

SFD Lite Report

Jammu India

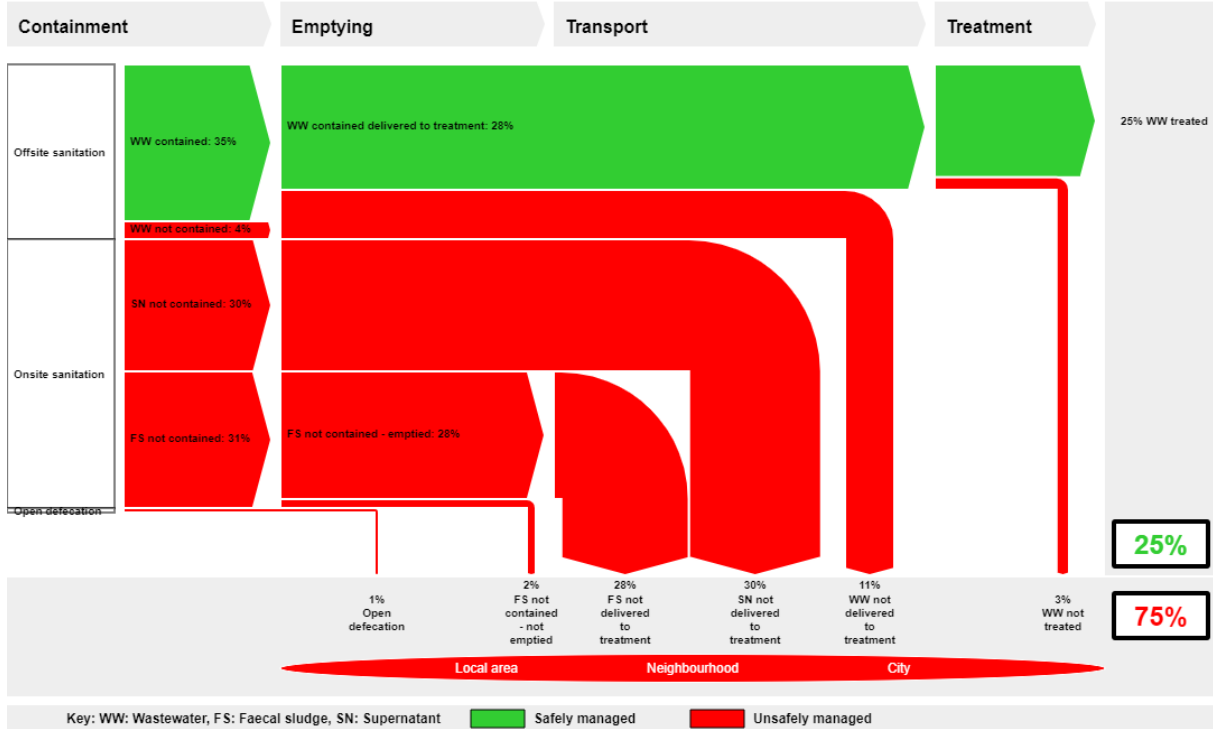
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1 The SFD Graphic

Jammu, J&K, India
Version: Reviewed
SFD Level: SFD Lite

Date prepared: 16 Sep 2020
Prepared by: Richa Thakur



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 SFD Lite information

Produced by:

- Richa Thakur
- 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 Rajesh C, Assistant Engineer, Urban Environment Engineering Department (UEED); Mr Hemdeep Ishar, MIS Operator UEED; Mr Deep Sharma, Statistician, Jammu Municipal Corporation (JMC); Mr Rakesh Chander Gupta, Special Assistant to the Commissioner, JMC for providing all the required secondary data and cooperating for Key Informant Interviews (KIIs) & Focussed Group Discussions(FGDs).
- This report would not have been possible without constant support of Mr Rajesh C, Mr Hemdeep Ishar and Mr Rakesh Chander Gupta who helped in conducting sample surveys and FGDs in the field.

Collaborating partners:

- Jammu Municipal Corporation, Jammu & Kashmir
- Centre for Science & Environment, New Delhi, India

Date of production: 16/09/2020

3 General city information

Jammu city is situated along the bank of River Tawi in the Union territory (UT) of Jammu & Kashmir. It is also regarded as the summer capital of the UT. Jammu is the district headquarters of Jammu district. The urban local body governing the city is Jammu Municipal Corporation (JMC). JMC has an administrative area of 189 sq.km which is divided into 75 wards and 3 zones¹. The density is 56 per sq. km which is fairly below the national average of 382 per sq. km².

According to 2011 census, the population of the city was 5,89,640 and total number of households was 1,20,007³. The current population of the city is 7,02,290. The municipal boundary and current population is used for preparation of SFD.

It is located at mean elevation of about 327 msl at 32° 43' 58.7928" North and 74° 51' 51.3828" East⁴. Jammu city is bestowed with hills and forests in the south-east and north-east running from Sapwal to Nagrota physically. Jammu city's topography is characterized by innumerable natural drainage channels or seasonal rivers dominating its landscape. Since the city exists in the foot-hills of Himalayas on east side, the conglomerate of small boulders with silt often gets carried away by the incessant rains causing heavy damage to the services and infrastructure⁵.

The average rainfall of the city is 1238mm⁶. June is the hottest month of the year with mean daily temperature ranging between 24.9° C and 41.7C and reached up to 47° C. January is the coldest month and temperature comes as low as 4.0°C. The groundwater levels ranges between 2m - 5m⁷.

Table 1: Population Growth rate Jammu City

| Census Year | Population | Growth Rate (%) | Source |
|-------------|------------|-----------------|---|
| 1981 | 2,06,135 | - | Census 2001 |
| 1991 | 2,67,976 | 2.3 | Census 2001 |
| 2001 | 3,69,959 | 2.8 | Census 2001 |
| 2011 | 4,91,555 | 2.5 | Census 2011 |
| 2017 | 6,08,497 | 1.9 | Population Projected in DPR for Septage Management Plant(2017) |
| 2020 | 7,02,290 | 1.3 | Projected Population by Arithmetic Population Method along with Floating population |

4 Service outcomes

¹ FGD with ULB official, Jammu Municipal Corporation

² Master Plan for Jammu, 2032

³ Census of India, 2011

⁴ Master Plan for Jammu, 2032

⁵ Master Plan for Jammu, 2032

⁶ Master Plan for Jammu, 2032

⁷ District Ground Water Profile, 2013

Jammu, J&K, India, 11 Sep 2020. SFD Level: SFD Lite

Population: 702290

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 |
|---|--|--|--|--|--|---|---|---|---|---|
| System description | 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 |
| T1A1C1 Toilet discharges directly to a centralised combined sewer | 35.0 | 80.0 | 90.0 | | | | | | | |
| T1A1C6 Toilet discharges directly to open drain or storm sewer | 4.0 | | | 0.0 | 0.0 | | | | | |
| T1A2C6 Septic tank connected to open drain or storm sewer | 55.0 | | | | | 95.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer | 4.0 | | | | | 95.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| T1B11 C7 TO C9 Open defecation | 1.0 | | | | | | | | | |
| T2A4C5 Lined tank with impermeable walls and open bottom, connected to a soak pit, where there is a 'significant risk' of groundwater pollution | 1.0 | | | | | 95.0 | 0.0 | 0.0 | | |

Table 2: SFD Matrix for Jammu

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

4.1 Offsite Systems

The city does not have a planned and a full-fledged sewerage system. For the purpose of sewerage management, the city has been divided in three divisions via. A, B and C due to topographical irregularities⁸. At present, the sewerage network for division A is completed which is on the right side of River Tawi. The STP (Sewage Treatment Plant) for the completed sewer network is constructed at Bhagwati Nagar in 2017 with a capacity of 67 MLD out of which only 27 MLD (Million liters per day) is operational⁹. The STP is based on UASB technology. Currently, only 20,000 households are connected to the STP out of 47,000 connections planned to be laid by ERA (Economic Reconstruction Agency) & NBCC (National Building Construction Corporation)¹⁰.

According to census 2011, around 21.47% of the city population is connected to sewerage network¹¹. Currently 35% of the city's population is connected to the sewer system based on sample household survey, KIIs and FGDs with relevant stakeholders. During the household survey, it was observed that around 4% of population along river bank have toilets directly discharging into open drains¹².

Presently conservancy system of using bucket latrines which necessitates carriage of night soil from latrines by sweepers to cart trucks and then to the disposal site is practiced in few parts of the city. In most parts of the old city, night soil is flushed into roadside drains and natural water channels causing fly nuisance and unhygienic conditions¹³.

Currently, there are no provisions laid for interception and diversion of natural drains for transporting wastewater to STP. In several parts of the old city, such as Jewel Chowk, Raghunath Bazar, Karan Nagar, Amphala, etc. main trunk sewer lines were laid, but household connections were not provided..As

⁸ KII with UEED official

⁹ Field observation

¹⁰ Detailed Project Report for STP, 2017

¹¹ District Census Handbook 2011 for Jammu

¹² Field observations

¹³ Master Plan of Jammu, 2032

per the current scenario, ~80% of the wastewater is reaching to the STPs (w4a) considering the defunct sewer lines and leakages which finds its way to either storm water drains and river¹⁴. There are no seasonal variations observed in the inflow according to the operators¹⁵. The lab report from the STP revealed that the discharge standards, prescribed by Central Pollution Control Board (CPCB), are met by the plant, hence the wastewater and supernatant treated at the STP is considered 90% (w5a) which is safely discharged into River Tawi¹⁶. The sludge generated at STP is reutilized for horticulture purpose at plant itself¹⁷.



Figure 1: Sewage Treatment Plant in Bhagwati Nagar, Jammu

4.2 On-site Sanitation Systems

Containment: Based on sample household survey, KIIs and FGDs with relevant stakeholders, it was concluded that 62% population is dependent on the On-site Sanitation Systems (OSS)^{18,19,20}. The two most prevalent OSS in the city are Fully lined tank (FLT) connected to open drain (T1A3C6, 4%) and Septic tank (ST) connected to open drains (T1A2C6, 55%)^{21,22}. FLTs are either square or rectangular in shape whereas septic tanks are 2-3 chambered tanks with proper partition walls including plastered bottom²³. The average size of septic tank is 800 mm x 1000 mm x 1900 mm and fully lined tank is depending upon the household size, income level etc²⁴.



Figure 2: Septic tank under construction (Right) and design of Septic Tank (left)

¹⁴ Field observations & KII

¹⁵ Field observations

¹⁶ KII with Urban Environmental Engineering Department (UEED)

¹⁷ Field observations

¹⁸ Field observations

¹⁹ KII with Executive Engineer

²⁰ FGDs with sanitation staff

²¹ Sample household survey

²² FGD with masons

²³ KII with UEED officials

²⁴ Field observations

Community Toilets/Public Toilets: According to the Swachh Bharat Mission (SBM), 4991 Individual Household Latrines (IHHL) have been provided to households having no toilets or to households with insanitary toilets as of August 2020. There are eight community toilets and 22 public toilets in the city which have septic tank connected to open drain²⁵. The average size of septic tanks in public toilet is 4 x 3 x 3.5 m and in community toilet is 15 x 4 x 1 m²⁶.

Even though Jammu has been declared as an Open Defecation Free city, the instances of open defecation is still observed along the nallahs²⁷. According to JMC, open defecation is practiced among the migrant labours settled away from public toilets and community Toilets. The unequal distribution of PT/CT's across the city is matter of concern.

Emptying: The city is dependent partly on both public and private desludging service providers for emptying of faecal sludge (FS) from OSS. JMC owns 5 tractor mounted vacuum tankers²⁸. There are over 10 private operators with 40+ truck mounted vacuum tankers plying in the city²⁹. The vacuum tankers are equipped with a motorised pump with a storage capacity of 5000 to 6000 L .



Figure 3: Emptying of faecal sludge by private emptier



Figure 4: Public Toilets in Jammu City

The private emptiers usually charge between INR 1500 - 1800 per trip based on the size of containment and service area³⁰. Most of private emptiers operate from Gangyal and Baribrahmna area in the outskirts of the city³¹. The emptying frequency for households varies from 3 to 4 years (demand based) depending upon the nature and the size of containment system. While for public and community toilets, the emptying is done once in every 3-6 months³².

²⁵ Field observations

²⁶ KII with private operators

²⁷ Field observation

²⁸ KII with Sanitary Inspector

²⁹ FGD with private desludgers

³⁰ FGD with private desludgers

³¹ FGD with private desludgers

³² Primary Survey

The private emptiers are not provided with Personal Protective Equipments (PPEs)³³. There were no instances of manual emptying observed in the city³⁴.

Transportation: The emptied faecal sludge is transported using truck/tractor mounted vacuum tanker in around 1-2 trips per day³⁵. These vacuum tankers cover a distance of 3-5 km per trip on an average³⁶. The time taken for emptying and discharge of FS is one hour on an average with exceptional households located in congested areas where it may take as long as four hours³⁷. The emptied faecal sludge is discharged along the sub urban areas and farms³⁸. Since none of the FS getting emptied is delivered to the treatment facility, F4 & S4e is considered to be 0% in SFD matrix.



Figure 5: Private tractor mounted vacuum tanker

Treatment/Disposal: JMC has no designated site for the disposal of FS³⁹. Therefore in the absence of such provision, the private emptier discharge the faecal sludge along the sub urban areas and farms. There are 35 nullahs carrying wastewater in the city, out of which 15-16 are directly overflowing in the Tawi River. The rest are overflowing in other water bodies and low-lying areas. Since there is no proper treatment of emptied faecal sludge, F5 & S5e is considered 0% in SFD matrix. . There is a proposed FSTP of 167 KLD capacity constructed under AMRUT scheme at Bhagwati Nagar but it is not yet commissioned. Currently, noere is no proper treatment of emptied FS hence, F5 is zero.



Figure 6: Faecal sludge driving at STP

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 for Jammu.

- 80% of water supplied is wastewater generated
- 50% of the contents of Septic tanks and Fully lined tank is Faecal sludge
- Proportion of OSS emptied is considered as 95% assuming 5 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 5 years are considered to be using their system with emptying and those who are taking more than 5 years are considered as good as not emptying their systems.

6 Context adapted SFD Graphic

³³ Field observations

³⁴ Primary survey & field observations

³⁵ FGD with private desludgers

³⁶ FGD with private desludgers

³⁷ FGD with private desludgers

³⁸ Field observation, 2020

³⁹ KII with Sanitation and Food Inspector, BNPP

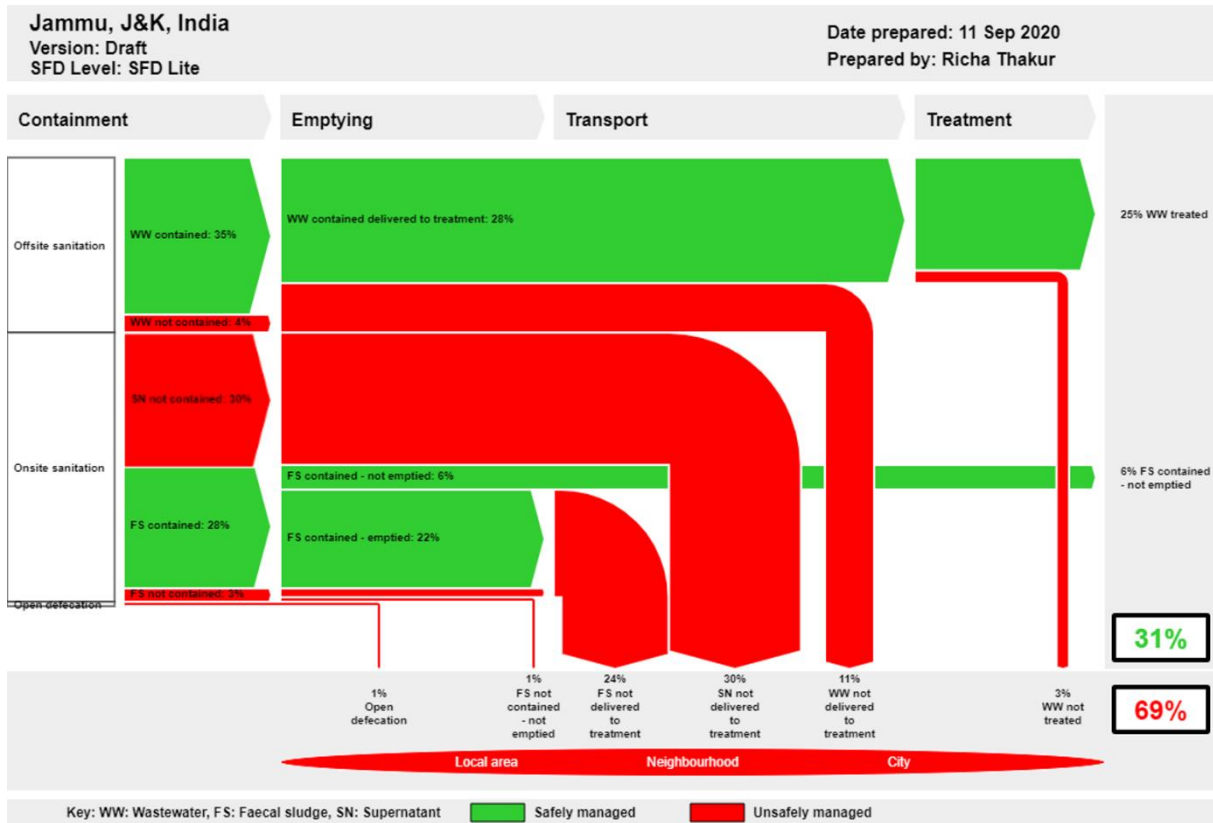


Figure 6: Context adapted SFD Graphic for Jammu

The key point of difference as reflected in the context adapted SFD 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 30% of the population flows through open drains. The solid FS collected in the septic tank is considered to be contained and hence 28 % of FS is contained (represented green in colour at containment stage). Followed by this, 22% FS contained is emptied, remaining 6% is FS remains in the tank which is contained and never emptied. The supernatant generated from the septic tank connected to open drain is not contained and hence regarded to be unsafely managed (represented red in colour). Overall, excreta of 69% population in the Jammu city is not managed according to the context adapted SFD.

7 List of data sources

Reports and literature

- District Census Handbook 2011 for Jammu (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>)
- Ground Water Information Booklet Jammu district, J&K (2013).
- IHHL, SBM data, Jammu, J&K (2018-2019).
- Jammu Master Plan 2032, Jammu Development Authority (2012)
- DPR for Construction of STP of 4 MLD capacity in Jammu City under AMRUT Scheme (2015-16).
- DPR for Septage Management Scheme, Jammu City, 2017.

Key Informant Interviews (KII)

- Regional Sulabh Incharge
- STP In-charge & Site Engineer
- Sanitation Inspector
- Additional secretary to Municipal Commissioner, JMC
- Assistant Engineer, UEED Jammu

Focus Group Discussions (FGD)

- Masons
- Private desludging operators
- Ward members.

Field Visits

- Survey of Public toilet (8 nos) and community toilets (1 nos).
- Visit to STP at Bhagwati Nagar
- Visit to FSTP at Bhagwati Nagar
- Visit to approximate 50 households covering Slums, Lower Income Groups (LIG), Middle Income Groups (MIG) and Higher Income Groups (HIG) spread throughout the town

SFD Jammu, India, 2020

Produced by:

Richa Thakur

Editing:

CSE, Dr Suresh Kumar Rohilla

CSE, Manish Mishra

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