SFD Lite Report

Kalyanpur-Panki India

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

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1 The SFD Graphic

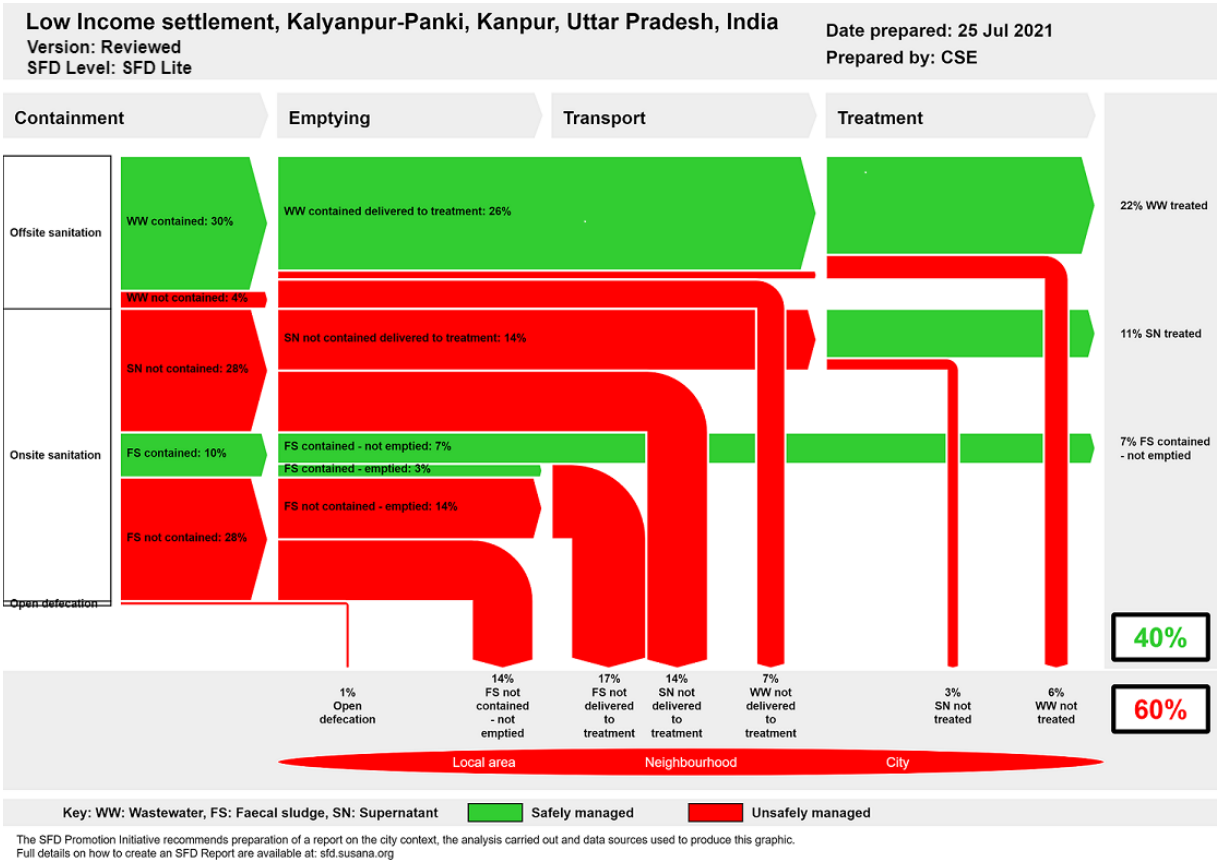

Figure 1: SFD Graphic for low Income settlement, Kalyanpur-Panki, Kanpur.

2 SFD Lite information

Produced by:

- Centre for Science and Environment, New Delhi.
- 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 Mr.Ajay Kumar Sankhwar, Health Sanitation Inspector, Kanpur Nagar Nigam, Nishkant Singh, Computer Operator, Health and Sanitation Department, Kanpur Nagar Nigam for providing the required secondary data and cooperating for Key Informant Interviews (KIIs) & Focused Group Discussions (FGDs).
- Mr. Abhishek Raj, Executive Engineer, Kanpur Awas Vikas .
- Kanpur Nagar Nigam, Uttar Pradesh which helped in providing relevant sanitation data.

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3 General city information

Kanpur is the biggest city of the state and is the main centre of commercial and industrial activities. Formerly it was known as Manchester of India. Now it is the commercial capital of Uttar Pradesh. It is situated on the right bank of the Ganga River. The city is famous for its leather and textile Industry. As per statistics released by District Industrial Corporation, Kanpur, the city has over 17,444 registered industrial units.

Panki is a suburb of metropolitan Kanpur, India, situated about 20 km from Kanpur Central on the NH-2 to Delhi. The region is famous for the Panki Temple and Panki Thermal Power Station which are among the few thermal energy units in Northern India. Panki is an industrial and residential region and has recently seen large economic developments. The site is also famous for being the logistics hub in Kanpur region.

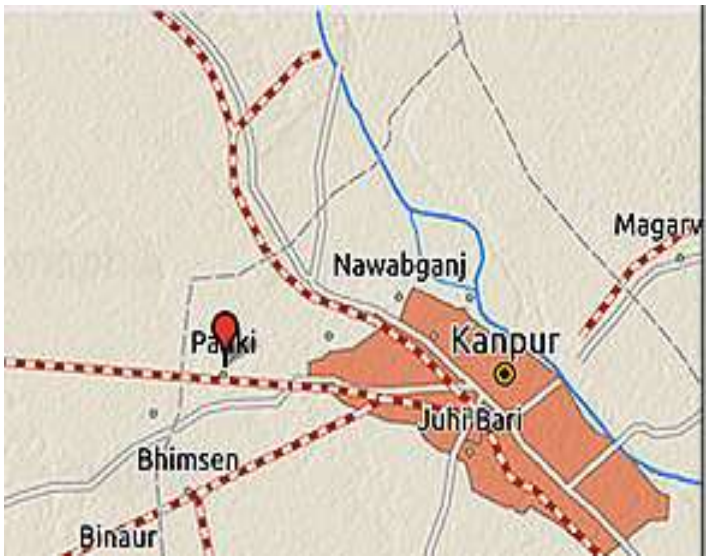

Figure 2: Location, Kalyanpur-Panki, Kanpur.

Awas Vikas Colony, Panki is a locality in Kanpur, Uttar Pradesh and its local governance falls under Kanpur division. The Urban Local Body (ULB) governing the suburb is Kanpur Nagar Nigam (KNN). The current population of the low income settlement residing in Kalyanpur-Panki is 11,672[1] and total no. of households (HHs) is 2,318[2] and is spread across 0.18 km^2 and falls in Saraimita administrative ward as per ULB records 2019. As per the census 2011, the population of the area was 8,231 and total no. of households (HHs) were 1,910. There has been no change in the ward boundary and area since the 2011 census.

The average annual rainfall is 821.9 mm. Climate is dry-winter humid subtropical climate under the Köppen climate classification. It is characterized by hot summer and pleasant monsoon and cold to mild winter. About 90% of rainfall takes place from June to September. Depth of groundwater in pre and post monsoon ranges between 5-10 metres below ground level (mbgl) with fluctuation of 1.5 mbgl and 2-5 mbgl during pre and post monsoon, respectively. The major part of the district consists of ordinary soils known locally as Bhur and Sand on ridges, Matiyar or clay in depressions and Domat or Loam in the Plains. The source of water in the low income settlement area of Kalyanpur-Panki is through municipal supply. The water supply in the area through municipality is 140 litres per capita per day (lpcd). However, people residing in the slum area depends on groundwater and water tanker supply by the municipality.

[1] KII with ULB official and official record.
[2] As per official record from KNN.

4 Service outcomes

Low Income settlement, Kalyanpur-Panki, Kanpur, Uttar Pradesh, India, 25 Jul 2021. SFD Level: SFD Lite
Population: 11672
Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 100%

Containment										
System type	Population	WW transport	WW treatment	WW transport	WW treatment	FS emptying	FS transport	FS treatment	SN transport	SN treatment
	Pop	W4a	W5a	W4c	W5c	F3	F4	F5	S4e	S5e
System label and description	Proportion of population using this type of system (p)	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
T1A1C2 Toilet discharges directly to a centralised foul/separate sewer	30.0	85.0	80.0							
T1A1C6 Toilet discharges directly to open drain or storm sewer	4.0			50.0	80.0					
T1A2C6 Septic tank connected to open drain or storm sewer	15.0					50.0	0.0	0.0	50.0	80.0
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	40.0					50.0	0.0	0.0	50.0	80.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	10.0					30.0	0.0	0.0		
T1B11 C7 TO C9 Open defecation	1.0									

Table 1: SFD Matrix for low income settlement Kalyanpur-Panki, Kanpur.

The outcome of the SFD graphic shows that 60% of the excreta is unsafely managed (Figure.1), out of which, 1% is due to open defecation in the area, 14% from Faecal Sludge (FS) not contained - not emptied, 17% from FS not delivered to treatment plant, 14% Supernatant (SN) not delivered to treatment plant, 7% Wastewater (WW) not delivered to treatment plant, 3% SN not treated and 6% WW not treated. 40% of the excreta is safely managed which is a result of 22% treated WW, 11% SN treated and 7% FS contained - not emptied.

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

4.1 Offsite Systems

There is sewer network coverage in the area within the study area- Awas Vikas colony. The connections have been provided by Kanpur Nagar Nigam and it corresponds to 30% of the population residing in the study area (T1A1C2). In addition, in the sample household survey, it was found that few of the households have connected their toilets discharging directly to an open drain (T1A1C6)(Figure 4)[3]. It was concluded that such households correspond to 4% of the population of the low income group.

4.2 On-site Sanitation Systems

Containment: In low income settlement Panki, 34% of the population is dependent on the off-site sanitation system and 65% of the population depends on onsite sanitation system

[3] Sample household survey, 2021.

(OSS). The most prevalent OSS in the low income settlement area in Panki is fully lined tanks connected with open drains (T1A3C6) and as high as 40% of the population is dependent on this type of system (Figure 3). 15% of the population has septic tanks connected to open drains (T1A2C6) and around 10% of the population has constructed lined pits with semi-permeable walls and open bottom with no outlet and no overflow (T1A5C10). In this system, low risk of ground water contamination is selected since groundwater level is as low as 80 feet (24.3 metres) as informed by locals in the area.

Figure 3: FLT discharging into open drain.

Figure 4: Toilet discharging into open drain.

Customarily, the population dependent on lined pits with semi-permeable walls are observed particularly in areas with congested space and high population density. However, in areas with less space constraint, people have constructed either septic tanks (ST) or fully lined tank (FLT) (with outlets), lined tanks with open bottom. 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 tanks (with outlet) without baffle wall is considered as fully lined tank. As per Focused Group Discussion (FGD) with masons and based on field observation, it was seen that septic tanks were less prominent as compared to fully lined tanks. 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. However, due to the low groundwater level of the city within the concerned study area, there is low risk of groundwater pollution. However, during monsoon season, the groundwater level rises and increases the chances of contamination.

Emptying: The area is dependent on desludging service provided by the Urban Local Body (ULB) vacuum tanker and few private operators for emptying faecal sludge from containment systems of the households. The frequency of emptying varies from 6 to 8 years and can go up to 15 years for larger containment systems. Hence, it was observed that households are taking too long to get their contaminants emptied. Hence, it was assumed that the population using their systems with emptying (variable F3) is taken as 50% for all sanitation systems, except for lined pits with semi permeable walls and open bottom, no outlet no overflow (T1A5C10) as their emptying frequency when compared with that of septic tanks/fully lined tanks was almost half i.e. 25%. So, in order to make easier calculations, the F3 variable for these systems was taken as 30%.

Emptying frequency varies across the area, depending upon the type of Onsite Sanitation Systems (OSS). Containments, which have outlets, have an emptying frequency ranging from 6-10[4] years depending on the size of the tank, whereas a system with open bottom increases to 15-20 years.

ULB has registered 2 private desludgers which provide emptying services in the area (Figure 5). The faecal sludge carrying capacities of these trucks varies between 4,000-5,000 litres and the fee charged by them ranges from 13 – 20 US$[5] per trip.

Figure 5: Emptying service in action.

As per KII with private operators, the depth of septic tank differs with pertinence of location. These private desludgers advertise their contact number by distributing business cards or posters on walls (Figure 6). On an average, private vacuum tanker operators receive 1 emptying request every 1-2 weeks, monsoon being the peak season for emptying. On an average, it takes about 1–2 hours for completing one trip depending on the distance covered during the trip.

Transportation: Wastewater generated from households connected with the sewer network is approximately 1.2 Million Litres per day (MLD), out of which 85% of the wastewater directly reaches the Sajri STP (Figure 7). The transportation efficiency of these sewage networks has been assumed as 85% taking into account losses occurring due to pipe leakages spread over long distances (variable w4a set to 85%). Supernatant generated from containments (septic tank/fully lined tank) connected to open drains, is transported through open drains.

[4] Based on sample HH survey
[5] Based on KII with ULB vacuum tanker driver.

Figure 6: **Private vacuum tanker in Panki.**

Figure 7: UASB Reactor System at Sajri STP.

These small drains eventually converge to form big drains. These big drains are tapped and the supernatant is diverted to Sajri STP. However, due to unlined open drains, it is considered that only 50% of the supernatant reaches the treatment facility (variable S4e set to 50%).

Treatment and End-use/disposal: The total wastewater generated in the study area of Panki is 1.2 MLD. Out of this, almost 1.02 MLD reaches the STP through sewer network. The treatment efficiency of the STP at Sajri is taken as 80% on the basis of visual inspection of the STP during field visit (variables W5a and S5e set to 80%). Private vacuum tanker operator discharges the faecal sludge in nearby low lying areas[6]. Usually, local farmers in the peripheral area of Panki allow them to discharge the FS on their farm lands, which is later used by farmers as a soil conditioner. Sometimes, farmers tip them on discharging FS regularly in times of need.

Open Defecation: In the study area of Panki, there is considerable number of slums and the slum population lacks access to toilets. Some of the community toilets in the vicinity of the area are not functional and based on the field visit. It is estimated that 1% of the population is still engaged in open defecation.

5 Data and assumptions

Census 2011 was considered as the baseline and the data for all the stages of the sanitation chain were updated based on the data collected from the field through KIIs, FGDs, observations and secondary data collected from relevant stakeholders. Following assumptions were made for developing the SFD graphic for low income settlement area, Kalyanpur-Panki.

- Losses in the sewerage network are taken as 15%.
- Treatment efficiency of STP is taken as 80%.
- Proportion of FS emptied is taken as 50% for septic tanks and fully lined tanks and 30% for lined tanks with semi-permeable walls and open bottom.
- 80% of water supplied is wastewater generated.

[6] Field observation, 2021.

6 Context-adapted SFD Graphic

The only difference suggested in the context-adapted SFD is at the containment stage .The FS portion of correctly designed septic tanks is considered as safely managed, even though connected to open drains. The supernatant is considered as unsafely managed. So, the final percentage for safely managed excreta becomes 44% and the unsafely managed excreta decreases to 56%.

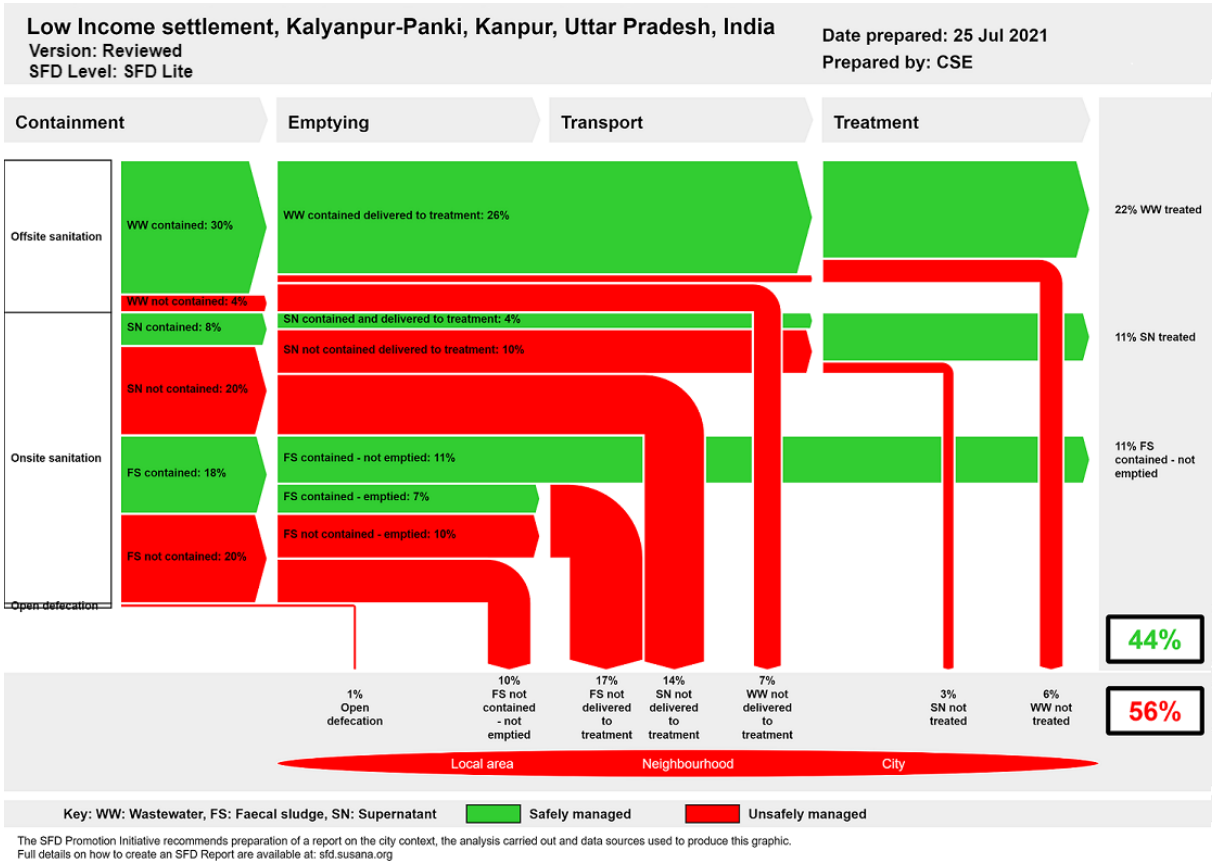

Figure 8: Context-adapted SFD Graphic for low Income settlement Kalyanpur-Panki, Kanpur.

7 List of data sources

Reports and literature

- District Census Handbook 2011 for Kanpur (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 & Level)State/UTs-Town//Village/Ward http://censusindia.gov.in/2011census/population_enumeration.html
- Groundwater Year Book - Uttar Pradesh (2015-16): Central Ground Water Board (CGWB), Available at http://cgwb.gov.in/Regions/GW-year-Books/GWYB-2015-16/GWYB%20NR%202015%20-%2016.pdfMoSJE. 2014.
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- NMCG. 2011a. National Mission for Clean Ganga. [Online] [Accessed 15 September 2020] Available at: http://nmcg.nic.in/about_nmcg.aspx

Key Informant Interviews (KIIs)

- Health Sanitation Inspector, Nagar Nigam Kanpur.
- Executive Officer, IT Cell.
- Computer Operator, Nagar Nigam Kanpur.
- Executive Engineer, Awas Vikas , Kanpur.

Focus Group Discussions (FGDs)

- Masons.
- Ward members.

Field Visits

- Public and Community toilets.
- Nullah tapping locations.
- Sewage Treatment Plants.
- Random household survey.

Kalyanpur-Panki, Kanpur, India, 2021

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