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Door-to-Door Garbage Collection program in Surat city

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Abstract

In April 2004, the Surat Municipal Corporation (SMC) of Gujarat had introduced the door-to-door Garbage Collection (DDGC) program in three selected zones namely South West, Central and East zone as per the guidelines of the Supreme Court of India and Municipal Solid Waste Management Rules, 2000. The DDGC has been out sourced to private contractors and ensures proper collection, segregation, transportation, processing and disposal of municipal solid wastes. Before embarking on a city-wide implementation of the program the SMC decided to get a mid-term assessment of the functioning of the program. This paper focuses on the evaluation study of DDGC program carried out by the Centre for Social Studies, Surat in 2005. The study was based on the information gathered from 4000 respondents drawn from a cross section of society and interviews with the respective officers, contractors and labourers. It also examined the process of actual transfer of solid waste from the generator to the collector and people's attitude and perception regarding practices of garbage collection and disposal. The findings of the study highlight the problem areas in implementation of the DDGC in Surat; these problems must be addressed for a clean and healthy urban environment. The main thrust of the respondents has been limited to door to door collection of household garbage and informal arrangements of garbage disposal to community containers.

JEL Classification : **R1, I18**

Key Words : Municipal Solid Waste, Bio Medical Waste, Hazardous Waste, Ragpickers, Surat Municipal Corporation (SMC), India

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Introduction

Solid Waste Management is the mainstay of urban management program. The problem of solid waste, its collection and disposal especially in urban areas around the world, compounded by their high population growth rates and dense population[1] has emerged as one of the most serious threat to environmental quality and human health. Chakrabarti and Sarkhel (2003) cites a study by the World Bank on urban areas of Asia, which estimates that nearly 0.76 million tones of municipal solid waste per day is being produced in these areas and is likely to go up to 1.8 million tonnes of waste per day by 2025. Definitely, in the near future the urban areas of India as well as the world will have to confront the problem of massive quantities of solid waste.

Solid Waste Management is basically associated with primary and secondary collection, storage, segregation, recycling, transportation, resource recovery, and disposal of waste. The Barman committee report[2] underlines the need for municipal solid waste to be segregated into organic, inorganic, and recyclable and hazardous waste, which has not been in practice in Indian cities. The committee suggested that bio degradable wastes like food should be processed as compost, recyclable wastes be sent to recycling industries and only rejects should be land filled. But in India, especially in the

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[1] Gupta (2001) referring to a UN report in 1995, mentions that more than 40 percent, that is, over 400 million people will be clustered in cities in the next thirty years.

[2] For improving SWM practices expeditiously, the Supreme Court of India constituted a committee under the chairmanship of Asim Barman for suggesting improvement in SWM practices in class I cities in India.

cities ninety percent of the municipal solid waste is disposed by land filling without segregation (CPCB, 2000).

The city of Surat in South Gujarat is no different from other cities in India and Solid Waste Management (SWM) was not a priority till 1994. Outbreak of diseases that was diagnosed as plague-like in 1994 changed the attitude and the approach of the Surat Municipal Corporation (SMC) and the citizens. Earlier the average citizen had accepted garbage and dirt as part of his/her daily life, the year 1994 however proved to be a turning point in the history of the city. After the nightmarish experience of calamity that struck Surat in 1994 people suddenly realized that they could not leave the city at the mercy of God or civic authorities. This attitudinal change inculcated in them a sense of belonging and pride for the city, and a concern about cleanliness was born.

Surat: A Brief Profile

Surat city has emerged as the nerve centre of economic activities in Gujarat. It is popularly known as 'silk city' as well as 'diamond city', and is the financial capital of Gujarat. It is the hub of industrial activities both small and large. Besides small and medium industries of textile and diamond polishing, large industries like KRIBHCO, NTPC, Reliance Petrochemicals, ONGC, ESSAR, Larsen and Toubro, Shell, etc. have also added to the prosperity of the city. Das (1997) noted that with a changing industrial landscape and growth in its economic activities, the city of Surat not only attracted a substantial amount of capital, but also a large proportion of migrant population from within Gujarat, the neighboring state of Maharashtra as well as from further regions of Uttar Pradesh, Orissa, Andhra Pradesh and Tamilnadu. In two years, the city limit has extended three times; eight nagarpalika and twenty seven villages merged with the Surat city in December 2006. The city with 326.515 sq. km area has 28.77 lakhs population, as per the SMC. It is the second largest city in Gujarat after Ahmedabad. The city is divided into seven administrative Zones and 38 Wards. There are 54

sanitary wards, under seven administrative zones to devolve responsibilities for all civic functions like health, sanitation, drinking water and Solid Waste Management (SWM) etc.

The average population density is 21,676 people per sq. km. The Central Zone has the highest population density of 50,562 people per sq. km. With its high density of commercial establishment (see table 1) it can also be referred to as the commercial district of the city. The West Zone has lowest population density of 12,756 people per sq. km. The East Zone also known as “Mini Saurashtra” has the second highest density of 41,879 people per sq km. The city’s decadal growth is above 80 percent in all zones except Central Zone. One fifth of the city population lives in slums.

Surat has one of the oldest municipal governments in the country established in 1852. In 1964, due to the increasing population, the Surat Municipality became the Surat Municipal Corporation (SMC). It is governed by the Bombay Provincial Municipal Act, 1949, which has been amended from time to time. “The performance of the municipal government’, Ghanshyam Shah observes, “since its inception has been rather poor (till 1995)[3]. It has failed to take the initiative in meeting new and challenging demands which the growth of the city has presented (1997: 67)”. The governance of the city has however changed significantly after the outbreak of the 1994 plague. The Health Department has undertaken a number of measures. It launched ‘public health mapping’ program for strengthening the health infrastructure and revival of work ethics among health workers. Under this program, a massive campaign was launched to clean sewage lines and septic tanks. Sweeping of streets and garbage collection on a regular basis became the hallmark of the civic body i.e. Surat Municipal Corporation. It was mandatory to clean streets twice daily. Group 'Safai' including brushing and scraping was done

[3] For an insightful and analytical account refer to a CSS study by Ghanshyam Shah titled Public Health and Urban Development – the Plague in Surat, published by Sage, New Delhi.

in the afternoon. Private players were also encouraged to provide their vehicles for clearing tones of garbage. In fact, the city which was known as the 'dirtiest city' is now acclaimed as the second cleanest city of the country (by INTACH)[4]. This drastic change was brought about by the SMC especially under the able supervision of municipal commissioner S. R. Rao[5] and during this "safai abhiyan" program citizens played a key role.

SWM in Surat

Municipal solid waste management (MSW) is a mandatory service of Urban Local Bodies in India. The SMC has revamped the conventional garbage collection system. As per NIUA study the collection of solid waste increased from 30% in 1995 to 98% in 2006. In 1996 a group of concerned citizens filed a public interest litigation seeking directions for improving solid waste management practices expeditiously (Mrs. Almitra Patel, Convener, Indian National Trust for Art and Cultural Heritage (INTACH) Waste Network and others v/s Union of India and others). After several hearings the Supreme Court of India constituted a committee on 16th January 1998 under the chairmanship of Mr. Asim Barman, Municipal Commissioner, Calcutta Municipal Corporation for improvement in Solid Waste Management (SWM) practices in class I cities in India. In this committee there were eight members including Mr. S R Rao Ex-Municipal Commissioner, Surat.

The Barman Committee in its report submitted to the Supreme Court in March, 1999 suggested that State laws be enacted to make solid waste management practices effective and that the Government of India should keep the SWM services outside the purview of the contract Labour (Regulation & Abolition) Act

[4] After the plague a three member environmentalist group of Indian National Trust for Art and Cultural Heritage (INTACH) a premier organization working for preserving Indian Cultural heritage visited, as a part of their clean India.

[5] Dr. S. R. Rao was awarded Padma Shree for the efforts. In the history of Indian Administrative Service, Dr. Rao holds the distinction of being the second person to receive the national honour while in service.

1970, so as to enable public - private partnerships and private sector participation in selected areas for improving the quality of life in urban areas. The Committee also suggested that the supervisory staff of SWM services in the country be kept out of the preview of Schedule Caste, Schedule Tribes (prevention of Atrocities) Act 1989, to enable a free and proper supervision of the work of street sweepers and the labour force employed in collection, transportation, processing and disposal of waste. The committee has also made recommendation to give boost to the composting of waste and recycling industry in this field.

Following the Guide Lines (see appendix) issued by the Supreme Court, Surat introduced the door-to-door garbage collection (DDGC) system in April 2004; in fact the city had already evolved a system of its own in 1996. But it did not cover the whole city. Now, Surat is one of the twenty five cities of the country which have introduced door-to-door garbage collection system (FICICI, 2007). This paper presents a brief review of the working of the DDGC system based on an evaluation of the system carried out by Centre for Social Studies in 2005; co-authored by Patel and Trivedi.

Methodology

The basic sample unit in the study was the garbage collection route under the DDGC program. In order to give better representation to different areas we, while selecting actual sample routes, introduced municipal wards as a cluster. In each zone we selected 10 per cent of all routes in such a way that each route fell in a different municipal ward. Residential units and commercial units are the two main types. We used them as weights in selecting sample units. In selecting residential units we have further tried to give adequate representation to different type of structures namely, high rise and low rise flats, slums, chali, mohalla etc. The study was based on the views expressed by 4000 respondents drawn from a cross-section of society and interviews with the officers, contractors and labourers. The author examined the

process of actual transfer of solid waste from the generator to the collector. Peoples' attitude and perception regarding practices of garbage collection and disposal were also studied.

Waste Management System in Surat

Before 1995, Surat had conventional garbage collection and disposal system like that of any other city in the country. Sweepers employed by the municipal government used to clean streets and collect the garbage from the community containers. Private sweepers of the organized housing societies or apartments had carried out this work. Trucks and other heavy vehicles deployed either directly by the SMC or by the contractors used to lift the garbage from the containers to the transfer stations and/or at the land-filling sites. In 1996, SMC introduced sweeping of main roads every night and had given contract to 31 private agencies at the rate of 29 paise per square meter. In Surat it was common practice to throw house hold waste in the street or near the community container. Sweepers employed by the SMC used to collect this garbage and dispose it in nearby containers. Before the introduction of DDGC program there were 1281 community containers put up by the SMC at various places. Fifty six percent of the garbage containers were emptied on a daily basis, while the rest were cleared on alternate days or three times a week.

Functioning of DDGC System

DDGC system aims at making zero container cities where all the waste is taken directly from the waste generators to final dumping station. In the last two decades, SMC has introduced more and more private participation in various services which includes collection, transportation and disposal of solid waste on the lines of Chennai Municipal Corporation (CMC). DDCG is a part of this process. Initially the program was confined to three zones, covering 37 sq. km area and fifty

percent population i.e. 278899 households and 95306 commercial units (see table 1).

Table 1: Routes and Units Covered in DDGC Program

Zone	Area (in sq. kms.)	Residential Units	Commercial Units	Total Units	Number of Routes	Per Route Coverage households/ commercial units
Central	8.18 (22.1)	88509 (31.74)	59336 (62.26)	147845 (39.51)	129 (53.75)	1146
South-West	14.96 (40.4)	56598 (20.29)	5970 (6.26)	62568 (16.72)	29 (12.08)	2158
East	13.86 (37.5)	133792 (47.97)	30000 (31.48)	163792 (43.77)	82 (34.17)	1997
All	37.0 (100.0)	278899 (100.0)	95306 (100.0)	374205 (100.0)	240 (100.0)	1559

Note: Figures in parentheses indicate column percentage.
Source: Surat Municipal Corporation, July 2004.

In November 2005, the program covered all the seven zones of 112.28 sq. km area. The program aims to ensure proper collection, segregation, transportation, processing and disposal of municipal solid wastes. Before launching the program, the feasibility study with respect to the size of the ward, population of ward and network of roads with the existing road width was carried out to chart out the Time Place and Movement (TPM) schedule. First, a pilot project was undertaken in one ward. On the basis of TPM schedule and the scope of the DDGC work, SMC has given contract to three private agencies for next seven years i.e. up to February 2011. In the tender, it is clearly mentioned that the SMC reserves the right to increase or decrease the scope of work. On specific occasions SMC reserves the right to ask the contractor to provide additional cleaning services and the contractor is bound to provide the same at a short notice of few hours. The scope of work and specifications for implementation of DDGC program is given as follows.

- DDGC and transportation of waste has to be carried out on a regular basis i.e. on all seven days of the

week including national holidays, festivals and Sundays.

- The contractor will ensure that the waste materials stored in the close container vehicles are not dumped/emptied at any place other than the one specified by the commissioner.
- During transportation care should be taken to ensure non spillage of waste from the closed vehicle.
- The contractor shall not reassign the work under contract to any other party without prior written approval of the SMC.

The agency is paid for the work executed as per M.T. basis. Because of this, it is expected that the agency would find 'innovative ideas for improvement' of the program so that coverage of the collection of the garbage increases. Therefore responsibility for publicizing and propagating the program among the people is left to the agencies. With the permission of the SMC, the contractors have developed their own collection routes convenient to them (see table 1). In South West Zone there are 29 routes covering 62,568 (16.72 percent of all houses/shops in the three zones) houses/shops, in Central Zone 129 routes covered 1,47,845 (39.51 percent) houses/shops and in East Zone 82 routes covered 1,63,792 (43.77 percent) houses/shops. Thus, on an average each route covers 1559 household/shop. In South West Zone there are 35 vehicles for 29 routes, in East Zone 30 vehicles for 82 routes and in Central Zone there are 54 vehicles for 129 routes. It seems that in East Zone and Central Zone the contractor has merged three to four routes and has deployed heavy vehicle (HGV due to which the allotted time remains insufficient to cover both the zones. The residents, mostly women, have to stand in long queues to dump garbage in to the vehicles. Due to the height of these vehicles people find it difficult to tip the garbage into it neatly, hence some of the waste gets dropped outside.

The task of primary collection of garbage on a route is a continuous process and normally starts from 7 a.m. and gets over by 2.00 p.m. All the waste collection vehicles (WCV) are expected to be equipped with an alarm system for regular door to door visits at a scheduled time. The morning timings proved inconvenient for the collection of garbage from the shops and offices as they open after nine. Acting, on request from the shop keepers this system was made operative in second shift i.e. from 5pm to 11pm to facilitate commercial units. The garbage, after being collected from the door steps is finally disposed off at six transfer stations. Under the DDGC program the present daily municipal waste collection is about 585 M.T. It is claimed that more than 50% of the total municipal solid waste is being collected and transported to transfer stations in the respective zones by contractors through this DDGC system. The remaining municipal solid waste collection is through community containers.

The municipal waste, collected through various sources including community containers, is taken to the transfer station in each zone. It is then taken to the landfill sites. Out of 1281 containers, 67 percent are lifted and transported to the transfer station by the SMC while private contractors transfer the remaining 33 percent. Three private agencies are responsible for the transportation of municipal waste from transfer station to Khajod disposal site, 16 km. away from the SMC main building. Surat Urban Development Authority (SUDA) has allotted land at Khajod for the sanitary land filling of MSW as per the Supreme Court guidelines. This transportation work starts from early morning. On the route, the overflowing trucks often drop some garbage on the roads. Moreover, the residents of the area near the dumping site Khajod often complain about health problems. They protest and demand that the dumping site be located elsewhere.

Apart from DDGC program SMC has given contract to the private agencies for various services including removal of dead animals, bio-medical waste collection and disposal etc. Dead animals from the streets are removed by SMC but the

processing activities have been given to Private Party. The debris and other waste collected from construction and demolition sites are transported by private agencies. Biomedical waste and Industrial waste disposal is also carried out by private agencies.

Findings of the Study

The DDGC program can be seen as part of the larger system of SWM of Surat city. The problem areas in implementation of the DDGC in Surat have been identified in the context of the clean and healthy urban environment perspective. The information gathered from the respondents mainly relates to door to door collection of household garbage and informal arrangements of garbage disposal to community containers; the assessment of the problems reflects a larger urban environment perspective.

As per the SWM rules, all the garbage containers are required to be closed. However, several containers were found overflowing with garbage particularly in the slum areas. Local residents have often complained about the foul smell emanating from these overflowing containers. Recently the SMC has replaced the containers with lids to solve this problem. Thirty two percent of the sample respondents in our study believed that the containers remained clean or dirt free after this DDGC program. Regular spray of Gamexine powder was noticed at many places. Twenty four percent respondents believed that vermin and mosquitoes had decreased due to the introduction of the DDGC program. It had certainly reduced the load on container. Twenty seven percent sample families were of the view that cleanliness had increased. However, ninety five percent of the respondents felt there was little change in the occurrences of epidemics.

The location of the transfer stations in each zone varies. In some places it is bothersome for the local residents. For instance in the west zone a common wall exists between a higher secondary school and transfer station, where dogs and

pigs feed on the garbage. Thus secondary storage proves to be a breeding ground for flies and other insects. To solve the secondary storage and its problem, SMC is planning to build closed body transfer station at the cost of Rs. 4.59 crores. According to the solid waste department of SMC the present daily municipal waste generation in the municipal area is about 1230 M.T. (see table 2). Before the expansion of the city limit the MSW was 1000 Metric Tones (M.T.). The SMC projected 7 % rise every year, corresponding to population increase and collection efficiency.

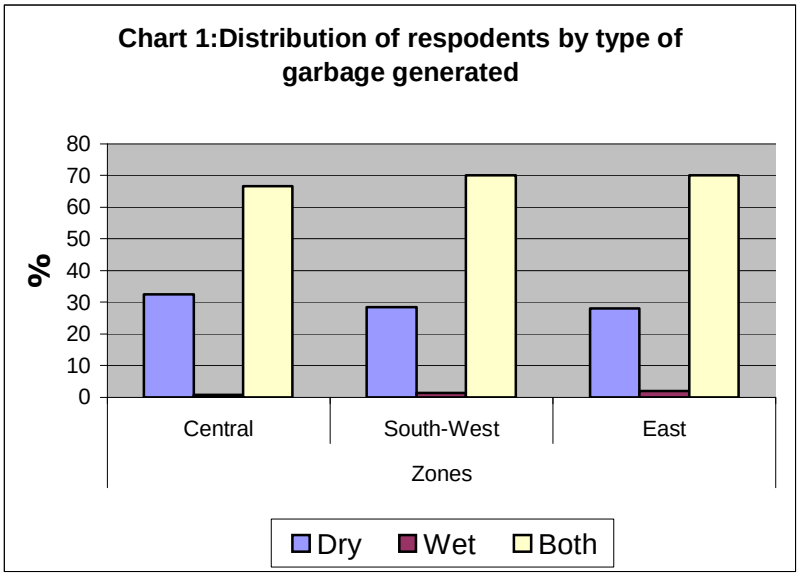
On an average, SMC pays Rs. 630 per M.T. to private agency under the DDGC program. The total budget of SMC for the financial year 2005-2006 was Rs 700 crores and it is estimated that the SMC would roughly spend Rs 70 crores, which is around 10 percent of the total budget for SWM. The private agencies have deployed 210 vehicles and around 1000 helpers. As per the contract the private agencies have to allot at least one supervisor for each ward and two or three helpers depending upon the vehicle. In addition the supervisors of DDGC program have to report every day at the ward office, and ensure that the services are provided efficiently. Our study found that this was not practiced regularly. During our random visits we hardly found a supervisor on the route.

Table 2: Year wise Solid Waste Lifted in M.T. / Day

Year	Solid waste lifted M. T. per Day
1995-1996	860.99
1996-1997	905.47
1997-1998	929.62
1998-1999	959.84
1999-2000	919.87
2000-2001	965.75
2001-2002	1021.99
2002-2003	1064.56
2003-2004	1022.59
2004-2005	1097.02
2005-2006	1230.27

Source: SMC

It was also mentioned in the contract that private agencies have to provide uniform, gumboot, hand gloves and other gear, but it was found helpers and drivers were not provided by these three agencies. In fact some helpers did not have any kind of footwear. They were not getting any medical facility, leave etc. Almost all helpers did not know the name of their employers. On an average the helper was given Rs. 1800 and the driver Rs. 3000 per month. Some even work on daily wages.



As the name of the program suggests, the waste collection vehicle is supposed to go to each and every house/shop. But in about 28% cases it does not. Proportion of such cases was highest in the East Zone followed by Central Zone and South West Zone. There were many reasons for not collecting garbage from door to door. In some cases the lanes are narrow; some had developed their own system of garbage collection, while in other places the staff remained absent.. Overall the garbage collection was done very regularly. Only one percent of the respondents said that the DDGC staff did not collect their garbage during the 15 days preceding the

survey. Even when the garbage trucks failed to appear people avoided throwing their garbage out in the open spaces.. They (70%) used the community containers. 7% sample units told that they threw the garbage in open when the vehicle did not take the garbage.

The garbage produced in the house and the shop is of two types: dry and wet. The wet garbage is the breeding ground for vermin, mosquitoes and others insects. If it is not cleared in time it creates foul smell too. Such is not the case with dry garbage. According to our survey in 2005, majority of the families (68%) generated both types of garbage i.e. dry and wet (see chart 1). Dry garbage was found more in central zone as more shop units are located in it and shops generally do not have wet garbage.

According to the Supreme Court guidelines DDGC program operating through private agencies are required to collect only wet waste for composting. The remaining waste needs to be left out for recycling by the informal sector. But this has not been observed in Surat. The contractors are only interested in heavy loads as they fetch more amounts from the SMC, so they avoid collecting the wet garbage. Hence, the poor rag pickers get marginalized because they survive on collecting the type of garbage which has resale or recycling value. Of course this has not completely eliminated the rag pickers. There are around 3500 rag pickers in the city. They still collect the dry waste from containers and roadsides or landfill sites in some cases. There are more than ten wholesale dealers of waste in Surat. They receive around 220 to 250 metric tones recyclable wastes per day. Nearly 60% of the sample families produced less than one kg and nearly 30% produced 1.1 to 2 kg garbage. Thus majority of the sample households produced less than two kg garbage. It is expected that every household and shop would keep two bins one for dry waste and another for wet waste, so that one can segregate wet and dry wastes. But only two per cent of the households reported in our study that they were segregating the waste. The common response was that “even if we start segregating the garbage, it ends up

getting mixed up again because there is no separate collection mechanism for wet and dry waste".

During our field visits we observed that segregation is done partly by the helpers of the garbage collector. Almost all households as well as shopkeepers had one bin with the capacity to hold one day's garbage. Therefore, if garbage is not collected daily then the garbage is thrown into the container or in open space/plot, reported by the residents. Forty eight percent of the respondents stored garbage in closed bins, and 48.3% used open bins, while the rest who lived in lower settlements stored their wastes in plastic bags. When the garbage collection vehicle does not arrive in their area for one reason or the other people find it difficult to store garbage for one more day. In the absence of an alternative they throw garbage in the community containers or in open spaces. Another striking feature was that only the female members or private servant were involved in the disposal of waste. Although women are happy to empty the dustbins into the vehicles by themselves, it is the task of the contractors' employees- swachchhatamitra. The percentages of the female members engaged in the garbage disposal were more in East Zone (59.5%). In Central Zone the male member does this job mainly because the shops are more here compared to other zones.

In our study, we found the residents were happy with the DDGC services as the garbage from their area was collected everyday including public holidays. They felt the DDGC was more effective than earlier conventional system where the private servants and SMC's sweepers swept the garbage and dumped in community containers. We gathered this impression from all the localities and income group. However the extent of cleanliness, according to our observation varies from locality to locality. For instance, the City Light area in South-west zone, which is new and fast developing, and is inhabited mostly by the well-to-do, is found very clean. People can afford to hire extra help to clear the garbage from their

apartments and bungalows. In the same locality there is a labour colony near Nav Mangalam Complex on route no. 8. About 100 labourers reside in make shift huts close to the drainage passing through this area. Mounds of garbage and filth are found lying because the DDGC vehicle does not visit this locality. No community containers are provided in the vicinity. The people of this locality have little option but to throw their garbage in the drain. The slum areas of all the zones face the problem of filth as they are generally located in low densely populated areas. They have inadequate infrastructure amenities like drainage, toilet and water. These areas are infested with vermin and mosquitoes. There is a slum locality called `Agriculture Slum' near the Agriculture college canal. About 30 huts are disposing garbage on the canal side. They have seen the garbage vehicle but it does not stop at their place. Besides, they go for their work early in the morning hence they do not know much about DDGC. They are migrants and mostly illiterate. Similar is the case with the slum located near the Vaishali.

The study found that only 14% of the respondents were aware about the DDGC program through SMC. In fact 70% of the respondents came to know about it through private contractors. Most of them are unaware about the functioning of the program what the contractors are supposed to collect and not collect; whom could they complain to in the event of irregularity in the collection of garbage etc. It may be noted that a small number of respondents did tell us that they were dissatisfied with the attitude of the *Swachchhatamitra* (helper). Their complaints were related to cleaning of garbage (20%), irregularity in maintaining timings and indifferent attitude towards citizens. Punctuality in arrival of the vehicle is problematic especially in east zone where women have to leave their household chores and. come out and wait for the vehicle anywhere between 15 minutes to half an hour.

The program does not cover the garbage generated by hawkers, vendors, small time eateries and shops, and also

community functions such as marriage, religious and other social feasts. Festivals and social functions generate a lot of garbage that remains uncollected and hence ends up in community containers that overflow soon. The Hotel association in Surat has arranged a separate mechanism for the collection of food waste from 240 registered hotels and restaurants. They have deployed 18 vehicles for that purpose. But this system excludes unregistered eating houses and small time eateries, which also generate leftovers in large quantities.. Separate collection of food waste from hotels and restaurants has no meaning because these kitchen wastes also get disposed off at the landfill site.

Biomedical and hazardous Waste

Biomedical waste contains a variety of infectious and toxic wastes generated by health care units (HCU). To dispose the biomedical waste in a more scientific manner, SMC has given contract to Envision Enviro Engineering since January 2003 with tenure of seven years. As per the health department of SMC, there are 356 small and big hospitals, 1154 private dispensaries and 156 laboratories. Besides these there are a number of unregistered HCUs like private dispensaries in slums or residence cum clinics. The contractor Envision is estimated to collect 2000 kg medical waste every day; and the disposal arrangement has been made accordingly. But the agency could collect only 700 kg. i.e. 30 % of the calculation per day. Though the doctors and hospitals have been persuaded to avail this facility yet it has met with very little success.

Segregation of bio medical wastes at the source of its generation is mandatory under the Biomedical Waste (M&H) rules 1998 for all the HCUs. But it was observed in Surat that the sweepers or helpers in the residence cum clinics and hospitals generally threw their bio-medical waste without segregation in the community containers, which gets mixed with municipal waste; sometimes they even dump clinical waste under the DDGC program. We observed that HCUs

were not disclosing their actual quantity of medical waste due to per kg billing system. Almost 80 % of HCUs do not deposit their waste even after obtaining registration from the disposal unit as well as authorization from Gujarat Pollution Control Board (GPCB). Only 20 % registered medical waste generators deposited their waste. It was observed that private dispensaries sell their medical waste to waste collectors. In 2007, the municipal commissioner called a joint meeting of GPCB and Medical Association, Surat Chapter for the collection, transformation and disposal of medical waste. However, very few members from the association attended this meeting. Newspapers reported that the SMC had issued a notice and slapped a fined of Rs 10000/- on each of the three private hospitals responsible for dumping their medical waste in community container (DNA, Surat, June 21 2008). Alarmingly, this is not an isolated incident. Private medical practitioners are not taking adequate measures for the safe disposal of their bio-medical wastes. It was also reported that out of the three private hospitals, one hospital did not have authorization from GPCB.

Surat city is brimming with intensive small scale industrial activities and the informal sector is dominated by diamond cutting, textiles, zari, dyeing and printing units. Many residential areas such as Katargam, Udhana, Sagarampura, Nanpura, Gopipura etc., are surrounded by small scale industrial units. In Surat district, the Gujarat Industrial Development Corporation has established five industrial estates. They include large and medium scale chemical as well as dying and printing factories. These industrial units also generate hazardous waste and hence residents of the city face serious health risks. Like medical waste, the industrial hazardous waste generators also deposit their waste in open plots or in the community containers. The Supreme Court, in an October 2003 order, mandated that each state should have at least one plant for scientific disposal of hazardous waste. However, in collaboration with the Pandesara Green Environment and Water Welfare Co-operative Society Ltd, the

SMC has recently installed Common Effluent Treatment Plant along with underground effluent collection network and conveyance system for Pandesara GIDC estate.

Conclusion

DDGC in Surat is a half hearted attempt in the specific context of total urban management program in sanitation and hygiene. DDGC program has been immensely beneficial at household level as the garbage clearance is practically at the door step. However, hiring contractors' services for the programs had led to compartmentalization of the total neighborhood cleanliness program. Their differences lead to lack of coordination. Insufficient and inadequate street cleaning (cleaning of community containers) do not ensure clean and healthy environment and animal–insect free neighborhoods. The DDGC vehicles are not deployed as per the area conditions. Almost in all cases four wheelers are used. In narrow lanes and by lanes four wheelers are unable to enter and hence in most of the cases 10 to 20 per cent of units located in the entrance are covered and the rest are untouched. But in general the citizens of Surat are satisfied with DDGC program. The average citizen follows the rules and hands over the garbage regularly to the helpers of the DDGC program who visit them. They perceive that the city has become cleaner. Though the present program has not made the city completely ‘container free’ yet the residents of Surat are very satisfied with DDGC.

The benefits of DDGC are twofold. One is the cost saving factor. The Community containers are fewer in number and the cost of transporting wastes from the community containers to the transfer station is reduced. This is direct and tangible benefit by way of savings in the cost. The second type of benefit that can be monetized with some reasonable assumption is the improved urban environment and cleanliness. Scavenging animals would eventually be off the road and would gradually disappear. The diseases vector will come under substantial control. It would definitely affect the

morbidity favorably. It would result in saving both public and private cost on health care. Aesthetic and scenic look of the city would improve and level of pleasure would go up. This would reduce the collection and transport costs. There would be indirect benefit and part of it would be tangible and it would be possible to convert it in pecuniary terms.

There has been a sea change in the attitude of the people after the introduction of the DDGC program. Garbage is now collected and disposed off through the channel of SMC's SWM Program. Majority (94.8%) of the sample families reported that due to the introduction of DDGC program, consciousness regarding cleanliness has increased. Nearly 80% have noticed that the areas around the containers have improved considerably. However their participation in the program is limited to depositing the garbage only. There is no local or ward committee. No NGO is involved in this program at any level. In general it is felt that SMC has no scarcity of finance in the SWM. However adequate priority is not given to create awareness in the society for SWM. To garner support and to create awareness among civic society, the municipal authority should start a massive campaign with two initiatives- first how to reduce the waste and secondly source segregation practice at household level. For that they can take help from the educational institutions and NGOs as well as they can adopt some innovative techniques so that minimum wastes go to the landfill site.

Appendix 1: MSW Management and Handling (M & H) Rules – 2000

The draft of the MSW (M & H) Rules, 1999 was published under the notification of India in the Ministry of Environment and Forests dated 27th September, 1999 in the Gazette of India. The copies of the said Gazette were made available to the public on 5th October, 1999 inviting objections and suggestions. The objections and suggestions in respect of the

said draft rules were duly considered by the Central Government. The MSW (M & H) rules – 2000 for Municipal Wastes were issued on 25th September 2000. Also issued earlier were "Bio-medical Wastes (M & H) Rules 1998" for Hospital Wastes and "Hazardous Wastes (M & H) Rules 1989, (amended in 2000)" for Industrial Wastes and notified under the Environment Protection Act 1986. The deadline for implementation of "Municipal Solid Wastes (M & H) Rules 2000" (see Annexure 1.1) for Municipal Wastes was December 31, 2003. It is specified that every municipal authority is responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes. The rules specify the following.

- Organize house to house collection of Garbage.
- Separate collection of Waste from Slums.
- Separate collection of Waste from Slaughter Houses, Fruit and Vegetable Markets
- Separate collection of Bio-Medical Waste from Hospitals.
- Separate collection of demolition Waste / Debris,
- Introduce containerized collection.
- Mechanism of Municipal Solid Waste collection eradicating human handling of waste at any point.
- Establishing of Sanitary land fill sites.
- Establishing of composting plants / processing plants

In the said rules the compliance criteria for implementation schedule is given as follows:

- Setting up of suitable processing and waste disposal facilities by all the cities and towns. - By 31-12-2003 or earlier.
- Monitoring the performance of waste processing and disposal facilities - once in six months

- Improvement of existing land fill sites as per provisions by all cities and towns - by 31-12-2001 or earlier.
- Identification of land fills sites for future use by all cities and towns and ready for future operation - by 31-12-2002 or earlier.

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