SFD Report

Jayaprithvi Municipality
Nepal

Final Report

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

Date of production: 29/11/2022
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SFD Report Jayaprithvi Municipality, Nepal, 2023

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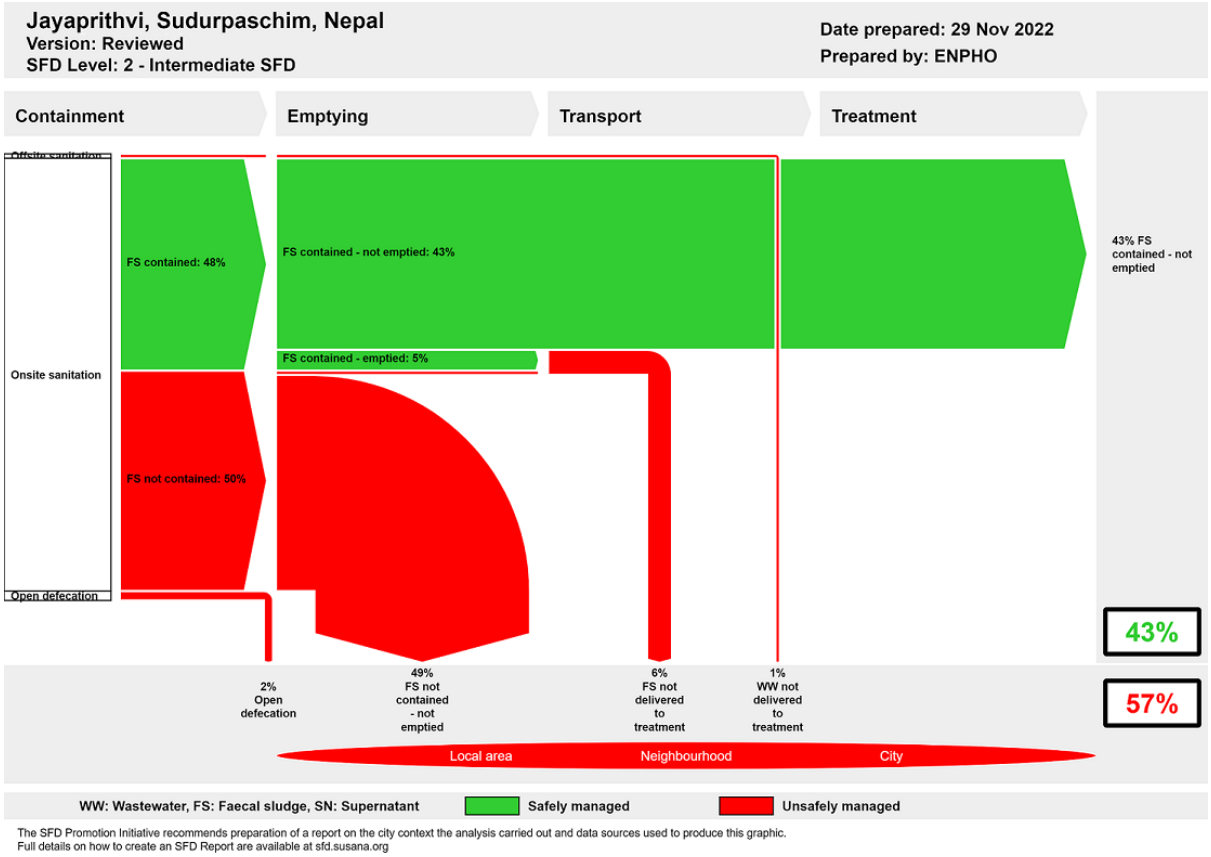
1. The SFD Graphic



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:

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

Status:

Final SFD report.

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3. General city information

Jayaprithvi Municipality is situated in the hilly region of the southeast of Bajhang District, which is situated in the northern region of Nepal's far western. The former Rithapata, Chainpur, Hemantabada, Luyanta, and Subeda Village Development Committees were merged to form this municipality on 10th March 2017. The municipality is divided into eleven political wards.

The municipality has a total of 28,865 population with 14,549 males and 14,316 females (Jaya Prithvi Municipality, 2020). Out of the total wards, ward number 11 has the largest population (4,548), while ward number 2 has the least number of population with 1,248. Jayaprithvi has a total of 4,733 households. Ward number 7 has the greatest number of households with a total of 732, while ward number 2 has the least number of households with a total of 183.

Both tropical and temperate climates are present in the Municipality(Municipality, Municipal Profile, 2020).

4. Service outcomes

The overview of different sanitation technologies across the sanitation value chain in the municipality is briefly explained in this section. Basic sanitation coverage in the municipality is 97.92%. The families without toilet defecate in open places or use neighbour's toilet.

Containment: A sort of onsite sanitation system is connected to the toilet in 99.69% of houses with the user interface. The remaining 0.31% of households have an offsite sanitation system that directly connects their toilet to either water sources or open drainage. The mostly used onsite sanitation system by the households in the municipality is an unlined pit (97.55%) followed by a lined tank with semi-permeable walls and open bottom (1.50%), A lined tank with impermeable walls and open bottom is used by 0.61% and households using a fully lined tank is 0.30%.

Emptying and Transportation: There is no regular emptying practices of the containments. Only 6.71% of the households had emptied the containment at least once since installation, and all households emptied their containments manually because there is no mechanized emptying service in the municipality.

Treatment and Disposal: The municipality lacks a faecal sludge treatment facility. The majority of Faecal Sludge (FS) emptied is mainly used in agricultural land as soil improver.

The SFD graphic shows that 43% of the excreta generated are safely managed while 57% of the excreta generated are unsafely managed. Importantly, the safely managed percentage of FS generated by 43% of the population is temporary until the tanks and pits become full and FS from the containment is emptied.

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 already passed the Water Supply and Sanitation Law 2018 which has emphasized on a right to quality sanitation services and prohibited direct discharge of wastewater and sewage into water bodies or public places which has been published in Nepal Gazette.

Several policies have been in places to accomplish the sanitation need of people. Particularly, 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 into sanitation campaign. The document adopted sanitation facilities as improved, basic and limited in line with WHO/UNICEF guideline. The sanitation campaign throughout the country focused to achieve universal access to improved sanitation.

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.

6. Overview of stakeholders

The major stakeholders envisioned by the regulatory framework for Faecal Sludge Management (FSM) in urban cities is presented in Table 1.

Table 1: Overview of Stakeholders.

Key Stakeholders	Institutions / Organizations
Public Institutions at Local Government	Jayaprithvi Municipality
Public Institutions at Local Government	Urban Water Supply and Sanitation Sector Project (UWSSP)

	Water Supply and Sanitation Division Office (WSSDO) Department of Water Supply and Sewerage Management (DWSSM), Bajhang Branch
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, 337 households and 61 institutions were surveyed from 11 wards of Jayaprithvi Municipality. Primary data on emptying, transportation and current sanitation practices in the municipality were triangulated with the data obtained from Key Informant Interviews (KIIs) with Municipal Officers, Operators of public toilet, and the sanitation and environmental section. Also, a data sharing and validation workshop with key stakeholders was performed.

8. Process of SFD development

Data on sanitation situation were collected through household and institutional survey. 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 the survey. Along with this, KIIs were conducted with officers and the engineer of the municipality and the Department of Water Supply and Sewerage Management, Bajhang Branch. The types of sanitation technologies used in various locations were mapped using ARCGIS. For the SFD graphic production, initially a relationship between the sanitation technology used in the 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:

- MoFAGA. (2017). Ministry of Federal Affairs & General Administration. Retrieved from Government of Nepal, Ministry of Federal Affairs & General Administration: https://www.sthaniya.gov.np/gis/
- MoH, N. N. (2017). Nepal Demographic and Health Survey 2016. Ramshah Path, Kathmandu, Nepal: Ministry of Health.
- Municipality (2020). Municipal profile.

SFD Jayaprithvi Municipality, Nepal, 2023

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Abbreviations

CAO	Chief Administrative Officer
DUDBC	Department of Urban Development and Building Construction
ENPHO	Environment and Public Health Organization
FS	Faecal Sludge
FSM	Faecal Sludge Management
GoN	Government of Nepal
HH	Household
IRF	Institutional and Regulatory Framework
JMP	Joint Monitoring Programme
KII	Key Informant Interview
Km	Kilometre
MDG	Millennium Development Goal
mm	Millimetre
MoEST	Ministry of Education, Science and Technology
MoFAGA	Ministry of Federal Affairs and General Assembly
MoH	Ministry of Health
MoHP	Ministry of Health and Population
MoUD	Ministry of Urban Development
MoWS	Ministry of Water Supply
MTEF	Medium Term Expenditure Framework
MuAN	Municipal Association of Nepal
NPC	National Planning Commission
NUWSSP	National Urban Water Supply and Sanitation Sector Policy
NWSSP	National Water Supply and Sanitation Policy
ODF	Open Defecation Free
PPP	Public Private Partnership
RWSSNP	Rural Water Supply and Sanitation National Policy
SDG	Sustainable Development Goal
SDP	Sector Development Plan
SFD	Shit Flow Diagram
SFD PI	Shit Flow Diagram Promotion Initiative
UCLG ASPAC	United Cities and Local Governments Asia Pacific
UNICEF	United Nations Children's Education Fund
VDC	Village Development Committee
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WSUC	Water Supply and Users Committee
WW	Wastewater

1 City context

Jayaprithvi Municipality lies in Bajhang district of Sudurpaschim Province in Nepal. The Municipality has a total of 11 political wards boundary, which are dispersed across 167 square kilometres area with a population density of 172.84 per km. The district is surrounded by Samastha Village Development Committee (VDC) and Bajura District in the East, Chhabipathibhera VDC and Surma VDC in the West, Talkot village and Kada village in the North and Khaptad Chhanna VDC and Chhavispathibhera VDC in the South. The municipality is also a district headquarters of Bajhang District in Sudurpaschim Province. (Jaya Prithvi Municipality, 2020). Figure 1 Shows the geo-political map of Jayaprithvi Municipality.

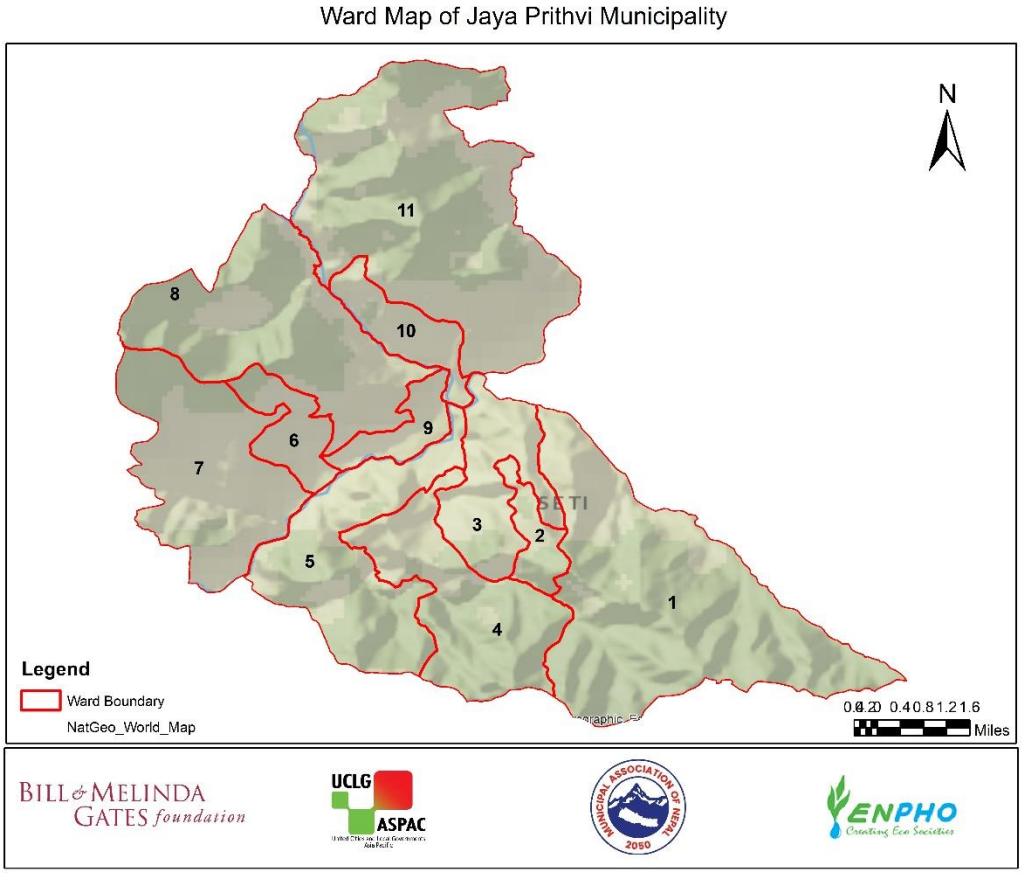

Figure 1: Map of Jayaprithvi Municipality with ward boundaries.

1.1 Population

There are 28,865 people living in Jayaprithvi Municipality, with 14,549 men and 14,316 women (Municipality, Municipal Profile, 2020). Out of all the wards, ward number 11 has the most residents (4,548), while ward number 2 has the fewest (1,248). The number of households in Jayaprithvi Municipality is 29,143. With a total of 4,733 households, ward 7 has the most, while ward 2 has the fewest, with a total of 183 households. Table 1 shows the total population and households in each ward (Municipality, Municipal Profile, 2020).

Table 1: Ward Wise Household and Population Data.

Ward No.	Households No.	Male	Female	Total Population	Family Size
1	620	1,435	1,351	2,786	4.5
2	183	619	629	1,248	6.8
3	493	1,517	1,493	3,010	6.1
4	244	846	827	1,673	6.9
5	427	1,351	1,286	2,637	6.2
6	368	1,185	1,192	2,377	6.5
7	732	2,255	2,201	4,456	6.1
8	320	1,091	1,075	2,166	6.8
9	253	716	771	1,487	5.9
10	410	1,241	1,236	2,477	6
11	683	2,293	2,255	4,548	6.7
Total	**4,733**	**14,549**	**14,316**	**28,865**	**6.2**
(Municipality, Municipal Profile, 2020)					

1.2 Climate

Both tropical and temperate climates are present in the Municipality. Winter temperatures range from 0°C to 23 °C, while summer temperatures can get as high as 32 °C (Municipality, Municipal Profile, 2020). Bajhang district typically receives about 175.6 millimetres (6.91 inches) of precipitation and has 149.69 rainy days (41.01% of the time) annually (Climate, 2022).

1.3 Topography

This municipality's terrain is characterized by steep hills, largely agricultural land and, in certain locations, hard rock and forest. White clay soil and silty soil are also present in some locations, demonstrating the variability of the soil's fertility.

The Municipality lies at 29º28’55” to 29º38’04” N latitude, 81º10’59” to 81º13’45” E longitude and altitude of 3,307ft (1,007.9 m) to 11,779 ft (3,590.2 m) above sea level (Municipality, Municipal Profile, 2020).

2 Service Outcomes

2.1 Overview

2.1.1 Sanitation Status

The Municipality has been declared as an Open Defecation Free (ODF) zone in 2015. This suggests that everyone has access to basic sanitation facilities. However, data showed that the municipality's basic sanitation coverage is only 97.92%, and the remaining households still defecate outside in the vicinity of forests and other open spaces.

Offsite sanitation refers to a sanitation system in which excreta (referred to as wastewater) is collected and transported away from the plot where they are generated. An offsite sanitation system relies on a sewer technology for transport (SuSanA, 2018) whereas onsite sanitation refers to a sanitation technology or sanitation system in which excreta (referred to as faecal sludge) is collected and stored and emptied from or treated on the plot where they are generated (SuSanA, 2018). Figure 2 shows the types of sanitation system in the municipality.

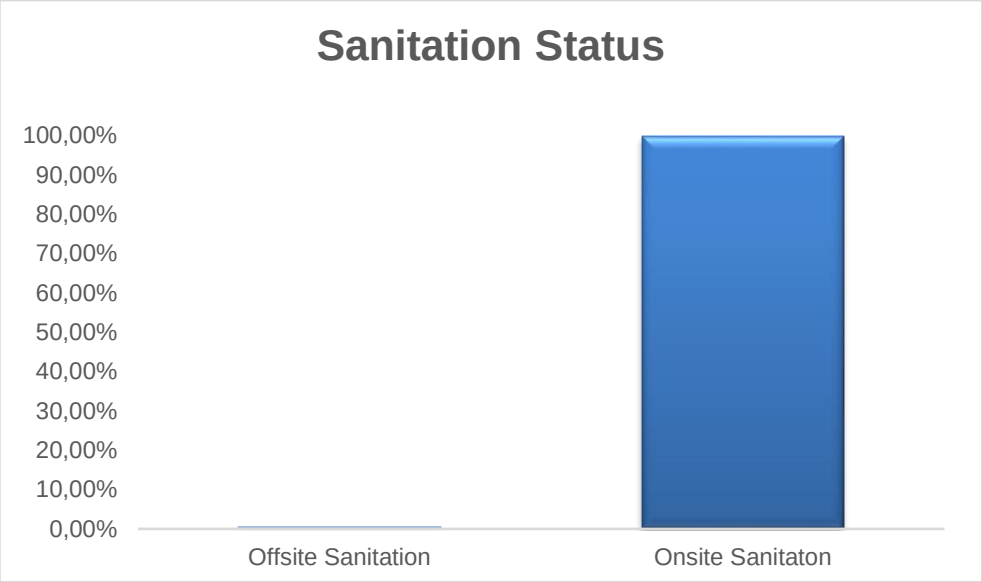

Figure 2: Household sanitation status of Jayaprithvi Municipality.

Onsite sanitation systems are prevalent in the municipality. 99.69% of households rely on onsite sanitation technologies in the municipality. Although there is lack of a sewerage network, 0.31% of the households have connected their toilet to open drain and water bodies near their houses (Figure 2).

2.1.2 Types of Containment

0.31% of households in Jayaprithvi Municipality having onsite sanitation technology use fully lined tanks in their houses. A fully lined tank is a rectangular onsite sanitation technology which is used to safely store faecal sludge. There is no outlet or overflow to discharge the effluent. The walls and bottom of tank are totally lined and sealed. 0.61% of households in the municipality have built lined tanks with impermeable walls and open bottom, which are

rectangular onsite technologies where the walls of the tank are lined and the bottom of the tank is not lined and allows infiltration of effluents. Lined pits with semi-permeable walls and open bottom are used by 1.52% of the households.

An unlined pit is a containment constructed with mud mortar stone or brick wall or dry-stone walls and open bottom or could be of no lining. An unlined pit with dry stone wall is popular in the rural areas of the municipality. 97.56% of households in the municipality use such type of pit. Figure 3 shows the percentage of households with different types of containments in the municipality.

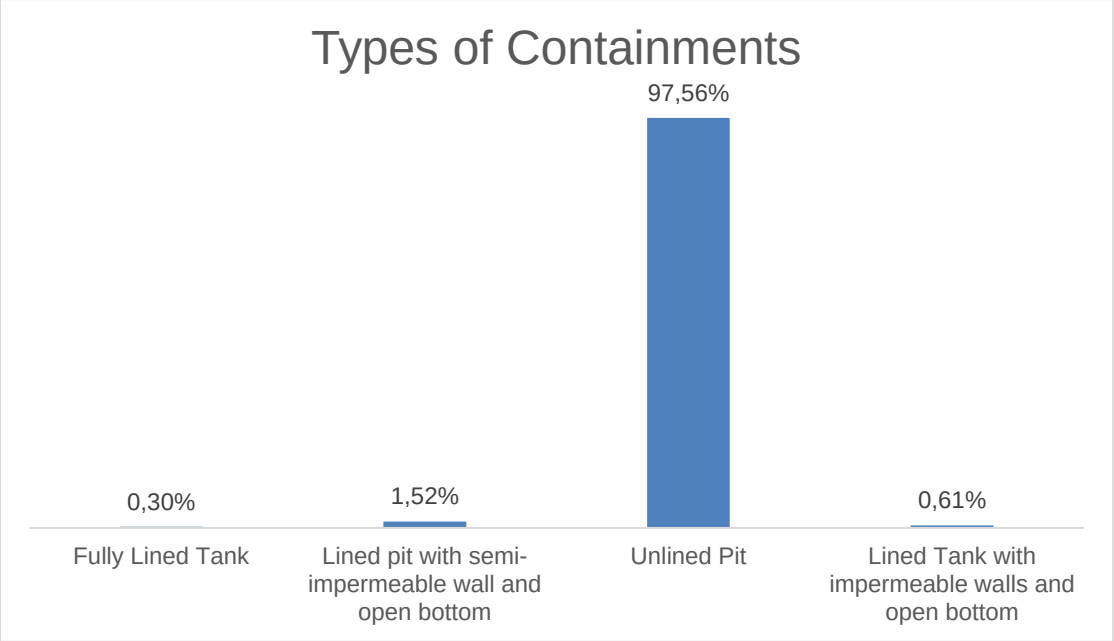

Figure 3 : Types and percentage of onsite sanitation system at households of Jayaprithvi Municipality.

Figure 4 shows the distribution of various types of sanitation technologies in different wards of Jayaprithvi Municipality.

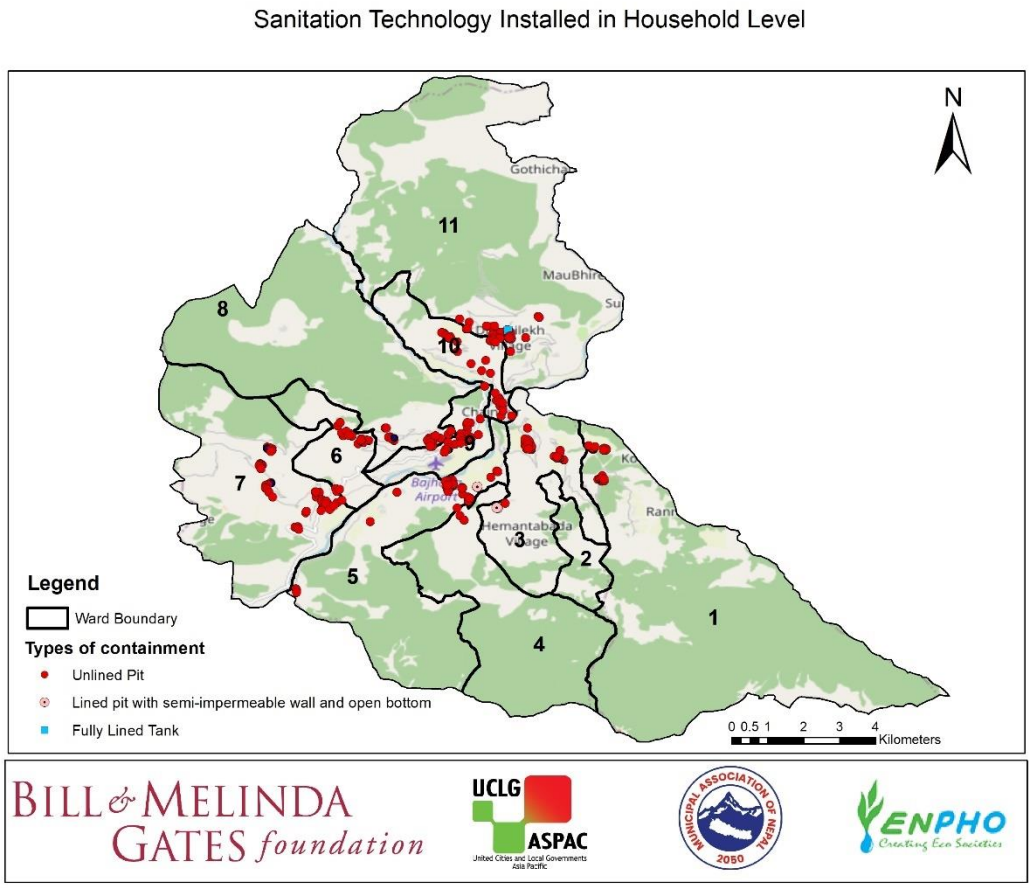

Figure 4: Sanitation Technologies installed in household levels.

2.1.3 Emptying of Faecal Sludge

Emptying is one of the major components of the sanitation value chain. It ensures proper functioning of containment basically for septic tanks which functioned well until the volume of sludge is one-third of the total column of the tank. Also, in other containments, regular emptying prevents overflow of the sludge and blockages (Linda Strande, 2014). Figure 5 represents the map of Jayaprithvi Municipality showing the status of the sanitation technology that has been emptied at least once.

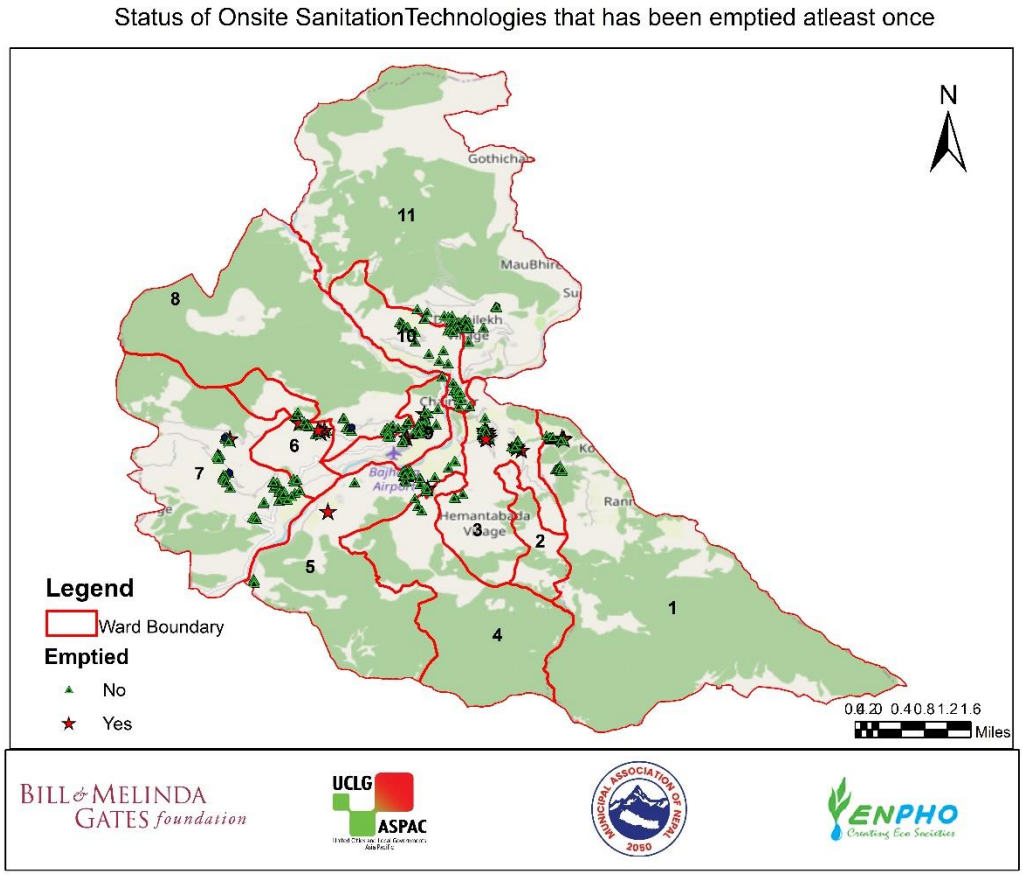

Figure 5: Status of households which have emptied their containment at least once.

Only 6.71% of Households (HHs) have emptied the containment at least once since installation, out of which all containments were emptied manually as there is no mechanical emptying services. Thus, 93.29% of HHs have not emptied their containment as it has not been filled yet.

2.1.4 Treatment and Disposal/Reuse

Jayaprithvi Municipality does not have any form of the treatment plant for faecal sludge. The majority of Faecal Sludge (FS) emptied is applied in farmlands and a few percentage of FS emptied is disposed nearby water bodies, in both cases without any treatment at all. A few households in the municipality have an illegal connection of their toilet to an open drainage.

Figure 6 shows the percentage of perception of people residing in the Municipality about disposal of FS after the onsite sanitation system is emptied. Application in farms is the most practised way for disposal of FS.

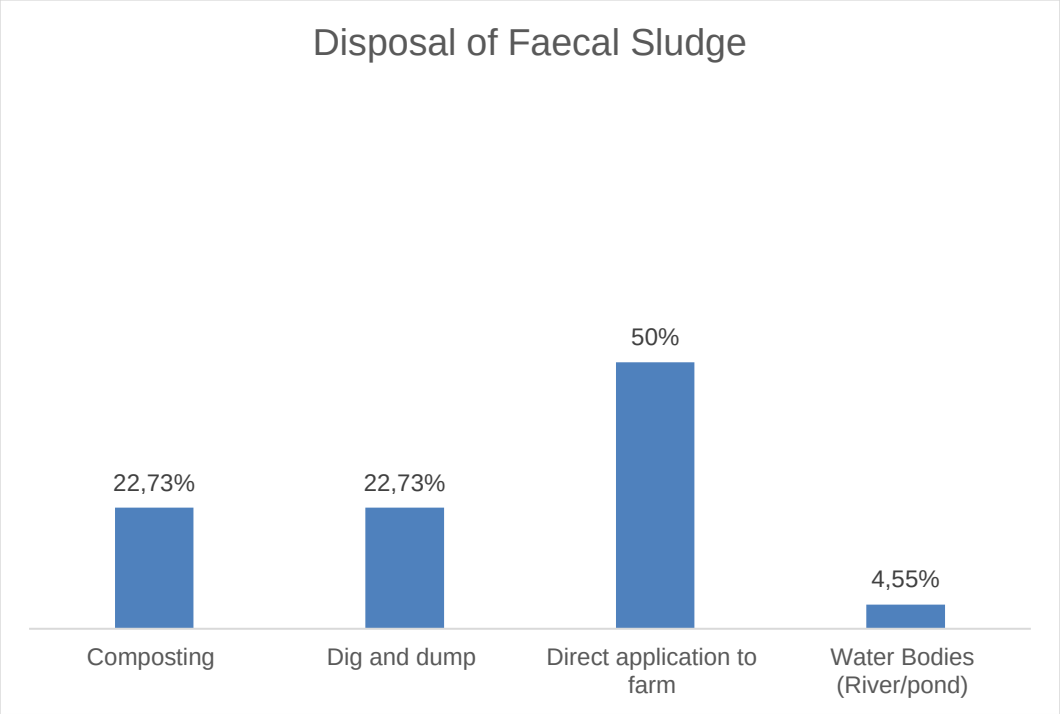

Figure 6: Disposal of Manually Emptied Faecal Sludge.

2.1.5 Institutional Level Sanitation System

Altogether 61 institutions from commercial buildings, educational institutions, governmental and non-governmental offices, health care centres, home stay and hotels were assessed randomly. It was revealed that 98% of such buildings has connected their toilet to onsite sanitation technologies. The percentages of types of onsite sanitation technologies in these buildings are shown in Figure 7.

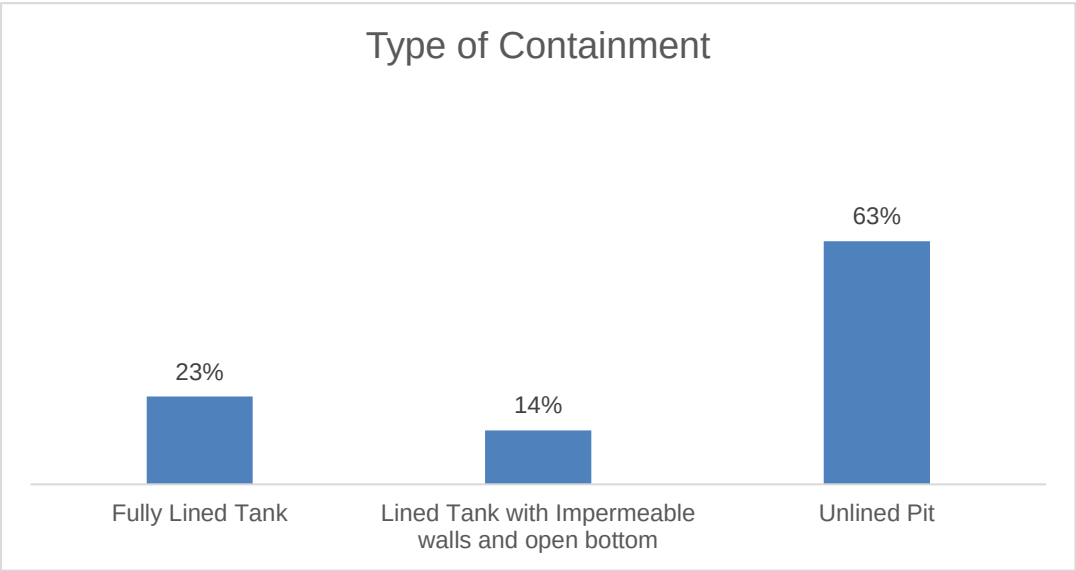

Figure 7: Types of containment in institutions of Jayaprithvi Municipality.

Only 10.17% of institutions in Jayaprithvi Municipality have emptied their containments and 89.93% of institutions have not emptied them because they were never filled. The distribution of different types of onsite sanitation technologies of institutions in various wards of Jayaprithvi Municipality is shown in Figure 8.

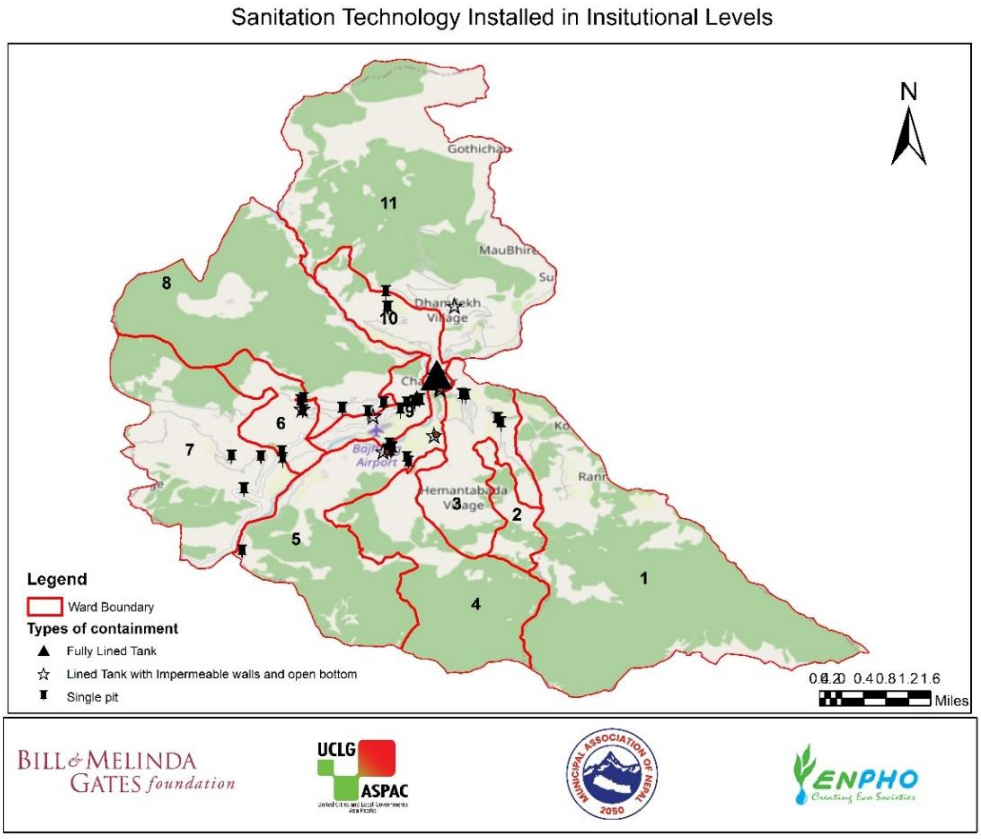

Figure 8: Types of onsite sanitation systems in institutions of Jayaprithvi Municipality.

2.1.6 Public Toilets

Jayaprithvi Municipality has three public toilets, one is within the premises of the hospital area which is operated and maintained by the hospital whereas two other public toilet facilities are located on the side of highway and near a playground area. The public toilets in the highway and near the playground area are not managed properly. No operators are appointed for daily operation and maintenance. The systems have not been operated in a while due to lack of proper operation and maintenance (KII, 2022). Figure 9 displays one of these public toilets in the Municipality.

Figure 9: Public Toilet at Jayaprithvi Municipality.

2.2 SFD Selection Grid

The types of sanitation technologies selected in the SFD selection grid in the municipality are shown in Figure 10. The vertical column in the left side of the SFD selection grid has a list of technologies to which the toilet is connected to and open defecation in case of households without toilet. Similarly, horizontal row at the top of the selection grid shows options for connection for outlet or overflow discharge from toilet.

Thus, different types of sanitation systems and their outlet are selected in the selection grid and the proportion of the population using such types of systems is calculated in the SFD graphic generation process.

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		T1A1C7			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					T2A4C10 T1A4C10
Lined pit with semi-permeable walls and open bottom	Not Applicable									T2A5C10 T1A5C10
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 10: SFD selection grid for Jayaprithvi Municipality.

A brief explanation of terms used to indicate different frame selected in the SFD selection grid in Figure 10 is explained in Table 2.

Table 2: Explanation of terms used to indicate different frame selected in the SFD selection grid in Figure 9.

T1A1C7	A fully functioning toilet discharging directly to a water body. All the excreta in this system are considered not contained.
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.
T2A4C10 (High Risk)	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.
T1A4C10 (Low Risk)	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.
T2A5C10 (High Risk)	A correctly designed, properly constructed and well-maintained pit with semi-permeable, honeycombed lined walls and an open, permeable 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.
T1A5C10 (Low Risk)	A correctly designed, properly constructed and well-maintained pit with semi-permeable, honeycombed lined walls and an open, permeable base, through which infiltration can occur. The tank is not fitted with a supernatant/effluent overflow, so this system is considered contained.
T2A6C10 (High Risk)	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.
T1A6C10 (Low Risk)	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.
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.

2.2.1 SFD Matrix

SFD matrix is the second step to generate an SFD graphic. The SFD matrix calculates the proportion of people using each type of system and the proportion of each system from which FS and supernatant is emptied, transported and treated. A detailed instruction on how to calculate SFD proportion in SFD PI was used as guide to calculate the proportion of the contents of each type of onsite container which is faecal sludge.

As stated on SFD PI, the default "100%" value is used for onsite containers which are connected to soak pits, 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.

The value for onsite containers that are connected to a sewer network or to open drains is used as "50%" which means half of the contents are modelled FS and 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 obtained from SFD PI used for FS proportion calculation is shown below:

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

Here, data for each selected sanitation system on the SFD Matrix is entered. The proportion of the contents of each type of onsite container (either septic tanks; or fully lined tanks (sealed); or lined tanks with impermeable walls and open bottom and all types of pits), is shown in column Population (Pop) of Figure 11.

Since the Municipality does not have proper sewer networks or a wastewater treatment plant, the proportion of wastewater delivered to the treatment plant is 0%. Similarly, the proportion of FS emptied and delivered to treatment and then to a treatment plant afterwards is shown in column F4 and F5, respectively(Susana, 2018). Figure 11 shows the SFD matrix of Jayaprithvi Municipality.

Jayaprithvi, Sudurpaschim, Nepal, 29 Nov 2022. SFD Level: 2 - Intermediate SFD
Population: 28865
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 1

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
T1A1C7 Toilet discharges directly to water body	0.3			
T1A3C10 Fully lined tank (sealed), no outlet or overflow	0.3	0.0	0.0	0.0
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	0.3	0.0	0.0	0.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	0.3	0.0	0.0	0.0
T1A6C10 Unlined pit, no outlet or overflow	47.0	10.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	2.1			
T2A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	0.3	0.0	0.0	0.0
T2A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	1.2	0.0	0.0	0.0
T2A6C10 Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	48.2	2.0	0.0	0.0

Figure 11: SFD Matrix of Jayaprithvi Municipality.

2.2.2 SFD Matrix Explanation

The sanitation technologies and the corresponding percentage of the population using such technologies are shown in Table 3.

Table 3: Sanitation technologies with SFD reference variable and percentage of the population using each type.

SN	Sanitation Technologies	SFD Reference Variable	Percentage of Population
1	User interface discharges directly to water body	T1A1C7	0.3%
2	Fully lined tank (sealed), no outlet or overflow	T1A3C10	0.3%
3	Lined tank with impermeable walls and open bottom, no outlet or overflow	T1A4C10	0.3%
4	Lined pit with semi-permeable walls and open bottom, no outlet or overflow	T1A5C10	0.3%
5	Unlined pit, no outlet or overflow	T1A6C10	47.0%
6	Open defecation	T1B11 C7 TO C9	2.1%
7	Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	T2A4C10	0.3%
8	Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	T2A5C10	1.2%
9	Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	T2A6C10	48.2%

2.2.3 Risk of Groundwater Pollution

The risk of groundwater pollution is assessed according to the following criteria.

Source of Drinking water and water production

There are 68 water sources listed out of which 65 of them were in use. Table 4 shows the ward wise numbers of water sources of Jayaprithvi Municipality (Jaya Prithvi Municipality, 2020).

Table 4: Ward wise water source data of Jayaprithvi Municipality.

Ward No.	Nos. of Water Sources	In use	Usage percentage
1	4	3	75%
2	3	2	75%
3	5	4	75%
4	10	10	100%
5	6	6	100%
6	8	8	100%
7	10	10	100%
8	3	3	100%
9	4	4	100%
10	2	2	100%
11	13	13	100%
Total	**68**	**65**	**95.60%**

Chainpur water supply and sanitation users committee are providing drinking water services to 1,165 households residing in wards number 4, 9, 10 and 11. The water is lifted from two sump wells located in the bank of Seti River. The system has 2.84 km of transmission line and a distribution line of 22.37 km.

The water supply system was developed as a sub-project of Urban Water Supply and Sanitation Sector Project (UWSSP). The project was implemented by the Department of Water Supply and Sewerage Management (DWSSM). DWSSM is the leading government agency in the planning and implementation of water supply and sewerage management in the country under the Government of Water Supply. Besides, the users committee is also supported technically and financially by the Water Supply and Sanitation Division Office (WSSDO). WSSDO is a leading agency under the Ministry of Physical Infrastructure Development in the provincial government. Also, many water supply and sanitation users committees in other wards provide drinking water supply to either private taps or public taps.

It was revealed that approximately 48% of the households have access to piped drinking water supply service through either a private tap or public taps operated by the water users committee while the remaining households rely on spring source.

As per the water quality data report published by Suaahara, 2018 of Bajhang District, some the systems that include reservoir and private taps were found to have presence of *E. coli* (bacteria found in faecal sludge). Annex 4 presents all the sampled water quality data of Bajhang District. Table 5 shows the water quality data from the reservoir tank, the sources and private taps.

Table 5: Water Quality Data.

Parameters	Unit	Sample Types					
		Source	Reservoir Tank	Tap 1	Tap 2	Tap 3	Tap 4
Temperature (Celsius)	Celsius	19	24	24	25	25	25
pH	-	7.9	7.6	8.15	7.96	8	7.99
Turbidity (NTU)	NTU	5	5	5	5	5	5
Total Hardness (mg/L)	mg/L	144	168	-	-	-	-
Ammonia (mg/L)	mg/L	ND (<0.05)	3	-	-	-	-
Nitrate (mg/L)	mg/L	ND (<0.2)	ND (<0.2)	-	-	-	-
Iron (mg/L)	mg/L	0.34	0.07	-	-	-	-
Manganese (mg/L)	mg/L	ND (<0.05)	ND (<0.05)	-	-	-	-
Arsenic (mg/L)	mg/L	ND (<0.005)	ND (<0.005)	ND (<0.005)	ND (<0.005)	ND (<0.005)	ND (<0.005)
Free Residual Chlorine (mg/L)	mg/L	-	0	0	0	0	0
Total Coliform (CFU/100 mL)	CFU/100 mL	300	250	180	800	1,200	572
***E. Coli* (CFU/100 mL)**	CFU/100 mL	0	2	2	0	0	0

(Suaahara, 2018)

Table 5 indicates that the majority of the municipality's drinking water sources are contaminated with *coliforms*, necessitating the use of any Point of Unit (POU) method, such as filtration, chlorination, sun disinfection, or boiling water. The households using any of these POU options before drinking in the municipality is shown in Table 6.

Table 6: Percentage of Households using POU option.

Sources	Do you use POU option for treatment?	
	Yes	No
Ground water	1.19%	0.30%
Private tap	3.87%	9.82%
Public tab	1.49%	32.44%
Spring Source	2.38%	48.51%
Total	**8.93%**	**91.07%**

It was found that 91.07% of the households do not use any kind of Point of Unit (POU) options of water treatment before drinking. Groundwater vulnerability is specific to containment type and pollution scenarios (Andreo, 2013). Thus, a higher percentage of HHs using piped network water indicates that the probability of groundwater pollution at household level is very low to none. But those using spring sources and not using POU option that is 48% is in risk as it can affect the human health. The remaining households are in safe side as they are using POU option before drinking.

Since the water quality data presented is of the whole Bajhang District including Jayaprithivi Municipality and the Suaahara report from 2018 does not clearly state that the presence of *Coliforms* is because of the use of sanitation systems, it has been assumed that only people using spring sources might be at risk of contamination. Therefore, in the SFD matrix, unlined pits are split into those located in high risk areas (T2A6C10) and low risk areas (T1A6C10) in almost equal proportions (48.2%) vs (47.0%) as per the data shown in Table 6.

2.2.4 Proportion of FS emptied and transported

Proportion of FS emptied from the containment is considered as 90% as emptying and assumed that certain portion of FS gets remains as complete emptying is not possible. All containments that have been emptied at least once after the installation, have been emptied manually. So, almost 90% of the FS content in the containment is removed during emptying. Thus, the proportion of FS emptied from each containment is calculated as

$$FS\ proportion\ emptied\ from\ containment = percentage\ of\ containment\ emptied \times proportion\ of\ FS\ emptied$$

The proportion of FS emptied from different types of sanitation technologies is shown in Table 7.

Table 7: Sanitation Technologies and Proportion of Faecal Sludge Emptied.

S.N.	Sanitation Technologies	SFD Reference Variable	Percentage of Emptied Containment	Proportion of FS emptied during emptying	F3
1	User interface discharges directly to water body	T1A1C7	0%	90%	0%
2	Fully lined tank (sealed), no outlet or overflow	T1A3C10	0%	90%	0%
3	Lined tank with impermeable walls and open bottom, no outlet or overflow	T1A4C10	0%	90%	0%
4	Lined pit with semi-permeable walls and open bottom, no outlet or overflow	T1A5C10	0%	90%	0%
5	Unlined pit, no outlet or overflow	T1A6C10	11.4%	90%	10%
6	Open defecation	T1B11 C7 TO C9	0%	90%	0%
7	Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	T2A4C10	0%	90%	0%
8	Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	T2A5C10	0%	90%	0%
9	Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	T2A6C10	2.5%	90%	2%

2.3 Summary of Assumptions

Offsite sanitation systems:

- ✓ 0.3% of the toilets discharge directly to a water body (T1A1C7). Since there is no treatment plant, all wastewater is disposed of untreated into the environment.

Onsite sanitation systems:

- ✓ The proportion of FS in septic tanks were set to 100%, the proportion of FS in fully lined tanks were 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 given in the Frequently Asked Question (FAQs) in the sustainable Sanitation Alliance (SuSanA) website.
- ✓ Variables F3, F4 and F5 for all onsite sanitation system were derived from the HH survey and cross-checked with KIIs conducted.
- ✓ The traditional practice of emptying and dumping the FS on agricultural land is not considered to be a safe practice for managing emptied faecal sludge. Moreover, the municipality does not have any designated faecal sludge treatment plant. Therefore, variables F4 and F5 are both set to 0% for all sanitation systems.

2.4 SFD Graphic

Figure 12 shows the SFD graphic for Jayaprithvi Municipality. In the graphic, the percentage of FS and wastewater (WW) indicated by color green represents FS and WW which are safely managed whereas the percentage in color red represents FS and WW which are unsafely managed. Figure 12 also represents the sanitation value chain going from left to right.

The faecal sludge that is safely managed is further segregated as 43% of FS which is safely contained and has not been emptied. The FS that is unsafely managed originates from FS not contained - not emptied (49%), FS emptied but not delivered to treatment (6%), wastewater not delivered to treatment (1%) and people practising open defecation (2%).

The current lack of an FSTP in the Municipality is a concern as it leads to unsafe disposal of FS untreated in farmlands and water bodies. And even though a large proportion of FS is considered safely managed (43%), this situation is temporary as it is all FS safely contained within the pits and tanks. Importantly, when these pits and tanks eventually become full the FS will require and transporting to a treatment plant.

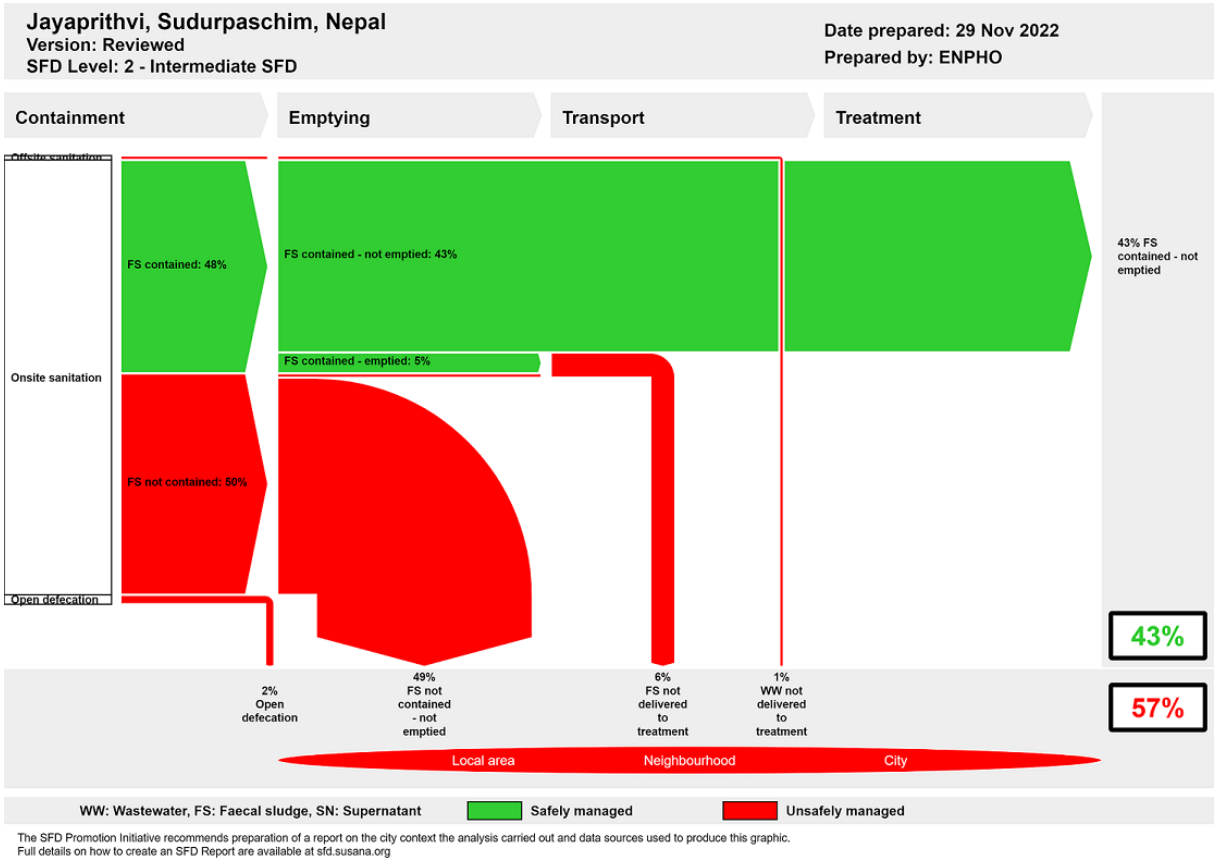

Figure 12: SFD graphic of Jayaprithvi Municipality.

2.4.1 Offsite Sanitation

Nepal Demographic and Health Survey reported that 6.9% of the urban population in the country have offsite sanitation systems connected to piped sewer networks (MoH, 2017). No pipe networks have been developed in Jayaprithvi Municipality. However, 0.3% of the population have connected their toilet to water bodies near their houses.

2.4.2 Onsite Sanitation

The population relying on onsite sanitation systems is 97.62%. Among them, 48% are using a containment that safely stores faeces and 50% with unsafe containment. Jayaprithvi Municipality does not have a treatment plant or land separated for disposal of FS, which was confirmed by the information collected during the KII with the municipal officer. The majority of FS emptied is taken to open land or farmlands for untreated disposal. The description of the flow of FS from the onsite sanitation systems as shown in the SFD graphic is explained in Table 8.

Table 8: Description of the percentages of the SFD graphic.

Variables	Description	Percent
FS contained	FS contained within an onsite sanitation technology which ensures safe level of protection from excreta i.e. pathogen transmission to the user or general public is limited.	48%
FS not contained	FS contained within an onsite sanitation technology which does not ensure safe level of protection from excreta i.e. pathogen transmission to the user or general public is likely.	50%
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. These containments are fully lined tanks (sealed), no outlet or overflow (T1A3C10), fully lined tanks with impermeable walls and open bottom without outlet or overflow (T1A4C10), lined pit with semi-permeable walls and open bottom without outlet or overflow (T1A5C10) and unlined pits (T1A6C10) without significant risk to groundwater.	43%
FS contained – emptied	FS that is contained in onsite sanitation technology and emptied manually.	5%
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 and polluting groundwater.	49%
FS not delivered to treatment	FS emptied from an onsite sanitation system which is either FS contained or not but is not delivered to treatment.	6%
WW not delivered to treatment	All wastewater from toilets discharges going directly to open drain or water bodies.	1%

2.4.3 Open Defecation

Despite of ODF status, people residing in 2% of households still go for open defecation outside in the vicinity of forests and other open spaces. This population with high defecation rate is economically underdeveloped.

3 Service delivery context

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 promotion of safe sanitation services is discussed here.

Local Government Operation Act, 2017

Local Governance Operation Act 2017 has promulgated 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 promulgated 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 ray. It provides the mechanism for appointing environmental inspector to control pollution by federal, provincial and local government.

Water Supply and Sanitation Act, 2022

The act was promulgated to ensure the fundamental right of citizen 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 tank 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 Faecal Sludge Management (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 the 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, 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. 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. Both these policies were limited to address emerging issues and challenges in the rural and urban areas. Thus, National Water Supply and Sanitation Policy (NWSSP) was formulated in 2014 by the Government of Nepal (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.

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 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 lack of concrete policies, guidelines, and indicators on Faecal Sludge Management in the sector for effective planning, implementation, and service delivery.

3.2.1 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, develop 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, facilitate and coordinate with federal, provincial, and local government for developing policy plan 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.

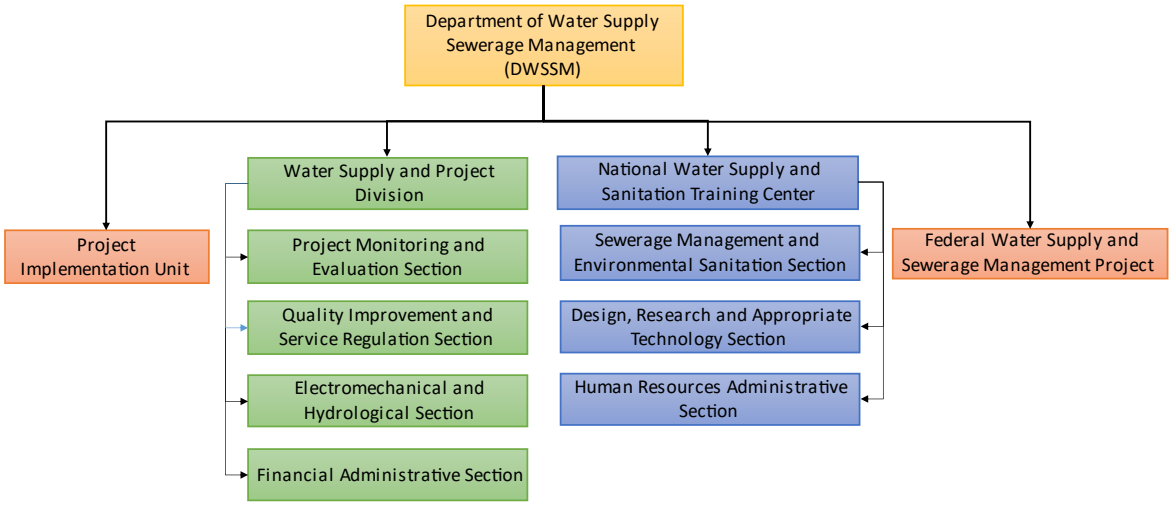

Figure 13: Organizational Structure Department of Water Supply and Sewerage Management (DWSSM).

Ministry of Urban Development (MoUD): It works on integrated urban planning and development in municipalities, including faecal sludge management respectively (GoN, 2015). Department of Urban Development and Building Construction (DUDBC) under MoUD is proactive for setting the standards for safe, affordable building construction and implementation for managed residential environment. The executing agency, project implementation organization, and implementing agency for urban development are depicted in Figure 13.

At Provincial Level

Ministry of Physical Infrastructure: Ministry of physical infrastructure of provincial government in Sudurpaschim is 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:

i. Inter local government projects

ii. 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.

3.2.2 Service Provision

Urban Water Supply and Sanitation Policy 2009 has emphasized the Public-Private Partnership (PPP) in water supply and sanitation to improve service delivery (MoPIT, 2009). Also, 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).

3.2.3 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 9. However, FSM specific standards have yet to be developed and implemented.

Table 9: 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 grey water	✓	✓	✓
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	✓	✓	✓

3.3 Planning

3.3.1 Service Targets

The plans and programs for development in Nepal is guided by a national development framework formulated by the national planning commission in coordination with sectoral ministries. The ministry of finance allocates budgets and releases them to executing agencies and coordinates with development partners to address resource gaps. Nepal is committed to the Sustainable Development Goals (SDGs) which has been reaffirmed in key documents such as the current 15th development plan and the 25-year long-term vision 2100 that internalizes the sustainable development goals (NPC, 2020). The SDGs codes are assigned for all national development programs through the Medium-Term Expenditure Framework (MTEF). The MTEF sets out three-year spending plans of the national and provincial governments which aims to ensure that budgets reflect social and economic priorities and give substance to reconstruction and development commitments (NPC, 2020). Further, Nepal has prepared the SDG status and roadmap to localize the SDG indicators with baselines and targets for 2030. Nepal has set the following target and indicator focused on sanitation based on global SDGs as shown in Table 10.

Table 10: National SDG target and indicator on sanitation.

National SDG Target and Indicator		2015	2019	2022	2025	2030
Target 6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations						
6.2.1 Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water						
1	Households using improved sanitation facilities which are not shared (%)	60	69.3	78.7	85.7	95
2	Proportion of population using latrine (%)	67.6	75.7	83.8	90	98
3	Sanitation coverage (%)	82	86.5	89.9	93.3	99
4	Urban households with toilets connected to sewer systems/ proper FSM (%)	30	46	62	74	90

4 Stakeholder Engagement

4.1 Key Informant Interviews (KIIs)

Key Informant Interviews (KIIs) and objective sharing of the study were conducted with the major stakeholders of sanitation sector of the municipality. Interview was performed with Mr. Bijay Kumar Rajat, Planning Officer of Jayaprithvi Municipality for the planning and the activity that is going on sanitation sector and Mr. Harka Bahadur Khadka, Chairperson of Department of Water Supply and Sewerage Management, Bajhang Branch for drinking water in the municipality. Table 11 shows the KII with the municipal officers and chairperson of DWSSM.

Table 11: KII Details.

S.N.	Name	Designation	Organization	Purpose of KII	Date
1.	Bijay Kumar Rajat (KII-1)	Planning Officer	Jayaprithvi Municipality	Sanitation status, Ongoing projects on Sanitation, Policies and plan for Sanitation development	13th June, 2022
2.	Harka Bahadur Khadka (KII-2)	Chairperson	Department of Water Supply and Sewerage Management, Bajhang Branch	Supply and demand of water, water sources, groundwater contamination risk	12th June, 2022

Figure 14: KII with Chairperson of Department of Water Supply and Sewerage Management, Bajhang Branch.

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 on sanitation and methods for conducting HH survey. The household survey was conducted using mobile application "KOBOCOLLECT" after orientation. SFD team members along with municipal focal person went on field visit in households to encourage enumerators and observe household sanitation status.

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= no/(1+ (no-1)/N).

Where,

Z^2	1.96	At the confidence level of 95%
p	0.5	Assuming that about 50% of the population should 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 sized required in each ward is calculated as

nh= (Nh/N)*n, where Nh is a total population in each stratum.

Thus, a total of 337 households were sampled from 4,733 households distributed in 11 wards with proportionate stratification random sampling which is shown in Figure 15.

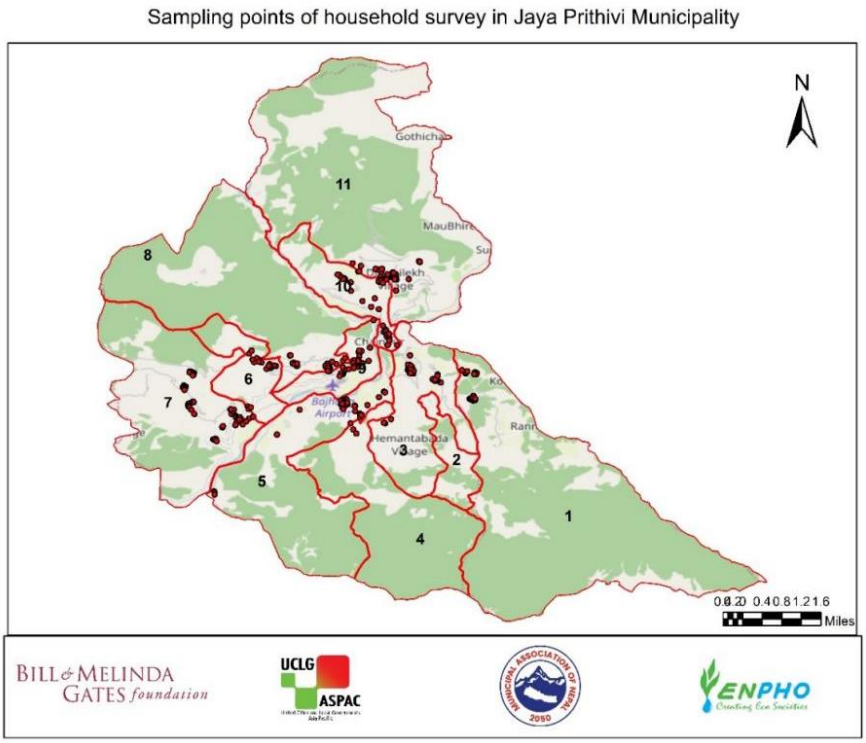

Figure 15: Distribution of sampling points in different wards of Jayaprithvi Municipality.

4.2.2 Direct Observation

Various sanitation technologies in the households in all the wards were observed and visual references were kept. Also, observation of the containments and transportation of faecal sludge were carried out. Storm water drain is available in the urban area of the municipality, where most of the households here empty their containment during the monsoon season even though it is against the rule (Figure 16).

Figure 16: Direct observation Survey in the Municipality.

4.3 Sharing and Validation of Data

The sharing and validation workshop of findings on sanitation status was conducted in the municipality hall with the participation of the Mayor, Deputy Mayor, Ward Chairpersons, c, General members of the municipal council and other relevant stakeholders. The participants agreed upon the findings of this study that showed current sanitation status of the municipality (Figure 17).

Figure 17: Sharing and Validation Workshop at Jayaprithvi Municipality.

5 Acknowledgements

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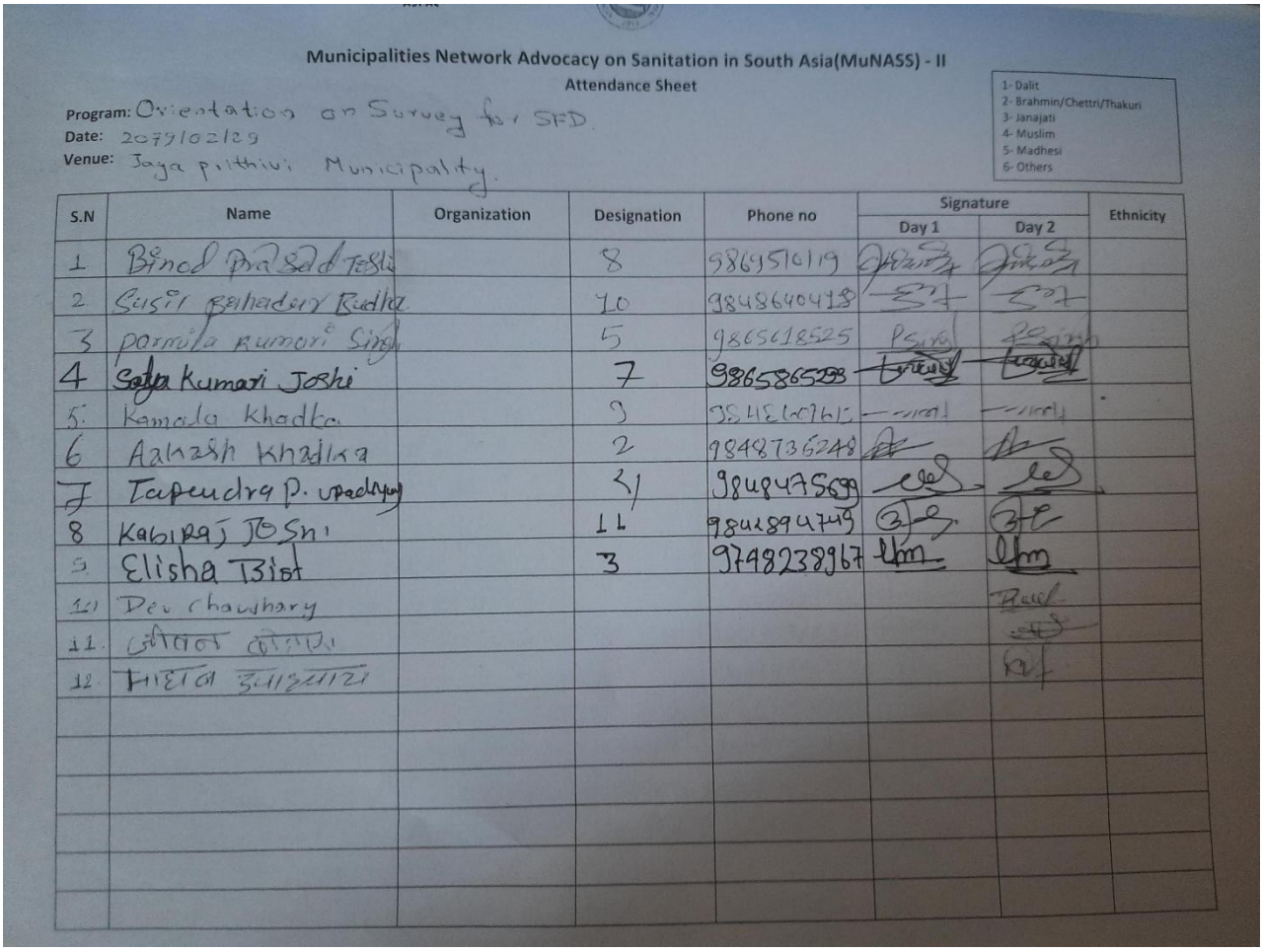
7 Appendix

7.1 Appendix 1: List of Participants in the Orientation on Survey for SFD



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

Attendance Sheet

Program: Orientation on Survey for SFD

Date: 2079/02/29

Venue: Jaya prithvi Municipality

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

S.N	Name	Organization	Designation	Phone no	Signature		Ethnicity
					Day 1	Day 2	
1	Binod Prasad Teshi		8	9869510119			
2	Susil Bahadur Rudha		10	9848640413			
3	parmila kumari Singh		5	9865618525			
4	Sajja Kumari Joshi		7	9865865288			
5	Kamala Khadka		9	9848407615			
6	Aakash Khadka		2	9848736248			
7	Tapendra P. Upadhyay		3/1	9848475699			
8	Kabiraj Joshi		11	9841894749			
9	Elisha Bist		3	9749238967			
10	Dev chaudhary						
11	[illegible]						
12	[illegible]						

7.2 Appendix 2: List of Participants in Sharing and Validation Workshop

आज मिति २०७६ साल भाद्र महिना १३ 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 जयपृथ्वी नगरपालिकामा Shit Flow Diagram (SFD) सम्बन्धी अन्तरक्रिया कार्यक्रममा निम्न अनुसारको उपस्थिति रहेको छ ।

उपस्थिति

क्र.स.	नाम	पद	कार्यालय	फोन नं.	हस्ताक्षर
१	चेत राज बजाल	नगर प्रमुख	जयपृथ्वी नगरपालिका	९८४८६३३५०८	
२	रतन बहादुर सिंह	नगर उप प्रमुख	जयपृथ्वी नगरपालिका	९८६०५१६१०३	
३	डम्बर ब. सिंह	वडाध्यक्ष वडा नं १	" "	9848463477	
४	कलक ब. खड्का	" " २	" "	9864635367	
५	उँजा ब. खड्का	" " ३	" "		
६	ईश्वर ब. स्वाती	" " ४	" "	9861916446	
७	प्रेम जंग पाध्या	का.वा. " ५	" "	9765326519	
८	नरेन्द्र ब. सिंह	वडाध्यक्ष वडा नं ६	" "	9847515735	
९	शिव राज जोशी	" " ७	" "	9848589727	
१०	लोकेन्द्र ब. बोहरा	" " ८	" "	9849723998	
११	गोपाल ब. खड्का	" " ९	" "	9865960956	
१२	पुष्प ब. सिंह	" " १०	" "	9841600593	
१३	सर्जन ब. थापा	" " ११	" "	9862471296	
१४	अमर राज जोशी	प्र. प्र. अ.	" "	९८४८६४३८८५	
१५	देवेन्द्र प्रसाद जोशी	शिक्षा शाखा प्रमुख	"	९८६८८०१३५०	
१६	राम बहादुर खड्का	ऑफ सेनाम	"	9866463046	
१७	नैन बहादुर सिंह	स्वा. संयोजक	" "	९८४८४६५४५८	
१८	टीटा मगर	अधिकृत छैटौं	" "	९८६५६२०९८६	
१९	गिता रावल	सहायक चौथो	" "		

क्र.सं.	नाम	पद	कार्यालय	फोन नं.	हस्ताक्षर
२०	सुमन बोगटी	सूचना प्र.अ.	ज.न.पा.	9849033492	[illegible]
२१	नवराज	व्यापारी			[illegible]
२२	दिनेश व. सिंह	नगर प्रमुख सचिवालय	ज.न.पा.	9848473764	[illegible]
२३	रामचन्द्र धामी	भण्डार संयोजक	ज.न.पा.	9864647626	[illegible]
२४	मदन ब. खड्का	स्टोर सहायक	,,	9848406143	[illegible]
२५	[illegible] प्रसाद जोशी	[illegible]	ज.न.पा.		[illegible]
२६	अनुजा कु. जोशी	ना.सु.	,,	9861043901	[illegible]
२७	मालति रोकाया	केन्द्र व्यवस्थापक	,,	9844166909	[illegible]
२८	बिजय कु. रजक	योजना अधिकृत	,,	9858488535	[illegible]
२९	लाल ब. धामी	इन्जिनियर	ज.न.पा.	9868861828	[illegible]
३०	[illegible]	[illegible]	[illegible]	9868410449	[illegible]

7.3 Appendix 3: Water Quality Analysis Results_SUAAHARA-Phase-I

Sample Code	District	Development region	Ecological region	Name of VDC	Ward no.	Sample kind	Temperature (Celsius)	pH	Turbidity (NTU)	Total Hardness (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Iron (mg/L)	Manganese (mg/L)	Arsenic (mg/L)	Free Residual Chlorine (mg/L)	Total Coliform (CFU/100 mL)	*E. Coli* (CFU/100 mL)
BAJ-BAN-5-SO	Bajhang	Far Western	Mountain	Banjh	5	Source	19	7.90	5.00	144.00	ND(<0.05)	ND(<0.2)	0.34	ND(<0.05)	ND(<0.005)	-	300	0
BAJ-BAN-5-RVT	Bajhang	Far Western	Mountain	Banjh	5	RVT	24	7.60	5.00	168.00	3.00	ND(<0.2)	0.07	ND(<0.05)	ND(<0.005)	0	250	2
BAJ-BAN-5-TAP-1-HH1-HW	Bajhang	Far Western	Mountain	Banjh	5	Water for handwashing	24	7.99	5.00	-	-	-	-	-	ND(<0.005)	0	800	6
BAJ-BAN-6-TAP-1-HH2-HW	Bajhang	Far Western	Mountain	Banjh	6	Water for handwashing	24	8.40	5.00	-	-	-	-	-	ND(<0.005)	0	8000	0
BAJ-BAN-6-TAP-1-HH3-HW	Bajhang	Far Western	Mountain	Banjh	6	Water for handwashing	24	8.17	5.00	-	-	-	-	-	ND(<0.005)	0	8000	1
BAJ-BAN-6-TAP-2-HH1-HW	Bajhang	Far Western	Mountain	Banjh	6	Water for handwashing	25	8.05	5.00	-	-	-	-	-	ND(<0.005)	0	8000	10
BAJ-BAN-6-TAP-2-HH2-HW	Bajhang	Far Western	Mountain	Banjh	6	Water for handwashing	26	8.02	5.00	-	-	-	-	-	ND(<0.005)	0	8000	0
BAJ-BAN-6-TAP-2-HH3-HW	Bajhang	Far Western	Mountain	Banjh	6	Water for handwashing	26.7	8.04	5.00	-	-	-	-	-	ND(<0.005)	0	8000	4
BAJ-BAN-6-TAP-3-HH1-HW	Bajhang	Far Western	Mountain	Banjh	6	Water for handwashing	27	7.85	5.00	-	-	-	-	-	ND(<0.005)	0	350	0
BAJ-BAN-6-TAP-3-HH2-HW	Bajhang	Far Western	Mountain	Banjh	6	Water for handwashing	25	7.97	5.00	-	-	-	-	-	ND(<0.005)	0	1200	0
BAJ-BAN-6-TAP-3-HH3-HW	Bajhang	Far Western	Mountain	Banjh	6	Water for handwashing	26	8.09	5.00	-	-	-	-	-	ND(<0.005)	0	8000	10
BAJ-BAN-5-TAP-1-HH1-WR	Bajhang	Far Western	Mountain	Banjh	5	Water for washing raw vegetables	23	7.91	5.00	-	-	-	-	-	ND(<0.005)	0	248	0
BAJ-BAN-6-TAP-1-HH2-WR	Bajhang	Far Western	Mountain	Banjh	6	Water for washing raw vegetables	24	8.31	5.00	-	-	-	-	-	ND(<0.005)	0	1200	0
BAJ-BAN-6-TAP-1-HH3-WR	Bajhang	Far Western	Mountain	Banjh	6	Water for washing raw vegetables	24	8.25	5.00	-	-	-	-	-	ND(<0.005)	0	900	0
BAJ-BAN-6-TAP-2-HH1-WR	Bajhang	Far Western	Mountain	Banjh	6	Water for washing raw vegetables	24	8.23	5.00	-	-	-	-	-	ND(<0.005)	0	152	0
BAJ-BAN-6-TAP-2-HH2-WR	Bajhang	Far Western	Mountain	Banjh	6	Water for washing raw vegetables	25	7.90	5.00	-	-	-	-	-	ND(<0.005)	0	8000	0
BAJ-BAN-6-TAP-2-HH3-WR	Bajhang	Far Western	Mountain	Banjh	6	Water for washing raw vegetables	26	8.13	5.00	-	-	-	-	-	ND(<0.005)	0	1200	0
BAJ-BAN-6-TAP-3-HH1-WR	Bajhang	Far Western	Mountain	Banjh	6	Water for washing raw vegetables	26	7.99	5.00	-	-	-	-	-	ND(<0.005)	0	164	0
BAJ-BAN-6-TAP-3-HH2-WR	Bajhang	Far Western	Mountain	Banjh	6	Water for washing raw vegetables	26	7.85	5.00	-	-	-	-	-	ND(<0.005)	0	134	0
BAJ-BAN-6-TAP-3-HH3-WR	Bajhang	Far Western	Mountain	Banjh	6	Water for washing raw vegetables	25	8.21	5.00	-	-	-	-	-	ND(<0.005)	0	8000	0
BAJ-BAN-5-TAP-1-HH1-DW	Bajhang	Far Western	Mountain	Banjh	5	Water for drinking	24	8.15	5.00	-	-	-	-	-	ND(<0.005)	0	180	2
BAJ-BAN-6-TAP-1-HH2-DW	Bajhang	Far Western	Mountain	Banjh	6	Water for drinking	25	7.96	5.00	-	-	-	-	-	ND(<0.005)	0	800	0
BAJ-BAN-5-TAP-1-HH3-DW	Bajhang	Far Western	Mountain	Banjh	5	Water for drinking	25	8.00	5.00	-	-	-	-	-	ND(<0.005)	0	1200	0
BAJ-BAN-6-TAP-2-HH1-DW	Bajhang	Far Western	Mountain	Banjh	6	Water for drinking	25	7.99	5.00	-	-	-	-	-	ND(<0.005)	0	572	0
BAJ-BAN-6-TAP-2-HH2-DW	Bajhang	Far Western	Mountain	Banjh	6	Water for drinking	25	7.87	5.00	-	-	-	-	-	ND(<0.005)	0	8000	0
BAJ-BAN-6-TAP-2-HH3-DW	Bajhang	Far Western	Mountain	Banjh	6	Water for drinking	26	8.01	5.00	-	-	-	-	-	ND(<0.005)	0	1600	0
BAJ-BAN-6-TAP-3-HH1-DW	Bajhang	Far Western	Mountain	Banjh	6	Water for drinking	26	7.94	5.00	-	-	-	-	-	ND(<0.005)	0	8000	0
BAJ-BAN-6-TAP-3-HH2-DW	Bajhang	Far Western	Mountain	Banjh	6	Water for drinking	26	7.85	5.00	-	-	-	-	-	ND(<0.005)	0	480	0
BAJ-BAN-6-TAP-3-HH3-DW	Bajhang	Far Western	Mountain	Banjh	6	Water for drinking	24	8.03	5.00	-	-	-	-	-	ND(<0.005)	0	8000	0
BAJ-BAN-6-TAP-3	Bajhang	Far Western	Mountain	Banjh	6	Tap	25	7.86	5.00	-	-	-	-	-	ND(<0.005)	0	272	0
BAJ-BAN-6-TAP-2	Bajhang	Far Western	Mountain	Banjh	6	Tap	25	7.90	5.00	-	-	-	-	-	ND(<0.005)	0	92	0
BAJ-BAN-5-TAP-1	Bajhang	Far Western	Mountain	Banjh	5	Tap	24	7.69	5.00	-	-	-	-	-	ND(<0.005)	0	80	0

SFD Jayaprithvi Municipality, Nepal, 2023

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