



# Draft SFD Lite Report

## Unnao India

This SFD Lite Report was prepared by  
Centre for Science and Environment

Date of production: 28/03/2020

# 1 The SFD Graphic

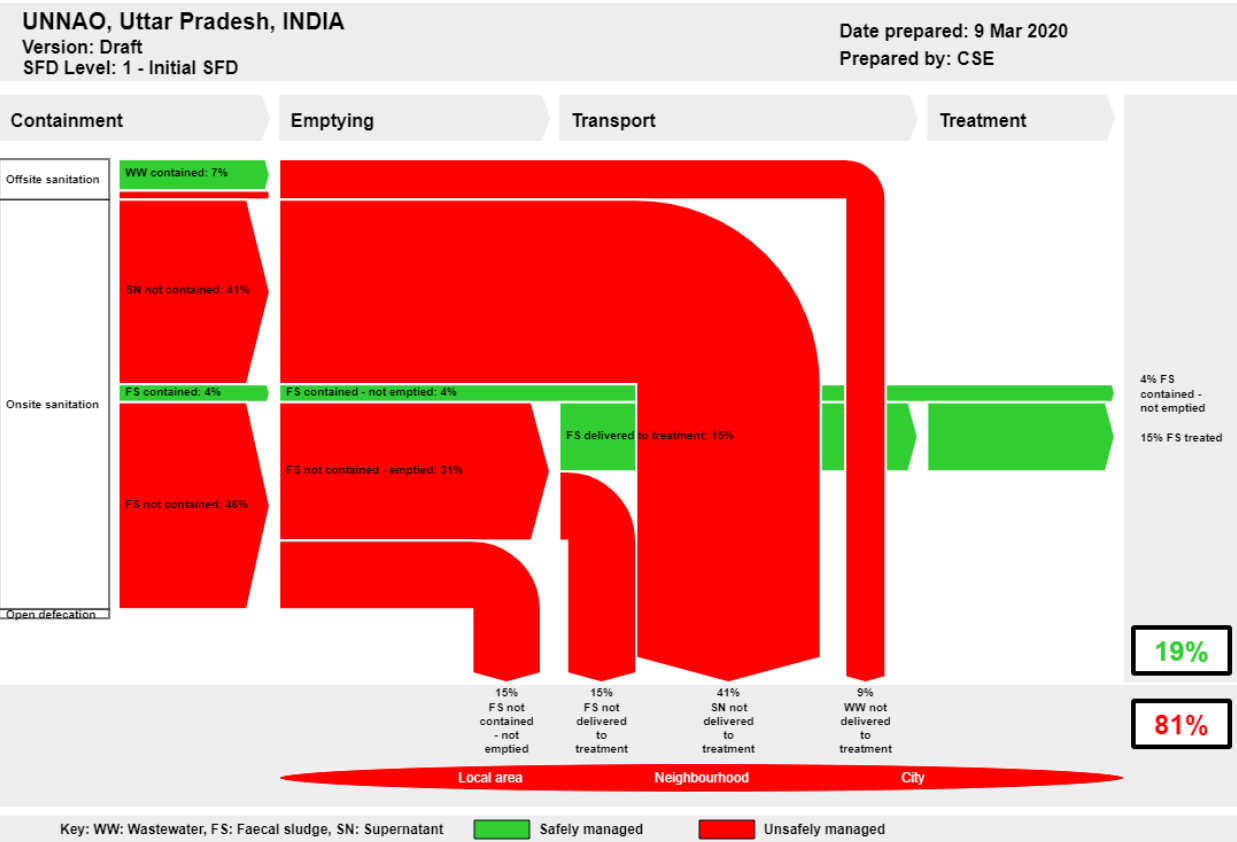


Figure 1: SFD Graphic for Unnao

## 2 SFD Lite information

### Acknowledgement:

This report was compiled as part of the SFD Promotion Initiative project funded by Bill and Melinda Gates Foundation (BMGF). We would like to thank Dr. R P Shirvastava, Executive Officer and Mr. Abhishek Rai, District Program Manager, NPP for providing all the required secondary data and cooperating for KII & FGDs.

### Collaborating partners:

- Unnao Nagar Palika Parishad, Unnao, Uttar Pradesh

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### 3 General city information

The town of Unnao is the headquarters of Unnao district in Uttar Pradesh. It comprises of 6 Tehsil and 16 Blocks. The District is part of Central Ganga Plain and lies between Latitude 26°8' N & 27°2' N and Longitude 80°3' E & 81°3' E. The city is famous for its tanneries. It is around 65 km from state capital, Lucknow.

The Urban Local Body (ULB) governing the city is Unnao Nagar Palika Parishad (UNPP). As per the census 2011, the population of the city was 1,77,658 and total no. of households (HH) were 33,273 and is spread across an area of 21.5 sq km. The projected population used for this SFD for the year 2020 is 214,128. For this study, only area that falls under Nagar Palika Parishad i.e. Municipal boundary is taken into consideration.

Table 1: Population growth for Unnao city

Census year	Population	Growth rate (%)
1991	107,425	
2001	144,662	34.7%
2011	177,658	22.8%

The annual normal Rainfall of the district comes to 837.125 mm. The maximum rainfall occurs during the monsoon period i.e. June to Sept. having the normal value 743.60 mm of which is monsoon rainfall 88.83% of the total annual rainfall. The July and August are the wettest months having the normal rainfall of 262.125 and 247.35 mm respectively. Depth of ground water in pre and post monsoon ranges between 2.15 to 14.13 mbgl and 0.60 to 13.33 mbgl respectively.

### 4 Service outcomes

Table 2: SFD Matrix for Unnao (2020)

UNNAO, Uttar Pradesh, INDIA, 9 Mar 2020. SFD Level: 1 - Initial SFD Population: 198588 Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 50%										
System label	Pop	W4a	W5a	W4c	W5c	F3	F4	F5	S4e	S5e
<b>System description</b>	Proportion of population using this type of system	Proportion of wastewater in sewer system, which is delivered to centralised treatment plants	Proportion of wastewater delivered to centralised treatment plants, which is treated	Proportion of wastewater in open sewer or storm drain system, which is delivered to treatment plants	Proportion of wastewater delivered to treatment plants, which is treated	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	Proportion of supernatant in open drain or storm sewer system, which is delivered to treatment plants	Proportion of supernatant in open drain or storm sewer system that is delivered to treatment plants, which is treated
<b>T1A1C2</b> Toilet discharges directly to a centralised foul/separate sewer	7.0	0.0	0.0							
<b>T1A1C6</b> Toilet discharges directly to open drain or storm sewer	2.0			0.0	0.0					
<b>T1A2C6</b> Septic tank connected to open drain or storm sewer	41.0					75.0	50.0	100.0	0.0	0.0
<b>T1A3C6</b> Fully lined tank (sealed) connected to an open drain or storm sewer	41.0					75.0	50.0	100.0	0.0	0.0
<b>T1A4C10</b> Lined tank with impermeable walls and open bottom, no outlet or overflow	4.0					0.0	50.0	100.0		
<b>T2A4C10</b> Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	4.0					0.0	50.0	100.0		
<b>T2A6C10</b> Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	1.0					0.0	0.0	0.0		

Overview on technologies and methods used for different sanitation systems through the sanitation service chain is as follows:

**Containment:**

In Unnao, 91% of the population is dependent on the onsite-sanitation system (OSS) and only 9% is dependent on the offsite sanitation system. Out of this 9%, Sewerage network is available to the 7% of the population (i.e. ward-27 and ward-4 have been connected to sewer lines constructed by Unnao Shuklaganj Development Authority) and rest 2% have their toilets discharging excreta directly to the open drain i.e. Night Soil disposed in Open Drain practice.

Customarily, the population dependent on OSS have constructed either septic tanks or fully lined tank (with outlets), lined tanks with open bottom or lined pits (locally called as *sokhta gaddha*). Any kind of lined tanks (with outlet) with baffle wall in between (2-3 chamber) connected to toilets are locally called septic tanks irrespective of whether it adheres to the design specifications prescribed by Bureau of Indian Standards (BIS) or not and Lined tank (with outlet) without baffle wall is considered as fully lined tank. As per Focused Group Discussion (FGD) with masons, since last 10 years they mostly construct Septic tank and fully lined tank connected to open drain, whereas earlier, particularly in areas of Low Income Group (LIG) households they used to construct lined tank with Impermeable wall (no outlet) with open bottom or unlined pit with open bottom. The size of the containments is usually decided on the basis of space availability and affordability of the households. Due to no standardization being followed while constructing the containment system, few households have constructed their containments large in capacity irrespective of their household size. Households which have big drains flowing in their vicinity or don't have enough space for constructing any type of containment systems skip building containments and follow the Night soil directly into open drain (NSOD) practice. Depth of ground water in pre and post monsoon ranges between 2.15 to 14.13 mbgl and 0.60 to 13.33 mbgl respectively. There is significant risk to groundwater.



**Septic tank**



**Fully lined tank**

**Figure 2: Containment type in Unnao**

Unnao NPP, under Swachh Bharat Mission (SBM) has constructed 3478 Individual Household Latrines (IHHL) and 12 Community Toilets (CT) with a total of 74 seats and 2 Public Toilets (PT) with 24 seats. The city has been declared open defecation free (ODF). Field survey revealed that Open Defecation (OD) is still being practiced in some of the wards reason being improper maintenance of Community Toilets in the vicinity and behavioral issues.

**Emptying:**

Emptying frequency varies widely across the city, depending upon the type of Onsite Sanitation Systems. Containments, which have outlet, have an emptying frequency ranging from 5-6 year, whereas system with open bottom increases to 15 – 20 years.

Unnao NPP owns and operates two vacuum tankers that have a faecal sludge carrying capacity of 3500 litres. The emptying fee per trip charged by the NPP for 3500 liters tankers is INR 1000 to 1200. On an average, these tankers cumulatively complete 1 - 2 trips per day, monsoon being the peak season for

emptying. 02 people (1 driver + 1 helper) usually carry out emptying of faecal sludge from containments. On an average, it takes about 1–1.5 hours for completing one trip and around 15 km distance covered during the trip.

As per discussion with NPP officials, there ~5 private vacuum tankers operating in the city. The faecal sludge carrying capacities of these trucks varies between 4000-5000 litres and the fee charged by them ranges from INR 800 to 1000 per trip. As per KII with private operator, the depth of septic tank differs with pertinence of location. These private desludgers advertise their contact number by distributing business cards or posters on wall. On an average, private vacuum tank, cumulatively complete 1-2 trips per day, monsoon being the peak season for emptying. On an average, it takes about 01 – 1.5 hours for completing one trip and 15 -20 km distance covered.



*Open drain ending at open ground*



*Outlet connected to open Drain*

**Figure 3: Containments connected to open drain**

**Transportation:**

Vacuum tankers used for desludging in Unnao are tractor mounted, Faecal Sludge Treatment Plant (FSTP) of capacity 32 KLD is the designated site by NPP for decanting of faecal sludge that is approximately 14 km from the heart of the city. Trail run of FSTP started in the month of June 2019.

As per the KII (26 Feb, 2020) with the FSTP operator and the log book, the plant was in operational state till 18 February 2020 i.e. the day it last received faecal sludge.

FGD with the private operator revealed that, they transported the septage to the FSTP till incentives in form of cash were paid to them (31 January, 2020) by FSTP operator for decanting the faecal sludge to the FSTP, as FSTP site is quite far from the city. Some of the vacuum tankers from Gangagat, a neighboring ULB, also offer septic tank emptying services in Unnao city at low price and decant the septage illegally into the Nullahs or in agricultural fields nearby Lucknow-Kanpur highway.



*Desludger emptying septage at FSTP*



*Desludger emptying septage into nullah*

**Figure 4: Private desludgers emptying septage at different locations**

The supernatant from containment systems of the households flows to small open drains. These small drains eventually converge in big drains, locally called as Nullahs which ultimate meet the canal outside the city. In addition, some of the drains end up in the open ground.

**Treatment and End-use/disposal:**

Unnao generates an average of 25 MLD of wastewater. Presently, the wastewater/supernatant from Households is discharged into open ground or in the Nullahs. As per discussion with officials UPJN and NPP, Sewage Treatment Plant (STP) is proposed in Dakari, funded by AMRUT for treatment of sewage. The city generates 108 KLD of faecal sludge. For treatment of faecal sludge generated majorly from septic tanks or lined tanks of residential as well as commercial areas, 01 FSTP is operational in Unnao that is presently running. However, it treats only ~10 KLD of FS due to low number of tankers decanting at the FSTP premises.



Figure 5: Faecal Sludge Treatment Plant of Unnao (Source: Sarim/CSE, 2020)

## 5 Data and assumptions

Census 2011 was considered as the baseline and the data for all the stages of sanitation chain were updated based on the data collected from field through KII, FGDs, observations, secondary data collected from relevant stakeholders. Following assumptions were made for developing the SFD.

Assumptions followed for preparing SFDs:

- Volume of wastewater generated is 80% of water supplied.
- 50% of the contents of tanks and pits is Faecal Sludge
- Population is calculated from the HH data provided by NPP for the year 2018-19.

## 6 Context adapted SFD graphic

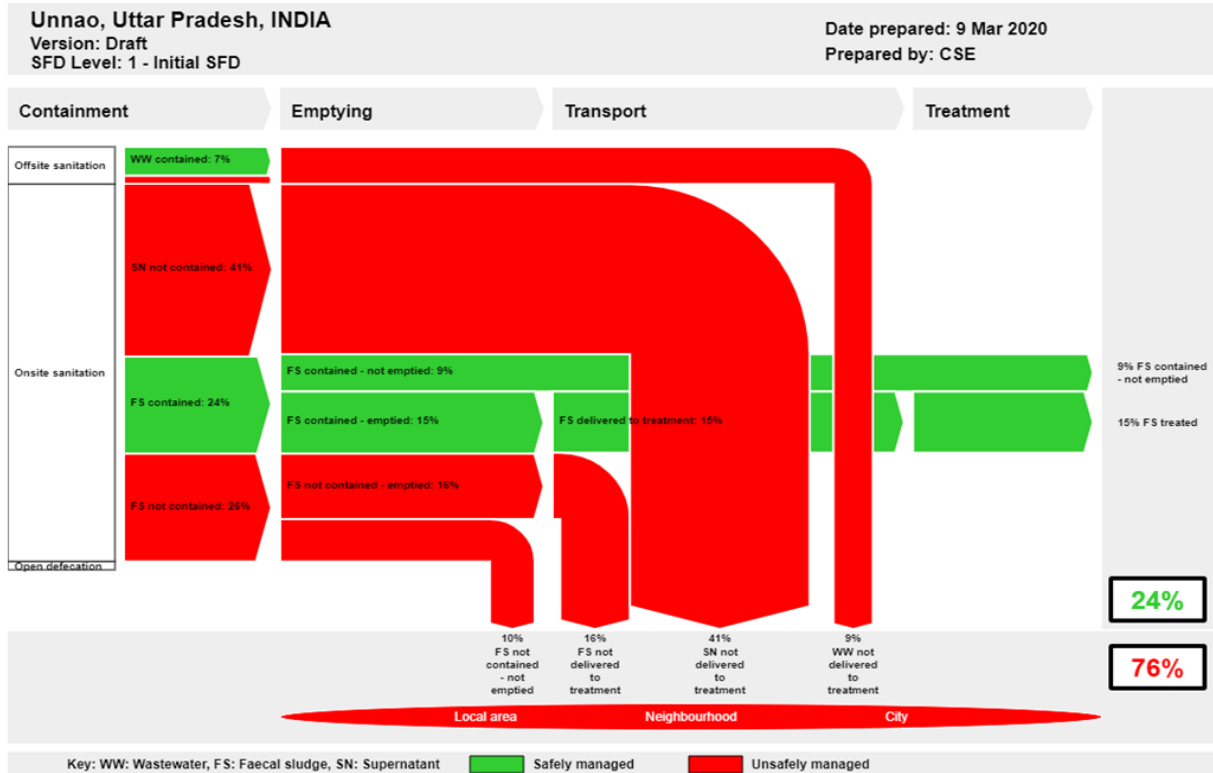


Figure 6: Context adapted SFD Graphic for Unnao

The context adapted SFD is prepared to highlight the difference at the containment stage for correctly designed septic tanks that are connected to open drains.

From the previous assumption that 50% of the proportion of the content of the septic tank is solid FS, rest 50% is supernatant. SN generated from septic tanks connected to open drain is considered as unsafely managed (represented in red). The solid FS collected in the septic tank is considered as contained, as it is neither polluting the groundwater nor the solid excreta is overflowing in the open drain. Hence, out of 24% FS contained, 20% of FS is from septic tank, out of which 5% FS contained from septic tank is emptied and rest 15% FS remains in the tank which is contained and never emptied and the rest is from other type of containment systems.

The context adapted SFD Graphic for Unnao has FS contained as 24% in containment stage as compared to that of 4% in SFD generated using graphic generator. FS contained-not emptied is 9% whereas in original SFD Graphic it is 4% and FS contained-emptied is 15% in the Emptying stage. FS delivered to treatment plant is 15% and 100% of it is assumed to be treated at the treatment facility. FS not contained-not emptied is 10% as compared to 15%.

Overall, excreta of 24% of the population of Unnao is safely managed in the context adapted SFD Graphic.

## 7 List of data sources

### Reports and literature

- District Census Handbook 2011 for Unnao (Houses and household amenities and assets table HH-08: percentage of households by availability of the type of Latrine Facility <http://censusindia.gov.in/DigitalLibrary/MFTableSeries.aspx>)

- District Census Handbook 2011 (Population Census Abstract Data Table (India & State/UTs-Town/Village/WardLevel) [http://censusindia.gov.in/2011census/population\\_enumeration.html](http://censusindia.gov.in/2011census/population_enumeration.html))
- IHHL, SBM data, Unnao, U.P (2017-18).
- Ground Water Brochure Unnao District, U.P. (2013).
- Detailed Project Report for 32 KLD FSTP at Unnao prepared by Uttar Pradesh Jal Nigam
- Assessment of Excreta Management: SFD factsheets for 66 cities in Uttar Pradesh (2018).

**Key informant interviews**

- KII-1; Dr Ram Poojan Srivastava, Executive Officer, Unnao, NPP
- KII-2; Sanjeev Verma, Sanitary Inspector, NPP
- KII-3; Rashmi Pushkar, Sanitary Inspector, NPP
- KII-4; Mr. Abhishek Rai, DPM, SBM, Unnao NPP
- KII-5; Ankit Kumar, Computer operator, Unnao, NPP
- KII-6; Harshit Updadyay, Junior Engineer, UP Jal Nigam
- KII-7; Vivek Verma, Junior Engineer, UP Jal Kal Vibhag

**Focus group discussions**

- FGD-1; Masons
- FGD-2; FSTP Plant operators and staff
- FGD-3; Private Desludgers

**Field Visits**

- Visit to Faecal Sludge Treatment Plant
- Visited a total of 50 no. of households covering low-income, middle income and high-income category
- Visited 6 no. of community / public toilets in the city
- Visit to informal faecal sludge disposal site

Unnao, India, 2020

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