
**A RAPID ASSESSMENT SURVEY
OF
THE HEALTH AND ENVIRONMENTAL IMPACTS
OF
SOLID WASTE RECYCLING**

March, 1996

Conducted by

Direct Initiative for Social & Health Action, Calcutta

B-23/2, Kalandi Housing Estate, Lake Town, Calcutta - 700 089

in Collaboration with

**Centre for Occupational & Environmental Health
Society for Participatory Research in Asia**

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Centre for Study in Man and Environment, Calcutta

Dedicated to

The Waste Pickers of Calcutta

PREFACE

The disposal of solid waste has become a serious problem in Indian cities. The contributory factors are the rising population, change in the nature of waste and absence of scientific method of waste disposal. Even today we follow the system of open landfills. Most of the landfills in Bombay, Delhi and Calcutta are over and the search for new ones is going on. Quite major proportion of the waste is composed of non biodegradable materials. Also the waste from hospitals, construction sites, markets and industries are dumped at one place. Ultimately these dumping grounds pose serious health hazards to the waste pickers and the population living around them.

In Calcutta these dumping grounds are made around the villages and this study highlights their plight. The second group taken into consideration is that of waste pickers. Who are malnourished and economically exploited by the middle men. Their health hazards go unheard. We are thankful to DISHA for taking initiative to conduct this study and Centre for Man and Environment to undertake air and water monitoring.

This study is done with a hope that some scientific method will be developed in waste disposal system with the consent and participation of the local population and waste pickers will have better place to live and earn their livelihood.

Harsh Jaitli

FOREWORD

Solid Waste Management with its social and environmental implications is an increasing problem associated with metropolises. In this context, the role the wastepickers play in waste recycling, though largely unrecognised, is simply outstanding. These wretched of the earth—men, women and children, at the risk of being exposed to serious occupational hazards, collect substantial portions of solid waste and deliver them to various recycling points. They are thus playing the role of waste managers; helping recover valuable resources on one hand and relieving the society of environmental and other costs of waste disposal on the other.

Monitoring the environmental fall out of city waste disposal system is also very important in view of the primitive and unscientific method pursued year after year by the municipal authorities.

Direct Initiative for Social and Health Action (DISHA) is a relatively newly formed initiative developed to take up the cause of the most deprived sections of the society regarding occupational hazards, environmental problems and human rights. With support from Fourth World Action, U.K. it is running a health clinic for waste pickers and dumpsite dwellers near the Dhapa dumping ground. In collaboration with FOCUS — an NGO working among waste pickers, DISHA has started another clinic for waste pickers and their families in the Park Circus area. DISHA looks forward to help initiate a co-operative spirit and united action among the waste pickers in the coming days.

The following project was taken up as a rapid assessment study to understand the socio-economic and health problems of wastepickers as well as some of the environmental impacts of solid waste disposal in Calcutta. The Study was made possible through the encouragement and support from PRIA. Analysis of water and air quality was carried out with the help of CSME.

Being a rapid assessment study, this report can only aspire to be a gross depiction of the overall status of waste recycling and the condition of wastepickers. Further elaborate studies are called for to clearly identify the health and environmental impacts of present day solid waste management system. It is hoped that the present study will render its modest contribution towards highlighting the crucial issues and thus help scientists, social activists and other personnel who can further the cause.

Date: 31st March, 1996

Dr. Dipankar Sengupta
Secretary, DISHA

Title : A rapid assessment survey of the health and environmental impacts of solid waste recycling.

1. Introduction :

Garbage that is thrown away is usually looked upon as a nuisance, to be promptly taken away and disposed of by the civic staff, which they hardly ever manage to, resulting in dirty smelly heaps of waste. However irregular and illmanaged, the garbage is ultimately removed and disposed in the dumping ground, albeit in a most unhygienical way in most areas. During the process, a very important activity goes on almost unnoticed i.e. the recycling of waste. From the kerbside near residential quarters, from the roadside waste heaps to dumping grounds, almost in any site where garbage is thrown and dumped, a group of marginal people - men, women and children - loiter around looking for any item that has a resaleable value. They do it for their own subsistence and almost anything - from paper, plastic, broken glass to bones, leather shreds and scrap metals are picked away by them. More often than not looked upon as thieves and good for nothings, they are the poorest of the poor and this is their only way out to etch out a living. Nevertheless, often overlooked is the fact that they are playing a very important role in the society, i.e. recycling of energy. Unbelievable but true, there are hundreds of factories in Calcutta city only, which are solely or partially dependent of recycled wastes as raw materials.

Variously known as ragpickers, scavengers, or waste pickers, very little is known about their lives and health. Unorganised, they are wholly dependent on the middlemen buyers for their daily earnings. Hazardous waste dumps are their workplaces, and they can hardly afford to bother about occupational safety. Till recently very few researches have been carried out in India or elsewhere to assess their living, working and health conditions.

The existing solid waste management practice in Calcutta and in most other Indian cities pose a substantial amount of environmental health risk. The waste dumps are potentially dangerous for people who are occupationally exposed and

also for general population. For the general citizen the main risks to health are indirect and arise from the breeding of disease vectors, primarily flies and rats. The site and smell create nuisances aesthetically unacceptable, and most importantly, waste dumps containing toxic and hazardous material have the potential of adding to the already existing water and air pollution.

It is in this background that this study has been undertaken and is aimed at making a rapid assessment of the socio-economic and health status of a cross-section of ragpickers in Calcutta city. It is hoped that this study will help formulate a methodological basis for more elaborate studies in future and appropriate intervention programmes.

2. Project Objectives :

2.1. General :

To carry out a baseline survey of the socio-economic, health and environmental aspects of solid waste recycling.

2.2. Specific :

1. To assess the socio-economic status of waste pickers both at the dumping site and other areas of Calcutta city.
2. To assess the health status of waste pickers.
3. To carry out air and water quality monitoring in and around the dumping site.

3. Methodology :

3.1. Epidemiological and Socio-Economic Survey :

The overall objective was to carry out a baseline survey of the status of waste recycling and its health impacts on the unorganised waste pickers. The primary study area was the main dumping site of Calcutta city. Socio-economic and epidemiological studies were also carried out among street waste pickers concentrated in other areas of the city.

Waste pickers were selected from different areas of the city categorised as :

- i. Disposal Ground (Dhapa-Bantola Area)
- ii. Industrial Area-I (Gardenreach Area - West Calcutta)
- iii. Industrial Area - II having small-scale industries (Tangra-Tapsia Area - East Calcutta)
- iv. Commercial Area (Esplanade, Chitpur, College Street - Central Calcutta).
- v. Residential Area (Ballygunge/Tollygunge/Salt Lake - South Calcutta)

Socio-economic and health status assessment was carried out by the questionnaire method. Laboratory examination of stool samples were carried out to see the extent of parasitaemia among waste pickers. The sample population was selected by spot randomisation. Microscopic examination of stool was carried out on a sub-sample to see the presence of cyst, ova and parasites.

3.2. Water Quality Analysis :

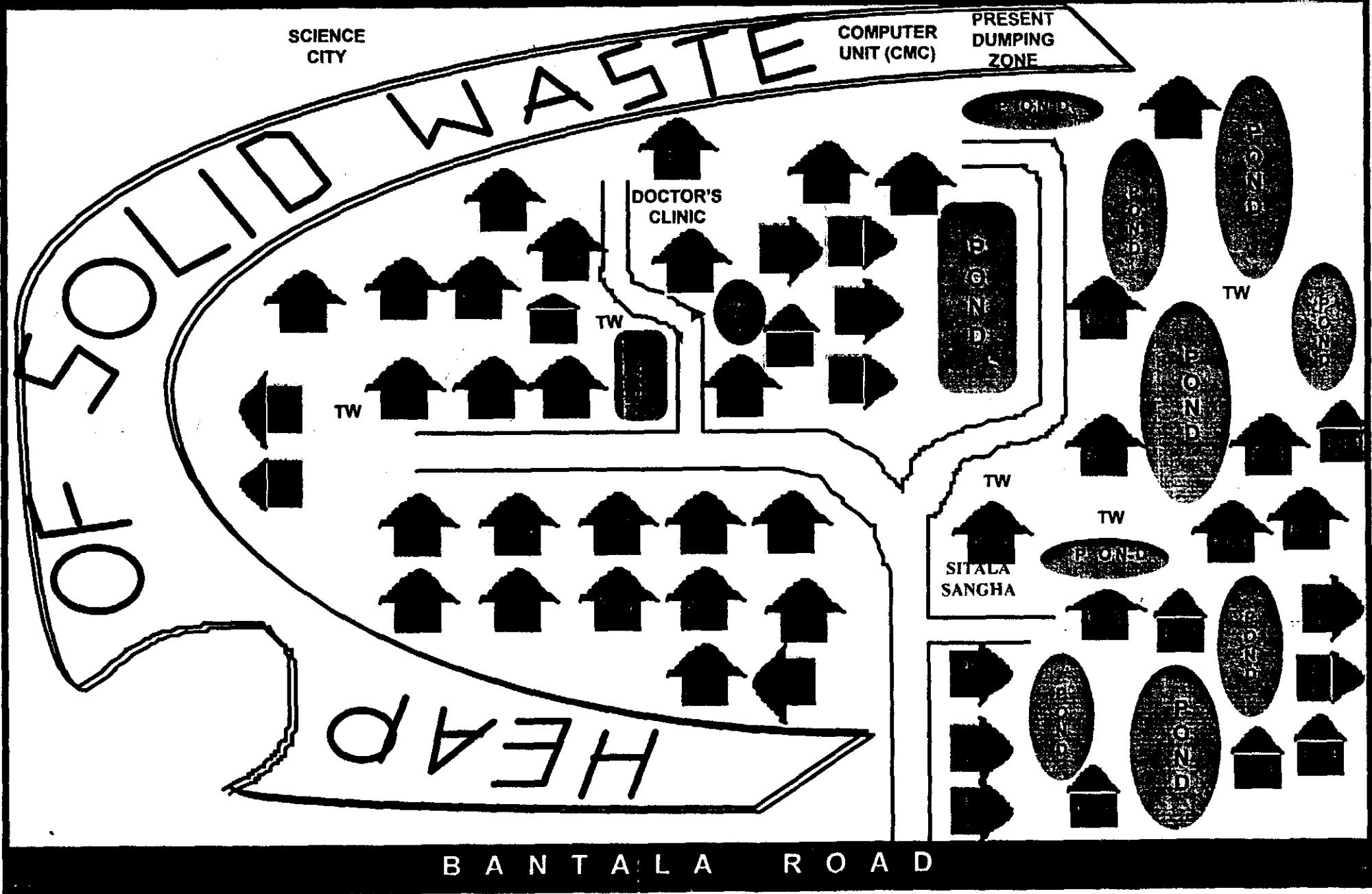
In the first phase (late July, 1955) 10 tubewells (GW) were sampled from the Arupota and Bahishtala villages adjoining the old dump site at Dhapa. These hand pumps constructed by the Municipal authorities are reported to be tapping water from 150 to 250 m depth. In the second phase (November - December 1995) 9 tubewells out of the 10 were again sampled. In addition samples were collected from 3 ponds (P) within the area.

Sample locations were as follows :

Arupota Village :

- GW 1 - near the house of Shri Laltu Sardar / DISHA clinic
- GW 2 - near the house of Shri Sushil Mondal
- GW 3 - near the house of Shri Nishi Sardar
- GW 4 - near the house of Shri Panchanan Naskar

SITE PLAN OF ARUPOTA (DHAPA)
EASTERN BY PASS



- GW 5 - near the house of Shri Gopal Naskar
- P 1 - near the house of Shri Kenaram Sardar
- P 2 - near the house of Shri Jayanta Sardar

Bahishtala Village :

- GW 6 - near the house of Shri Pancha Das / CPI(M) Party office
- GW 7 - near the youth club
- GW 8 - near the house of Shri Ganesh Mondal
- GW 9 - near the house of Shri Umapada Mallick
- GW 10 - near the house of Shri Goutam Makal
- P 3 - near the youth club

Note : GW = Ground Water (from tubewells), P = Pond water.

All water samples were of grab type and were transported to the laboratory within 4-6 hours of sampling. Physical, chemical, bacteriological parameters were monitored along with heavy metal analysis. Properly sterilised glass bottles were used for sampling in respect of bacteriological parameters.

3.3. Air Quality Monitoring :

The ambient air at 1m level were sampled through the use of High Volume Samplers as follows :

- 1. Near the dumping site at Aruporta - 8 am to 4 pm
- 2. Near Bahishtala Club house - 8 am to 4 pm.

The samples were analysed for SO₂, NO₂ and SPM concentration.

Water and air quality analysis was carried out by Centre for Study of Man and Environment, Calcutta.

3.4. Duration of Survey :

The field surveys were carried out from July to December, 1995.

4. Results

4.1. *Socio-Economic Survey :*

Of the total number of ragpickers surveyed 100 were from Dhapa dumping ground, 26 were from Central & South Calcutta each, 29 from East and 24 from West Calcutta (Table - 1).

All age groups and both sexes are engaged in this trade. However, more than 65% belonged to the age group between 11 to 35 years. (Table - 2). Generally a similar pattern was observed in all regions. Around 30% of ragpickers were children below 15 years.

More than 50% of the ragpickers were women (Table - 3). However males predominate in this job in all regions except at the dumping ground at Dhapa. This is possibly because among the resident population at Dhapa, the men folk are often involved in other trades, whereas women become ragpickers. In other areas, ragpickers have to travel long distances all alone, which the women tend to avoid.

More than 80% of the ragpickers were illiterate (Table - 4). The rest could write their names and a marginal few could read and write.

Most of the ragpickers have been doing this job for quite a long time (Table - 5). More than 40% have continued in this trade for more than 10 years.

For most of the ragpickers this is a full time job (Table - 6). Less than 10% are part time ragpickers also engaged in other jobs. Most ragpickers at Dhapa work for 4-6 hours, whereas at other places the duration of work is often more than 6 hours (Table - 7) as they have to travel a lot and pickings are less concentrated.

Their income varies widely depending upon the amount of efforts put in. However most ragpickers (>65%) earn Rs.20-40 daily.

Most ragpickers are either pavement dwellers or stay in poor quality slums. A major section at Dhapa, however, have their own cottages in the adjoining villages.

The source of drinking water for those at Dhapa, South Calcutta and East Calcutta is almost exclusively community hand pumps. In Central and West Calcutta, the drinking water source is public stand posts. (Table - 10).

More than 70% of ragpickers and their family members use open fields for defecation. Less than 5% have their own latrines, while around 20% have access to community latrines (Table - 11).

A ragpicker would pick up any item worth of recycling. However ragpickers in all areas generally look for paper, plastic, glass, leather and scrap metals. Even disposable syringes are recycled (Table - 12). Bone, rubber, gold are almost exclusively looked for at Dhapa.

After the hard work of collecting a bag full of salvageable articles weighing about 25-30 kgs, they sell the articles at the buyers' shop and may return to pick up some more. Individual weekly collection can go up to 200 kgs.

Often 1-2 hours is spent in sorting out the items before selling. The sorting in some cases is assisted by their immediate family members.

4.2. Health Survey :

Less than 10% of the ragpickers are immunised against tetanus toxoid. (Table - 13). 60% or more do not remember having taken a single dose of tetanus vaccine.

Backache is a very common ailment among ragpickers. This is possibly related to long stretch of work in a bent posture associated with a load on the back.

Around 70% of the ragpickers suffer from chronic backache (Table - 14). Most (63%) also complain of general weakness. Many also suffer from recurrent attacks of chest pain and pain abdomen. While cough is a chronic problem for around 40%, (more than 90% in South Calcutta) breathing difficulty is complained of by less than 10%.

37% of the ragpickers complained of having one or more attacks of jaundice in the last one year (46% at Dhapa). This is a very high figure and cannot be fully relied upon. This is understandable as traditional healers have a tendency to over diagnose jaundice. In any case jaundice appears to be of relatively frequent occurrence, possibly due to viral infections (faeco-oral or blood borne) or due to rare causes (e.g. leptospira).

Dog and rat bites are relatively frequent, more so at Dhapa (54% and 23% respectively).

Manhandling by resident population has been reported by some street ragpickers but this is absent at Dhapa. Genital ulcer, gland and bubo appears to be a relatively frequent occurrence while purulent urethral discharge is not. This is possibly related to sexually transmitted diseases like chancroid or syphilis, but could also be related to infected wounds in legs and feet. Burning in micturition has been reported by many at Dhapa, but less frequently in other regions. This could also be related to sexually transmitted diseases like chlamydia or gonococcal infections, but many cases may also be symptomatic manifestations of dehydration related to working in hot and dry open air. Abortion has been reported by only a few in South Calcutta. Molestation has not been reported by any woman ragpicker except one at Dhapa.

Diarrhoea is extremely common among all ragpickers, the 3 monthly prevalence being 85%. The 3 monthly prevalence of fever and cough & cold is 72% and 63% respectively. History of worm expulsion could be obtained from only 24%.

All types of injuries appear to be quite common. The 3 monthly prevalence of cut injury is 69% (86% at Dhapa). The prevalence of pin prick is 33% while that of eye injury is 16% (23% at Dhapa)

Eye infections and other eye problems are 15% (42% at South Calcutta).

Different types of skin problems are highly prevalent (76%) and the 3 monthly prevalence of skin ulcer is 29%.

Stool examination report shows a high prevalence of roundworm and trichuris infection (Table - 17). The prevalence of giardia infection was also moderately high.

4.3. Quality of Drinking Water Collected from Tubewells :

Water samples from 10 numbers of tubewells were analysed. Results of the analysis have been presented in Table - 18 & 19. The pH of all the ground water samples tested varied between 7.1 and 7.4 and is well within the desirable limit i.e., neutral to slightly alkaline.

The total dissolved solids (TDS) and chlorides are the two general indicators of groundwater quality. The TDS concentration ranged from 800 mg/l to 1070 mg/l.

Chloride concentration, an important indicator of organic pollution, was also above the desirable limit of 200 mg/l. Chloride was found to be exceedingly high ranging between 290 mg/l and 415 mg/l in all the water samples.

The ground water of the area was characterised by high hardness ranging between 625 mg/l and 710 mg/l, which is much above the desirable limit of 300 mg/l.

The calcium and magnesium concentrations were also high and above the desirable limits of 75 and 30 mg/l.

The nitrate content of groundwater was found to be very low ranging between 0.03 mg/l and 0.10 mg/l. This is contrary to the other findings, as high nitrate would have fitted into the picture of organic pollution.

The concentration of Zn was within the desirable limit of 5 mg/l. The concentration of iron and manganese was high and above the desirable limit.

A hitherto unreported finding in some of the sampled water was the presence of phenolic compounds much above the permissible limit of 0.001 mg/l. The presence of phenolic compounds causes objectionable taste and odour of the water. It was found that 4 samples (out of 9) yielded high values. The presence of phenolic compounds in ground water of Dhapa region needs a detailed investigation. This could either be due to natural phenomenon or due to continued dumping of coal ashes for years.

As far as the bacteriological quality is concerned, all the tubewells were unsuitable for drinking. Faecal coliforms were found in all the samples. The sources of contamination appears to be due to leakage of contaminated water from surface through the openings / cracks by the side of the tubewell pipes.

4.4. Quality of Pond Water :

The ponds identified for the study were all within the village premises close to the dwelling houses. One of them is used as a fish pond, another by washermen. As the water in most ponds there looks and smells bad, many tend to

avoid the pond water for regular domestic purposes. However, these are still being used on a non-regular basis; children and often adults wash and bathe there. The water sample analysis showed high BOD and COD values and it is obviously unfit for domestic use of any type. Heavy metal analysis showed only trace presence of some chemicals (chromium, cadmium, lead, nickel etc.). However, these results are not conclusive as only a few sample were analysed. Further studies are required to determine whether the population living in these regions are exposed to toxic concentration of heavy metals directly or through food-chain.

4.5. Air Quality :

Air quality results showed a high SPM count as was expected in this area. However, oxides of sulphur and nitrogen were found to be relatively low. These results again, are not conclusive as only a few samples were collected and other studies have found very high SO₂ and NO₂ in this region.

5. Discussion

In Calcutta Metropolitan area the municipal service of collection and transportation of urban solid waste can be divided into three major phases as given below :

- i) Sweeping and kerbside collection*
- ii) Collection by hand carts to large on-road open dumps/vats.*
- iii) Transportation by vehicle (open/closed truck) to the disposal sites (Dhapa/Bantola etc.).*

Sweeping and kerbside collection is more or less regular (once a day) but transportation from open on-road dumps/vats is very irregular except from the very important stations (e.g., big markets).

These are the three major points where waste pickers are active - (i) at the kerbside, (ii) at the on road collection points and (iii) at the disposal ground.

Under the existing system of storage, collection and transportation of solid waste in Calcutta, a substantial portion of salvageable components are picked up

and recycled before the waste is finally disposed off. However even in the disposal ground, quite a large amount of salvageable articles are still available to a large number of waste pickers. Qualitatively the articles available in the disposal ground are not as fresh as those in the city waste dumps.

During the survey work, it was found that the waste pickers did not have any fixed working hours or a definite working locality. Only in Dhapa disposal ground waste pickers reside near the working locality and scavenging is done as soon as truck loads of wastes arrive.

Waste pickers collect the wastes in gunny bags (usually supplied by middleman buyers) or in baskets (at the dumping site).

There are several shops in different regions of the city, owners of which are basically middlemen buyers who buy the scavenged articles from the scavengers and sell these to other agencies. The middlemen buyers can be classified into 2 groups - (i) small dealers who buy the articles directly from the waste pickers, and (ii) big dealers or wholesalers who buy the articles from the small dealers. Small dealers are the primary buyers purchasing recovered materials from the wastepickers. Big dealers are generally specialised dealers who purchase specific articles from the small dealers. Small dealers are usually people of the locality who construct a makeshift structure usually in an unauthorized space by the side of the road or any other vacant space. These structures or shops lie within an easy access of the scavengers.

On the whole it can be said that the economic gain in this "picker based recycling" is mostly enjoyed by the middlemen buyers, particularly the big dealers. The total income generated in this business is still beyond the knowledge of the policy makers. The actual grassroot level workers (waste pickers) are oblivious of the rate of profit and get little share of this huge unaccounted money.

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A ragpicker is a familiar site anywhere in the lanes and by-lanes of Calcutta — there is this stooped figure bent with a load on the back, eyes on the dirt, shuffling along.

The present state of waste management in Calcutta gives ample opportunities for pickers to go on "treasure hunt" in any region they opt for. Their poverty, living and housing conditions make them highly vulnerable so far as health is concerned. Most of them are malnourished and frequently suffer from common communicable diseases, like diarrhoea, worm infections, cough & cold etc. Over and above their job of scavenging the waste dumps make them vulnerable to some specific diseases. The dumps are infested with rats and stray dogs and both rat and dog bites are quite common. Cuts and bruises frequently occur. The dumps are often mixed with various types of toxic and hazardous waste materials to which the waste pickers are regularly exposed.

The solid waste management practices in Calcutta are far from satisfactory. Dirty smelling waste dumps by the road sides infested with rodents and insects is a nuisance, an eye sore, clogs the drain and favours fly and mosquito breeding. They pollute the air with foul odour and increase the concentration of suspended particulate matter.

The dumping sites however are far worse. Instead of sanitary landfill the practice here is of open dumping. The uncontrolled tipping that is carried out, results wind aided dispersal of the waste and adjoining areas are covered with litter. Often overlooked is the fact that the waste dumps contain hazardous materials which have the potential of contaminating surface and ground water. It has not been scientifically studied but there is a high probability bio-contamination and bio-magnification of toxic chemicals from leachates of waste dumps into fish and vegetables grown in the dumping sites and adjoining areas.

The daily chore at Arupota — one of the main dumpsites
of Calcutta city





Left over eatables is salvageable too !



DISHA clinic at the dumpsite at Arupota

Epidemiological and Socio-Economic Survey in Progress



In DISHA Clinic

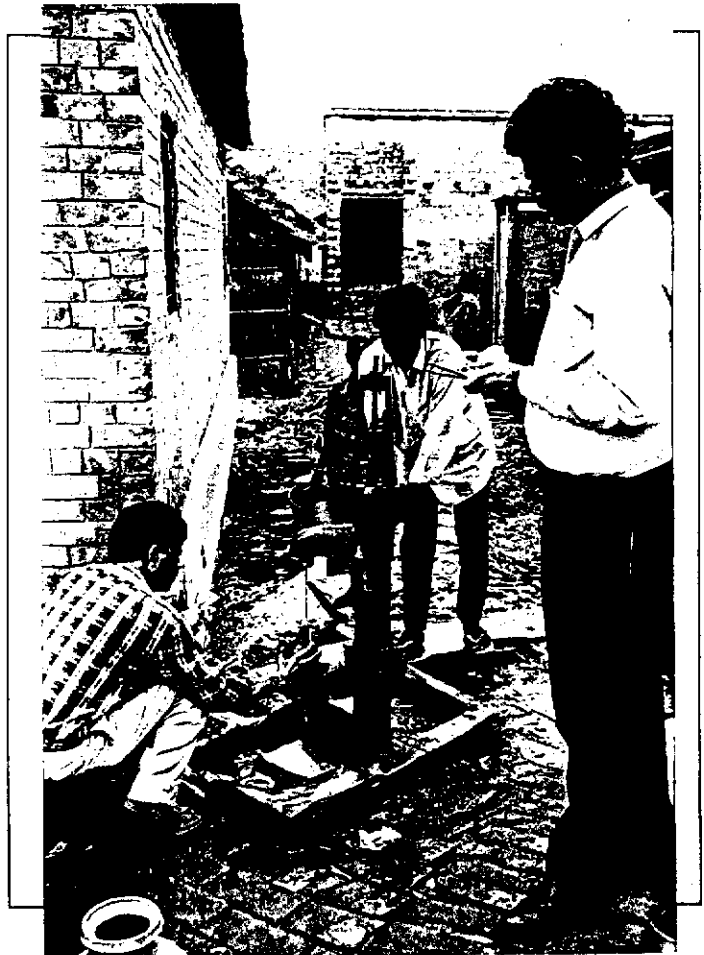


at the Dumpsite



Collection of water sample for
chemical and bacteriological
analysis

Arupota



Bahistala

Table - 1 : Age and Sex Distribution of Sample Population

Survey Area

| Age Group | Dhapa | | Central Calcutta | | South Calcutta | | East Calcutta | | West Calcutta | | Total |
|--------------|-----------|-----------|------------------|----------|----------------|----------|---------------|-----------|---------------|-----------|------------|
| | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female | |
| 5 - 10 | 2 | 8 | | | | | 3 | | 1 | 2 | 16 |
| 11 - 15 | 2 | 20 | 6 | | 6 | | 7 | 3 | 1 | 2 | 47 |
| 16 - 20 | 3 | 8 | 1 | | 2 | | 3 | 1 | 1 | | 19 |
| 21 - 25 | 1 | 4 | 1 | | 3 | 1 | 3 | 1 | 4 | 2 | 20 |
| 26 - 30 | 2 | 13 | 4 | | 2 | 1 | 1 | | | 4 | 27 |
| 31 - 35 | 2 | 12 | 1 | 2 | 1 | | 1 | 2 | 1 | 1 | 23 |
| 36 - 40 | | 3 | | | 1 | 1 | | 1 | 2 | | 8 |
| 41 - 45 | 2 | 8 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 23 |
| 46 - 50 | 5 | 1 | 1 | 1 | 1 | | | | 1 | | 10 |
| 51 - 55 | 2 | 1 | 2 | | 1 | 1 | | 1 | | | 8 |
| 56 - 60 | | | | | | 1 | | | | | 1 |
| 60 above | 1 | | | | | 2 | | | | | 3 |
| Total | 22 | 78 | 20 | 6 | 18 | 8 | 19 | 10 | 12 | 12 | 205 |

| Table - 3 :Sex Distribution of Sample Population | | | | | | | | | | | | |
|---|-------|----|------------------|-------|----------------|-------|---------------|-------|---------------|-------|-------|-------|
| <i>Survey Area</i> | | | | | | | | | | | | |
| Age Group | Dhapa | | Central Calcutta | | South Calcutta | | East Calcutta | | West Calcutta | | Total | % |
| | No. | % | No. | % | No. | % | No. | % | No. | % | | |
| Male | 22 | 22 | 20 | 76.92 | 18 | 69.23 | 19 | 65.52 | 12 | 50.00 | 91 | 44.39 |
| Female | 78 | 78 | 6 | 23.08 | 8 | 30.77 | 10 | 34.48 | 12 | 50.00 | 114 | 55.61 |

| Table - 4 : Educational Status of Ragpickers (%) | | | | | | |
|---|--------------|-------------------------|-----------------------|----------------------|----------------------|--------------|
| <i>Survey Area</i> | | | | | | |
| Educational Status | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | Total |
| Illiterate | 81 | 84.62 | 84.62 | 79.31 | 83.33 | 81.95 |
| Literate | 11 | 7.69 | 11.54 | 13.79 | 12.50 | 11.22 |
| Primary | 8 | 7.69 | 3.85 | 6.90 | 4.17 | 6.83 |
| Middle School | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Secondary | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | |
| | | | | | | |

| Table - 5 : Duration in the Profession (%) | | | | | | |
|---|--------------------|-------------------------|-----------------------|----------------------|----------------------|--------------|
| Duration | <i>Survey Area</i> | | | | | Total |
| | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | |
| Less than 1 year | 12.00 | 15.38 | 3.85 | 13.79 | 8.33 | 11.22 |
| >1 year but < 5 year | 30.00 | 15.38 | 34.62 | 48.28 | 20.83 | 30.24 |
| 5 - 10 years | 9.00 | 23.08 | 19.23 | 20.69 | 20.83 | 15.12 |
| More than 10 years | 49.00 | 46.15 | 42.31 | 17.24 | 50.00 | 43.41 |

Table - 6 : Nature of Work (%)

| <i>Survey Area</i> | | | | | | |
|--------------------|-------|------------------|----------------|---------------|---------------|-------|
| | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | Total |
| Full time | 93 | 84.62 | 92.31 | 96.55 | 100.00 | 93.17 |
| Part Time | 7 | 15.38 | 7.69 | 3.45 | 0.00 | 6.83 |

Table - 7 : Duration of Work (%)

| Table - 7 : Duration of Work (%) | | | | | | |
|---|--------------------|-------------------------|-----------------------|----------------------|----------------------|--------------|
| | | | | | | |
| | <i>Survey Area</i> | | | | | |
| Time in hrs | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | Total |
| < 4 hours | 0.00 | 0.00 | 0.00 | 3.45 | 4.17 | 0.98 |
| 4 - 6 hours. | 74.00 | 34.62 | 15.38 | 41.38 | 37.50 | 52.68 |
| 6 - 9 hours | 26.00 | 65.38 | 84.62 | 55.17 | 58.33 | 46.34 |
| | | | | | | |

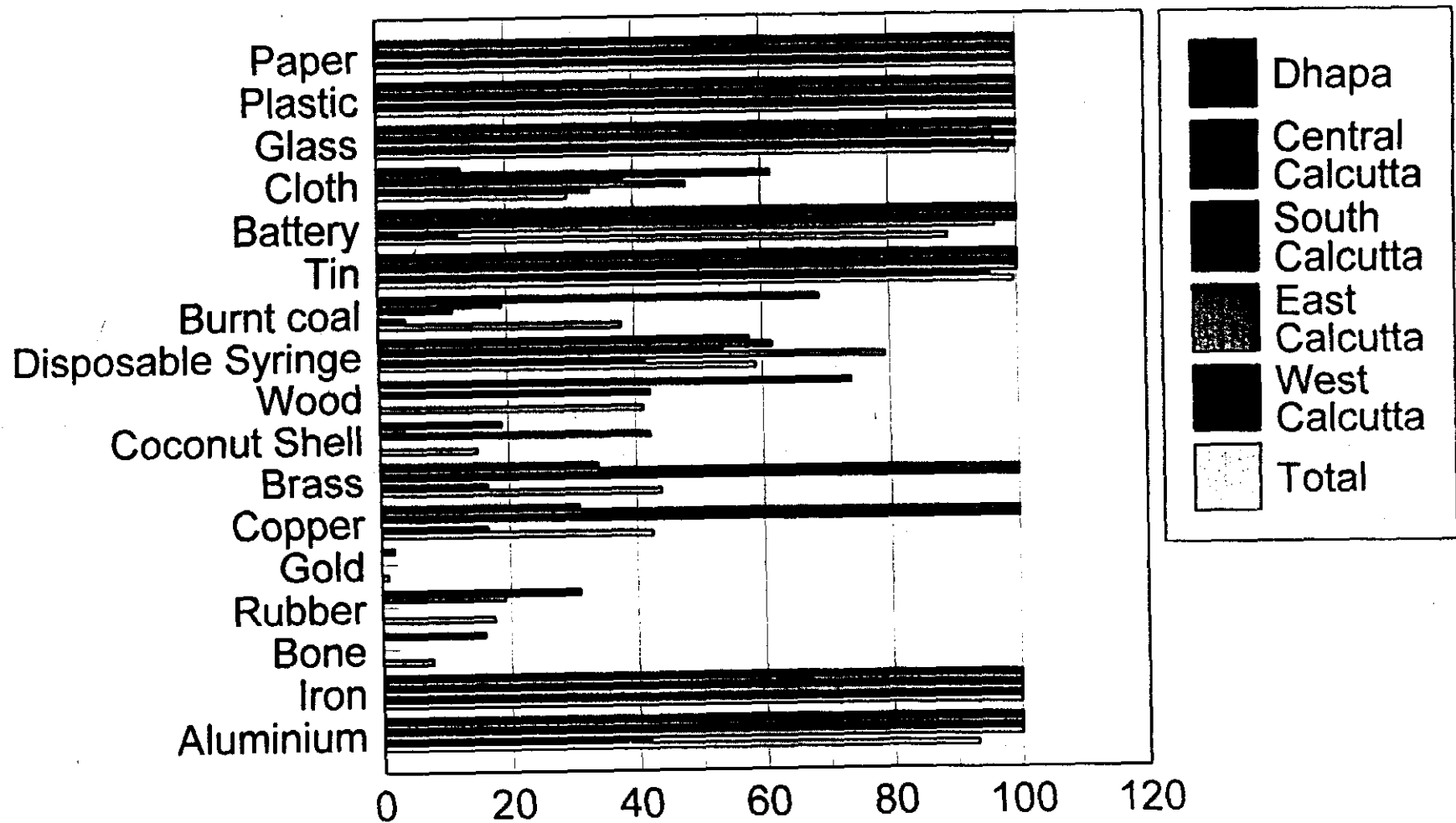
Table - 9 : Housing Status (%)

| Table - 9 : Housing Status (%) | | | | | | |
|---------------------------------------|--------------|-------------------------|-----------------------|----------------------|----------------------|--------------|
| <i>No. of Dwellers</i> | | | | | | |
| Dwellers | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | Total |
| Pavement | 20.00 | 80.77 | 38.46 | 27.59 | 12.50 | 30.24 |
| Slum | 39.00 | 19.23 | 61.54 | 72.41 | 87.50 | 49.76 |
| Others | 41.00 | 0.00 | 0.00 | 0.00 | 0.00 | 20.00 |

Table - 12 : Nature of Scavenging (%)

| Item | No. of Users | | | | | Total |
|--------------------|--------------|------------------|----------------|---------------|---------------|--------|
| | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | |
| Paper | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Plastic | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Glass | 100.00 | 96.15 | 100.00 | 96.55 | 100.00 | 99.02 |
| Cloth | 13.00 | 61.54 | 38.46 | 48.28 | 33.33 | 29.76 |
| Battery | 100.00 | 100.00 | 100.00 | 96.55 | 12.50 | 89.27 |
| Tin | 100.00 | 100.00 | 100.00 | 100.00 | 95.83 | 99.51 |
| Burnt Coal | 69.00 | 19.23 | 11.54 | 0.00 | 4.17 | 38.05 |
| Disposable Syringe | 58.00 | 61.54 | 53.85 | 79.31 | 41.67 | 59.02 |
| Wood | 74.00 | 0.00 | 42.31 | 0.00 | 0.00 | 41.46 |
| Coconut Shell | 19.00 | 3.85 | 42.31 | 0.00 | 0.00 | 15.12 |
| Brass | 34.00 | 100.00 | 100.00 | 0.00 | 16.67 | 43.90 |
| Copper | 31.00 | 100.00 | 100.00 | 0.00 | 16.67 | 42.44 |
| Gold | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.98 |
| Rubber | 31.00 | 19.23 | 0.00 | 0.00 | 0.00 | 17.56 |
| Bone | 16.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.80 |
| Iron | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Aluminium | 100.00 | 100.00 | 100.00 | 100.00 | 41.67 | 93.17 |

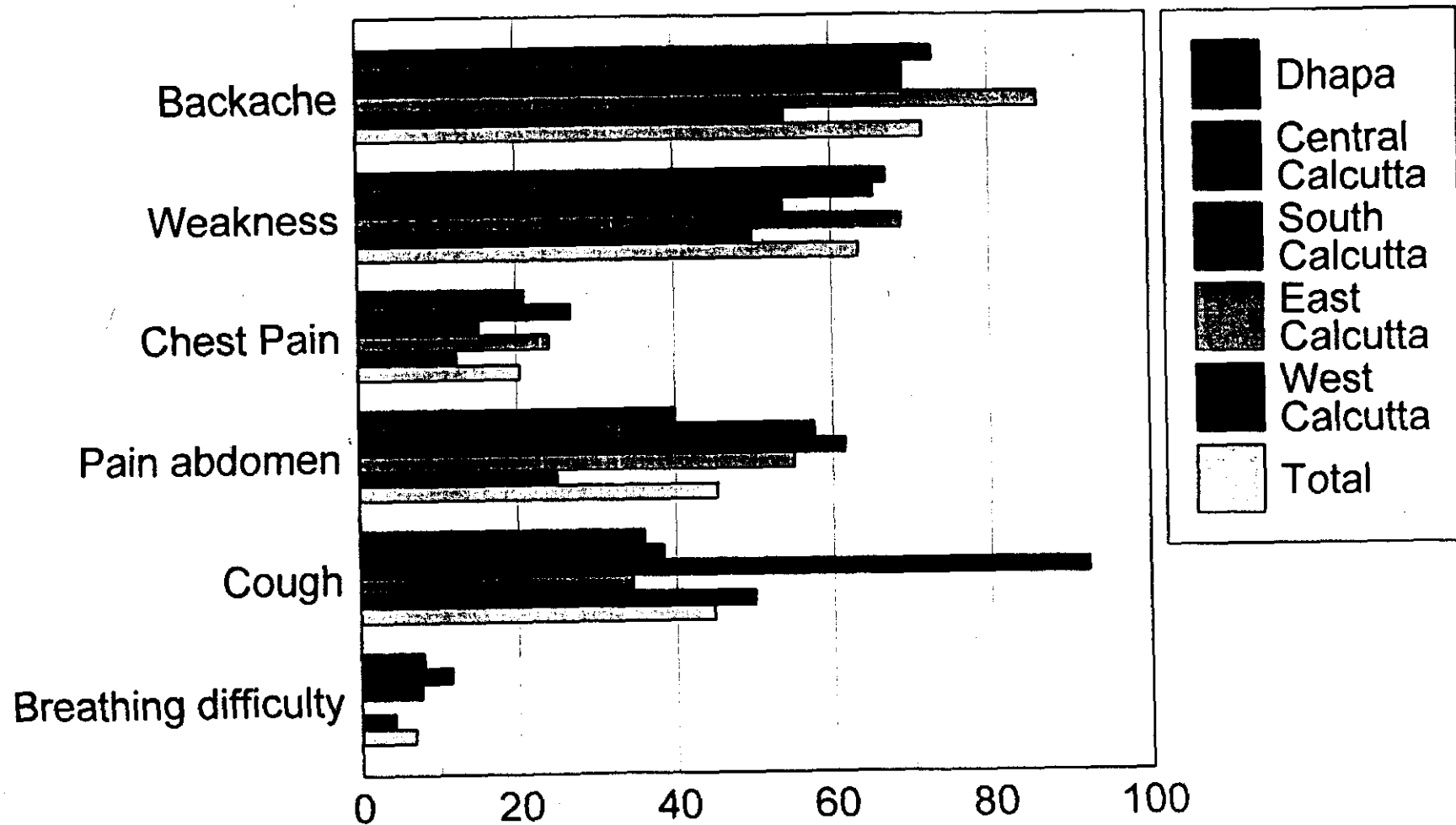
Nature of Scavenging (%)



| Table - 13 : Immunisation Status (Tetanus toxoid) (%) | | | | | | |
|--|--------------|-------------------------|-----------------------|----------------------|----------------------|--------------|
| <i>Survey Area</i> | | | | | | |
| | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | Total |
| Fully Immunised | 8.00 | 7.69 | 7.69 | 3.45 | 8.33 | 7.32 |
| Partially Immunised | 32.00 | 19.23 | 30.77 | 37.93 | 16.67 | 29.27 |
| Not taken | 60.00 | 73.08 | 61.54 | 58.62 | 75.00 | 63.41 |

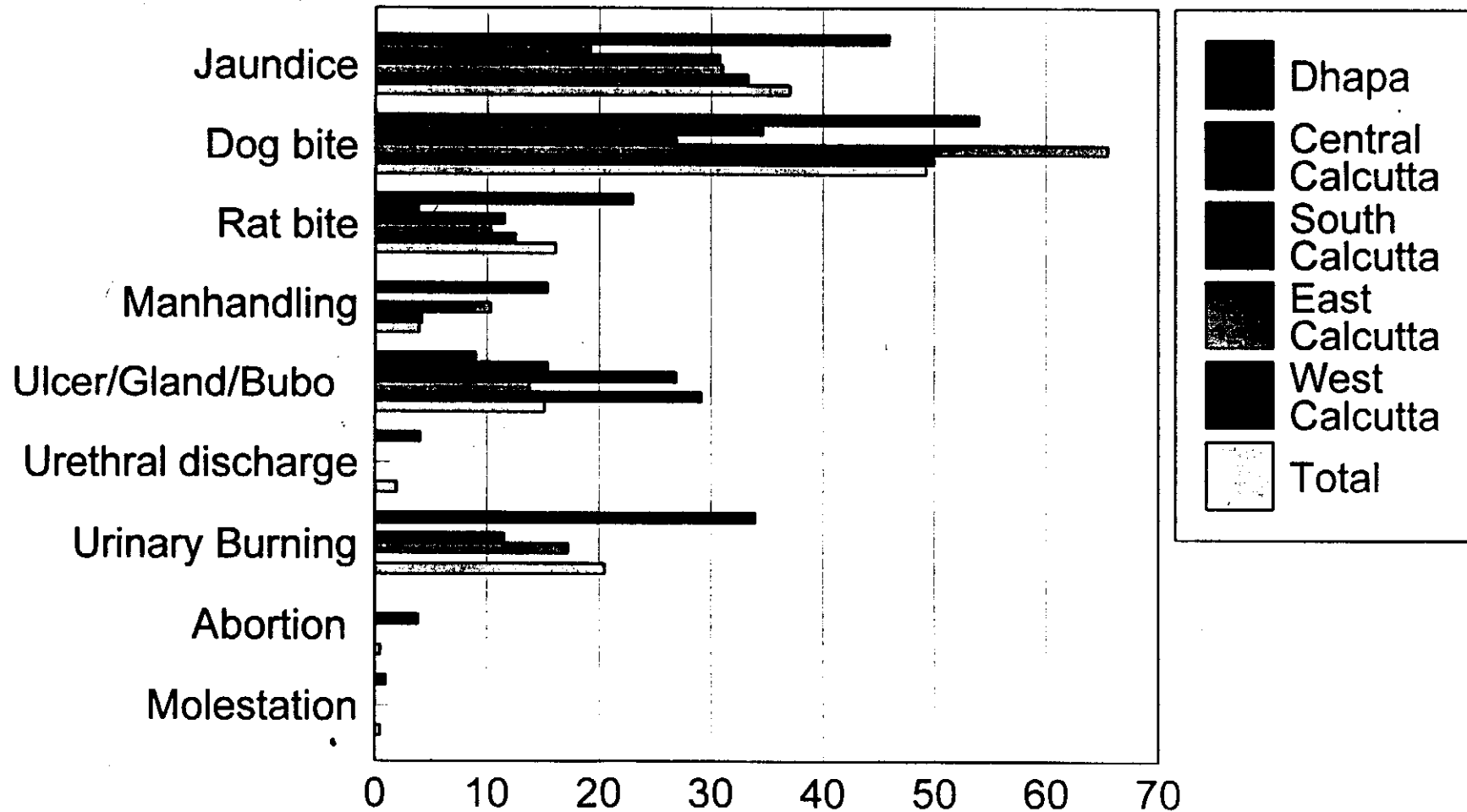
| | | | | | | |
|---|--------------------|-------------------------|-----------------------|----------------------|----------------------|--------------|
| | | | | | | |
| Table - 14 : Chronic Health Problems (%) | | | | | | |
| | | | | | | |
| | <i>Survey Area</i> | | | | | |
| | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | Total |
| Backache | 73.00 | 69.23 | 69.23 | 86.21 | 54.17 | 71.71 |
| Weakness | 67.00 | 65.38 | 53.85 | 68.97 | 50.00 | 63.41 |
| Chest Pain | 21.00 | 26.92 | 15.38 | 24.14 | 12.50 | 20.49 |
| Pain abdomen | 40.00 | 57.69 | 61.54 | 55.17 | 25.00 | 45.37 |
| Cough | 36.00 | 38.46 | 92.31 | 34.48 | 50.00 | 44.88 |
| Breathing difficulty | 8.00 | 11.54 | 7.69 | 0.00 | 4.17 | 6.83 |
| | | | | | | |

Chronic Health Problems (%)



| Table - 15 : Present Illness (Yearly Prevalence) (%) | | | | | | |
|---|--------------------|------------------|----------------|---------------|---------------|-------|
| | <i>Survey Area</i> | | | | | |
| | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | Total |
| Jaundice | 46.00 | 19.23 | 30.77 | 31.03 | 33.33 | 37.07 |
| Dog Bite | 54.00 | 34.62 | 26.92 | 65.52 | 50.00 | 49.27 |
| Rat Bite | 23.00 | 3.85 | 11.54 | 10.34 | 12.50 | 16.10 |
| Manhandling | 0.00 | 15.38 | 0.00 | 10.34 | 4.17 | 3.90 |
| Ulcer/Gland / Bubo in genital region | 9.00 | 15.38 | 26.92 | 13.79 | 29.17 | 15.12 |
| Purulent urethral discharge | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.95 |
| Burning in micturition | 34.00 | 0.00 | 11.54 | 17.24 | 0.00 | 20.49 |
| Abortion (in females) | 0.00 | 0.00 | 3.85 | 0.00 | 0.00 | 0.49 |
| Molestation (in females) | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 |
| | | | | | | |
| | | | | | | |

Present Illness (Yearly Prevalence) %



| Table - 16 : Present Illness (3 montly prevalence) (%) | | | | | | |
|---|--------------------|------------------|----------------|---------------|---------------|-------|
| | | | | | | |
| | <i>Survey Area</i> | | | | | |
| | Dhapa | Central Calcutta | South Calcutta | East Calcutta | West Calcutta | Total |
| Diarrhoea | 78.00 | 96.15 | 100.00 | 79.31 | 91.67 | 84.88 |
| Fever | 84.00 | 46.15 | 80.77 | 58.62 | 58.33 | 72.20 |
| Cough & Cold | 66.00 | 50.00 | 88.46 | 44.83 | 62.50 | 63.41 |
| Worm Expulsion | 30.00 | 11.54 | 11.54 | 20.69 | 33.33 | 24.39 |
| Cut injury | 86.00 | 57.69 | 57.69 | 72.41 | 16.67 | 68.78 |
| Pin prick | 22.00 | 30.77 | 61.54 | 44.83 | 37.50 | 33.17 |
| Eye injury | 23.00 | 11.54 | 7.69 | 10.34 | 8.33 | 16.10 |
| Eys Sore / Redness | 14.00 | 11.54 | 3.85 | 6.90 | 41.67 | 14.63 |
| Skin Ulcer | 45.00 | 15.38 | 23.08 | 10.34 | 8.33 | 29.27 |
| Other skin problems | 76.00 | 88.46 | 96.15 | 68.97 | 50.00 | 76.10 |
| | | | | | | |

Present Illness (3 monthly prevalence)

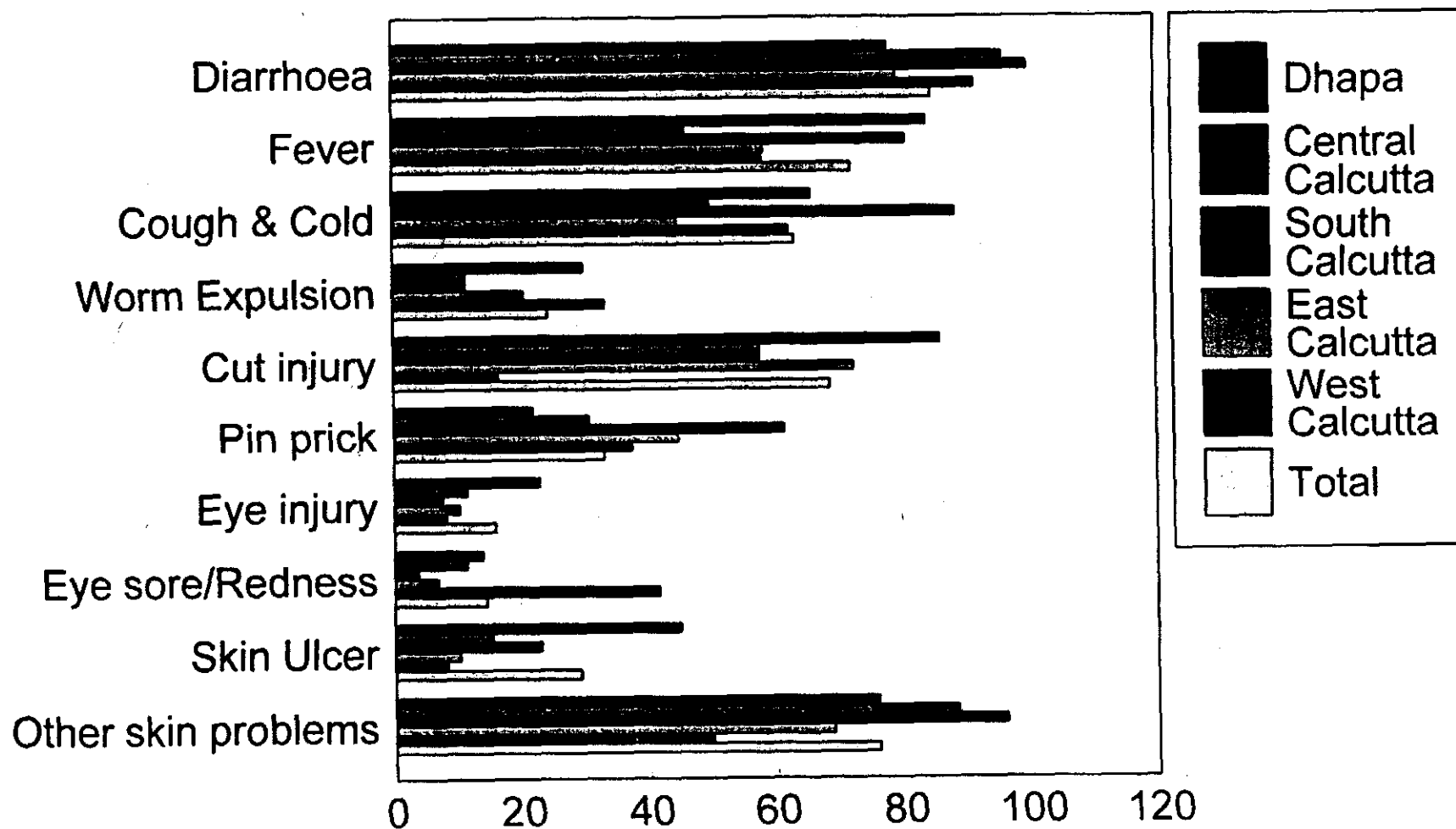


Table - 17

Stool Examination Report

| | | |
|------------------------------------|---|-------|
| Mucous | = | 100% |
| Pus cell | = | 91.7% |
| Veg. cell | = | 100% |
| Ova | | |
| • <i>Ascaris lumbricoides</i> | = | 50% |
| • <i>Trichuris trichura</i> | = | 58.3% |
| • <i>Hymenolopsis nana</i> | = | 8.3% |
| Cyst | | |
| • <i>Giardia lamblia</i> | = | 16.7% |
| • <i>Entamoeba histolytica</i> | = | 8.3% |
| • <i>Entamoeba coli</i> | = | 8.3% |
| Parasites | | |
| • <i>Strongyloides stercoralis</i> | = | 8.3% |
| • <i>Trichomona</i> | = | 8.3% |

Table - 19
Result of Bacteriological Analysis of Tubewell Water
around Dumpsite

| Sample No. with date of Sampling | MPN Total Coliform /100 ml. | MPN Faecal Coliform/100 ml. |
|---|--|--|
| GW1 | 2 | 2 |
| GW2 | 11 | 7 |
| GW3 | 13 | 5 |
| GW4 | 170 | 27 |
| GW5 | 33 | 17 |
| GW6 | 94 | 46 |
| GW7 | 5 | 5 |
| GW8 | 5 | 5 |
| GW9 | 63 | 11 |
| GW10 | 33 | 17 |

Table - 20
Result of Chemical Analysis of Pond Water
around Dumpsite

| Parameter | Sample No. | | |
|---------------------------------------|-----------------|---------------|---------------|
| | P1 | P2 | P3 |
| Colour | Yellowish black | Light yellow | Light yellow |
| Odour | Obnoxious | No foul odour | No foul odour |
| pH (25°C) | 8.26 | 8.27 | 7.98 |
| Conductivity (μ mohs cm^{-1}) | 8574 | 1970 | 1072 |
| Turbidity (N.T.U.) | 1161 | 39 | 46 |
| T.D.S. | 7925 | 990 | 580 |
| D.O. | Nil | 5.4 | 5.4 |
| B.O.D. | 126 | 18 | 14 |
| C.O.D. | 980 | 64 | 28 |
| Chloride | 1973 | 410 | 160 |
| Sulphate | 372.5 | 52.3 | 34.7 |
| Nitrate | 1.3 | 0.3 | 0.3 |
| Phospate | 0.15 | 0.4 | 0.8 |
| Fluoride | BDL | BDL | BDL |
| Phenolic Compound | 0.75 | BDL | 0.45 |
| Oil & Grease | 5.6 | Nil | Nil |
| Alkalinity (P) as $CaCO_3$ | 50 | 20 | 10 |
| Alkalinity (M) as $CaCO_3$ | 2925 | 290 | 285 |
| Cyanide | BDL | BDL | BDL |
| Total Hardness as $CaCO_3$ | 620 | 680 | 370 |
| Ca | 105 | 136 | 64 |
| Mg | 87.3 | 83 | 51.3 |
| Na | 820 | 95 | 70 |
| K | 932 | 6.5 | 5.0 |
| Zn | 0.3 | 0.12 | 0.06 |
| Pb | 0.06 | BDL | BDL |
| Cd | 0.02 | BDL | BDL |
| Cr | 0.05 | BDL | BDL |
| As | BDL | BDL | BDL |
| Mn | 0.4 | 0.34 | 0.11 |
| Hg | BDL | BDL | BDL |
| Fe | 2.0 | 0.3 | 0.3 |
| Cu | BDL | BDL | BDL |
| Ni | 0.6 | BDL | BDL |

*All values are in mg/l except pH, colour, odour, conductivity & turbidity,
BDL = Below Detection Limit.*

Table - 21
Air Quality Monitoring around Dumpsite

| Date | Location | Time | SPM | NO_x | SO₂ |
|-------------|------------------------------|----------------|------------|-----------------------|-----------------------|
| 07.12.95 | Near Dumping ground, Arupota | 08.00 to 16.00 | 931.8 | 17.0 | BDL (<0.5) |
| 09.12.95 | Bahistala village | 08.00 to 16.00 | 240.5 | 26.7 | BDL (<0.5) |

All values are in microgram/cubic metre.

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- ◆ Arupota Sitala Sangha



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