SFD Lite Report

Lama Municipality Bangladesh

This SFD Lite Report was prepared by
CWIS-FSM Support Cell, DPHE

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1 The SFD Graphic

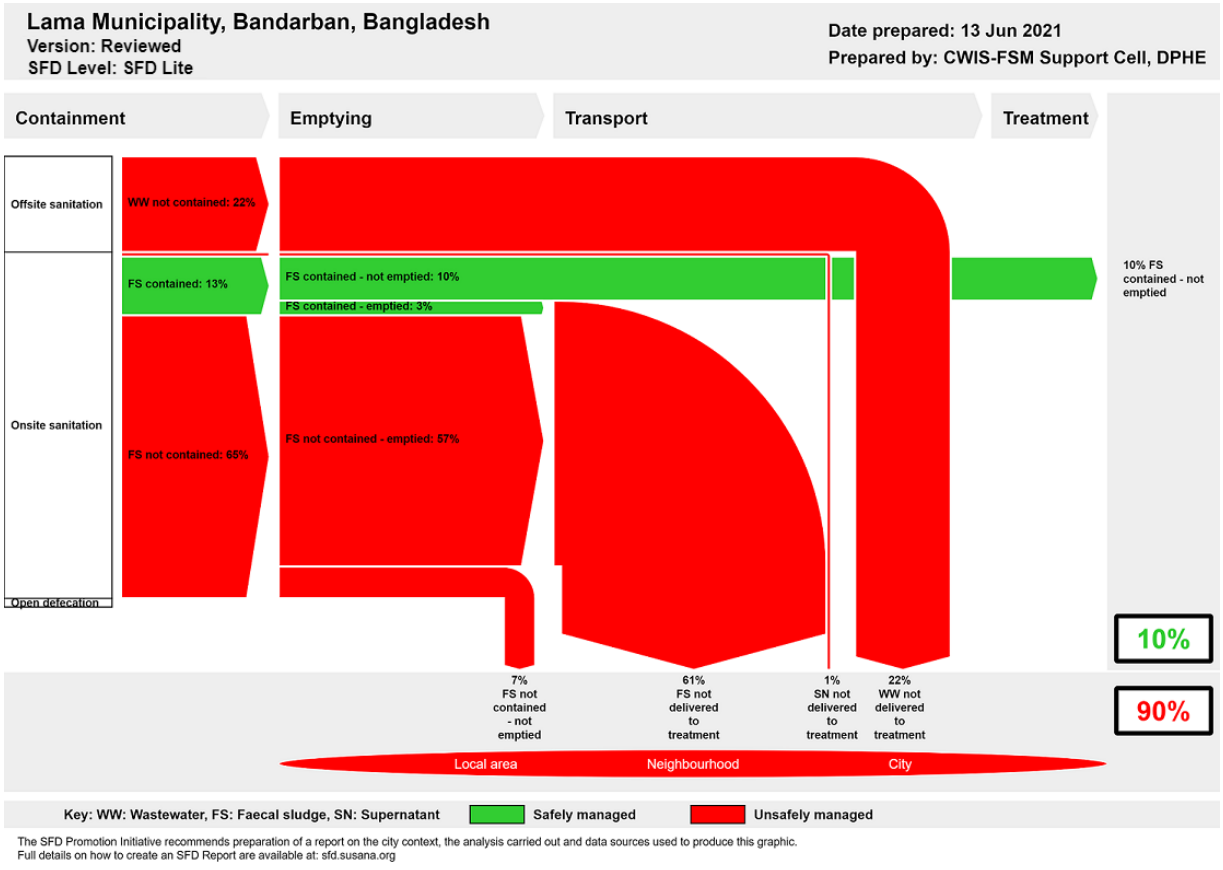

Figure 1: SFD Graphic for Lama municipality.

2 SFD Lite information

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- This report was compiled as a part of the Baseline Survey of Urban Infrastructure Improvement Preparatory Facilities (UIIPF) project of DPHE. We would like to thank Mr. Md. Zahirul Islam, Mayor, Lama Municipality, Mr. Nur Muhammad, Tax Assessor, Lama Municipality for providing all the required primary and secondary data and cooperating for Key Informant Interviews (KIIs) & Focussed Group Discussions (FGDs). This report would not have been possible to produce without the constant support of Mr. Md. Zahirul Islam, Mayor, Lama Municipality, helped in conducting sample surveys and FGDs in the field. And finally, Centre for Science and Environment, India provided necessary training on SFD and we are acknowledging their profound support also.

Collaborating partners:

- AQUA Consultant and Associates, and Lama Municipality played vital roles in collecting and sharing data, and producing this SFD graphic and SFD lite report.

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3 General city information

Lama municipality is a hill town of Bandarban, which is 366 km away from Dhaka city. It is surrounded by hills and River Matamuhuri. It is connected with road and water. Lama is a sub-division town (Upazila) in Bangladesh administrative map. Before, it was declared a municipality in 2001. Lama is one of the 330 municipalities in the country.

Table 1: City profile.

Population parameters	
Estimated population, 2021	28,903
Households, 2021	6,010
Area, sq.km	14.50
Total roads, km	56.00
Total drains, km	18.00

According to the population census in 2011 by the Bangladesh Bureau of Statistics (BBS), the municipality population was 19,010. The urban population growth in Lama is considered 3.29% per year. Considering 10% floating population, such as farmers and traders, comes to the city every day, the present (2021) population is estimated to be around 28,903.

The municipality covers an area of 14.50 square kilometres. At present, the Lama municipality has 56.00 km of road out of which 24.00 km is the kutcha road, 32.00 km is the pucca road. The city has about 18.00 km of drain which includes 3.00 km of pucca drain and 1,500 km of the earthen kutcha drain (Table 1).

The geographical coordinates of Lama are 21° 47' 30" North, 92° 12' 30" East (Figure 2). In the context of Bangladesh, the municipality area is relatively highland. The Matamuhuri River passes around the municipality. The municipality is located in the axial part of the Matamuhuri anticline where sediments of the Bhuban and Boka Bil Formations are exposed to the surface. These formations are comprised of alternating bluish-grey to yellowish-grey, well-bedded siltstone and shale with subordinate light yellowish-brown to brown, fine to medium-grained, bedded to massive, hard sandstone, locally calcareous and conglomeratic.

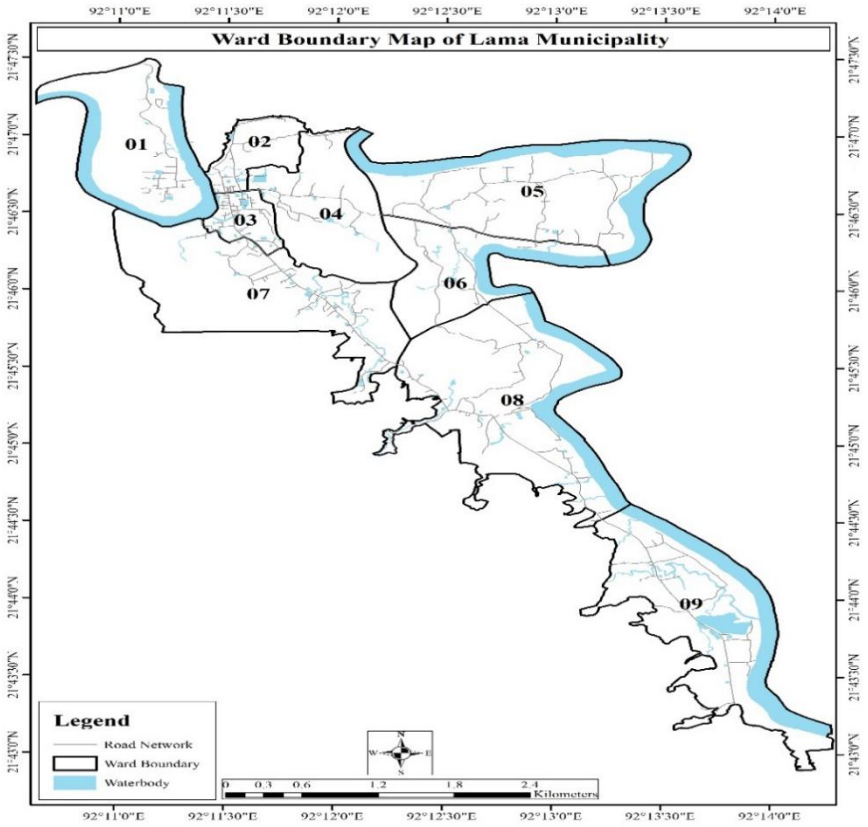

Figure 2: Lama Ward Boundary Map.

According to the Bangladesh Meteorological Department, the city area and surrounding area experience a tropical monsoon climate. It is characterized by warm, humid summers and cool, and dry winters. About 84% of the total annual rainfall occurs in the period from May through October and the driest months of the year are November to March. The maximum mean temperature observed is 26.3°C -32.3°C between April-August, with the minimum mean temperatures of between 11.8-13.3°C in January. The annual average rainfall is about 2,250 mm, according to BMD (1981-2020).

Like the Sangu River, the Matamuhuri River also flows Northwest in the Hill Tracts and enters Cox's Bazar district from the east. Bhuban, Boka Bil, Tipam Sandstone and Dupi Tila formations constitute the bedrock of Lama town. According to the flood zoning map of Bangladesh (BMD, 2012), the city is in a flood-free zone. However, the drainage network of the city is not adequate. Every year, many city areas face water logging during the monsoon for drainage congestion. There are some secondary drains carrying stormwater and domestic wastewater to the outfalls of the rivers and canals.

The population density in the 9 wards of the city is shown in Figure 3. The density is high in the north and west, ranging from 2,620 to 8,571 per sq km. The population density in the south and east is lower, ranging from 1,034 to 1,140 per sq km.

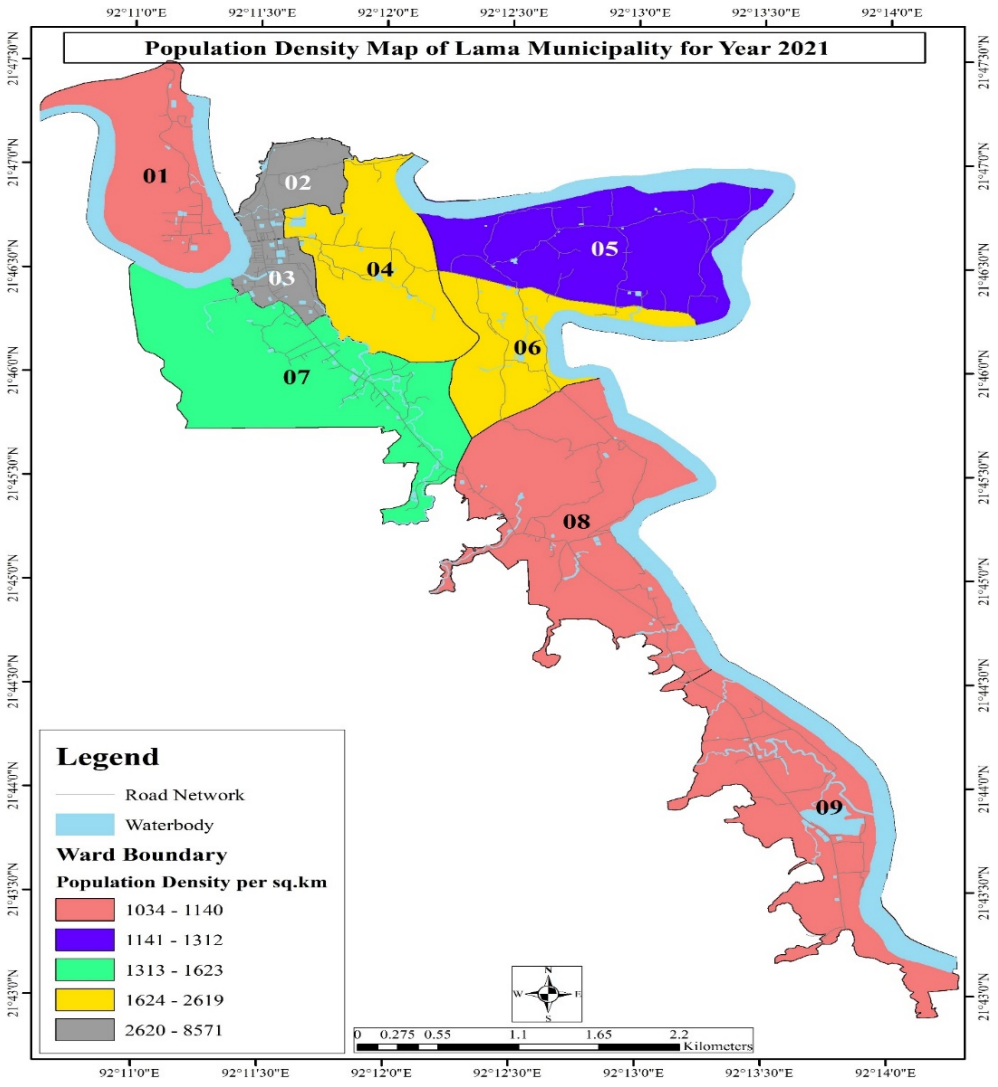

Figure 3: Population density in different Wards of Lama municipality.

4 Service outcomes

Lama Municipality, Bandarban, Bangladesh, 13 Jun 2021. SFD Level: SFD Lite
Population: 28903
Proportion of tanks: septic tanks: 95%, fully lined tanks: 0%, lined, open bottom tanks: 100%

Containment						
System type	Population	Emptying	Transport	Treatment	Transport	Treatment
	Pop	F3	F4	F5	S4e	S5e
System label and description	Proportion of population using this type of system	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
T1A1C7 Toilet discharges directly to water body	6.1					
T1A1C8 Toilet discharges directly to open ground	15.8					
T1A2C5 Septic tank connected to soak pit	7.0	50.0	0.0	0.0		
T1A2C6 Septic tank connected to open drain or storm sewer	1.0	20.0	0.0	0.0	0.0	0.0
T1A2C7 Septic tank connected to open water body	1.4	20.0	0.0	0.0		
T1A2C8 Septic tank connected to open ground	0.6	20.0	0.0	0.0		
T1A2C9 Septic tank connected to 'don't know where'	0.7	20.0	0.0	0.0		
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	6.4	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	56.7	100.0	0.0	0.0		
T2A6C10 Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	4.3	0.0	0.0	0.0		

Table 2: SFD Matrix for Lama municipality.

The outcome of the SFD graphic shows that only ten percent (10%) of the excreta flow is classified as safely managed, and the remaining ninety (90%) percent is classified as unsafely managed (Figure 1). The unsafely managed excreta origínate from wastewáter not delivered to treatment (22%), Faecal Sludge (FS) not contained – emptied but not delivered to treatment (61%), FS not contained – not emptied (7%) and 1% of the supernatant not delivered to treatment.

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 dedicated sewerage system. However, during field observation and HouseHold (HH) survey, it was found that there are certain areas where toilets are directly connected to water bodies and open ground. A portion of septic tanks are directly connected to open drains or the storm sewer. Therefore, systems T1A1C7 and T1A1C8 are considered as 6.1% and 15.8% respectively of the total population of the city to generate the SFD graphic. Similarly, the system T1A2C6 is considered as 1% of the total population of the city to generate the SFD graphic. In the absence of a sewerage system, the sludge in T1A1C7 and T1A1C8 and the supernatant in T1A2C6 are directly discharged into the river or into the environment untreated.

4.2 On-site Sanitation Systems

The percentages presented in Table 2 and discussed in this section are based on data collected through household surveys, Key Informant Interviews (KIIs), and Focus Group Discussions (FGDs) (Figure 4).

Figure 4: Household survey and consultations.

Containment: Almost all the households (95.70%) in the city have their latrine which are connected to single pits, twin pits, septic tanks or discharged directly to the environment. A portion of the septic tanks at the household level are lined tanks. However, very few of the latrines are environmentally safe (Figure 5). From the household survey, it was found that 10.70% of the city population use septic tanks as the containment system, 56.70% of the toilets have single pit systems and 6.40% of people use double pits in the city. About 21.9% do not have any type of containment and discharges directly to the environment (such as water bodies, open ground, etc.). 4.3% of the population uses unlined pits, which have a 'significant risk' of groundwater pollution (KII, FGDs, HH survey, 2020).

Figure 5: Septic tank and unimproved pit latrine in Lama.

According to the type of connectivity and features of containment technologies, the discharging points of the toilets are categorized as 7% of the population uses septic tanks connected to soak pits (T1A2C5), 1% uses septic tanks connected to open drain or sewer (T1A2C6), 1.40% uses septic

tanks connected to open water body (T1A2C7), 0.6% utilizes septic tanks connected to open ground (T1A2C8), 0.7% utilizes septic tanks connected to 'don't know where' (T1A2C9), 6.40% of the population uses lined tanks with impermeable walls and open bottom, no outlet or overflow (T1A4C10), 56.70% of the population uses lined pits with semi-permeable walls and open bottom with no outlet or overflow, where there is a 'significant risk' of groundwater pollution (T2A5C10) and 4.30% of the population rely on the unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution (T2A6C10). Thus, at the containment stage, the city's excreta of only 13.4% of the population are contained, 64% of the population are not contained and 21.9% of wastewater are not contained. Figure 6 shows a couple of examples of these sanitation systems.

Figure 6: Containment technologies and their connections in Lama. Left: Septic tank connected to a nearby water body; Right: Toilet pipe connected to open drain.

Groundwater Pollution: The depth of groundwater in the city ranges from 6-7 m. The present source of the urban water supply of Lama town includes both surface water and groundwater. Water from the Matamuhuri River is collected and treated before supplying for potable use in the town. Tube wells of different sizes and depths are generally used to pump water from the subsurface aquifers. Lateral separation between sanitation facilities and water sources varies from one area to another. The main source of drinking water is tubewell. 61% of the drinking water comes from tubewell and the rest of 39% of water is collected from the nearby ring well, spring, municipal taps, ponds, lake, river, etc. On the other hand, the percentage of water usage is: 48% tubewell, 16% ring well, 6% spring water, 14% pond or river and 16% municipal tap are being used for domestic purposes. 50% of the water sources have a distance of 0-3 meters and 50% of the water sources have a distance of 3-10 meters. According to a survey report on 'Hydrogeological screening, slug test and geophysical logging on observation well units', conducted by the Department of Public Health Engineering (DPHE), drinking water is collected from the confined aquifer through pumps. Hence, considering all these factors, it is considered that there is a significant risk of groundwater contamination in the city.

Emptying: There are only 10.70% of septic tanks, among which, only 7% are connected to soak pits. The rest are connected to drains, water bodies, open ground, and 'don't know where'. Households relying on septic tanks have to arrange themselves for emptying the septic tank. The time duration for emptying of the tank varies between 5 to 10 years depending upon the size, uses, etc. It is observed among the households, where the survey was conducted, that most of the septic tanks have been constructed in the last 4-6 years. Manual scavenging practice is carried out for emptying the septic tanks in Lama. Charges for cleaning the single pit latrines vary from BDT 2,000 to BDT 3,000 (US$23 - US$35), for twin pit latrines vary from BDT 3,000 to BDT 4,000 (US$35 - US$47) and for septic tanks vary from BDT 5,000 to BDT 8,000 (US$59 - US$94) depending upon the accessibility, size of the tank, and disposal location. According to the survey, half of the septic tanks were constructed during the last six years. As about half of the septic tanks were reported not to have ever been desludged and many would need desludging within 3 to 5 years. It is expected that the demand of desludging the

septic tanks would increase shortly. For a single pit latrine, 100% of the single pit latrines are desludged within this period. Desludging of the septic tanks or pits is near about (68%) done by private sweepers. Only in a few households, desludging is done by ownself (24%). Most of this withdrawal is done manually using a bucket and rope for several reasons. This method is highly risky for the health and safety of the workers. A substantial number use motorized (mud) pumps. The municipal authority has no vacu-tug for providing the service.

Transportation: The sludge withdrawn from the septic tanks and latrine pits by the cleaners is disposed of in various places. Based on the household survey 2020, it is indicated that about 65% of the respondents who use septic tanks informed that the faecal sludge (septage from the septic tank or covered pit toilets) is disposed of by digging an earth hole close to the septic tanks. Besides, septage disposal by the river, lake, drains and roadside places have been reported by 13%, 9.3% and 5.6% of respondents respectively, whereas 6.5% of respondents did not have any idea about sludge disposal.

Treatment/Disposal: There is no faecal sludge treatment plant in Lama municipality.

4.3 Open Defecation:

From HH surveys, KIIs and FGDs, though it was found that there are 4.3% of unlined pits in the Municipality, this is considered as open defecation from the sanitation point of view (but finally shown as unlined pits in the SFD graphic, not as open defecation).

5 Data and assumptions

The baseline household survey, conducted in October 2020, contains detailed data on different stages of the sanitation value chain. The SFD graphic relied on these data, collected during sample household surveys, along with key informant interviews and focus group discussions. Finally, data from all these sources were triangulated to produce the SFD graphic.

The last census was carried out about 10 years ago. So, the actual population, household, and sanitation data are not updated yet. Most of the households with septic tanks do not know the actual type, size, and design desludging periods. Also, a large number of pit users are unaware of if they emptied their pits or not. Due to all these data gaps, some assumptions have been made to produce the SFD graphic.

Following assumptions were made for developing the SFD graphic for Lama:

- ✓ The proportion of FS in septic tanks, fully line tanks and line, open bottom tanks are considered 95%, 0%, and 100% respectively, as per the guidance given in the Frequently Asked Questions (FAQs) in the Sustainable Sanitation Alliance (SuSanA) website.
- ✓ According to the Census 2011, conducted by the Bangladesh Bureau of Statistics (BBS), the Lama city population was 19,010. The Urban population growth in Lama is considered as 3.29% and the present (2021) population is estimated to be around 28,903.
- ✓ There are around 6.40% of twin pit latrines as containment systems. So, it is assumed that all these twin pit containment technologies are defined as a lined tank with impermeable walls and open bottom (system T1A4C10, 6.40%).
- ✓ There are around 56.70% of single pit latrines as containment systems. So, it is assumed that all these single pit containment technologies are defined as a lined tank with impermeable walls and open bottom, no outlet or overflow (system T2A5C10, 56.70%).
- ✓ 7% of septic tanks are connected to soak pits (system T1A2C5). Since they are well-constructed as per the field visit observation, they were considered to be located in areas of low risk of groundwater contamination.
- ✓ Around 50% of HHs have emptied their septic tanks with a desludging frequency of 5-10 years. Thus, variable F3 for system T1A2C5 is set to 50%.

- ✓ A lined pit with semi-permeable walls and open bottom, no outlet or overflow, is considered as a single pit latrine. Thus, variable F3 for system T2A5C10 is set to 100%.
- ✓ 3.7 % of septic tanks are connected to the environment. Only 20% of these types of septic tanks are emptied with a desludging frequency of 5-10 years. Thus, variable F3 for systems T1A2C6, T1A2C7, T1A2C8, and T1A2C9 is set to 20%. Moreover, variables S4e and S5e related to the discharge of supernatant for system T1A2C6 are set to 0%.
- ✓ A lined tank with impermeable walls and open bottom, no outlet or overflow, is considered as a twin pit. Thus, variable F3 for system T1A4C10 is set to 0%.
- ✓ 4.3% of containments are found to be unlined pits with no outlet or overflow, where there is a significant risk of groundwater pollution. After observations, these containments are considered as open defecation but finally shown as unlined pits in the SFD graphic, not as open defecation.
- ✓ Since there are no wastewater or faecal sludge treatment facilities in the town, variables F4 and F5 for all systems are set to 0%.

6 List of Sources

Key Informant Interviews (KII)

- KII with Mayor, Lama Municipality.
- KII with DPHE Engineer, Lama Municipality.
- KII with Women Affair Officer, Lama Municipality.
- KII with Restaurant Owner, Lama Municipality.
- KII with Ward Commissioner, Lama Municipality.
- Facilitators: Nasima Akter, Social Safeguard Specialist, UIIPF, DPHE.

Focus Group Discussions (FGD)

- A group of the representative from House Owners.
- Sweepers and waste collectors.
- Tax and Tariff payers of Municipalities.
- A group of representatives from Educational Institutions.
- Masons Association (septic tank builders).

Figure 7: Focus Group Discussion in Lama.

Lama Municipality, Bangladesh, 2021

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