Achieving open defecation free in Surabaya city by 2019

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Abstract. Achieving open defecation free (ODF) in Indonesia by 2019 is closely monitored by the Government of Indonesia (GoI) as it is targeted in the RPJMN (national mid-year term). This achievement is also targeted at Surabaya City as the second largest city in Indonesia. There are still 15,527 houses in Surabaya which do not have proper sanitation system or still practicing open defecation. This study is aimed to assess how ODF would be achieved in Surabaya by 2019; including what type of toilets are to be used. A household survey was conducted to locate and assess the condition of those houses. Survey results show that 12,772 houses still practice defecation in the open area. These houses comprise of legal and illegal houses which are 5,586 and 7,186, respectively. Priority is given to legal houses as they are manageable to be given toilet under Surabaya’s regulation procedure. Based on the available technologies to construct sanitation system then there will be 2,833 individual septic tank, 419 communal septic tanks, 15 communal toilet with bathing and washing (MCK), 12 communal wastewater treatment, and 1 centralized system in Keputih Sub-district of Surabaya to be constructed to set free these legal houses from open defecation practices.

1. Introduction

Open defecation free (ODF) environment is explicitly stated in the Indonesian Ministry of Health Regulation number 3/2014 regarding Community Based Sanitation (STBM). According to Indonesia Mid-Year Plan 2015, ODF target in Indonesia must be achieved in 2019 as though the ODF target of SDGs is by 2030. The second one hundred of Indonesia Universal Access of 100.0.100 is to show ODF by 2019 while the first is for total coverage of water supply and zero is to show no slump areas in cities. ODF by 2019 seems ambitious as compared to SDG’s target of by 2030. It is, however, obvious by Indonesia Long-Year Plan as ODF is already targeted in 2009 within the first Indonesia Mid-Year Plan of 2005. It is then also obvious that Mayor of Surabaya wants to have ODF in Surabaya by 2015 as mentioned in the Mayor’s Decree of 443/310/436.6.3/2015 which was still based on the Millennium Development Goals (MDGs). Furthermore, according to Surabaya Sanitation Strategy [14], Santoso [11], Destio [1], Fahmi [2], and Gemardi [4], the total sanitation coverage (ODF) in 2021 is shown in Figure 1. Sanitation services are in the form of off-site and on-site sanitation system. On-site system (blue color) is the old part of Surabaya Communities while the rest is off-site system either runs by cities.
or communities. Out of 154 sub-districts (kelurahan) in Surabaya: 32 are covered with communal system and only 3 kelurahans with the on-site system. The rest is in the form of off-site system runs by Surabaya Government.

![Figure 1. Sanitation coverage in Surabaya by 2021 (SSK 2017-2021)](image)

At the moment, Surabaya City as the second largest city in Indonesia which is also the capital of East Java Province has an area of 350.5 km2 with more than 21% as open spaces. According to Surabaya Environmental Health Risk Assessment (EHRA 2015): 91% of the population has already individual septic tanks (92% in the form of squatting toilets and the rest is sitting toilets) and 7.6% uses public toilets. There is still of 2.9% of Surabaya people which still practices open defecation (OD) in the open fields and ditches, rivers, and even shorelines (EHRA 2015).

According to Surabaya Health Agency 2016, there were 15,527 houses (out of about seven hundred thousand houses) without access to toilet, as though Surabaya has its own septic tank sludge treatment plant (IPLT) with capacity of 400 m3/day. Distribution of the houses are shown in Table 1. Surabaya, however, does not have scheduled desludging services (LLTT) yet. By 2017, the OD houses reduced to 12,772 houses, 5,586 are in the form of legal houses.
Table 1: House distribution without septic tank in Surabaya

| No | Region          | Legal | Illegal | Total |
|----|----------------|-------|---------|-------|
| 1  | West Surabaya  | 505   | 1.885   | 2.390 |
| 2  | Central Surabaya | 1.350 | 1.226   | 2.576 |
| 3  | South Surabaya | 1.441 | 1.345   | 2.786 |
| 4  | East Surabaya  | 1.628 | 1.536   | 3.164 |
| 5  | North Surabaya | 2.808 | 1.803   | 4.611 |
| **Total** | | **7.732** | **7.795** | **15.527** |

Source: Surabaya Health Agency 2016

Based on Table 1: half of the OD houses are in illegal property which the land is owned by Indonesia Train Company (PT KAI), Irrigation Office, Surabaya Local Government, and Housing Developers. Furthermore, ODF covers all houses in legal and illegal properties. Especially in East of Surabaya, the highest number of OD is in Gubeng Sub district and the lowest is in Tambaksari Sub district (Purnama et al., 2019).

Based on Minister Regulation of Public Works number 4/2017 regarding Management of Domestic Wastewater there are four technologies can be used to achieve ODF, i.e. individual septic tanks, communal septic tanks, communal wastewater treatment, and conventional wastewater treatment. A hundred percent sanitation coverage within the Mid-Year Plan 2014 consists of 95% on-site sanitation system (85% of individual system plus 10% of communal system) and 5% off-site sanitation system. Besides, pit latrines are still allowed as sanitation ladder in the ODF simply notifies not to defecate in the open.

Using the financial support from the central and local government like APBN and APBD and other financial support like corporate social responsibility or CSR (Gunawan et al, 2014) then the leading sectors in providing toilet in Surabaya are Public Works Agency (Dinas PUCK) for communal system, Health Agency (Dinkes) of individual system, and Social Agency of Rehabilitasi Sosial Daerah Kumuh (RSDK) Program (Dinsos). The objective of this study is to access how ODF can be achieved in Surabaya based on the best suited technologies for the specific sites.

2. Materials and method

Surabaya City has still some problems with sanitation in the term of unhealthy community behavior [12]. Communities are still defecating in the open area such as in river, drainage system, and open field. Field survey was conducted to find out the distribution of any houses with no septic tanks for both houses in legal or illegal properties. A massive support was given by Dinas PUCK to conduct the survey as toilet construction, especially the ones with communal and conventional wastewater treatment plants, had to be provided by the Dinas. A massive support was also given by Dinsos. Sanitarians in each Puskesmas (community health center) was the one responsible for data and locations of houses with no septic tanks. There were 63 puskesmas in Surabaya. Based on Indonesia minimum standard services (SPM), each district (kecamatan) must have at least one puskesmas. As there were already 32 ODF sub-districts (kelurahans), toilet survey excluded these sub-districts. Survey results and Surabaya SSK 2016 were referred to decide which type of wastewater systems to be provided. As the number of OD houses were still lots in number, then toilet provision was to be prioritized for legal housing. Further studies
on people’s knowledge and understanding on healthy sanitation were also needed as having a proper toilet was not caused by poverty but was more towards awareness and changing of attitudes (Soedjono, et.al, 2018).

3. Results and discussion
The survey results show there were still 12,772 houses without septic tanks: 5,586 were in legal properties while 7,186 houses in illegal properties as shown in Table 2. Some photos from the sites are shown in Figure 2 to 4.

| No | Region         | Legal | Illegal | Total |
|----|----------------|-------|---------|-------|
| 1  | West Surabaya  | 354   | 2,000   | 2,354 |
| 2  | Central Surabaya| 1,070 | 870     | 1,940 |
| 3  | South Surabaya | 1,464 | 860     | 2,324 |
| 4  | East Surabaya  | 1,167 | 1,909   | 3,076 |
| 5  | North Surabaya | 1,531 | 1,547   | 3,078 |
| Total |             | 5,586 | 7,186   | 12,772 |

Source: Survey result, 2017

**Figure 2.** Condition of toilets in the Kedungdoro Sub-district

**Figure 3.** Land condition in Menur Pumpungan Sub-district
Based on Ministry of Public Works Regulation (2017), the selected technologies to achieve ODF in Surabaya would be individual septic tanks, communal septic tanks, communal wastewater treatments, and public toilets with bathing and washing (MCK). MCK was selected as some public places like traditional markets and bus terminals were used for domestic purposes. The selected technologies for Surabaya is shown in Table 3.

| Region            | Individual septic tanks (Unit) | Communal septic tanks (Unit) | Conventional wastewater treatments (Unit) | MCK (Unit) | Number of OD houses (legal) |
|-------------------|--------------------------------|-------------------------------|-------------------------------------------|------------|-----------------------------|
| West Surabaya     | 267                            | 20                            | 0                                         | 2          | 354                         |
| Central Surabaya  | 455                            | 75                            | 3                                         | 9          | 1.070                       |
| South Surabaya    | 911                            | 116                           | 1                                         | 0          | 1.464                       |
| East Surabaya     | 674                            | 92                            | 0                                         | 1          | 1.167                       |
| North Surabaya    | 526                            | 116                           | 11                                        | 0          | 1.531                       |
| Total             | **2,833**                      | **419**                       | **15**                                    | **12**     | **5,586**                   |

Since the field survey has already been conducted to determine the appropriate wastewater technology, individual septic tanks is the most suitable technology to reduce the number of OD. This choice was chosen as the communities did not have area for both communal septic tanks and conventional wastewater treatment. Usually the community gets support funding from the local government, academic institution, and association of sanitation management and empowerment (APPSANI) with the cost per septic tank is about IDR 1,650,000. The payment mechanism was by giving the down payment about 40% and the rest of the cost was paid by installment for four months [12].
There were several houses that did not have space even for septic tanks but they had quite large footpath in front of their house. These areas was suitable for communal septic tank system. The minimum width of the foot path is 2-3 meters. This values were also used for the minimum depth of the water table. Surabaya city is in coastal area and water table is quite high [3].

Surabaya has several existing communal wastewater treatment, but in these cases this technology was not recommended. It is because there are several previous communal system have not been optimized yet especially in South of Surabaya. Community empowerment and technical aspect are the most problem caused. From technical perspective, then the problem is usually for the communal system unit that was built not in accordance with the design criteria [8].

4. Conclusion
There were 5,586 legal houses in Surabaya with proper disposal of blackwater (illegal houses were excluded yet) which had to be provided with sanitation system before 2019. The facilities to be provided were 2,833 individual septic tanks, 419 communal septic tanks, 15 communal wastewater treatment plants, and 12 MCK. This visualizes that infrastructures construction has to be accelerated with massive financial support as compared with current condition which development was slow with poor financial support.

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