management under the WASH act. However, there have been no such actions seen in practice.

6. Overview of stakeholders

Based on the regulatory framework for faecal sludge management (FSM), the major stakeholders for effective and sustaining service delivery as presented in Table 1.

Table 1. Overview of stakeholders.

Key Stakeholders	Institutions / Organizations
Public Institutions at Federal Government	Ministry of Water Supply
Public Institutions at Provincial Government	Ministry of Water Resources and Energy Development
Public Institutions at Local Government	Chhayanath Rara Municipality
Non-governmental Organizations	Environment and Public Health Organization (ENPHO)
Private Sector	Public toilet operators.
Development Partners, Donors	MuAN, BMGF, UCLG ASPAC, USAID Karnali Water

7. Credibility of data

The data were collected from proportionate stratification random sampling. Altogether, 358 households and 48 institutions were surveyed from 14 wards of the municipality. Primary data on emptying, transportation, and current sanitation practices in the municipality are validated from Key Informant Interviews (KIIs) with water service providers, public toilet caretakers and other different sanitation and environmental stakeholders. The overall data and findings were shared with the stakeholders of the municipality and validated through a sharing program on 1st December 2023.

8. Process of SFD development

Data on sanitation situations is collected through household and institutional surveys. Enumerators from the municipality were mobilized after providing orientation on sanitation technologies, objectives of the survey and proper use of mobile application, KOBOCOLLECT for collection of data for survey. Along with this, KIIs were conducted with concerned stakeholders to understand the situation practices across the service chain. The different types of sanitation technologies used 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 was fed into SFD graphic generator to produce the SFD graphics.

8. List of data sources

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

- ENPHO. (2023). Sanitation Survey on Chhayanath Municipality. Chhayanath.ral Bureau of Statistics.
- NSO. (2022). National population and housing census 2021. Kathmandu: National Statisitics Office.
- SuSanA. (2018). SuSanA Manual.

SFD Chhayanath Rara Municipality, Nepal, 2025

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Abbreviations

BMGF	Bill and Melinda Gates Foundation
DWSSM	Department of Water Supply and Sewerage Management
ENPHO	Environment and Public Health Organization
FS	Faecal Sludge
FSM	Faecal Sludge Management
GoN	Government of Nepal
HH	Household
IRF	Institutional and Regulatory Framework
KII	Key Informant Interview
KM	Kilometers
MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Survey
MoUD	Ministry of Urban Development
MuNASS-II	Municipalities Advocacy on Sanitation in South Asia – II
MM	Millimeter
MoH	Ministry of Health
MoHP	Ministry of Health and Population
MoUD	Ministry of Urban Development
MoWS	Ministry of Water Supply
MuAN	Municipal Association of Nepal
NGO	Non-Governmental Organization
NPC	National Planning Commission
NWSSP	National Water Supply and Sanitation Policy
ODF	Open Defecation Free
PPP	Public Private Partnership
RWSSNP	Rural Water Supply and Sanitation National Policy
SDP	Sector Development Plan
SFD	Shit Flow Diagram
SFD PI	Shit Flow Diagram Promotion Initiative
SN	Supernatant
UCLG ASPAC	United Cities and Local Governments Asia Pacific
UNICEF	United Nations Children's Education Fund
USAID	U.S. Agency for International Development
VDC	Village Development Committee
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WSUC	Water Supply and User's Committee

1. City context

Chhayanath Rara is an urban municipality situated in the Mugu district of the Karnali Province, Nepal. It was established by merging Village Development Committees (VDCs) named Shreenagar, Karkiwada, Rowa, Ruga and Pina. It spreads across an area of 480.67 sq km. The municipality is divided into a total of 14 wards and include 4 major religious sites: Baraha area, Pasupati, Muktinath, Rishikes, and Chhayanath itself. The municipality was named Chhayanath Rara after Nepal's biggest lake, Rara lake, and the Chhayanath temple. This municipality can be reached from the Mid-Western Highway, detouring from Kohalpur, passing through Surkhet, Dailekh, Kalikot, and Jumla (Chhayanath Rara Municipality, 2023).

Figure 1 shows the map of the municipality with its ward boundaries.

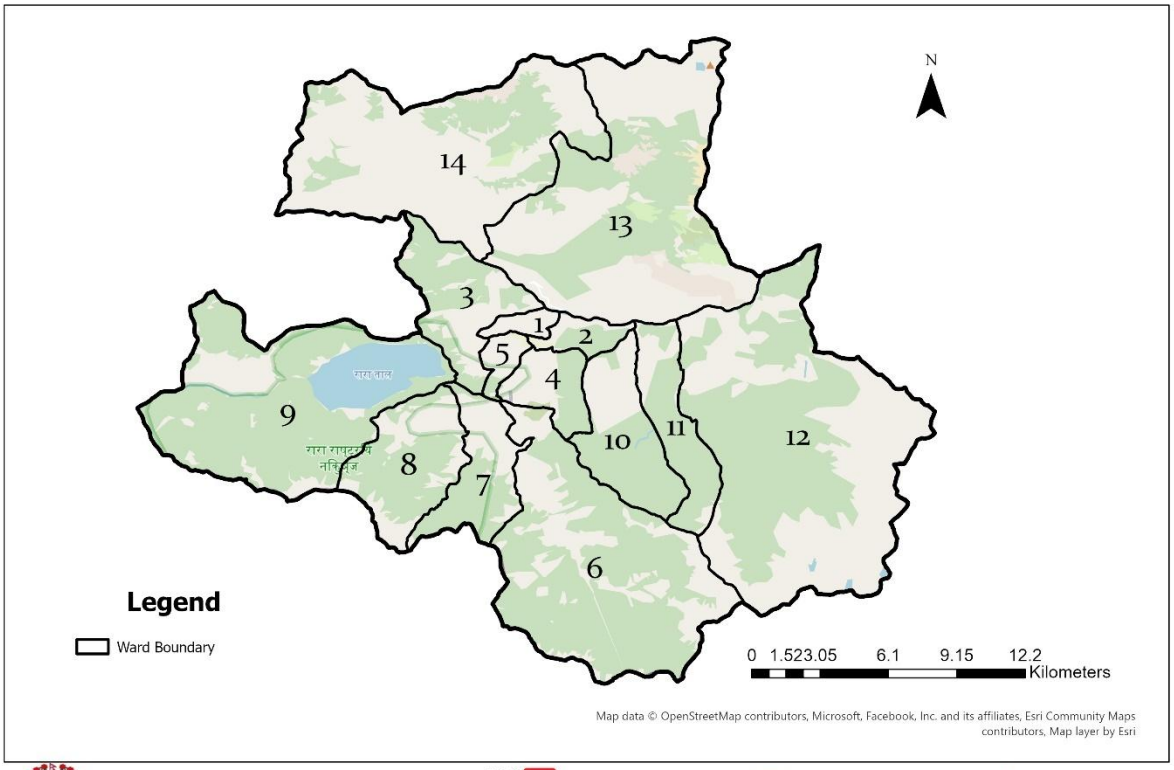

Figure 1: Map of Chhayanath Rara Municipality with ward boundaries.

1.1 Population

As of the 2021 National Population and Housing Census, the population of Chhayanath Rara municipality was recorded as 24,527 individuals, residing in 4,952 households. The male population accounted for 12,390 while the female population was 12,137 (NSO, 2021). The municipality has experienced an annual growth rate of 1.8% resulting in a population density of 51.03/km² (City Population Chhayanath, 2023). Among the wards, ward number 13 recorded the highest population with 2,731 individuals, while ward 9 had the least population of 401 residents (NSO, 2021).

1.2 Climate

Rara experiences a subarctic, dry winter, and cool summer climate (Classification: Dwc). The district's annual temperature averages 7.1ºC (44.78ºF), which is -14.9% lower than the national average in Nepal. Rara receives approximately 242.38 millimeters (9.54 inches) of precipitation, with 195.95 rainy days annually, accounting for 53.68% of the time. July is the warmest month, and January marks the coldest period. Additionally, July is the wettest month, while November is the driest month (Weather and climate, 2020).

1.3 Topography

The topography of Chhayanath Rara Municipality is characterized by diverse landscapes within its geographical boundaries with latitude 29°32'02.3"N and longitude 82°09'27.8"E (Places in the world, 2023). The municipality encompasses a variety of terrains. The topography ranges from the lowland areas to hills and possibly higher elevations, with the presence of Rara Lake, one of the Nepal's largest lakes. The elevation of Rara is approximately 2,990 meters (9,810 feet) above sea level (Chhayanath Rara Municipality, 2023).

2. Service Outcomes

2.1 Overview

The country has persistently worked towards achieving its current sanitation status for over three decades. On September 30, 2019, the Government of Nepal declared the nation free of open defecation, marking universal access to improved sanitation facilities nationwide (DWSSM, 2019). All the districts of Karnali Province have been declared as ODF (Open Defecation Free) zones (Chhayanath Rara Municipality, 2023).

Data on sanitation situation were collected through household and institutional surveys (ENPHO, 2023). As per the findings of this household survey, 6% of households still do not have access to improved sanitation facilities resorting to open defecation (ENPHO, 2023). To assess the sanitation status across the components of sanitation value chain, a household survey was conducted in 358 sampled households using a proportionate sampling in 14 wards of Chhayanath Rara Municipality (further details are presented in section 4). The results obtained after the triangulation and validation of the data with all the data sources including literature reviews, Key Informant Interviews (KIIs) and a validation workshop is presented in this section.

2.1.1 Sanitation systems in household buildings

An improved sanitation facility is defined as one that hygienically separates human excreta from human contact. Improved sanitation facilities include flush or pour flush to piped sewer systems, septic tanks, or pit latrines, ventilated improved pit latrines, pit latrines with slabs and composting toilets (MICS, 2019).

In the municipality, 94% of the households has access to improved sanitation facilities. Those who had containments in their house, 100% rely on onsite sanitation systems. Any sanitation technology or system involving the collection and storage of excreta (referred to as faecal sludge) on the plot where it is generated is known as onsite sanitation (Susana, 2018). In the municipality, 3% of households installed fully lined tanks with a single or double chamber. Additionally, 3% of households have constructed lined tanks with impermeable walls and an open bottom. The majority (88%) of the households built unlined pits, constructed by wall made of dry stone and open base (Table 1). This is because of the easy accessibility of dry stones and difficult geographical terrain to access other materials required for construction of proper sanitation technology (KII-2, 2023).

Table 1: Sanitation system showing proportion of open defecation, and different onsite sanitation technologies installed in households of Chhayanath municipality (ENPHO, 2023).

Types of containment	Construction material used in the wall of the containment	Construction material used in the bottom of the containment	Number of Chambers	%	Recategorized as SFD
Fully Lined tank	Cemented brick/stone walls or concrete wall	PCC or plaster	One or two	3%	Fully Lined tank
Lined tank with impermeable walls and open bottom	Cemented brick/stone walls or concrete wall	Soiling or nothing	One or two or more than two	3%	Lined tank with impermeable walls and open bottom
Unlined Pit	Mud mortar brick/stone wall, No lining, Dry stone wall	Soiling or nothing	NA	88%	Unlined Pit
Open defecation	NA	NA	NA	6%	Open defecation
			Total	**100%**	

Fully Lined Tank: A fully lined tank is a rectangular tank with impermeable walls and a base, engineered to prevent leakage or seepage of faecal sludge into the surrounding environment. This design ensures the safe storage of faecal sludge, protecting against groundwater contamination (Strande, Ronteltap, & Brdjanovic, 2014). In the municipality, only 3% of households have fully lined tanks built.

Lined Tank with Impermeable Walls and Open Bottom: This rectangular onsite technology involves constructing tanks with impermeable walls and a permeable base, allowing the infiltration of effluents that could potentially contaminate the groundwater (Peal, et al., 2020). In the municipality, 3% of households have installed this type of containment.

Unlined Pit: An unlined pit is a pit constructed and maintained with permeable walls and a base for liquid infiltration. However, it poses a concern as the walls are made of materials like mud mortar stone/brick or dry stone, and the base with soiling or nothing, making it permeable. This increases the risk of groundwater contamination. Most households in the municipality (88%) use unlined pits, due to limited access to construction materials and the geographical terrain, leading to the use of dry stones in containment construction. This practice heightens the risk of contamination of water sources. Furthermore Figure 2 demonstrates the construction of unlined pits in one of the sampled households. Similarly, Figure 3 demonstrates the overall mapping of the different sanitation technologies installed within the municipality.

Figure 2: Unlined pit built in sampled household.

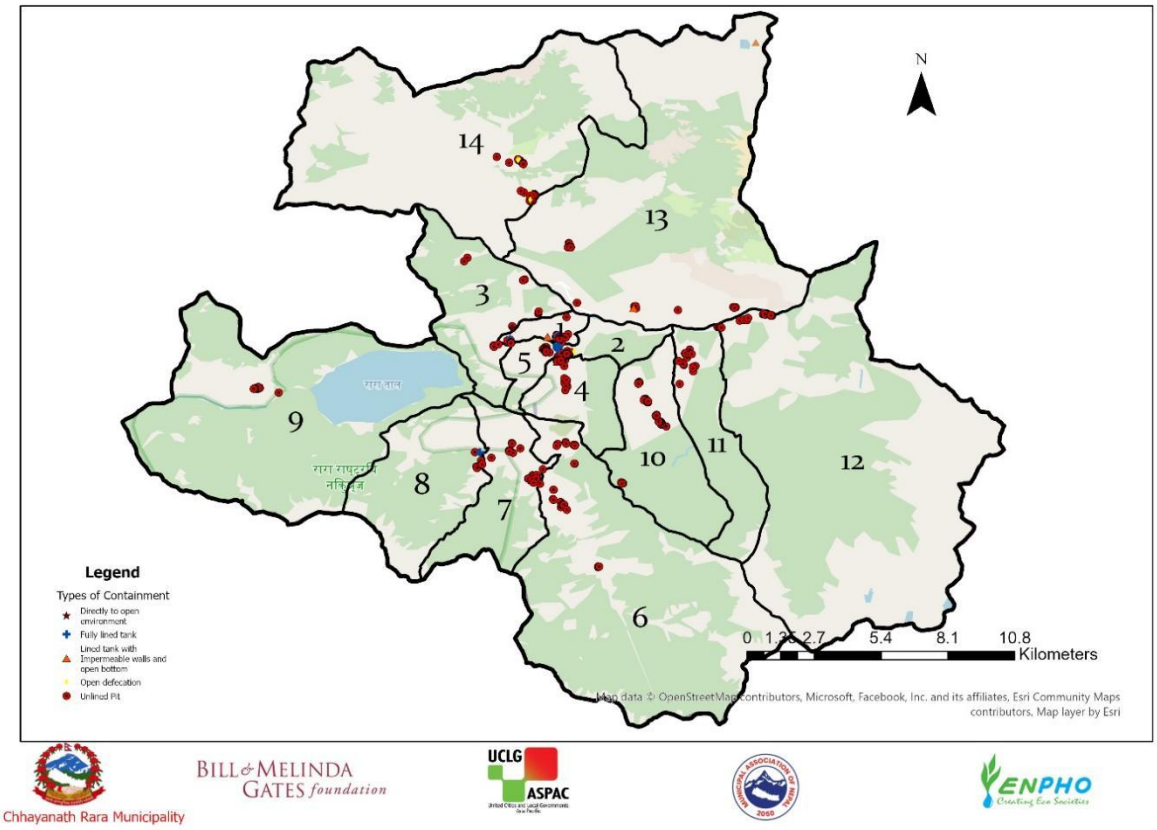

Figure 3: Map locating different types of containment in municipality.

2.1.2 Emptying and Transportation Services of Containment

Emptying is one of the major components of the sanitation service chain. Regular emptying of the containment prevents sludge overflow and blockages (Strande, Ronteltap, & Brdjanovic, 2014). It ensures the proper functioning of containment basically for the septic tank which functioned well until the volume of sludge is one-third of the total volume of the tank. Interestingly, of the total 94% households with containment, 17% have emptied their containment due to faecal sludge overflow. The data indicates that all the emptying is done manually. The desludging services are not available, neither by private sectors nor by municipality. The contributing factors for manual emptying are associated with high cost for mechanical emptying, and the use of faecal sludge in farmland (KII-2, 2023). Most of the emptied containments are unlined pits, possibly due to a higher proportion of unlined pits being constructed in the municipality compared to other containment types, leading to more frequent emptying of unlined pits (Table 2).

Table 2: Status of emptying of different containments.

Containment	Never Emptied	Emptied	Grand Total
Fully Lined tank	100%	0%	100%
Lined tank with impermeable walls and open bottom	92%	8%	100%
Unlined Pits	82%	18%	100%
Grand Total	**83%**	**17%**	**100%**

The findings indicated that 18% of the unlined pits, and 8% of lined tanks with impermeable walls and open bottom had undergone emptying. In contrast, none of the fully lined tanks were emptied since its installation.

Upon further analysis, it was found that the containments that have not been emptied since installation (fully lined tanks and lined tanks with impermeable walls and open bottom) were constructed within the last 5 years, which indicates the possibility of containment yet to be filled, while the proportion of unlined pits varied as shown in Table 3.

Table 3: Years of construction of different containments that have not been emptied.

Containment	0-2 years	3-5 years	6-10 years	More than 10 years
Fully Lined tank	70%	30%	0%	0%
Lined tank with impermeable walls and open bottom	50%	50%	0%	0%
Unlined Pits	24%	44%	26%	6%

Grand Total	**27%**	**43%**	**24%**	**6%**

This data highlights that unlined pits may not require emptying even over a long period of time, possibly due to the leakage of faecal sludge. However, lined tanks and fully lined tanks might need emptying soon in the upcoming years.

2.1.3 Treatment and disposal/reuse of faecal sludge

None of the faecal sludges are treated, as there are no treatment facilities. The disposal practices after manual emptying were found to be 63.16% direct application to farms, 29.82% opting for dig and dump, while the remaining 7.02% responded to composting method. However, direct application to farm can't be considered safe as it possess direct risks to environment and public health.

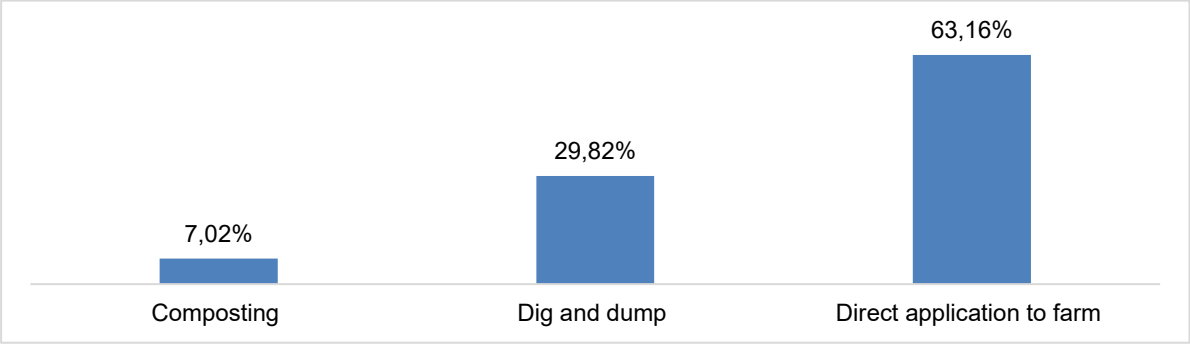

Figure 4: Disposal practices after manual emptying.

2.1.4 Sanitation system in institutional buildings of Chhayanath Rara Municipality

All the surveyed 48 institutions had access to a safely managed sanitation system in the municipality. 48 different institutions: 15 educational institutes, 19 government and non-government offices, 12 health care centres and 1 hotel with lodging facility and 1 commercial building were surveyed. The findings showed 29.17% of institutional buildings made fully lined tanks, 35.42% had lined tank with impermeable walls and open bottom and 36.42% had built unlined pit (Figure 5).

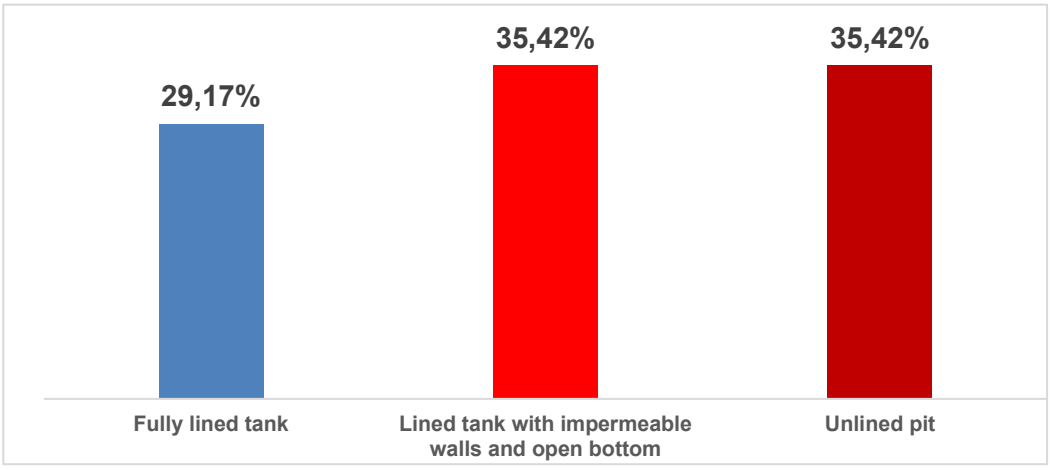

Figure 5: Containments used in institutional buildings.

2.1.5 Public Toilets

In total, there are 6 public toilets constructed in different areas where there is an increased flow of people: one in the market area and the other 4 in different premises within municipality. There is 1 public toilet constructed in buspark area, ward 1. It was constructed on a budget of Nepali Rupees (NRS) 930,902 (USD 6,555) invested by the municipality. There are 2 separate toilets made for male and female. Many of the public toilets are not functioning properly, and the sanitary condition of the toilets is very poor. The following pictures are of different public toilets visited during the visit.

Figure 6: Public toilets in different areas within Chhayanath Rara Municipality.

2.1.6 Risk assessment of spring source contamination from open bottom containment

The risk of drinking water source contamination was assessed based on source of drinking water, secondary data on water quality and the distance and vulnerability of the spring source with regards to spacing between sanitation systems.

The findings revealed that a significant portion, accounting for 63.41% of households, relies on spring sources as their primary drinking water source. Additionally, 21.57% have access to private taps within their homes, while 15.08% depend on public taps for their drinking water supply.

Notably, initiatives such as the Murma WSUC's distribution of drinking water through 77 taps, including those installed in households, schools, health posts, and ward offices, have significantly benefited the community (ward 9). The activities are being done with the support of the USAID Karnali water project. Similarly, other Water Supply and Sanitation Users Committees (WSUCs), such as Gamgadhi WSUC in ward 4, Dum WSUC in ward 5, Bhamwada WSUC in ward 4, Chaina WSUC in ward 2, Shreenagar bus park WSUC in ward 1, and Xatel wada WSUC in ward 4, play active roles in delivering safe drinking water to different households in their respective wards. Moreover, Chhayanath Rara is approaching towards one house one tap with support of different development partners in leadership of the municipality.

The vulnerability of water source contamination is specific to containment type and pollution scenarios (Andreo, 2013). Here, among the various types of onsite sanitation technologies, lined tanks with impermeable walls and open bottom and unlined pits are more prone to contamination. For considering the contamination risk of water source and containment, different water quality test report from sources of water within Chhayanath Rara Municipality was observed and analyzed.

In accordance with the World Health Organization's (WHO) guidelines for drinking water quality, the presence of E. coli serves as an indicator of potential faecal contamination. As per the National Drinking Water Quality Standard of 2022, drinking water should be free of E. coli, indicated by a count of 0 colony-forming units (CFU) per 100 millilitres of water (World Health Organization WHO, 2024). Consequently, the water quality test reports from various WSUCs were analyzed (presented in appendix 5), revealing *E. coli* contamination in some household taps but not in the main sources of drinking water. Thus, a thorough analysis of the risk posed by water distributed by WSUCs, particularly in terms of open-bottom containment systems, was analyzed. Furthermore, the proximity between spring sources and open-bottom containment systems is a critical factor in assessing contamination risk. Springs located above residential areas are deemed to pose a lower risk of contaminating drinking water compared to those situated below residential areas. Following Figure 7 is the picture of the reservoir tank built under the support of USAID.

Consequently, it was estimated that, in terms of groundwater contamination risk, 1% of the population relies on lined tanks (T1A4C10, low risk), 1% of the population relies on lined tanks (T2A4C10, high risk), 63% uses unlined pits (T1A6C10, low risk), and 25% depends on unlined pits (T2A6C10, high risk).

Figure 7: Reservoir tank built by Murma WSUC under USAID project.

2.2 SFD Selection Grid

The SFD selection grid consist of different containment technology used in list A and its connection in list B. Sanitation technologies selected in the SFD grid in Chhayanath Municipality are shown in Figure 8. The vertical column on the left side of the SFD selection grid has a list of technologies to which the toilet is connected to, and households without toilet resorting to open defecation. Similarly, horizontal row at the top of the selection grid shows options for connection made for the outlet or overflow of discharge from the toilet.

Following Figure 8 displays various sanitation technologies used in municipality, their selected outlets in the grid, and the subsequent calculation of the population proportion using each technology in the SFD graphic generation process.

Figure 8 SFD: selection grid for Chhayanath Rara Municipality.

A brief explanation of terms used to indicate different frames selected in the SFD selection grid is explained in Table 4.

Table 4: Explanation of terms used to indicate frame selected in the SFD selection grid.

T1A3C10	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 this system is considered contained.
T1A3C8	This is a well-designed, properly constructed, and well-maintained fully lined tank with impermeable walls and base. Since the tank is equipped with a supernatant/effluent overflow connected to open ground, the excreta in this system are considered not contained.
T1A4C10	A correctly designed, properly constructed and well-maintained lined tank with sealed, impermeable walls and an open, permeable base, through which infiltration can occur. However, since the tank is not fitted with a supernatant/effluent overflow this system is considered contained.
T1A4C8	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 fitted with a supernatant/effluent overflow connected to open ground, the excreta in this system are considered not contained.
T2A4C10	A correctly designed, properly constructed and well-maintained lined tank with sealed, impermeable walls and an open, permeable base, through which infiltration can occur - the excreta is therefore likely to be partially treated. The tank is not fitted with a supernatant/effluent overflow but since there is a 'significant risk' of groundwater pollution this system is considered not contained.

T1A6C10	This is a correctly designed, properly constructed and well-maintained unlined pit with permeable walls and base, through which infiltration can occur. The tank is NOT fitted with a supernatant/effluent overflow, so this system is considered contained.
T2A6C10	This is a correctly designed, properly constructed and well-maintained unlined pit with permeable walls and base, through which infiltration can occur. The tank is NOT fitted with a supernatant/effluent overflow but since there is a 'significant risk' of groundwater pollution this system is considered NOT contained;
T1B11C7 to C9	With no toilet, users defecate in water bodies, on open ground and to don't know where; consequently, the excreta is not contained.

2.3 SFD proportion and matrix

2.3.1 Proportion of faecal sludge from types of sanitation technologies

In the second step of developing SFD graphics, the proportion of faecal sludge (FS) in each type of sanitation technology is calculated. Following detailed instructions in SFD PI, a default "100%" value is applied when onsite containers are connected to soak pits, water bodies, or open ground, representing the entire contents as faecal sludge, with a portion being periodically emptied.

For onsite containers connected to a sewer network or open drains, a "50%" value is used, indicating that half the contents are modeled as faecal sludge, with periodic emptying. The remaining fraction contains faecal sludge in the container and infiltrates (for open-bottomed tanks), while the other half is modeled as supernatant discharging into the sewer network or open drains. The formula for calculating FS proportions is provided below:

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

The calculated FS proportion in each type of sanitation technologies are:

1. The proportion of faecal sludge (FS) in septic tanks is 0% as there are no septic tanks in municipality.
2. The proportion of FS in fully lined tanks is calculated as 100% as there are no connections made to an open drain; the tank maintains a 100% FS proportion.
3. The FS proportion from lined tanks with open bottoms and all types of pits is 100%, as there are no connections of lined tanks with impermeable walls and open bottoms to open drains.

After determining the proportion of faecal sludge (FS) in each type of sanitation technology, the corresponding population proportions from the selected technologies in the SFD selection grids are inputted. Figure 9 illustrates the SFD matrix of the municipality.

Chhayanath Rara, Karnali, Nepal, 23 Nov 2023. SFD Level: 2 - Intermediate SFD
Population: 26723
Proportion of tanks: septic tanks: 0%, fully lined tanks: 100%, lined, open bottom tanks: 10(

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	2.0	0.0	0.0	0.0
T1A3C8 Fully lined tank (sealed) connected to open ground	1.0	0.0	0.0	0.0
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	1.0	18.0	0.0	0.0
T1A4C8 Lined tank with impermeable walls and open bottom, connected to open ground	1.0	0.0	0.0	0.0
T1A6C10 Unlined pit, no outlet or overflow	63.0	22.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	6.0			
T2A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	1.0	0.0	0.0	0.0
T2A6C10 Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	25.0	0.0	0.0	0.0

Figure 9: SFD matrix of Chhayanath Rara Municipality.

2.3.2 Proportion of faecal sludge emptied (F3)

The column labeled "Population (Pop)" in Figure 9 displays the proportion of contents for each type of onsite container (fully lined tanks (sealed), lined tanks with impermeable walls and open bottom, and unlined pit). The variable F3 represents the proportion of contents in each type of onsite container that undergoes at least one emptying after construction. The calculation of the proportion of faecal sludge emptied (F3) is based on the percentage of containment emptied and the amount of faecal sludge (FS) emptied during the process. According to findings from household surveys and key informant interviews (KII-2, 2023), approximately 90% of the FS in the containment is emptied. This is attributed to most containments getting filled and some proportion left while manual emptying. In case, where the faecal sludge is characterized by high thickness and poor water solubility, then certain proportion of FS remains unremoved during emptying. The calculation of the emptied proportion of FS is adjusted accordingly as follows (Table 5):

$$Actual\ Proportion\ of\ FS\ emptied\ (F3) = percentage\ of\ containment\ emptied \times proportion\ of\ FS\ removed\ during\ emptying$$

Table 5: Sanitation technologies and proportion of emptied faecal sludge (ENPHO, 2023[(1)]; KII-2, 2023[(2)]).

SN	Sanitation Technologies	SFD Reference Variable	Percentage of Population	Percentage of Emptied Containment (1)	Emptied Proportion of FS (2)	Actual Proportion of Emptied FS (F3)
1	Lined tank with impermeable walls and open bottom, no outlet or overflow	T1A4C10	2%	20%	90%	18%
2	Unlined Pit, no outlet or overflow	T1A6C10	58%	25%	90%	22%
Source: ENPHO,2023, KII-2						

2.3.3 Proportion of FS emptied which is delivered to treatment Plant (F4 and F5)

Since FS is not delivered to treatment plant, all values of variables F4 and F5 are set to 0%. FS manually emptied is either disposed on farmlands, used as composting, or dig and dump.

2.4 Summary of Assumptions

Onsite Sanitation Systems

- ✓ 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% as there are no connections made to an open drain, as per the guidance provided by SuSanA.

- ✓ Variables F3, F4 and F5 for all onsite sanitation systems were derived from the household survey and cross-checked with KIIs conducted.
- ✓ Since there is no FSTP, all values for variables F4 and F5 were set to 0% for the rest of the sanitation technologies.

2.5 SFD Graphic

Figure 10 presents diagrammatic representations of the shit flow within Chhayanath Rara municipality. The color scheme signifies the nature of sanitation systems, with green indicating safely managed systems and red denoting unsafely managed ones. The diagram reveals that faecal sludge (FS) generated by 52% of the population is safely managed, represented by "Green" arrowheads, indicating FS stored in containment without significant risk to groundwater. Initially, 66% of FS is safely contained, but this proportion drops to 52% when 14% of safely contained FS is emptied. The emptied FS remains safe depending upon the emptying mechanism and available treatment options/facilities. Since there is no mechanical desludging service and 14% emptied FS are not delivered to treatment plant, it becomes unsafely managed.

Conversely, FS from 48% of the population is not safely managed, represented by "Red" arrowheads. This signifies FS that are not safely contained and when disposed in an open environment without treatment, they becomes unsafely managed. The SFD graphic illustrates four different factors across the sanitation value chain, arranged from left to right.

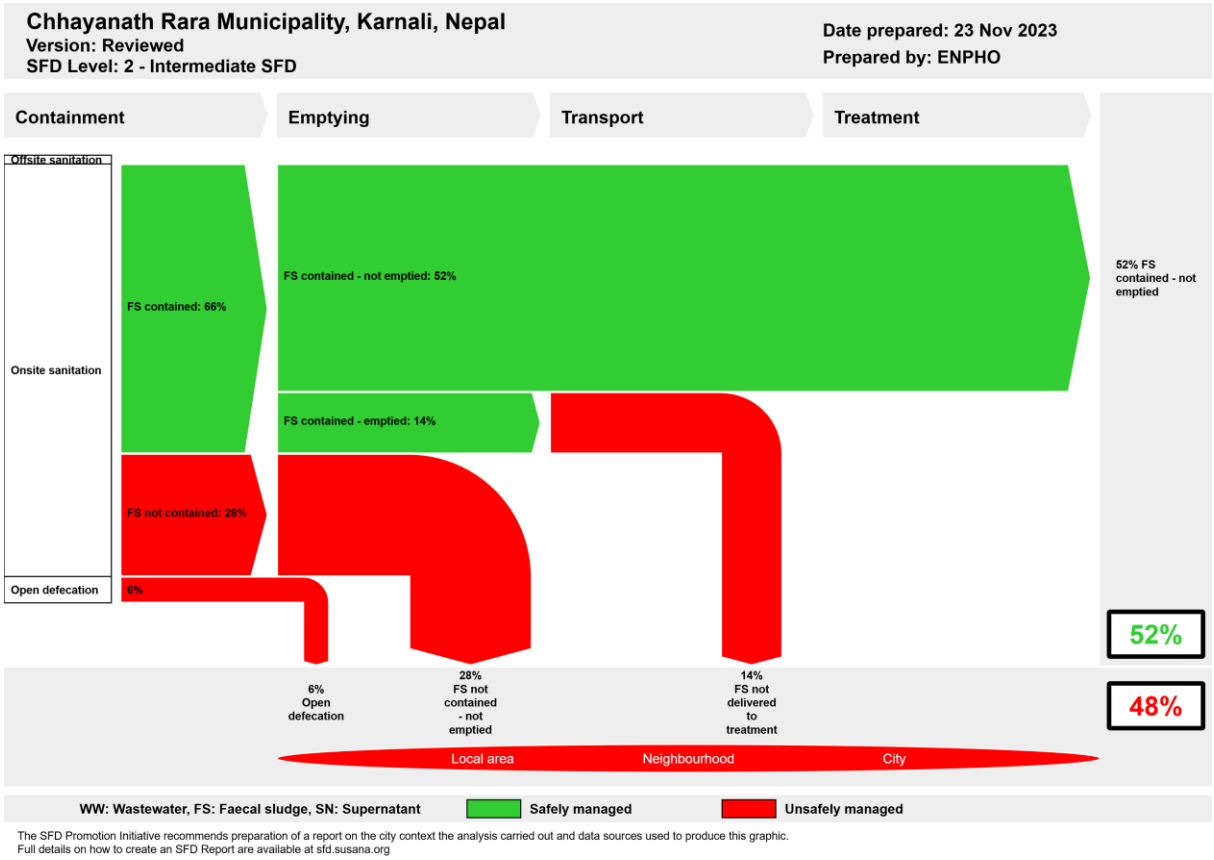

Figure 10: SFD graphic of Chhayanath Rara Municipality.

Onsite Sanitation

All 100% of the population in municipality utilizes onsite sanitation technologies for managing excreta. Among them, faecal sludge (FS) from 66% of the population is appropriately stored in technically effective containment, as depicted by "FS contained" in the SFD graphic. On the other hand, FS from the remaining 28% of the population is stored in unsafe containment, represented as "FS not contained."

FS contained

The term 'FS contained' refers to faecal sludge within an onsite sanitation technology that ensures a safe level of protection from excreta, limiting pathogen transmission to the user or the public. These containment systems, such as tanks or pits, are correctly designed, properly constructed, fully functioning, and pose little to no risk of polluting groundwater used for drinking (Susana, 2018). In the municipality, FS generated by 66% of the population is contained.

The value of FS contained (66%) is derived from the summation of the percentage of the population using the following containment systems: fully lined tank without outlet or overflow (T1A3C10), lined tank with impermeable walls and open bottom without outlet or overflow (T1A4C10), and unlined pit, no outlet or overflow (T1A6C10). This is multiplied by the proportion of FS contained in each specific containment.

FS not Contained

The term 'FS not contained' refers to faecal sludge within an onsite sanitation technology that does not ensure a safe level of protection from excreta, with a likely risk of pathogen transmission to the user or the public. These containment systems, such as tanks or pits, are incorrectly designed, poorly constructed, poorly functioning, and/or pose a 'significant' risk of polluting groundwater used for drinking (Susana, 2018). In the municipality, FS generated by 28% of the population is not contained.

The value of FS not contained (28%) is obtained from the summation of the percentage of the population using the following containment systems: fully lined tank (sealed) connected to an open ground (T1A3C8), lined tank with impermeable walls and open bottom without outlet (T2A4C10) and open ground (T1A4C8), unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution (T2A6C10), and open defecation (T1B11 C7 to C9).

FS contained - not Emptied

It is faecal sludge that is contained within an onsite sanitation technology but not removed may persist within the container or infiltrate into the ground, depending on the type of sanitation technology in use (Susana, 2018). The value of 52% is obtained from the proportion of the population using sanitation systems where the FS is contained and have not emptied their containment. However, this 52% of safely managed FS should be considered as only temporary, as most of the pits and tanks have not yet filled up and the FS generated remains ‘not emptied’. Therefore, these systems will require emptying in the short and medium term as they fill up.

FS not contained - not Emptied

It is faecal sludge that is not contained within an onsite sanitation technology and not removed which may persist within the container or infiltrate into the ground, depending on the type of sanitation technology in use. The value of 28% is obtained from the proportion of the population using sanitation systems where the FS is not contained and has not emptied their containment.

FS contained - emptied

It is faecal sludge which is removed from an onsite sanitation technology where it is contained, practicing manual emptying. The value of 14% is obtained from the proportion of population using sanitation systems where the FS is contained and have emptied their containment.

FS not delivered to treatment

The proportion of FS not delivered to treatment, i.e. 14%, is the summation of FS contained emptied. Chhayanath Rara Municipality don't practice mechanical desludging and those who manually emptied their containment, such FS are not delivered to treatment plant. The emptied FS is disposed of untreated to farmlands. Therefore, this proportion of disposed FS possesses risk to local area and neighbourhood.

Open Defecation

It is a situation where no toilet is in use, and people resort to open defecation in fields, forests, bushes, water bodies, or other open spaces. Despite municipality having ODF free status, 6% of population still defecate openly. Mostly, the households living in poverty and those who do not own land do not have toilets.

3 Service delivery context description.

3.1 Policy, legislation, and regulation

The constitution of Nepal 2015 has established right to access to clean drinking water and citizen as fundamental right. In Article 35 (4) 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 (1) recognizes that every person shall have the right to live in a healthy and clean environment (GoN, 2015). To respect and promote the right of citizens to wards accessing clean drinking water and sanitation services, the government has promulgated and amended necessary laws. The most relevant legislation for the promotion of safe sanitation services is discussed here.

Local Government Operation Act, 2017

The Local Governance Operation Act 2017 has promogulated to implement the rights of local government and promote co-operation, co-existence, and co-ordination among federal, provincial, and local government. The act defined roles and responsibility of municipalities along with provision and procedure for approving laws and regulations at local level. Regarding the management of sanitation, the act entitles local government to conduct awareness campaigns, design and implement sanitation programs at the local level.

Environment Protection Act, 2019

Environment protection act 2019 is promogulated to prevent and control pollution from different development activities. It defines "Pollution" as the activities that significantly degrade, damage the environment, or harm the beneficial or useful purpose of the environment, by changing the environment directly or indirectly because of wastes, chemical, heat, noise, electrical, electro-magnetic wave, or radioactive rays. It provides the mechanism for appointing environmental inspectors to control pollution by federal, provincial, and local government.

Water Supply and Sanitation Act, 2022

The act was promogulated to ensure the fundamental right of citizens to easy access on clean and quality drinking water, sanitation services and management of sewerage and wastewater. It defines sewerage and wastewater management as construction of sewer networks and treatment plants to preserve sources of water. It has entitled federal, provincial, and local level for the operation and management of water and sanitation services. The act also explicitly defines the responsibility of every citizen to preserve, conserve and maintain the sources of water and use responsibly.

Environment Friendly Local Governance Framework 2013

The environment-friendly local governance framework 2013 has been issued to add value to environment-friendly local development concept encouraging environmental protection through local bodies. The framework has set basic and advanced indicators for households, settlement, ward, village, municipality, and district levels for declaration of environment friendly. The use of water sealed toilets in households as basic indicators for sanitation and health. Provision of toilet with safety tank and use as advanced indicators for sanitation. Provision of gender, children and disabled friendly public toilets in parks, petrol pumps and main market as basic indicator for municipal level. Advance indicators such as drainage

discharged only after being processed through biological or engineering technique. While it has failed to identify the necessity of faecal sludge treatment plants as it has assumed safety tanks in the households is sufficient for treating faecal sludge.

Institutional and Regulatory Framework for Faecal Sludge Management, 2017

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. 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 the Water and Sanitation Users Committee (WSUC) in the framework reflects a participatory approach that would help in sustaining the interventions.

Total Sanitation Guideline, 2017

Total Sanitation Guideline was promulgated by the Ministry of Water Supply in April 2017 after the successful implementation of National Sanitation and Hygiene master Plan (NSHMP) 2011. It provides guidelines for sustaining ODF outcomes and initiating post-ODF activities through an integrated water, sanitation and hygiene plan at municipalities and districts. The guideline redefined sanitation as management of services and facilities to safely dispose of/reuse faecal sludge, collection and treatment of solid waste and wastewater to establish a hygienic environment and promote public health. Indicators are set to guide total sanitation movement with an arrangement for resource management, monitoring and evaluation, capacity building.

3.2 Policies

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 to 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, the 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. Both these policies were limited to addressing emerging issues and challenges in the rural and urban areas. Thus, the National Water Supply and Sanitation Policy (NWSSP) was formulated in 2014 by 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 the 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.

Nepal is a signatory of the historical resolution of 2010 United Nations General Assembly on the Human Right to Water and Sanitation. 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 the institutional setup tier of government in a participatory approach. In an alignment total sanitation campaign was initiated formally to sustain ODF. 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 a lack of concrete policies, guidelines, and indicators on faecal sludge management in the sector for effective planning, implementation, and service delivery. Nepal was declared ODF nation on September 23, 2019, (MoWS, 2017) however, the target of 90% households with toilets connected to sewer system or proper FSM is yet to be achieved.

The municipality has made the water, sanitation, and hygiene (WASH) act. The act discussed faecal sludge management by allocating necessary land for desludging facilities and liscencing process for proper regulations and functioning of mechanical desludging vehicle. However, no significant action has been taken till date and is limited to act.

3.3 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 Government

National Planning Commission: At the federal government, the National Planning Commission 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 governments for developing policy plans and implementation.

Ministry of Water Supply: Ministry of Water Supply 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 11.

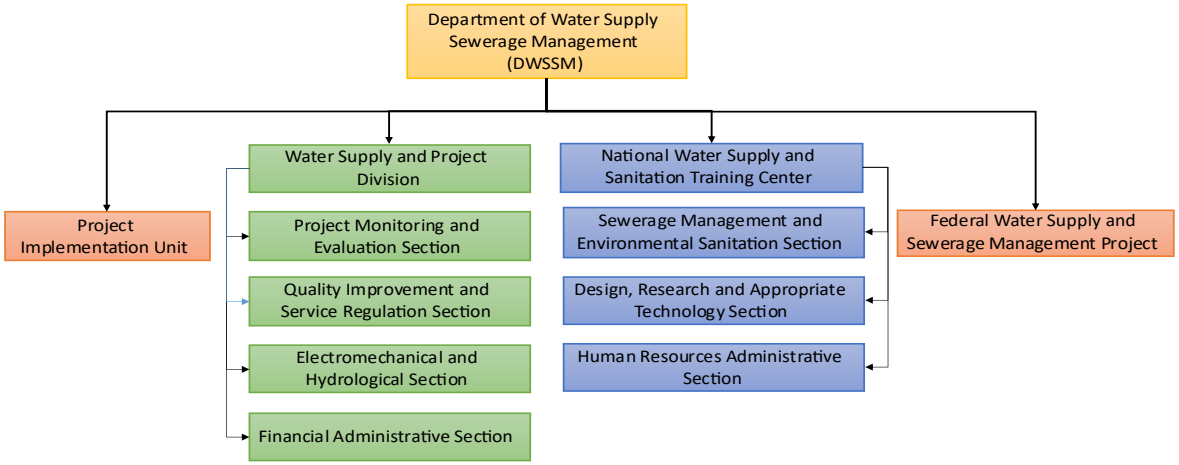

Figure 11: Organizational structure of Department of Water Supply and Sewerage Management.

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

At Provincial Government

Ministry of Water Resources and Energy Development: Ministry of Water Resources and Energy Development of provincial government in Karnali Province is major executing body in the province for planning, developing, and implementing water supply and sanitation programs. Planning and implementation of water supply and sanitation infrastructure in the province is executed through Drinking Water, Irrigation and Energy Development Office (DWIEDO). DWIEDO implements the water and sanitation programs meeting the following criteria:

1. Inter local government projects.
2. 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.

At Local Government

Municipal council: There is no specific sanitation section. However, the sanitation related works are being carried out by designated person as per municipal understanding.

3.4 Service provision

Urban Water Supply and Sanitation Policy 2009 emphasized the Public-Private Partnership (PPP) in water supply and sanitation to improve service delivery (MoPIT, 2009). Also, the Public-Private Partnership Policy, 2015 encourages private sector investment in the development and operation of public infrastructure services for comprehensive socioeconomic development. The policy has aimed to remedy challenges such as structuring of projects, land acquisition, coordination and approval, payments to private sectors and approval for environment impact (MoF, 2015).

The municipality has acknowledged their responsibility for managing the faecal sludge, but necessary action hasn't been taken to manage faecal sludge.

3.5 Service standards

The sanitation service standards have 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 (KIIs)

During the study, Key Informant Interviews (KIIs) were conducted to gather insights from key stakeholders working in the sanitation sector of Chhayanath Rara Municipality. The objective was to obtain a comprehensive understanding of current sanitation service practices. Mr. Bishnu Kumar Vam, Mayor of Chhayanath Rara Municipality, was interviewed specifically regarding sanitation service practices, covering technical, institutional, and financial aspects. Additional interviews were conducted with Mr. Kadak Bahadur Rokaya, WASH focal person of municipality. Similarly, caretakers from public toilets were interviewed to understand the status of public toilets in the municipality (Table 7).

Table 7: List of Key Informant Interviewed personnel.

S.N.	Name	Designation	Organization/ Company	Purpose of KII
1.	Bishnu Kumar Vam (KII-1)	Mayor	Chhayanath Rara Municipality	Sanitation status, Ongoing projects on Sanitation, Policies and plan for Sanitation development
2.	Kadak Bahadur Rokaya (KII-2)	WASH focal person	Chhayanath Rara Municipality	Sanitation status, Ongoing projects on Sanitation, Policies and plan for Sanitation development
3.	Not available (KII-3)	Caretaker	Public toilet	Sanitation status of toilet

4.2 Household survey

Household survey was conducted in all wards of the municipality through mobilization of enumerators selected by the municipality. The enumerators were given two days orientation about sanitation technologies and methods for conducting the household survey. The household survey was conducted using the mobile application “KOBOCOLLECT” after orientation. SFD team member went on field visits in households to encourage enumerators and observe the survey process. The Figure 12 below depicts the enumerators practicing Kobotoolbox in the field.

Figure 12: Enumerators during field practice for survey.

4.2.1 Determining sample size

The number of households to be sampled in the municipality was determined by using Cochran (1963:75) sample size formula $no = \frac{z2pq}{e2}$ and its finite population correction for the proportion $n = n_o/(1 + (n_o-1)/N)$.

Where,

Z	1.96	At the confidence level of 95%
p	0.5	If about 50% of the population have some sanitation characteristics that need to be studied (this was set at 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 sites).
q	1-p	
e	+/-5%	Level of precision or sampling error.
N		A 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 as one stratum. The sample size required in each ward is calculated as $n_h = (N_h/N)*n$, where N_h is a total population in each stratum. Thus, a total of 358 households were sampled from 5,114 households distributed in 14 wards with proportionate stratification random sampling. The household samples surveyed in the municipality is shown in Figure 13.

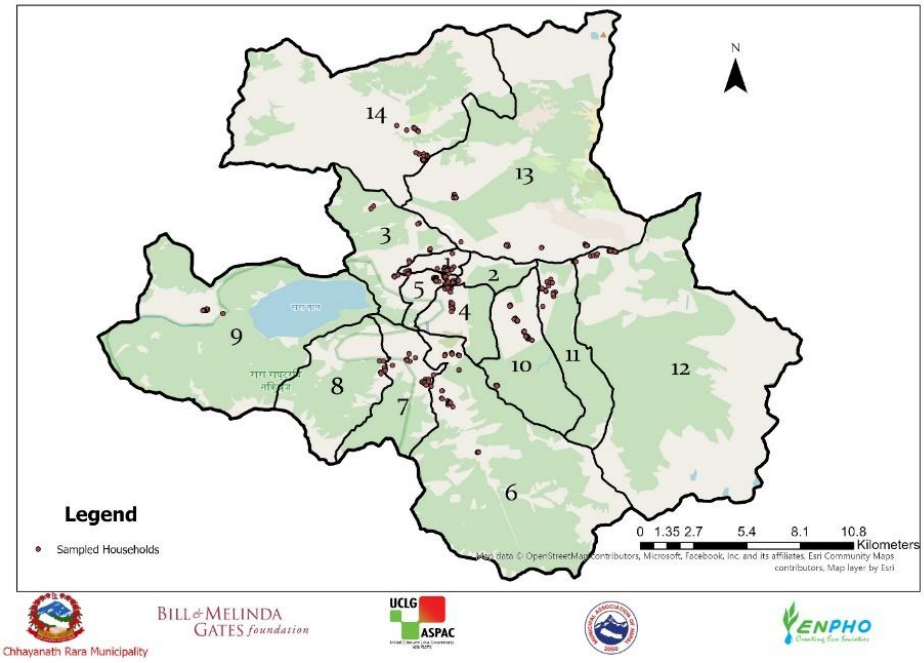

Figure 13: Distribution of sampling points in different wards of Chhayanath Rara Municipality.

4.3 Direct observation

Various sanitation technologies in the households in all the wards were observed and visual references were kept. Also, observation of the water sources, toilets and containments were done during the time of a survey.

4.4 Sharing and validation of data

The Shit Flow Diagram sharing, and validation workshop was conducted in the municipality to share the findings of the sanitation situation survey and receive the suggestion from municipal stakeholders. Altogether, 25 participants including the mayor, deputy mayor, ward chairpersons and other members from the municipal executive council, sectoral staff etc. actively participated in the workshop and provided valuable suggestions. The list of participants with their designation is attached to Appendix 3.

5 Acknowledgements

We would like to acknowledge the organizations involved in the Municipalities Advocacy on Sanitation in South Asia – II (MuNASS-II) project for their collaboration and coordination, namely the United Cities Local Government – Asia Pacific (UCLG ASPAC) as the executing agency and the Municipal Association of Nepal (MuAN) as the implementing agency, for their coordination with the municipality.

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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: List of enumerators in SFD orientation

UCLG ASPAC

ENPHO

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

Attendance Sheet

Program: SFD Orientation for Enumerators
Date: 2080 - 01 - 17, 18
Venue: Hotel Ausha Top Hall, Chhayanath Rara Municipality

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

S.N	Name	Organization	Designation	Phone no	Signature		Age	Ethnicity
					Day 1	Day 2		
1	Lal Bdr Budha	5	Enumerator	9863377[illegible]			25	
2	Teevan Aidi	6	"	9864961[illegible]			26	
3	Jit Jung Shahi	7	"	9864925[illegible]			34	
4	Ram Jung Malla	1	"	9841761389			22	
5	Dilli [illegible]	3	"	9845901074			22	
6	Bindu Laxmi Malla	11	"	9868921800			20	
7	Shanta Bhattacharjee	2	"	9848377611			26	
8	Kishor Sejuwal	4	"	9869834[illegible]			21	
9	Hira Kumary Mokaya	12	"	9840801245			34	
10	Lalu Khadka	13	"	9864800[illegible]			23	
11	Basanta Raj Budha	10	"	9845734731			22	
12	Nanda Lal Rawal	3	"	9868088944			28	
13	Bishnu Laxmi Thapa	14	"	9762760[illegible]			24	
14	Sat. B. Rawal	9	"	9961980287			31	

UCLG ASPAC

ENPHO

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

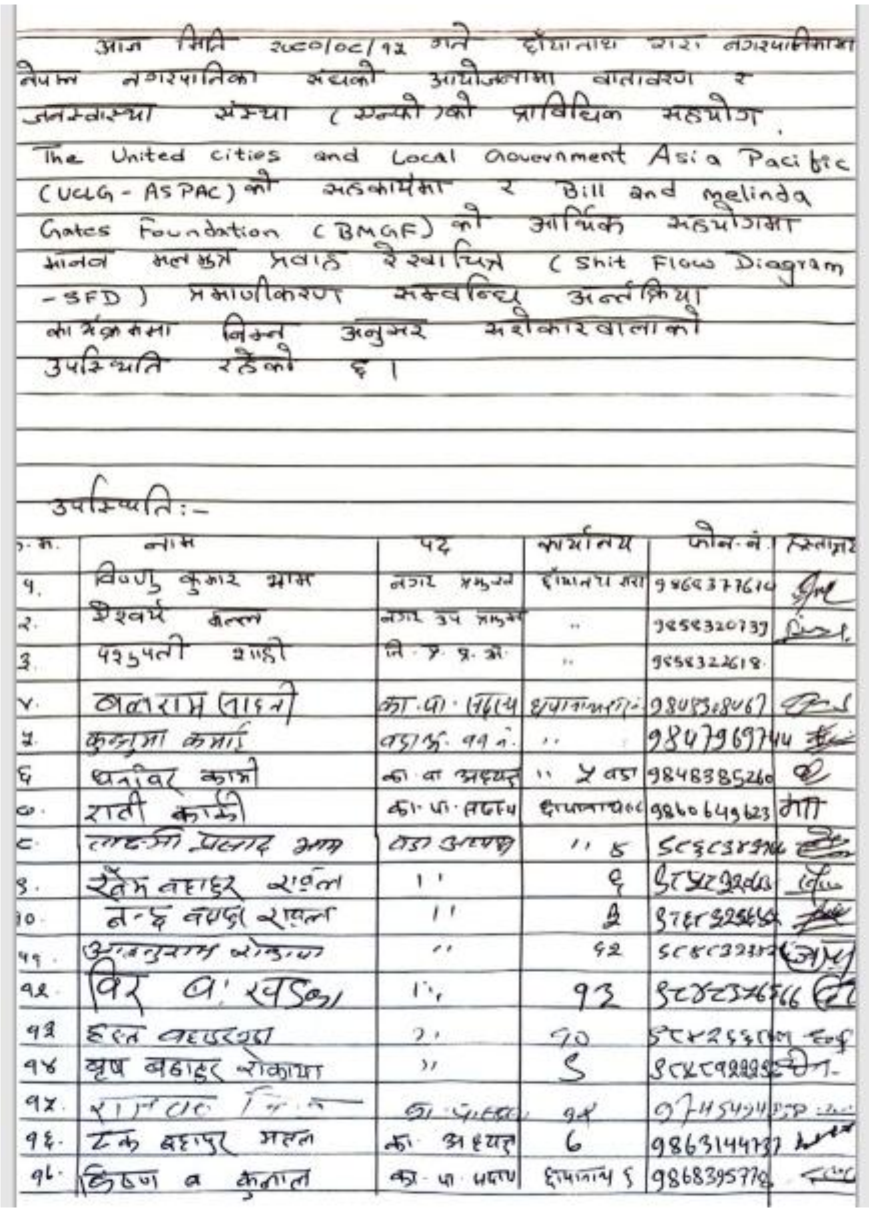
Attendance Sheet

Program: SFD Orientation for Enumerators
Date: 2080-01-17,18
Venue: Hotel Anusha Top Hall, Chayanath Rara Municipality

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

S.N	Name	Organization	Designation	Phone no	Signature		Age	Ethnicity
					Day 1	Day 2		
1	Bishnu Kumar Bhatt	Chhayanath Rara Municipality	Mayor	9863377670				
2	Prem Raj B.C	Chhayanath Rara		9848334620				
3	Hansa Bahadur Rawal	Chhayanath Rara	Mayor	9869961837				
4	Mini Bahadur Budhathoki	Chhayanath Rara		[illegible]				
5	Anita Bhuju	ENPHO	A.P.O.	9849358197				
6	Shreeya Rawal	ENPHO	APO	9845196176				

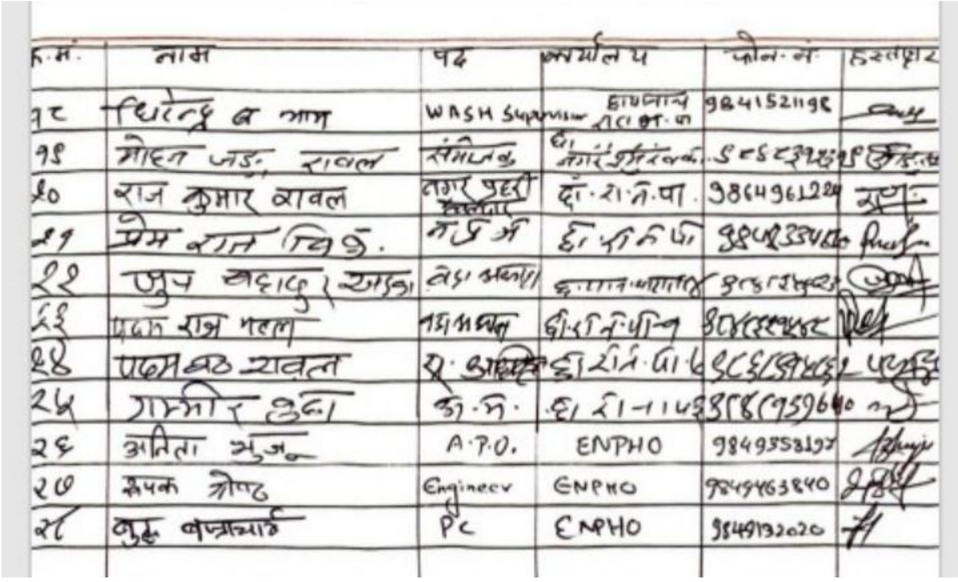
Appendix 3: List of Participants present in Sharing and Validation meeting of SFD



आज मिति २०८०/०८/१५ गते दोधारा चाँदनी नगरपालिकामा नेपाल नगरपालिका संघको आयोजनामा वातावरण र जनस्वास्थ्य संस्था (एन्फो) को प्राविधिक सहयोग, The United cities and Local Government Asia Pacific (UCLG - ASPAC) को सहकार्यमा र Bill and Melinda Gates Foundation (BMGF) को आर्थिक सहयोगमा मानव मलमूत्र प्रवाह रेखाचित्र (Shit Flow Diagram - SFD) प्रमाणीकरण सम्बन्धि अन्तर्क्रिया कार्यक्रममा निम्न अनुसार सहभागीहरुको उपस्थिति रहेको छ।

उपस्थिति:-

क्र.सं.	नाम	पद	कार्यालय	फोन नं.	दस्तखत
१.	विष्णु कुमार भाम	नगर प्रमुख	दोधारा चाँदनी	9868377614	
२.	ऐश्वर्य बल्ला	नगर उप प्रमुख	"	9858320737	
३.	पशुपति शाही	नि. प्र. प्र. अ.	"	9858322618	
४.	बलराम [illegible]	का. पा. सदस्य	दोधारा चाँदनी	9805308067	
५.	कुन्तुमा कमाई	वडा अ. ११ नं.	"	9847969744	
६	धनवीर कामी	वडा अध्यक्ष	" ५ वडा	9848385260	
७.	राती कार्की	का. पा. सदस्य	दोधारा चाँदनी	9860649623	गीता
८.	लक्ष्मी प्रसाद भट्ट	वडा अध्यक्ष	" ८	[illegible]	
९.	रतेन्द्र बहादुर रावल	"	९	[illegible]	
१०.	नन्द बहादुर रावल	"	३	[illegible]	
११.	आनन्दराम [illegible]	"	१२	[illegible]	
१२.	वीर ब. खड्का	"	१३	[illegible]	
१३	हस्त बहादुर [illegible]	"	१०	[illegible]	
१४	वृष बहादुर रोकाया	"	५	[illegible]	
१५.	[illegible]	[illegible]	१४	[illegible]	
१६.	टेक बहादुर मल्ल	का. अध्यक्ष	६	9863144737	
१७.	[illegible]	का. पा. सदस्य	दोधारा ९	9868395770	



क्र.सं.	नाम	पद	कार्यालय	फोन नं.	हस्ताक्षर
१८	धिरेन्द्र [illegible]	WASH Supervisor	[illegible]	9841521198	
१९	मोहन जङ् रावल	संयोजक	दा. नगर [illegible]	[illegible]	
२०	राज कुमार रावल	नगर प्रहरी [illegible]	दा.रा.न.पा.	986496129[illegible]	
२१	प्रेम राज [illegible]	[illegible]	[illegible]	[illegible]	
२२	[illegible] बहादुर [illegible]	[illegible]	[illegible]	[illegible]	
२३	[illegible] राज [illegible]	[illegible]	[illegible]	[illegible]	
२४	[illegible] रावल	[illegible]	[illegible]	[illegible]	
२५	[illegible]	[illegible]	[illegible]	[illegible]	
२६	अनिता [illegible]	A.P.O.	ENPHO	9849358197	
२७	रूपक [illegible]	Engineer	ENPHO	9849463840	
२८	[illegible] वज्राचार्य	PC	ENPHO	9849132020	

Appendix 4: Glimpses of the program

Appendix 5: Water Quality Test Report

फारम नं. १

यानीय तह/खानेपानी योजनामा रहेका पानी परीक्षण उपकरणहरूको प्रयोगबाट गरिएको पानी परीक्षणको प्रतिवेदन फाराम

उँ/नगरपालिकाको नाम : धायानाथ रा.न.पा. वडा ५ मिति : २०८०।९।२

नेपानी प्रणालि/सेवा ग्राहीको नाम : हैम खानेपानी उ.स.

नं.	मिति	नमुना लिएको स्थान	परीक्षण गरिएका पारमितिहरू/खानेपानी गुणस्तर मापदण्ड					कैफियत
			धमिलोपन/ ५(१०) NTU	pH/ ६.५-८.५	विद्युतिय संवाहता (Electrical Conductivity)/ 1500µS/cm	क्लोरिन अवशेष /०.१-०.२ मि.ग्रा./लिटर	ई.कोली/ ० CFU/१०० मि.लि.	
१	२०८०।९।२	मेनलाइन	-५	–	–	–	०	[illegible]
२	,,	धारा	-५	–	–	–	०	[illegible]
३	,,	धारा	-५	–	–	–	०	[illegible]
४	,,	धारा	-५	–	–	–	०	[illegible]
५	,,	धारा	-५	–	–	–	०	[illegible]
६	,,	धारा	-५	–	–	–	०	[illegible]
७	,,	धारा	-५	–	–	–	०	[illegible]
८	,,	धारा	-५	–	–	–	९	[illegible]
९	,,	धारा	-५	–	–	–	२	[illegible]
१०	,,	धारा	-५	–	–	–	[illegible]	[illegible]
११								

परीक्षण गर्ने .... जाँच गर्ने .... प्रमाणित गर्ने

फारम नं. १

यानीय तह/खानेपानी योजनामा रहेका पानी परीक्षण उपकरणहरूको प्रयोगबाट गरिएको पानी परीक्षणको प्रतिवेदन फाराम

उँ/नगरपालिकाको नाम : धायानाथ रा.न.पा. वडा ४ मिति : २०८०।९।४

नेपानी प्रणालि/सेवा ग्राहीको नाम : आम्खडा खानेपानी उ.स.

नं.	मिति	नमुना लिएको स्थान	परीक्षण गरिएका पारमितिहरू/खानेपानी गुणस्तर मापदण्ड					कैफियत
			धमिलोपन/ ५(१०) NTU	pH/ ६.५-८.५	विद्युतिय संवाहता (Electrical Conductivity)/ 1500µS/cm	क्लोरिन अवशेष /०.१-०.२ मि.ग्रा./लिटर	ई.कोली/ ० CFU/१०० मि.लि.	
१	२०८०।९।४	धारा	-५	–	–	–	०	[illegible]
२	,,	धारा	-५	–	–	–	०	[illegible]
३	,,	धारा	-५	–	–	–	०	[illegible]
४	,,	धारा	-५	–	–	–	०	[illegible]
५	,,	धारा	-५	–	–	–	०	[illegible]
६	,,	धारा	-५	–	–	–	०	[illegible]
७	,,	धारा	-५	०	–	–	०	[illegible]
८	,,	धारा	-५	०	–	–	०	[illegible]
९	,,	धारा	-५	०	–	–	३	[illegible]
१०	,,	मेनलाइन	-५	०	–	–	०	मेनलाइन
११								

परीक्षण गर्ने .... जाँच गर्ने .... प्रमाणित गर्ने

SFD Chhayanath Rara Municipality, Nepal, 2025

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This Executive Summary and the SFD Report are available from: www.sfd.susana.org

SFD Promotion Initiative