



CAG

Citizen consumer and civic Action Group

Analysis of Data from Health Service Providers: Linking Plastics and Health Disorders in Kodungaiyur

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1. Introduction

1.1 Background

The Human Rights Impact Assessment project at Kodungaiyur assesses the human rights impacts of business practices through the lens of waste management, with the goal of pushing for tighter regulations and liability laws around producer accountability. In this context, the violation of the right to health of four focus groups in Kodungaiyur (residents, scrap shop workers, conservancy workers and informal waste pickers) is sought to be assessed using two instruments: symptom diary and in-depth interviews. Symptom diaries are a simple tool to record non-invasive, self-reported data about symptoms experienced and perceived by a set of participants over a period of time in an organised manner to aid in the diagnostic process. The in-depth interviews of residents and non-residents help identify and understand other issues relating to health, social, property, and environment arising from the waste.

Apart from the quantitative findings from the symptom's diary exercise, information gathered by the researchers during the fieldwork affirms the health findings, and the following are the complaints gleaned through these sources. Scrap shop workers frequently report back pain (from long hours of sitting down and segregating waste) , skin allergies (due to working without

protective equipment) and injuries (which occur during the segregation process). For the residents, especially school children, noise pollution due to the plying trucks to and from the dumpyard is a particular problem. It affects their concentration and some of the older residents even attribute their hearing loss to it. Women residents have informed researchers that delayed periods is a problem which is rising exponentially and there have even been a number of cases of early puberty in girls. Apart from the above physical health issues, the mental health of young children is negatively impacted due to substance abuse and prostitution. Students often become drug addicts as parents are often working full-time and the children are left unattended. Unused cigarettes discarded as waste are easily available in the dumpyard for children to smoke. Children (11th -12th standard) in the area, especially RR Nagar, are forced into prostitution for measly sums of 50 Rs. by unnamed middle men after school hours. Clients often include lorry drivers, and daily wage workers.

The quantitative and qualitative data collected via the symptoms diary exercise, in-depth interviews, environmental sampling, and fieldwork proves that the fundamental right to health of the residents of Kodungaiyur is violated due to the physical and social impacts of the existence of the landfill. However, in public health research the assumption that A causes B simply because A correlates with B may not be a legitimate form of argument (ie, correlation does not mean causation). In the current scenario, it is difficult to directly hold the dumpyard as a cause for the health problems because of other possible factors at play such as the Indian Oil Corporation plant and metro construction. However, while causation might be difficult to prove, it would be a huge error to ignore the scientific evidence for correlation. The uncertainty and the potential fallacy behind proving causation are typically overcome by triangulation with empirical evidence. This is sought to be achieved in the current case using the health service providers study to triangulate the information received from the respondents of the symptoms diary exercise and the in-depth interviews.

1.2 Objectives of the Health Service Providers Study

The main objective of the health service providers study is to document the violation of the right to health, if any. As stated earlier, it serves to corroborate the information collected from the symptoms diary and in-depth interviews regarding the health symptoms frequently suffered by the people in Kodungaiyur. Secondly, the health service providers study aims at being larger in the scope of its reach than the symptoms diary exercise, which was limited to a total number of 66 representative respondents (38 residents, 11 conservancy workers, 11 informal waste pickers and 6 scrap shop workers). This is anticipated because data collected from hospitals/healthcentres/pharmacies will be wider in terms of both the number of patients and the nature of health problems suffered by the people, as opposed to data collected from a limited group of individuals.

The broader objective of the health service providers study in conjunction with the symptoms diary exercise and the in-depth interviews is to create evidence based reporting that will be available as a knowledge base for communities to make informed decisions and/or to seek remedy for any violation of their human rights. A well informed community is the base of any community-led Human Rights Impact Assessment process. Further this evidence serves to establish a channel to seek corporate accountability as well as establish the liability of the government for not regulating business practices that has led to the violation of human rights.

2. Research Methodology

The health service providers study aims at collecting data from the different health service providers including private hospitals and clinics, Greater Chennai Corporation run primary health centres, as well as private pharmacies in the area near the Kodungaiyur dumpyard. The quantitative data is collected using Kobo forms and the quantitative analysis of this data will help us identify frequent health symptoms suffered by the people in that area. These results will corroborate the symptoms diary exercise by investigating whether these results match with the information received from the symptoms diary exercise.

The Kobo forms are designed to collect data on the monthly frequency of patients suffering from health disorders relating to skin, respiratory system, abdominal and intestinal problems, dental disorders, eye and ear infections, skeletal muscular systems, central nervous system, blood disorders, cardiovascular problems, reproductive system and miscellaneous others including septic wounds and seasonal communicable diseases. Data is collected from each of the private hospitals/private clinics/pharmacies/primary health centres on the average number of patients diagnosed with a specific disease/health disorder on a monthly basis. The monthly basis herein refers not to a specific month, but an average month of the year. For each section of the study, be it private practitioners, primary healthcare centres and pharmacies, the data collected is analysed to find out the total monthly number of reported diseases as well as the most affected body system as a whole across the section. The total monthly number of reported diseases in a particular section is the sum total of the number of patients diagnosed with that specific disease/health disorder on a monthly basis reported by all the participants. The most affected body system under a particular section is calculated by adding the total monthly number of reported diseases that affect that respective body system.

While this remains the central focus of the forms for all four focus groups, there are minor additions/variations in the four forms targeting each of the focus groups pertaining to the specific services provided by them. (Refer to the forms in the Annexure).

The methodology of identification of participants in the study has been explained as follows:

1. Private Practitioners : This category covers both private hospitals (17) and private clinics (10), altogether 27. These hospitals/clinics have been chosen based on the following criteria:
 - a. Those private hospitals and clinics accessed by the respondents of the symptoms diary exercise. While most of them have been covered, some could not be covered because either the hospitals have now shut down. There were two cases wherein the hospitals declined to share any information.
 - b. The other criteria has been to select some major hospitals/ clinics in the Kodungaiyur dumpyard area and surrounding localities so as to get a representative sample of health problems from areas in and around the Kodungaiyur dumpyard.

2. Primary Healthcare Centres (PHC) run by the Greater Chennai Corporation: This category includes data collected from the 9 PHC's out of the 15 PHC's operating in Zone 4 (location of the Kodungaiyur dumpyard) of Chennai. All the PHCs could not be covered as some of them refused to give data. However, data has been collected from the key PHCs in Shivaji Nagar and Nethaji Nagar among others, accessed by the residents of Kodungaiyur, as mentioned by the participants of the in-depth interview study.

3. Pharmacies: Data has been collected from 24 private pharmacies from the areas in and around the Kodungaiyur dumpyard. Out of the 24 pharmacies, 9 are attached to private hospitals, and the rest of the 15 pharmacies are independent pharmacies in the area. An observation during fieldwork was that clusters of pharmacies are often located around major hospitals in the area, therefore an attempt has been made to collect data from one of the pharmacies in each such cluster. Further, data has been collected from a number of pharmacies located on the same road as the Kodungaiyur dumpyard and the main residential areas close to the dumpyard.

3. Findings

3.1 Private Hospitals and Clinics

All the doctors interviewed had completed their MBBS degree, with fourteen respondents having pursued their specialisations in different fields including gynaecology, obstetrics, orthopaedics and neurology. The average number of patients visiting the private hospitals/clinics on a daily basis was 114, with bigger multispeciality hospitals like KVT, Apollo, Senthil Priya etc registering the most number of patients. Clinics saw fewer patients on a daily basis ranging from 20 to a maximum of 60 patients.

Data was collected from each of the 27 hospitals/clinics on the average number of monthly patients diagnosed with different diseases/health disorders. Analysis of data collected from the 27 hospitals/clinics revealed that bacterial upper respiratory tract infections such as pharyngitis, laryngitis, rhinitis etc were the most commonly prevalent health diseases. Headaches and back pain come second and third respectively. The different kinds of cancers have a relatively low incidence and occupy the bottom part of the list. Refer to Table 1 for more information on the monthly frequency of health disorders reported by patients across the 27 private hospitals/clinics.

| No. | Body Organ | Health Disorder | Consolidated number of cases on a monthly basis reported/diagnosed by the 27 surveyed hospitals/clinics |
|-----|---------------------------------|--|---|
| 1 | Respiratory System | Bacterial upper respiratory tract infections | 3661 |
| 2 | Nervous System | Headaches | 2551 |
| 3 | Skeletal and Muscular System | Back pain | 2430 |
| 4 | Abdominal and Intestinal System | Bacterial Enteritis | 2163 |
| 5 | Blood | Iron Deficiency | 1378 |
| 6 | Respiratory System | Asthma | 1344 |
| 7 | General | Septic Wounds | 1286 |
| 8 | Abdominal and Intestinal System | Dysentery | 964 |
| 9 | General | Malaria | 920 |
| 10 | Reproductive System | Menstrual Cramps and Stress | 885 |

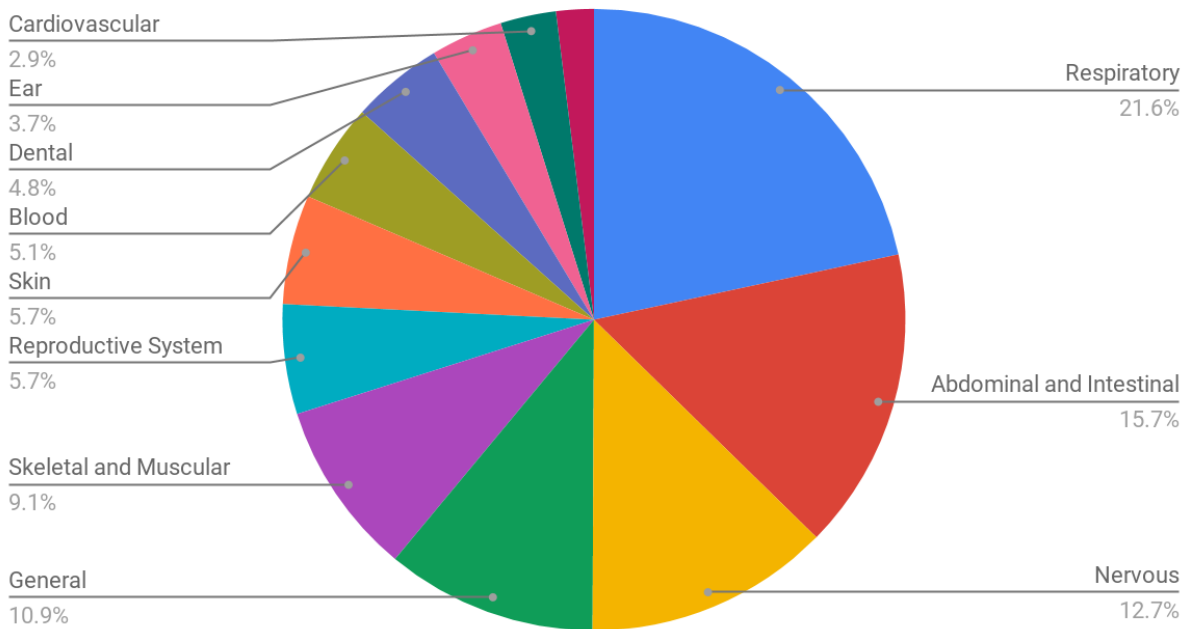
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|----|---------------------------------|---------------------------|-----|
| 11 | Cardiovascular | Cardiovascular Problems | 773 |
| 12 | General | Chicken Pox | 725 |
| 13 | Dental | Dental Pain | 652 |
| 14 | Dental | Dental Caries | 626 |
| 15 | Skin | Fungal Infections | 616 |
| 16 | Reproductive System | Delayed Periods | 605 |
| 17 | Respiratory System | Bronchitis | 595 |
| 18 | Ear | Otitis Media | 595 |
| 19 | Nervous System | Neurological Disorders | 589 |
| 20 | Skin | Allergic Dermatitis | 514 |
| 21 | Abdominal and Intestinal System | Kidney and Renal Problems | 466 |
| 22 | Ear | Bacterial Ear Infections | 408 |
| 23 | Skin | Pruritus | 391 |
| 24 | Abdominal and Intestinal System | Amoebiasis | 350 |
| 25 | Eye | Allergic Conjunctivitis | 331 |
| 26 | Nervous System | Peripheral Nerve Damage | 269 |
| 27 | Abdominal and Intestinal System | Helminthiasis | 258 |
| 28 | Eye | Bacterial Eye Infections | 192 |
| 29 | Respiratory System | Pneumonia | 181 |

| | | | |
|----|---------------------------------|------------------------|----|
| 30 | Reproductive System | Early onset of Periods | 38 |
| 31 | Respiratory System | Lung Cancer | 9 |
| 32 | Abdominal and Intestinal System | Liver Cancer | 5 |
| 33 | Skin | Skin Cancer | 2 |
| 34 | Abdominal and Intestinal System | Cholera | 0 |

Table 1 shows the monthly frequency of health disorders/diseases reported/diagnosed by private hospitals/clinics in descending order.

Apart from an individual analysis of the most commonly prevalent diseases/infections/illnesses, an analysis of which body system was most afflicted was also carried out; refer to the table below for more information on the same.

Most affected body systems as reported by Private Hospitals/Clinics



The questionnaire also consisted of a list of questions relating to the monthly frequency of pregnancy- related problems reported/diagnosed. Among the pregnancy related health problems, high risk pregnancies and spontaneous abortions were the most commonly reported. Refer to the table below for more information on the same.

| | |
|--------------------------|-----|
| High- Risk Mothers | 137 |
| Spontaneous Abortion | 99 |
| Low Birth Weight | 32 |
| Birth defects | 21 |
| Congenital Abnormalities | 18 |
| Infant Mortality | 8 |

Table 2 shows the monthly frequency of pregnancy related complications as reported/diagnosed in private hospitals/clinics.

Data was also collected on the number of times a month the doctors asked the patients to get cancer screening tests done for the following kinds of cancers listed in the table below. Apart from the different kinds of cancer mentioned below, throat cancer is also on the rise as reported by the doctors.

| | | |
|------------------|----|---|
| Lung Cancer | 28 | CT Scan, MRI, Biopsy |
| Liver Cancer | 27 | Liver function test, Blood Test, Ultrasound |
| Breast Cancer | 14 | Mammogram |
| Lymphatic Cancer | 11 | Blood Test |
| Cervical Cancer | 7 | Pap Test |
| Blood Cancer | 5 | Blood Test |
| Skin cancer | 2 | Biopsy |

Table 3 shows the monthly frequency of patients visiting private hospitals/clinics being asked to take cancer screening tests.

3.2 Pharmacies

Most of the pharmacists who we interviewed, 17 out of the 24, had completed their diploma in pharmacy. There was one pharmacist each who had completed their degrees in B.A, B.Sc, and M.Sc in pharmacy respectively. There were two pharmacists who had passed twelfth standard and one pharmacist who had completed his Diploma in Medical Laboratory Technology (DMLT). The average number of people visiting the pharmacies on a daily basis is 84.

Like the rest of the forms, data was collected for diseases pertaining to the 11 main body systems as mentioned previously. For the pharmacies, the questionnaire targets the average monthly frequency of patients who buy medicines for the respective diseases/illnesses/ailments.

As was done previously, initially a total number count of all the individual diseases/illnesses/disorders was carried out. Most commonly people sought medication for back pain, headache, bacterial upper respiratory tract infection, dysentery in that order respectively. The diseases in decreasing order of frequency have been listed in the table as follows.

| Serial Number | Body Organ | Disease/Illness/Disorder | Consolidated number of cases on a monthly basis reported by the 24 pharmacies |
|---------------|---------------------------------|---|---|
| 1 | Skeletal and Muscular System | Back pain | 2990 |
| 2 | Nervous System | Headaches | 2540 |
| 3 | Respiratory System | Bacterial upper respiratory tract infection | 2295 |
| 4 | Abdominal and Intestinal System | Dysentery | 1807 |
| 5 | Abdominal and Intestinal System | Bacterial Enteritis | 1769 |
| 6 | Skin | Fungal infection | 1134 |
| 7 | Blood | Iron deficiency | 871 |
| 8 | Eye | Bacterial eye infection | 842 |
| 9 | Dental | Dental pain | 822 |
| 10 | Dental | Dental carries | 728 |

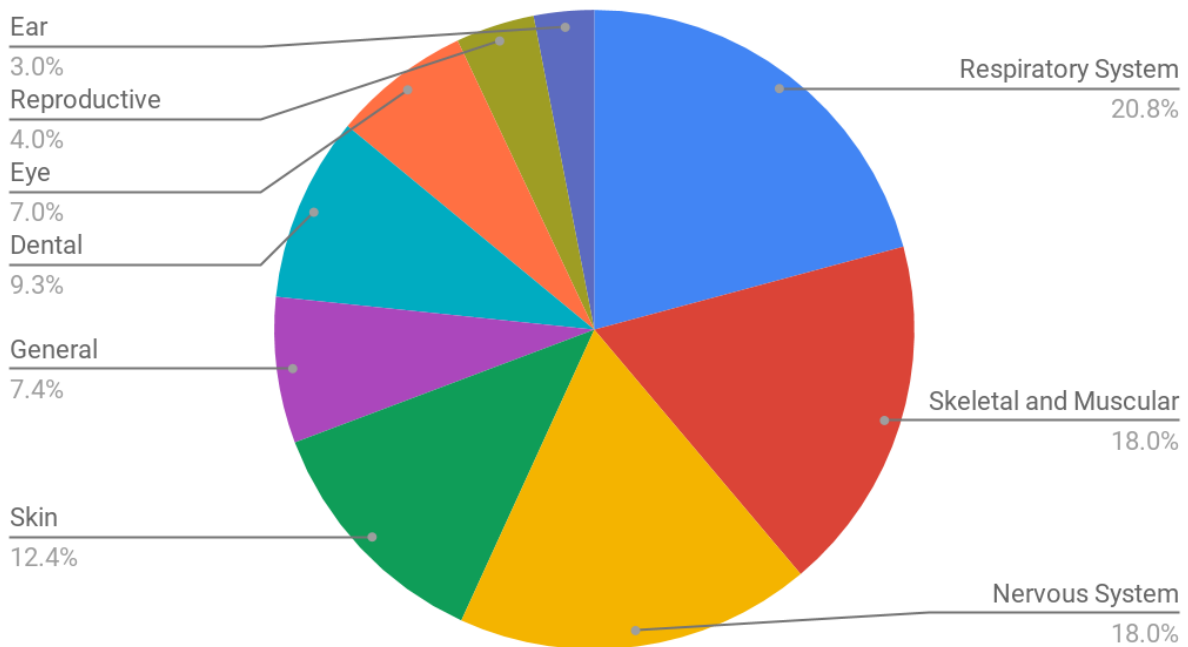
| | | | |
|----|---------------------------------|--------------------------------|-----|
| 11 | Skin | Allergic Dermatitis | 771 |
| 12 | Respiratory System | Asthma | 668 |
| 13 | Abdominal and Intestinal System | Kidney and Renal Problems | 586 |
| 14 | Cardiovascular | Cardiovascular problems | 484 |
| 15 | Reproductive System | Menstrual cramps and stress | 428 |
| 16 | Abdominal and Intestinal System | Helminthiasis | 417 |
| 17 | General | Septic Wounds | 317 |
| 18 | Eye | Allergic conjunctivitis | 316 |
| 19 | Nervous System | Neurological disorders | 309 |
| 20 | Respiratory System | Bronchitis | 309 |
| 21 | General | Malaria | 271 |
| 22 | Ear | Otitis Media | 257 |
| 23 | Ear | Bacterial infection in the ear | 248 |
| 24 | Reproductive | Delayed periods | 212 |
| 25 | Abdominal and Intestinal | Amoebiasis | 191 |
| 26 | Respiratory | Pneumonia | 179 |
| 27 | Skin | Pruritus | 158 |
| 28 | General | Chicken Pox | 147 |
| 29 | Nervous System | Nerve Damage | 130 |
| 30 | Reproductive | Early onset of periods | 20 |
| 31 | General | Cholera | 10 |

| | | | |
|----|--------------------------|--------------|---|
| 32 | Abdominal and Intestinal | Liver Cancer | 5 |
| 33 | Respiratory | Lung cancer | 1 |
| 34 | Skin | Skin cancer | 0 |

Table 4 shows the monthly frequency of health disorders/diseases reported by pharmacies in descending order.

The most affected body systems in decreasing order are as follows: abdominal and intestinal system, respiratory system, skeletal and muscular system, nervous system, skin, general, dental, eye, reproductive system and ear.

Most affected body systems as reported by pharmacies



The questionnaire also consisted of a list of questions relating to the frequency of pregnancy-related problems. Among the pregnancy related health problems, high risk pregnancies and low birth weight were the most commonly reported ones. Refer to the table below for more information on the same.

| | |
|----------------------|-----|
| High Risk Mothers | 207 |
| Low Birth Weight | 23 |
| Spontaneous Abortion | 3 |
| Birth defects | 2 |

Table 5 shows the monthly frequency of patients reporting to pharmacies with pregnancy related complications.

3.3 Government Primary Health Centres:

The following 9 PHCs in Zone 4 were covered under this study, namely Kodungaiyur II, Vyasarpadi, Anna Salai, VOC Nagar, Tondiarpet, Satyamoorthy Nagar, Shivaji Nagar, Nethaji Nagar and Harinarayan. Out of the 9 medical personnel interviewed, 7 were medical officers and two were nurses. The PHCs were frequented by an average of 166 patients daily. With the exception of the one PHC in Anna Salai, all of them reported that there was a sufficient number of staff to meet the demand for different services.

Like the previous sections, data was collected for the monthly number of patients diagnosed/reporting with the following diseases from each of the PHCs. Most patients visiting the PHCs suffer from back pain, bacterial upper respiratory tract infections and headaches.

| Serial Number | Body Organ | Disease/Illness/Disorder | Consolidated number of cases on a monthly basis. |
|---------------|------------------------|---|--|
| 1 | Skeletal and Muscular | Back pain | 6990 |
| 2 | Respiratory | Bacterial upper respiratory tract infection | 4940 |
| 3 | Central Nervous System | Headaches | 2405 |
| 4 | General | Cardiovascular diseases | 1280 |
| 5 | Blood | Iron Deficiencies | 923 |

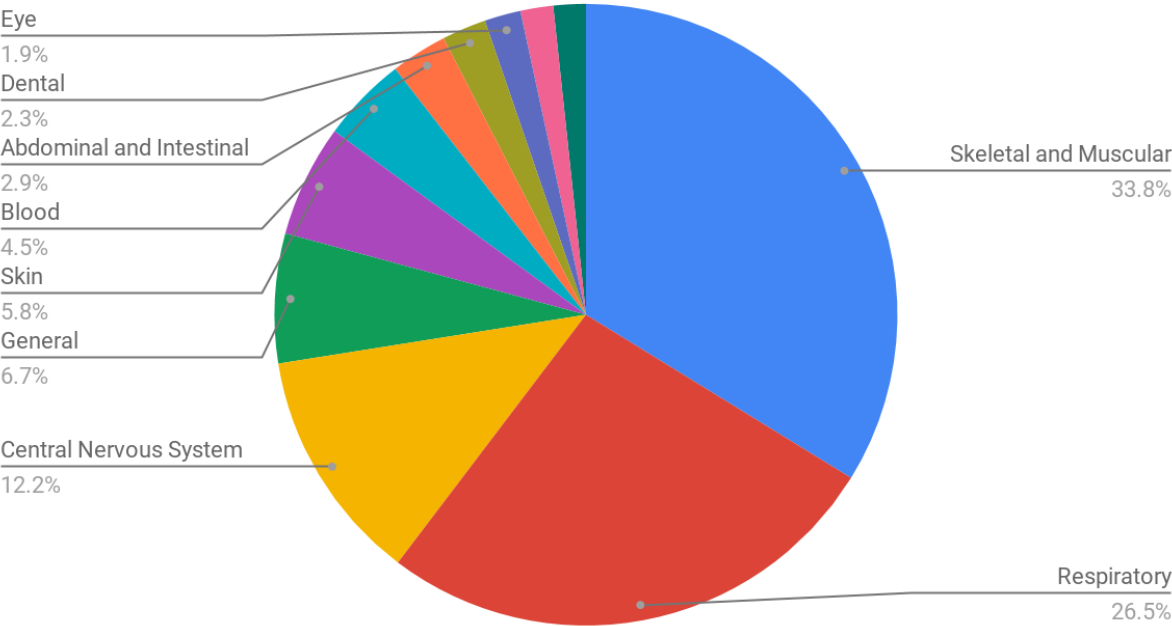
| | | | |
|----|--------------------------|--------------------------------|-----|
| 6 | Skin | Fungal Infection | 690 |
| 7 | Respiratory | Asthma | 516 |
| 8 | Respiratory | Bronchitis | 397 |
| 9 | Skin | Dermatitis | 327 |
| 10 | Dental | Dental caries | 295 |
| 11 | Abdominal and Intestinal | Amoebiasis | 221 |
| 12 | Reproductive | Menstrual cramps and stress | 200 |
| 13 | Eye | Bacterial eye infections | 199 |
| 14 | Skin | Pruritus | 190 |
| 15 | Eye | Allergic conjunctivitis | 190 |
| 16 | Abdominal and Intestinal | Bacterial Enteritis | 180 |
| 17 | Dental | Dental pain | 180 |
| 18 | Ear | Bacterial infection in the ear | 180 |
| 19 | Ear | Otitis Media | 172 |
| 20 | Abdominal and Intestinal | Dysentery | 161 |
| 21 | Reproductive | Delayed periods | 135 |
| 22 | Central Nervous system | Peripheral nerve damage | 103 |
| 23 | General | Septic wounds | 95 |
| 24 | Abdominal and Intestinal | Helminthiasis | 27 |
| 25 | Respiratory | Pneumonia | 19 |
| 26 | General | Malaria | 13 |
| 27 | Reproductive | Early onset of periods | 12 |

| | | | |
|----|--------------------------|--|----|
| 28 | Abdominal and Intestinal | Cholera | 10 |
| 29 | Central nervous system | Impairment of neurological development | 10 |
| 30 | Abdominal and Intestinal | Kidney and renal failure | 7 |
| 31 | General | Chicken pox | 4 |
| 32 | Respiratory | Lung cancer | 1 |
| 33 | Skin | Skin cancer | 0 |
| 34 | Abdominal and Intestinal | Liver cancer | 0 |

Table 6 shows the monthly frequency of health disorders/diseases diagnosed/reported by PHCs in descending order.

The most affected body systems percentage wise has been shown in the pie chart below.

Most affected body systems as reported by Primary Health Centres



The questionnaire also consisted of a list of questions relating to the frequency of pregnancy-related problems. Among the pregnancy related health problems, high risk pregnancies and low birth weight were the most commonly reported. The medical officers stated that the common causes behind high-risk pregnancies included anaemia, hypothyroidism, gestational diabetes, etc. Refer to the table below for more information on the same.

| | |
|-----------------------------|-----|
| High- Risk Mothers | 115 |
| Low Birth Weight | 16 |
| Spontaneous Abortion | 13 |
| Congenital Abnormalities | 11 |
| Antenatal Development Delay | 1 |
| Birth defects | 1 |
| Infant Mortality | 0 |
| Fetal Mortality | 0 |

Table 7 shows the monthly frequency of pregnancy related complications as reported/diagnosed in PHCs.

Data was also collected on the number of times a month cancer screening tests were carried out for the following kinds of cancers listed in the table below. Across all PHCs, cancer screening tests were available only for breast cancer (complete breast examination) and cervical cancer (Via Vili, Cervical Screening). During the screenings, if there were irregularities in the cervical screenings or lumps in the breast, the patients were referred to Stanley RSRM or the Institute of Social Obstetrics at the Government Kasturba Gandhi Hospital for Women & Children.

| Type of Cancer | Total number of Screenings carried out on an average on monthly basis across all PHCs | Total number of cases that test positive on an average on a monthly basis across all PHCs |
|------------------|---|---|
| Lung Cancer | Not available | |
| Liver Cancer | Not available | |
| Breast Cancer | 446 | 8 |
| Lymphatic Cancer | Not available | |
| Cervical Cancer | 436 | 8 |

| | | |
|--------------|---------------|--|
| Blood Cancer | Not available | |
| Skin cancer | Not available | |

Table 8 shows the monthly frequency of cancer screening tests being conducted at the PHCs.

In addition to the above, data on the monthly number of lab tests conducted was also collected from each of the PHCs.

| Kind of lab test carried out at the PHC | Total number of tests carried out on an average on monthly basis across all PHCs |
|---|--|
| Blood test | 3650 |
| Urine test | 3010 |
| X-Ray | Not available |
| Blood pressure | 10,250 |

Table 9 shows the monthly frequency of lab tests being conducted at the PHCs.

The questionnaire also surveyed the type and frequency of medical camps conducted in the PHCs so as to better understand the attempts to educate people and cover treatment for different health conditions. Most of the PHCs conduct three types of camps, namely malaria-dengue talks, special outreach medical camps and conservancy workers camps. The malaria-dengue awareness talks focusing on prevention and control of these diseases are held in the PHCs on a weekly basis and in some cases daily during the months of October, November and December. Special outreach medical camps are also conducted by almost all of the PHCs thrice in a month. These camps include blood screening to check for diabetes, checking for hypertension, as well screening for ophthalmological and skin problems among other diseases. However, in Kodungaiyur II PHC located in Vivekananda Nagar, this camp has not been conducted for the past three months due to lack of funds. Conservancy workers camps are medical camps conducted yearly for conservancy workers employed by the Greater Chennai Corporation. These generally include screening for diabetes, hypertension, blood pressure, cardiac problems, as well as breast and cervical cancer screening for women. A general physician is also present to look into health problems common to conservancy workers as a result of their work environment, like body pain, headaches and skin problems. Some of these camps also provide tetanus and diphtheria injections, as well as de-worming tablets. Other less common camps include TB awareness talks in schools and PHCs, leprosy camps, and health education camps for the antenatal mother.

4. Discussion Section

Respiratory System

Abnormalities in the respiratory system constituted the majority of health problems presented by patients on a monthly basis. The data collected from the private hospitals/clinics shows that the most common respiratory diseases/disorders were upper respiratory tract infections, asthma, bronchitis, pneumonia and lung cancer in that order respectively. Asthma and bronchitis were reported to be more common among children who are vulnerable to these diseases. Even hospitals which only deal with particular specialisations like orthopaedics, gynaecology etc like Sri and Ezhil Hospital are presented with a significant number of respiratory illnesses. This is because the doctors, though a specialist in a particular field, are family doctors for most of these patients.

At the PHCs, the medical officers state that treatment is given therein for cases of upper respiratory tract infections. However, for more serious illnesses such as bronchitis, asthma and pneumonia, patients are referred to Stanley Hospital for treatment in case the patient does not respond well to initial treatment at the PHC.

Further, the doctors state that in most of the respiratory cases the symptoms include cough, cold, wheezing, breathlessness, sputum discharge etc. The symptoms diary exercise revealed that the respondents have acknowledged poor air quality as a result of burning of waste including rubber and plastic at the dumpyard, emissions from the garbage trucks, and compactor lorries. This has been affirmed by the doctors who state that respiratory problems are linked to the poor air quality as a result of smoke from the burning of waste in the Kodungaiyur dumpyard, vehicular emissions and fumes from local industrial units.

Skin

Skin problems such as fungal infections, allergic dermatitis and pruritus are also common, same as the symptoms of diary exercise wherein approximately 7 percent of the respondents reported skin issues such as itching, scales, patches and boils. This is affirmed by the doctors who state that itching and rashes are among the most common symptoms of skin fungal infections and allergic dermatitis. Abundance/ presence of dust and an unhygienic environment is also reported to be a predominant reason for skin allergies; conservancy workers in the symptoms diary exercise stated that they are exposed to a lot of dust during street sweeping causing health issues.

At the PHCs, all of the listed skin diseases are treated and thereafter referred to the Communicable Diseases Hospital or Stanley Hospital in case there is no improvement in the skin condition.

Eye and Ear Infections

Ear and eye infections are relatively less common, with more cases of ear infection in comparison. At the PHCs, these conditions are mostly referred to the Sathyamoorthy Nagar Polyclinic, wherein they are treated by the ENT doctors. Unlike the usual PHCs which only have

a general physician, the PHC designated as a polyclinic (herein the Sathyamoorthy Nagar Polyclinic) is the only one which has specialist doctors be it ENT, dermatologist or cardiologist etc.

General Diseases/Illnesses

After respiratory issues, general health problems constitute a significant proportion of health issues. This includes cardiovascular diseases, septic wounds, malaria, chicken pox etc. Clinics near the dumpyard in Ezhil Nagar have attributed the problem of malaria to the open garbage in the dumpyard which provides breeding sites for the mosquitoes. Doctors attribute the cause of septic wounds to both diabetes and road traffic accidents. Negligence in taking first aid in both these scenarios leads to septic wounds. Cardiovascular diseases are again referred to Stanley, but the post-treatment check-up and medicines are available at the PHCs.

Blood disorders

Iron deficiency is a very common problem among pregnant women, which is treated by giving iron supplements to all the pregnant women who come in for ultrasounds scanning at the PHCs. Thursday is designated as the day for scanning at all the PHCs surveyed, wherein a complete scan is carried out as well as prenatal supplements and injections are given if required.

Nervous System

Nervous system problems, especially headaches constitute a significant proportion of health problems. This is true even of the symptom diary exercise where people reported headaches due to the odour from the open garbage in the dumpyard, plying of noisy garbage trucks day and night and conservancy and informal waste workers inhaling toxic fumes from the decaying garbage in the dumpyard.

Abdominal and Intestinal System

Abdominal and intestinal diseases are also quite common, the number of these cases goes up exponentially in the rainy season as stated by most of the doctors. Diseases like bacterial enteritis and dysentery have been reported as result of water contamination in the area. Helminthiasis and Amoebiasis are reported less commonly at the PHCs as per the doctors because patients are supplied with de-worming tablets at timely periods throughout the year.

Dental Diseases

Dental problems are usually not reported by people, but are identified by doctors when they come in for a general check up. At most PHCs there is no dentist available, and hence medicines are given for symptomatic relief in the case of dental pain, and thereafter the patient is referred to the Sathyamoorthy Nagar PHC or the Elango Nagar PHC which have resident dentists.

Reproductive System

Reproductive ailments though not as common as some of the other health issues, are being reported increasingly as per the doctors. While menstrual cramps and stress is an issue that's always been prevalent, there has been a tremendous increase in the number of patients with delayed periods as result of Polycystic Ovarian disorder, a hormonal condition. While this can be attributed to lifestyle changes and obesity, the role of Bisphenol A - A chemical found in plastic and a known hormone disruptor cannot be disregarded at all as per recent research.¹ There have also been a number of cases of early puberty in girls as young as eight years. Almost all cases involving gynaecological ailments/problems are referred by medical officers at the PHCs to the Stanley RSRM or the Institute of Social Obstetrics at the Government Kasturba Gandhi Hospital for Women & Children.

Conclusion:

The findings from the health service provider's study affirms the conclusions derived from the in-depth interviews as well as the symptom's diary exercise. Most respondents from the symptom's diary exercise experienced diseases or disorders affecting the skeletal and muscular system (33.5%), respiratory system (28.9%), abdominal and intestinal system (7.2%), and the central nervous system (6.8%). The health service providers' study also contains similar findings in that diseases affecting the aforementioned body systems constituted the majority of diseases diagnosed by the health service providers in Kodungaiyur.

The connection between the aforementioned health violations and the dumpyard at Kodungaiyur is further established through the testing of air, water, and leachate samples collected from different locations in Kodungaiyur for the presence of heavy metals and volatile organic compounds. The study conducted established that the heavy metals found in each water sample exceeded the permissible limit for some heavy metals set by the Bureau of Indian Standards (BIS) and US Environment Protection Agency (US EPA). There is a clear connection between phthalates and other chemicals used in plastic manufacturing and the health disorders frequently suffered by the people. The presence of these heavy metals and volatile organic compounds beyond permissible limits affirms the adverse impacts of the garbage including plastic found in the Kodungaiyur dumpyard and the health symptoms suffered by the people.

¹ <https://www.ncbi.nlm.nih.gov/pubmed/21193545>, <https://www.ncbi.nlm.nih.gov/pubmed/29373882>