SFD Lite Report

Sarai Taikore, Chunar
India

This SFD Lite Report was prepared by

Centre for Science and Environment.

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1 The SFD Graphic

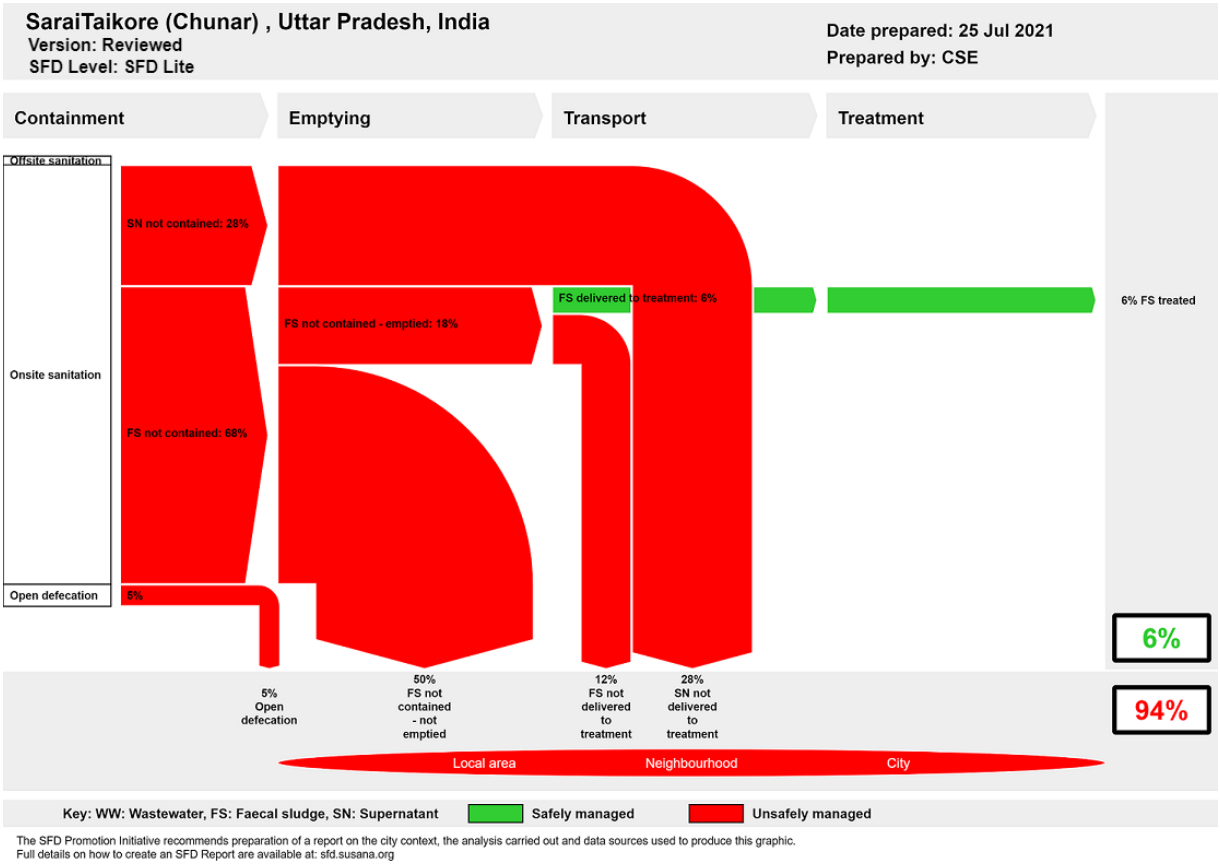

Figure 1: SFD Graphic of Sarai Taikore (CSE, 2021)

2 SFD Lite information

Produced by:

- Centre for Science and Environment, New Delhi.
- This report was compiled as part of the SFD Promotion Initiative (SFD-PI) phase 3, project funded by the Bill and Melinda Gates Foundation (BMGF). We would like to thank Mrs Pratibha Singh, Executive Officer (EO); Mr. Mithilesh Kumar, Sanitation and Food inspector (SFI); Mr. Lalmani Yadav (SFI); Mr. Saurabh Singh, Junior Engineer(JE), JalKal Vibhag; Mr. Ajit Singh Revenue Inspector (RI); Mr Sanjay Kumar *Lekhpal* and Mr. Sandeep Kumar, Clerk for providing all the required secondary data and cooperating in conducting KIIs & FGDs.

Collaborating partners:

- Chunar Nagar Palika Parishad (CNPP)

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3 General city information

Sarai Taikore south is a small Low-Income Group (LIG) settlement in Chunar Nagar Palika Parishad (CNPP) (geographical coordinates 25°06'53.7"N 82°52'25.7"E) in the state of Uttar Pradesh, India (Figure 1). It is located within Ward No. 5 of Chunar Nagar Palika Parishad (the city has a total of 25 wards). As per Census of India, 2011, Sarai Taikore south is part of Ward No. 5 and is surrounded by ward number 2, 6,16 and 9 (Table 1).

Table 1: Population growth rate of Ward no 5 Source: (CNPP, 2021) (Census, 2011).

Census Year	Population	Growth Rate (%)	Ward	Source
2001	1,754	-	5	Census 2001
2011	1,727	-1.5%	5	Census 2011
2021	2,100	21.6%	5	Estimated CNPP

As per the Census of India 2011, the population of Sarai Taikore south was 1,727 persons. The total area under the jurisdiction of CNPP is 14.00 sq. km. Sarai Taikore south is spread in across area of 0.4 sq. km (approx.) that accommodates around 300 Households (HHs). Sarai Taikore south consists of predominantly households on a hilly terrain and have most of the areas accessible only by small vehicles. Predominant occupation of the people here is daily wage labourers. Piped water supply is provided to the households here at 5 am in the morning for around half an hour. People here face issues related to water supply which is 80 litres per capita per day (lpcd)[1] due to its elevation[2]. Sanitation facilities are provided by CNPP to the residents of this ward. Here in this ward clay soil is generally found and the water table is low about 70[3] feet (21.3 metres) under the ground surface.

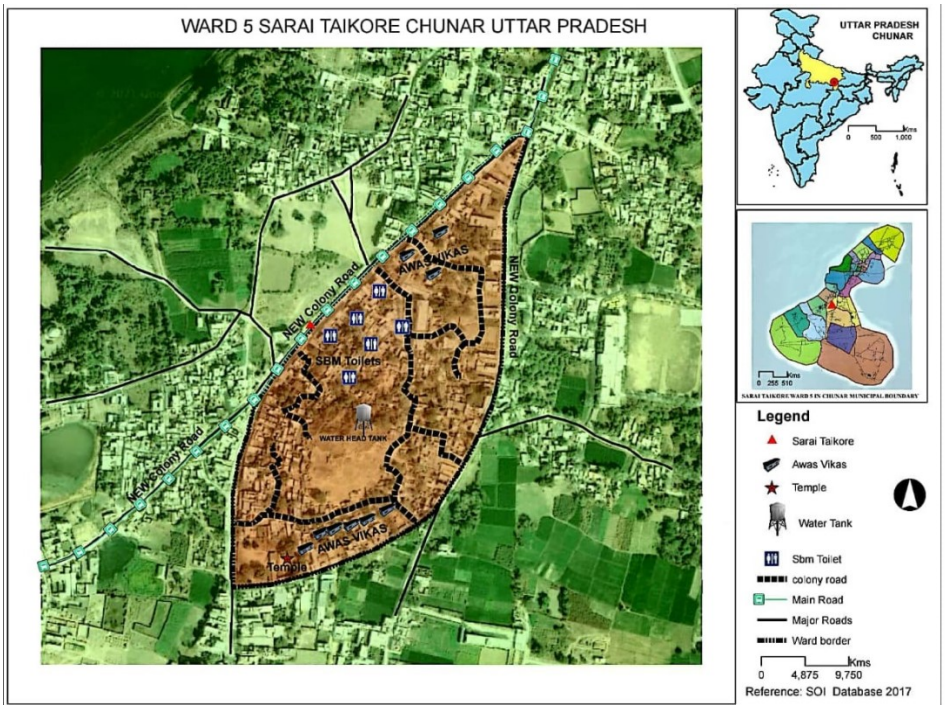

Figure 2: Map of ward no 5, Sarai Taikore South (CSE/ Manish Mishra /Sachin Sahani, 2021) .

[1] KII with Mr Saurabh Singh ,JE JalKal Chunar.
[2] FGD with NPP Chunar officials and visual observation.
[3] FGD with local people and JalKal Vibhag.

4 Service outcomes

Sarai Taikore (Chunar) , Uttar Pradesh, India, 25 Jul 2021. SFD Level: SFD Lite
Population: 2100
Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 100%

Containment						
System type	Population	FS emptying	FS transport	FS treatment	SN transport	SN treatment
	Pop	F3	F4	F5	S4e	S5e
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	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
T1A2C6 Septic tank connected to open drain or storm sewer	20.0	65.0	35.0	100.0	0.0	0.0
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	35.0	65.0	35.0	100.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	5.0					
T2A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	40.0	0.0	0.0	0.0		

Table 2: SFD Matrix for Chunar (CSE, 2021)

The outcome of the SFD graphic shows that 6% of the excreta flow is classified as 'Safely Managed', and the remaining 94% is classified as unsafely managed (Figure 1). The unsafely managed excreta originates from Faecal Sludge (FS) - not contained, not emptied (50%), FS not contained, emptied but not delivered to treatment (12%), Supernatant (SN) not delivered to treatment (28%) and open defecation (5%). The FS safely treated originates from FS not contained, delivered to treatment and treated (6%).

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

4.1 Offsite sanitation

None of the households in Sarai Taikore south ward are connected to sewer network. The Wastewater (WW) and Supernatant (SN) from the households are directly let into open drains.

4.2 Onsite sanitation

In absence of any kind of sewerage system in the ward, 100% of the population is dependent on onsite sanitation systems in Sarai Taikore[4]. There is no wastewater treatment plant in the city[5].

Containment

[4] KII with Sanitary inspector ,Executive Officer of NPP Chunar and field observation, July 2021.
[5] Field observation and KII with ward member of Saraitaikore.

According to HH survey, FGD with masons and officials and observation there are three types of containment systems prevalent in selected low income settlement area of Chunar City - septic tanks connected to open drains (Figure 4), fully lined tanks connected to open drains (Figure 3) and lined tanks with no outlet. 20% of the population is dependent on septic tanks connected to open drain (T1A2C6), 35% on fully lined tanks connected to open drain (T1A3C6) and 40% on lined tanks with impermeable walls and open bottom, no outlet or overflow where there is a 'significant risk' of groundwater pollution (T2A4C10)[6] as the rock type in the unsaturated zone is fine sand, silt and clay then the percentage of sanitation facilities that are located less than 10m away from groundwater sources were more than 25% and the percentage of sanitation facilities, that are located uphill of groundwater source were also more than 25%[7]. Coming to the water supply, the percentage of drinking water produced from groundwater sources were also more than 25% with the water production technology used included protected borewell and protected dugwell where adequate sanitary measures were in place which resulted in overall significant risk of groundwater[8] .The size of containment system depends on space availability and affordability of households. Whether it is a fully lined tank or septic tank, both are locally known as septic tank. Under the recent Swachh Bharat (Clean India) Mission, NPP Chunar constructed 59 Individual Household Latrines (IHHL) in this ward. One community toilet having 6 seats is present in this ward but it is poorly maintained and many of the seats are damaged. It was observed in the field, that open defecation is still being practised in the ward.

Figure 3: Toilet Connected to Fully Lined Tank (CSE/Manish Mishra, 2021).

Figure 4: Septic Tank Connected to Open Drain (CSE/Chirag Patel, 2021).

Community Toilets/Public Toilets: There is one community toilets in Sarai Taikore south ward which have a Septic Tank connected to Open Drain (STOD)[9]. The average size of the septic tank in community toilet is 5 x 2 x 4 m which is desludged every 1.5-2 years. Being declared as an Open Defecation Free (ODF) city, instances of open defecation are still prevalent in Sarai Taikore. According to CNPP, rare cases of open defecation can be attributed to behavioural issues but field observation shows that lack of daily and periodic maintenance of the public/community toilets contribute to open defecation in the city.

[6] Household Survey in Low-Income Group (LIG) with local masons and government desludgers.
[7] Field observation.
[8] https://www.sleigh-munoz.co.uk/sfd/database/gw-helper.html
[9] Field observations from visits to different Community & Public Toilet, 2020.

Emptying

The local body has one vacuum tanker of 3,500 litres capacity but the HHs in the selected low income settlement usually get their toilet containment emptied in 15 to 20 years frequency. The sanitary workers of the NPP use all Personal Protective Equipment (PPE) like gloves, boots and mask during emptying of OSS and cleaning of drains.[10] The user fee for mechanized emptying is INR 3,000 (40 USD). Manual emptying is still prevalent in this area as it is located on a high altitude and movement of vehicles is restricted to small vehicles only (Figure 5). Manual emptying is usually carried out by 2-4 people. The number of people deployed depends on the size of the containment and the degree of solidification of FS at the bottom of the containment. Spade and bucket are used by manual emptiers for emptying OSS without any safety gears. The emptying service fee ranges from INR 3,000 to INR 4,000 (40.30USD –53.730USD)[11]. Based on the sample household survey and FGD with emptiers, it was concluded that 65% of population is using their systems with emptying (variable F3 set to 65%). For system T2A4C10 (lined tank with impermeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution), the value of variable F3 was set to 0% as no emptying were done for the past 20 to 25 years.

Figure 5: Emptying FS from Sarai Taikore septic Tank (CSE/Manish Mishra) 2021).

Transportation

The faecal sludge emptied mechanically using a vacuum tanker gets transported to a newly constructed Faecal Sludge and septage treatment plant (Figure 7). The tanker has to cover a distance of 8 to 10 km for a round trip[12]. There is no leakage or spillage during transportation of FS through the vacuum tanker. The faecal sludge emptied manually is transported using hand/cycle carts which is discharged into open drains or any low-lying area in and around the ward. Supernatant (SN) is conveyed through open drains in the ward, which finally converge into a major nullah (open drain) eventually terminating in the Ganga River (Figure 6).[13]

Figure 6: Transportation of Supernatant through open drain (Nullah) (CSE/Manish Mishra, 2021).

Figure 7: Transportation of Faecal Sludge through Vacuum Tanker (CSE/Manish Mishra, 2021).

Based on FGDs with desludgers it was estimated that 35% of the faecal sludge emptied is getting delivered to the treatment plant (Variable F4 set to 35%), and rest of the 65% faecal sludge is getting emptied manually and not delivered to the treatment facility. Since no supernatant is delivered to any treatment facility variable S4e is considered zero.

[10] KII with government desludger , July 2021.
[11] KII with Sandeep Kumar,clerk at CNPP, July 2021.
[12] FGD with Sanitary inspector and trenching in charge Mr.Hiralal, July 2021.
[13] Document from JE Jalkal Vibhag, July 2021.

Treatment

Chunar has a newly constructed Faecal Sludge and Septage Treatment Plant (FSSTP) with a treatment capacity of 10 Kilo litres per day (KLD)(Figure 9). The entire amount of mechanically emptied faecal sludge is received at the FSTP[14]. There is no treatment of the supernatant and the grey water flows in the open drains. Depending upon the irrigation requirement of the crops, farmers often draw this mixture of supernatant and grey water from the big and small nullahs passing through their agriculture fields. As much as 50% of this mixture of supernatant and grey water is discharged into River Jargo, 25% in River Ganga and 25% on agriculture fields. River Jargo runs almost dry when it meets the Ganga River after flowing for 16 km (NPP, 2021). Since all the faecal sludge that is delivered to the FSSTP facility is getting treated (Figure 8), variable F5 is considered as 100%. But as supernatant is being discharged untreated, variable S5e is taken as zero.

Figure 8: Discharging of FS at Planted Drying Bed (CSE/Shantanu, 2021).

Figure 9: Aerial View of FSSTP Chunar (CSE/Manish Mishra, 2021).

5 Data and assumptions

The availability and accessibility of data:

- Two key sources of data are used; Census of India, 2011 and published documents of relevant departments. Ministry of Housing and Urban Affairs, Govt of India ,Swachh Bharat Mission, Swachh Survekshan 2021. Most of the data are then updated by Key Informant Interviews (KIIs), Focused Group Discussions (FGDs) and Field observations.
- Data on containment is available in Census but has been updated based on FGDs and KIIs. Data on emptying and transport has been collected by KIIs. However, most of the data is qualitative.

Assumptions followed for preparing SFD graphic:

- 80% of water supplied is wastewater generated.
- As per the guidance given in the Frequently Asked Questions (FAQs) in the Sustainable Sanitation Alliance (SuSanA) website, it is assumed that 50% of the

[14] KII with Project manager Mr.Afzal Khan UPJN Mirzapur, July 2021.

contents of septic tanks and fully lined tanks is FS. The FS in lined tanks with impermeable walls and open bottom was selected as 100%.

- Proportion of OSS emptied is considered as 65% assuming 11 years as the threshold, based on the size of the tank and no. of people dependent on that system. So, households getting their systems emptied in less than 11 years are considered to be using their system with emptying and those who are taking more than 11 years are considered as good as not emptying their systems.

6 Context-adapted SFD Graphic

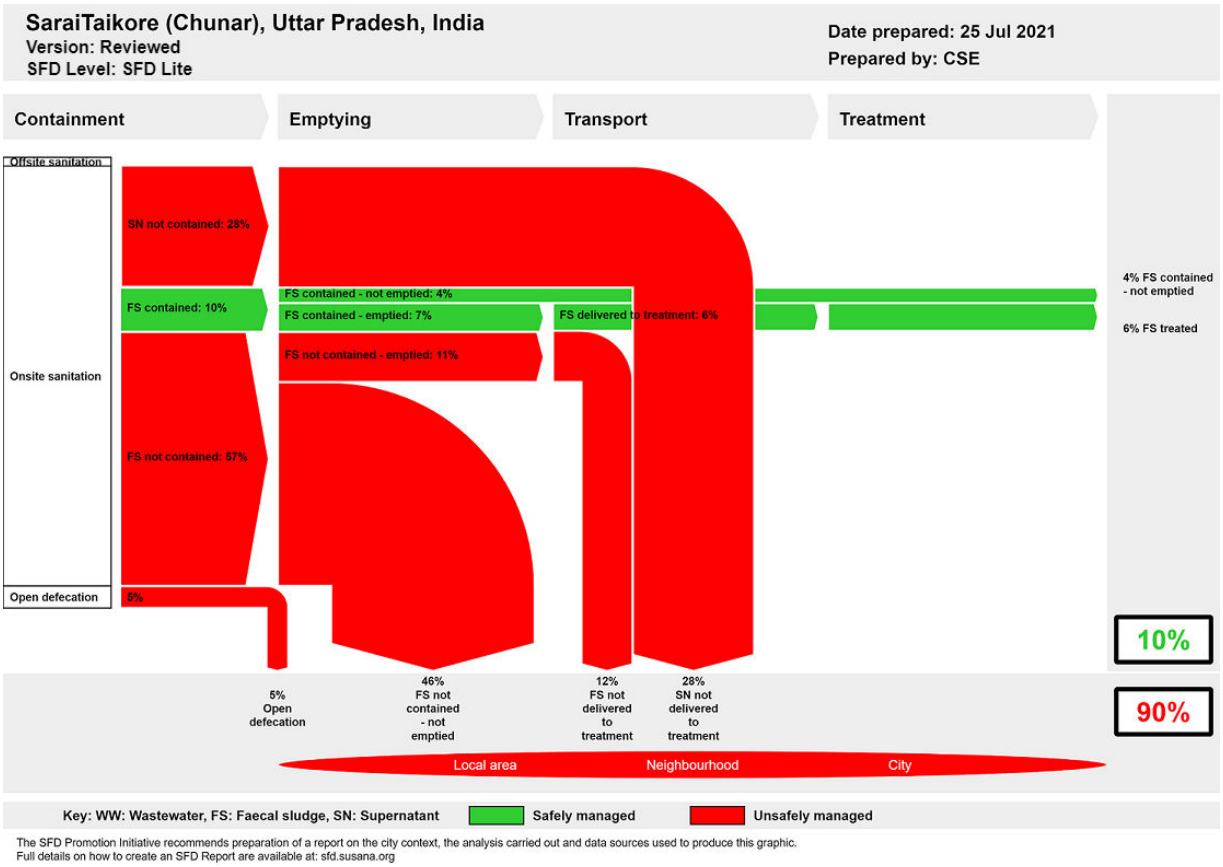

Figure 10 : Context-adapted SFD graphic for SaraiTaikore in Chunar (CSE, 2021).

The only difference suggested in the context-adapted SFD graphic is at containment stage for correctly designed septic tanks, though connected to open drains with an earlier assumption of 50% of the proportion of the content of the septic tank which is solid FS, generated and collected inside the septic tanks. 50% of the content is supernatant which attributes to be 28% of the population flows through open drains. The solid FS collected in the septic tank is considered to be contained and hence 10% of FS is contained (represented green in colour at containment stage). Followed by this, 7% (i.e 6.5%) is FS contained - emptied and the remaining 4% (i.e 3.5%) is FS contained - not emptied. The supernatant generated from the septic tanks connected to open drain is not contained and hence considered to be unsafely managed (represented in red colour). Overall, excreta of 90% of the population is not managed safely according to the context-adapted SFD graphic.

7 List of data sources

Reports and literature

- District Census Handbook 2011 for Chunar (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
- CGWB. 2014. Groundwater Year Book. Uttar Pradesh: Central Ground Water Board. Ministry of Water Resources, River Development and Ganga Rejuvenation.
- Swachhta Sarvekshan 2021, Ministry of Housing and Urban Development.
- Detailed Project Report of Faecal Sludge Treatment Plant in Chunar, 2019.
- Strategy cum operative guidelines on faecal sludge and septage management, 2020.
- SFD lite report of Chunar 2020, Centre for Science and Environment.

Key informant interviews (KIIs)

- Executive Officer, Nagar Palika Parishad Chunar (NPPC).
- Junior Engineer, JalKal Vibhag.
- Sanitation and Food Inspector, NPPC.
- Revenue Inspector, NPPC.

Focus Group Discussions (FGDs)

- Ward member old and new.
- Masons.
- Residents.
- Mechanical and manual emptiers.
- Sanitary workers, NPPC.

Sarai Taikore (Chunar), India, 2021

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