CHAPTER IX

IMPACT OF SOLID WASTE ON ENVIRONMENT AND HEALTH OF CONSERVANCY WORKERS IN KOLHAPUR
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INTRODUCTION

An attempt is made to study the bad environmental and health impacts of solid waste in the area of KMC. The environmental impacts are: i) Production of odour, ii) Breeding of flies, iii) Air pollution, iv) Soil pollution, and surface/ground water pollution etc. The health impacts are: i) physical impacts, and ii) mental impacts due to improper handling of solid waste. It is to the workers those who are working in solid waste. These impacts are explained as follows:

9.1 ENVIRONMENTAL IMPACTS

Following are the bad environmental impacts of solid waste in Kolhapur.

9.1.1 Production of Odour:

The odour is the typical type of smell which arises after the decay of the solid waste at storage site or at dumpsite.

The odour can develop when solid wastes are stored for long period of time on site between collections in transfer stations, and land fills. The development of odour in on site storage facilities is more significant in warm climates. Typically, the formation of
odour results from the anaerobic decomposition of the readily decomposable organic components found in the solid waste.

For example, under anaerobic (reducing) conditions, sulphate can be reduced to sulphide ($S^{2-}$), which subsequently combines with hydrogen to form $H_2S$. The formation of $H_2S$ can be illustrated by the following reaction.¹

$$2\text{CH}_3\text{CHOHCOOH} + \text{SO}_4^{2-} \rightarrow 2\text{CH}_3\text{COOH} + S^{2-} + \ldots$$

(Lactate) (Sulphate) (Acetate) (Sulphide)

$$\text{H}_2\text{O} + \text{CO}_2 \quad (4-12)$$

$$4\text{H}_2 + \text{SO}_4^{2-} \rightarrow S^{2-} + 4\text{H}_2\text{O}$$

$$S^{2-} + 2\text{H}^+ \rightarrow H_2S$$

The sulphide ion can also combine with metal salts they may be present such as iron, to form metal sulphide.

$$S^{2-} + \text{Fe}^{2+} \rightarrow \text{FeS}$$

The black colour of solid wastes that have undergone anaerobic decomposition in a landfill is primarily due to the formation of metal sulphides. If were not for the formation of a variety of sulfides, odour problems at landfills could be quite significant.

The biochemical reduction of an organic compound containing a sulphur radical can lead to the formation of malodourous compounds such as methyl mercaptan and
aminobutyric acid. The reduction of Methionine, an amino acid, serves as an example.

\[
\begin{align*}
+2H \\
\text{CH}_3\text{SCH}_2\text{CH}_2\text{CH}(&\text{NH}_2)\text{ COOH} & \rightarrow \text{CH}_3\text{SH} + \ldots \\
\text{(Methionine)} & \quad \text{(Methyl)} \quad \text{(Mercaptan)} \\
\text{CH}_3\text{CH}_2\text{CH}_2(&\text{NH}_2)\text{ COOH} & \\
\text{aminobutyric acid}.
\end{align*}
\]

The methyl mercaptan can be hydrolyzed biochemically to methyl alcohol and hydrogen sulphide;

\[
\text{CH}_3\text{SH} + \text{H}_2\text{O} \rightarrow \text{CH}_4\text{OH} + \text{H}_2\text{S}
\]

The Kolhapur city, at this juncture, is facing the problem of odour. While conducting the household survey, it was asked to the heads of the sample households, that whether they were facing the problem of odour or not. The responses were shown in the table 9.1.
Table 9.1
Odour Problem in Kolhapur City

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Locality</th>
<th>Odour Problem (Frequency)</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The high standard of living locality like Nagala Park and Tarabai Park (having maximum bungalows and RCC type of housing units)</td>
<td></td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(76.0)</td>
<td>(24.0)</td>
</tr>
<tr>
<td>2.</td>
<td>The new extended area like Shahupuri and Rajarampuri (consisit of maximum RCC type and flat type of housing units)</td>
<td></td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(76.0)</td>
<td>(24.0)</td>
</tr>
<tr>
<td>3.</td>
<td>The old Kolhapur like Mangalwar Peth and Shivaji Peth (having maximum number of old and Manglori roof type of housing units)</td>
<td></td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(76.0)</td>
<td>(24.0)</td>
</tr>
<tr>
<td>4.</td>
<td>The low standard of living (backward) area like Shahu Mill Workers Colony and Sidharthnagar (holding Kachha and Manglori type of housing units)</td>
<td></td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(100)</td>
<td>(00)</td>
</tr>
<tr>
<td>5.</td>
<td>The slum area like Sadar Bazar and Rajendranagar (Having kachha hut type of housing units)</td>
<td></td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(100)</td>
<td>(00)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>107</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(85.6)</td>
<td>(14.4)</td>
</tr>
</tbody>
</table>

Source: Field Survey

In all 125 households were surveyed out of these 125 heads of the sample households 107 (85.6%) heads of the households said ‘yes’ they were facing the problem of odour and hardly, 18 (14.4%) heads of the households said ‘no’. The low standard area like Shahu Mill Workers Colony and Sidharthnagar and slum area all
Residential houses near the Solid Waste dump site and people fighting against the odour.

Rag pickers Collecting recyclable plastic Solid Waste.
sample heads told that they were facing the problem of odour. The responses were shown in table 9.1.

9.1.2 Breeding of Flies:

The storage of solid waste in municipal bins or storage bins or elsewhere in Kolhapur city result in breeding of flies. The breeding process of flies is given below.

In the summer time and during the all season in warm climates, fly breeding is an important considerations in the on-site of wastes. Files can develop in less than two weeks after the eggs are laid. The life history of common house fly from egg to adult can be described as follows:

- Egg develop : 8-12 hours
- First stage of larval period : 20 hours
- Second stage of larval period : 24 hours
- Third stage of larval period : 3 days
- Pupal stage : 4-5 days
- Total : 9-11 days

The extent to which flies develop from the larval (Maggot) stage in on-site storage containers depends on the following facts: If Maggots develop, they are difficult to remove when the containers are emptied. Those remaining may develop into flies. Maggots can also crawl from uncovered cans and develop into flies in the surrounding environment.
Flies are the vectors of diseases. Multiple breeding of flies spread different diseases among the citizens.

While conducting the survey, the questions were asked to the heads of the sample households. Their response is shown in table 9.2.

Table 9.2
Breeding of Flies on Site of Storage of MSW

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Locality</th>
<th>Breeding of Flies on site of MSW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>/</td>
<td>Yes (%)</td>
</tr>
<tr>
<td>1.</td>
<td>The high standard of living locality like Nagala Park and Tarabai Park (having maximum bungalows and RCC type of housing units)</td>
<td>19 (76.0)</td>
</tr>
<tr>
<td>2.</td>
<td>The new extended area like Shahupuri and Rajarampuri (having maximum number of RCC and flat type of housing units)</td>
<td>19 (76.0)</td>
</tr>
<tr>
<td>3.</td>
<td>The old Kolhapur like Mangalwar Peth and Shivaji Peth (having maximum number of old and Manglori roof type of housing units)</td>
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</tr>
<tr>
<td>4.</td>
<td>The low standard of living area like Shahu Mill Workers Colony and Sidharthnagar (having maximum kachha and Manglori roof type of housing units)</td>
<td>25 (100)</td>
</tr>
<tr>
<td>5.</td>
<td>The slum area like Sadar Bazar and Rajendranagar (having maximum number of kachha and hut type of housing units)</td>
<td>25 (100)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>107 (85.6)</td>
</tr>
</tbody>
</table>

Source: Field survey
In all 125 households were surveyed. Out of these 125 heads of the sample households, 107 (85.6%) households said 'yes'. There was breeding of flies at the site of solid waste and hardly 18 (14.4%) heads of the sample household said 'no'. The low standard of living area like Shahu Mill workers Colony and the slum area all heads of the sample household said that they were facing the problem of flies.

9.1.3 Air Pollution:

The solid waste was burnt mainly at two places one was near Municipal refuse bins at road side and another was at Kasaba Bawada and Bapat Colony dump sites. In all 230 MT/ day solid waste was generated in Kolhapur. Out of it 100 TPD waste in the form of tree leaves, paper, plastic bags and grass trimings were burnt at road side by the Municipal conservancy staff They were also burning it at dump sites.

As per the NEERI estimation of waste burnt in Deonar (Mumbai) everyday 100 tonnes is set a flame (NEERI, 1993, P. 132-144). It is translating to emission levels. 100 tonnes of garbage burning per day for the whole year amounts to 3577 tonnes of SPM, 2664 tonnes of SO2, 5000 tonnes of VOC (volatile organic compound), 657 tonnes of NO2 and 14125 tonnes of Co per annum; polluting the ambient air significantly.²
Burning of valuable Solid Waste i.e. tree leaves by KMC workers.

Burning of Solid Waste at road side near municipal refuse bin in Kolhapur City.
On the basis, this NEERI estimate of Deonar in Mumbai, we can say that there is air pollution due to the burning of solid waste in Kolhapur. As per the report of KMC, 90 to 100 TPD solid waste is burnt in Kolhapur. This burning is making same amount of emissions in Kolhapur.

9.1.4 Soil/Land Pollution:

Till now, solid waste in Kolhapur city is disposed off in open dumps which causes environmental damages. This would include contamination of land and surface water.

Soil underlying the solid waste deposited within the open dumps could typically contaminated by pathogenic microorganisms, heavy metals, salts and chlorinated hydrocarbons contained in the seepage from the waste. The extent to which the soil attenuates such contaminants depends on its porosity, on exchange capacity and ability to absorb and precipitate dissolved solids. Kolhapur’s soil is more likely to attenuate contaminants than any other soil consisting of sand, silt and gravel. However, over the years, when the seepage continues after the underlying soil has reached its full capacity to attenuate the contaminants, contaminants from the open dumps in Kolhapur must have been getting released to ground water.
The most obvious contamination of land in Kolhapur, windblown dusts can also carry pathogens and hazardous materials. The open dumps in Kolhapur provide a ready access to domestic animas and the possibility of spreading diseases and contaminants through the food chain.

9.1.5 Ground Water Pollution:

The contaminants from the open dumps in Kolhapur have been getting released to ground water.

Moreover, through bio-degradation and chemical oxidation/reduction mechanisms on deposited solid waste dissolved by products of decomposition are added to the interstitial water within the solid waste mass. Overtime, as the solid waste decomposes into smaller particles and consolidates under its own weight polluted interstitial water are released and discharged into ground water.

In Kolhapur contaminated surface water is getting mixed with the water of Panchaganga river through the surface run off and the water which is used to drink and to agriculture is getting contaminated.

9.2 Health Impact of Solid Waste on Conservancy Workers in Kolhapur

An attempt is made to study the health impact of solid waste in Kolhapur. Till now the solid waste was loaded manually and
also dumped manually. It affects the health of the workers of Conservancy Department of KMC because of the direct contact with solid waste. The workers are affected on account of inadequate protection measures such as gloves, boots, uniforms and washing facilities.

9.2.1 Physical Impact on Workers:

In order to know the health impact on all 10 KMC workers from different areas of Kolhapur were interviewed. The response of the workers is shown in table 9.3.

Table 9.3

Health Problems Raised due to Direct Contact With Solid Waste of KMC Workers

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Health Problem</th>
<th>Responses of Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No.</td>
</tr>
<tr>
<td>1.</td>
<td>Body aching</td>
<td>09</td>
</tr>
<tr>
<td>2.</td>
<td>Head ache</td>
<td>07</td>
</tr>
<tr>
<td>3.</td>
<td>Skin diseases</td>
<td>09</td>
</tr>
<tr>
<td>4.</td>
<td>Injuries</td>
<td>10</td>
</tr>
<tr>
<td>5.</td>
<td>Burning of eyes</td>
<td>09</td>
</tr>
<tr>
<td>6.</td>
<td>Asthma</td>
<td>05</td>
</tr>
<tr>
<td>7.</td>
<td>Pains in abdomen</td>
<td>06</td>
</tr>
</tbody>
</table>

Source: Field survey

Out of 10, 09 (90%) workers said that they faced the problem of body aching, 7 (70%) workers said that they faced the problem...
Unhygienic loading of Solid Waste by Municipal Workers.

Handling of Solid Waste by municipal Workers without hand gloves and shoes i.e. without care of health.
of head-ache due to the odour, 9 workers told that they were facing the problem of skin diseases. All the workers said that they were getting injured at the time of work. Immediately after injuries they were not getting the first-aid. Out of 10 workers 5 workers said that they were facing the problem of asthma while 6 workers said they were facing the problem pains in abdomen. It can be seen from the table that majority of workers were facing the problem of physical pains.

9.2.2 Psychological Impact:

In order to study the psychological impact, the question was asked whether the workers were facing the problem of psychological depression or not. Out of 10 workers, 8 (80%) workers said that they were drinking liquor to forget the fatigue of work and physical pains. The bad health situation of workers affected the entire family of the worker. They were not in position to spend money on good health and schooling of the children.

9.2.3 Medical Treatment:

The interviewed workers said that there was free medical treatment in KMC dispensary but they were giving only tablets, so they have to consult to the private hospitals. The cost incurred on private medical treatment was mentioned by the workers is shown in the table 9.4.
Table – 9.4
Monthly Expenses of Medical Treatment of The Workers

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Range of medical expenses</th>
<th>No. of workers (Out of 10)</th>
<th>% of the total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Upto Rs. 50</td>
<td>05</td>
<td>50%</td>
</tr>
<tr>
<td>2.</td>
<td>Rs. 50 to 100</td>
<td>02</td>
<td>20%</td>
</tr>
<tr>
<td>3.</td>
<td>Rs. 100 to 150</td>
<td>01</td>
<td>10%</td>
</tr>
<tr>
<td>4.</td>
<td>Rs. 150 to 200</td>
<td>01</td>
<td>10%</td>
</tr>
<tr>
<td>5.</td>
<td>More than Rs. 200</td>
<td>01</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Field Survey

While conducting the interviews the workers were asked whether they were taking private medical treatment or not. All the workers said that the treatment given by the KMC dispensary was not adequate to them so they were taking treatment in private hospitals. They were asked as to what was the average cost of private medical treatment. Out of 10 workers, 5 (50%) workers said that they were spending minimum Rs. 50/- per month, 2 (20%) workers said that they were spending in the range of Rs. 50 to 100 per month, One (10%) worker said that he was spending in the range of Rs. 100 to 150 and one (10%) worker said that he was spending more than Rs. 200 per month as he was the patient of pains in back.
9.2.4 Medical Leaves:

Majority of workers said that they were taking the casual leaves and medical leaves. Monthly they were taking 5 casual leaves. Addition to it, they were taking 65 days medical leave per annum. It means that each worker avails 70 days leaves. It badly affects the working of solid waste management.

9.2.5 Economic Status:

At the time of interview, it was asked that whether they have purchased plot, vehicle or colour T.V. etc. The majority of workers (90%) said that they were not in position to purchase these things because of their expenses on food, liquor and medicines. It means that the standard of living of the workers is very very low.

CONCLUSION

In this chapter environmental impact of solid waste in Kolhapur city was studied. The production of odour, breeding of flies, air pollution, ground water pollution, soil pollution were the environmental impacts.

The health impact of solid waste on conservancy workers was studied. The physical impact due to direct contact with solid waste were body ache, headaches, injuries, burning of eyes, asthma and pain in abdomen were the physical impacts. In order
to overcome the problem of fatigue, workers were taking liquor. It was noticed that workers were remain absent without notice which affected the solid waste management of KMC. The workers were used to take treatment in private hospitals which was very costly. It was seen in the survey that workers economic condition was very week.
REFERENCES
