



OCCUPATIONAL IMPACT ON HEALTH OF WOMEN RAG PICKERS OF AHMEDABAD.

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ABSTRACT Rag pickers play an important but usually unrecognized role in the waste management system of Indian cities. They collect recyclable items including metal scraps and plastic from the garbage dumped at the waste dumping sites and sell it to scrap merchants. This paper presents a study on the women rag pickers of Ahmedabad city with focus on their health status to check the effects of occupational exposure. The results have been obtained through filling up of performa and testing of blood parameters. Statistical analysis was done using 'Chi-Square' test through Graph Pad Prism - 6.0 software. The results indicate significant prevalence of high blood pressure, cough, nasal irritation, nutritional deficiency, irregular menstruation, anaemia, eosinophilia etc. in exposed rag pickers as compared to control (age matched women with similar socio-economic background) due to their constraints and unawareness regarding health risks associated with this occupation which indicate future risks for various diseases in them.

KEYWORDS : Rag pickers, Occupational health hazards, Recyclable items, Hematology.

Introduction

Waste is an unavoidable by-product of human activities. Economic development, urbanization and improved living standards in cities lead to increase in the quantity and complexity of generated solid waste. If accumulated, it leads to degradation of urban environment, stresses natural resources and leads to health problems. Over one million rag pickers collect and sale recyclable materials from municipal solid wastes (MSW) in India for a living^[1]. The continuous exposure to the common garbage and the hospital waste has led to various diseases. Many of them smoke beedi and cigarettes and some are also addicted to drugs and indulge in prostitution and homosexuality, robbery and gambling. All this has affected their lives in several ways and shortened their life spans considerably^[2]. Rag pickers are subjected to chemical poisons and infections. Because of malnutrition they suffer from retarded growth and anemia. The rag pickers are very susceptible to diseases like tuberculosis and cancer due to their exposure to hazardous materials and addiction to chewing and smoking tobacco. They become addicted to alcohols and eventually switch to hard liquors and drugs. They have free sex with street walkers and hence become victims of AIDS^[3].

Children and women are particularly vulnerable to toxins because they ingest more water, food and air per unit of body weight; their metabolic pathways are less developed to detoxify and excrete toxins; and any disruption during their growth years can easily disrupt development of their organ, nervous, immune, endocrine and reproductive systems^[4]. Only one Indian study till date has been reported analyzing health issues of women rag pickers^[5]. Hence, the present study was aimed to analyze the situation of these women rag pickers from both perspectives of socio-economic and health status.

Materials and Methods

Ahmedabad is the 7th largest city of India and largest city of Gujarat State. It has more than 6 million population with 26.61% of decadal growth rate. Municipal Solid Waste (MSW) generated in Ahmedabad city and its surrounding areas is dumped at Pirana site, which is about 84 hectares out of which 65 hectares is used for landfill. The waste generation in the city is approximately 2,400 tonnes per day (TPD), out of which nearly 400 TPD is composted and the rest is land-filled at the site. The average depth/height of the waste is 22 meters^[6].

This study has been approved by Institutional Ethical Committee. Only women rag pickers were enrolled who were working on the dumping sites after taking written informed consent. Total number of 70 exposed women were included who have been working from minimum 3 years. Women working near Gujarat University area were recruited as controls (50 individuals) from similar socio-economic background and age matched. All the subjects were explained purpose and nature of the study. Those who had any severe disease/infections were excluded. Medical examination was performed by doctor and specific points were noted in the Performa.

A detailed performa was designed having demographic details including parameters such as age distribution, marital status, literacy, family income, addiction habits among family, health conditions, injury, use of personal protective equipment, dietary habits and food intake, chewing habits, consult to doctor, sanitary habits, rhythm of menstruation etc. for both the groups.

Blood samples were collected by technical staff with no potential risk and were tested for various haematological parameters. A copy of report was given to respective control and exposed subjects for their future treatment. Statistical analysis was done using 'chi square test'.

Results

Marital status comparison shows non-significant difference between Control (96%) and Exposed subjects (100%). Literacy status reveals that literacy is highly significant ($P < 0.0001$) in Controls (56%) as compared to Exposed subjects (20%). The family size of the subjects' reveals that 41% of Exposed workers have large families and this thing indirectly pressurize them to work in such occupation as compared to Control group who majorly belong to small (54%) and medium (42%) families and the results were highly significant ($P < 0.0001$). The family income is significantly ($P < 0.0001$) less in Exposed as 75% earn less than INR 5000 per month and 25% earn up to INR 10000 per month which is very less for handling large families. In contradiction Control's family income is better as 38% earn from INR 5001 to 10000 and 36% earn INR 10001 to 15000 and only 26% earn less than INR 5000 per month. As per study, 63% of Exposed have father/husband alcoholic which is significant ($P < 0.01$) as compared to Control women (38% have father/husband alcoholic).

Many Exposed subjects (67%) get sickness like vomiting, coughing, breathing problem etc. while working on dump site as compared to Control (32%) and results are highly significant ($P < 0.0001$). Also, many Exposed individuals (70%) get significantly ($P < 0.0001$) more injuries through needle/syringe, dog bites, harsh chemicals, metal scraps etc. as compared to Control subjects (26%). Only 23% of Exposed individuals use personal protective equipment like gloves, masks and tools for rag picking which is non-significant as compared to Control (38%) and this increases their chances of injuries and infections.

Dietary habits reveal that 87% of Exposed subjects eat mixed food (vegetarian and non-vegetarian) as compared to Controls (28%) and this was proved significant ($P < 0.0001$). Some Exposed subjects managed to eat only once (34%) in a day as compared to Controls (16%) which is significant ($P < 0.05$). Exposed subjects showed non-significant increase in frequency of chewing tobacco/panmasala (84%) as compared to Control subjects (70%). Study reveals that highly significant number ($P < 0.0001$) of the Exposed subjects (69%) do not consult doctor while sick as compared to Control subjects

(12%). Results show that only 41% of Exposed subjects use Private toilet as compared to Control (68%). The rhythm of menstruation is significantly irregular ($P < 0.01$) in Exposed (64%) as compared to Controls (30%).

Table 2 shows Body Mass Index (BMI) of Control and Exposed subjects which reveals that, only 4% of the Control subjects were underweight, whereas 48% of Exposed subjects were in this category. 70% from Control showed normal BMI whereas only 30% of Exposed individuals belonged to this category. 24% of Control subjects and 15% of Exposed subjects were overweight. 2% of Controls and 7% of Exposed were obese. The 'chi square test' revealed highly significant decrease ($P < 0.0001$) in BMI of Exposed subjects as compared to Control.

Table 3 shows the frequent occurrence of different types of illness. The study clearly reveals more prevalence of various types of ailments like headache, cough, fever, cold, body ache, nasal irritation, throat congestion, dimness of vision, fatigability, weakness, back pain etc. in Exposed subjects as compared to Control with high significance ($P < 0.0001$).

Table 4 shows various stages of blood pressure in Control and Exposed subjects. 34% of the Controls and only 20% of exposed had normal systolic pressure. Also, 42% of Control had normal diastolic pressure while Exposed were only 27%. Prehypertension conditions were majorly observed in Exposed subjects with percentage of 63% and 60% for high in systolic and diastolic respectively as compared to 54% and 58% in Control subjects. High blood pressure was clear indicator of health issue in Exposed subjects with high in 17% subjects for systolic and 13% for diastolic as compared to 12% and 0% in Control s respectively. The 'Chi-square test' revealed non-significant systolic pressure among Control and Exposed subjects while significant increase ($P < 0.05$) in diastolic pressure among Exposed subjects.

Table 5 shows non-significant decrease in number of Exposed subjects (44%) having less than 12 g/dl of Haemoglobin (Hb) as compared to Control subjects (52%). 2% of exposed subjects showed abnormal increase in Hb (more than 15 g/dl) which is not observed in Control subjects. The results show 3% of Exposed subjects showing less than normal values of Red blood cell (RBC) count as compared to 6% Controls. Only 65% of Exposed showed normal RBC count as compared to Control 72%. 32% of Exposed subjects showed abnormally high RBC count as compared to Controls (22%). The results showed less exposed individuals (26%) having low Packed cell volume (PCV) as compared to controls (32%) (ns). Few Exposed subjects (2%) showed elevated PCV levels too, which is not observed in Control (ns). The table showed non-significant increase in number of Controls (38%) having low Mean corpuscular volume (MCV) count as compared to Exposed individuals (37%). The table showed non-significant increase in number of Controls (44%) having low Mean corpuscular haemoglobin (MCH) count as compared to Exposed individuals (40%). 2% of Control subjects showed abnormal increase in MCH count which is not observed in Exposed subjects. As per results, the number of Exposed subjects (46%) having low Mean Corpuscular Haemoglobin concentration (MCHC) is non-significantly more as compared to Controls (34%). The Red cell distribution width (RDW) levels showed significantly increased values ($P < 0.05$) in Exposed (48%) as compared to Controls (28%). The results showed non-significant increase in Exposed subjects (26%) having high values of White blood cell (WBC) count as compared to Controls (20%). 2% of Control subjects showed decrease in WBC count which is not observed in Exposed subjects. The difference in polymorphs, lymphocyte, monocyte and basophils counts for all the Controls and Exposed subjects were also non-significant. The table 5 indicates highly significant increase ($P < 0.0001$) in Exposed individuals (46%) having high eosinophils as compared to Control subjects (10%). The table shows few numbers of subjects (2% Control and 2% Exposed) having low and other few (8% Control and 4% Exposed) having high platelet count which is non-significant according to statistical analysis ('Chi-square test').

Table 1: Shows demographic results of various parameters for Control and Exposed subjects.

Categories	Control (n = 50)	Exposed (n = 70)
Marital status (ns)		
Married	48 (96%)	70 (100%)
Unmarried	2 (4%)	0

Can read or write (***)		
Yes	28 (56%)	14 (20%)
No	22 (44%)	56 (80%)
Family size (***)		
Small (1-5)	27 (54%)	15 (22%)
Medium (6-8)	21 (42%)	26 (37%)
Large (9 and above)	2 (4%)	29 (41%)
Family's total income (***)		
<5000	13 (26%)	52 (75%)
5001 – 10000	19 (38%)	18 (25%)
10001 – 15000	18 (36%)	0
Father/Husband Alcohol Addiction (***)		
Yes	19 (38%)	44 (63%)
No	31 (62%)	26 (37%)
Sick during work (***)		
Yes	16 (32%)	47 (67%)
No	34 (68%)	23 (33%)
Injury during work (***)		
Yes	13 (26%)	49 (70%)
No	37 (74%)	21 (30%)
Use of separate clothes while working (***)		
Yes	38 (76%)	15 (21%)
No	12 (24%)	55 (79%)
Use of Masks/Gloves while work (ns)		
Yes	19 (38%)	16 (23%)
No	31 (62%)	54 (77%)
Dietary habits (***)		
Vegetarian	36 (72%)	9 (13%)
Mixed	14 (28%)	61 (87%)
No. of meals/day (*)		
Once	8 (16%)	24 (34%)
Twice	42 (84%)	46 (66%)
Chewing habits (ns)		
Chewer	35 (70%)	59 (84%)
Non-chewer	15 (30%)	11 (16%)

Consult doctor for illness (***)		
Yes	44 (88%)	22 (31%)
No	6 (12%)	48 (69%)
Use of toilet (**)		
Public	16 (32%)	41 (59%)
Private	34 (68%)	29 (41%)
Rhythm of menstruation (**)		
Regular	35 (70%)	25 (36%)
Irregular	15 (30%)	45 (64%)

Table 2: Shows comparison of Body Mass Index between Control and Exposed subjects.

Body Mass Index (BMI) (***)		
BMI Categories	Control (n = 50)	Exposed (n = 70)
Underweight: <18.5	2 (4%)	33 (48%)
Normal: 18.5-24.9	35 (70%)	21 (30%)
Overweight: 25-29.9	12 (24%)	11 (15%)
Obesity: ≥ 30	1 (2%)	5 (7%)

Table 3: Shows prevalence of various ailments in Control and Exposed subjects.

Categories	Control (n=50)	Exposed (n=70)
Headache (***)		
Yes	15 (30%)	46 (65%)
No	35 (70%)	24 (35%)
Cough (***)		
Yes	12 (24%)	49 (70%)
No	38 (76%)	21 (30%)
Fever (***)		
Yes	13 (26%)	45 (65%)
No	37 (74%)	25 (35%)

Cold (***)		
Yes	8 (16%)	48 (68%)
No	42 (84%)	22 (32%)
Body Ache (***)		
Yes	15 (30%)	49 (70%)
No	35 (70%)	21 (30%)
Nasal Irritation (***)		
Yes	14 (28%)	52 (74%)
No	36 (72%)	18 (26%)
Throat Congestion (***)		
Yes	14 (28%)	51 (72%)
No	36 (72%)	19 (28%)
Dimness of vision (***)		
Yes	14 (28%)	55 (78%)
No	36 (72%)	15 (22%)
Fatigability (***)		
Yes	8 (16%)	58 (82%)
No	42 (84%)	12 (18%)
Weakness (***)		
Yes	22 (44%)	58 (82%)
No	28 (56%)	12 (18%)
Back pain (***)		
Yes	16 (32%)	54 (78%)
No	34 (68%)	16 (22%)

Table 4: Shows various stages of Blood Pressure in Control and Exposed subjects.

Blood Pressure				
Stages of B.P (Range)	Systolic (ns)		Diastolic (*)	
	Control (n = 50)	Exposed (n = 70)	Control (n = 50)	Exposed (n = 70)
Low B.P Systolic: <80 Diastolic:<60	0	0	0	0
Normal Systolic: 80-120 Diastolic: 60-80	17 (34%)	14 (20%)	21 (42%)	19 (27%)
Prehypertension Systolic: 120-139 Diastolic: 80-89	27 (54%)	44 (63%)	29 (58%)	42 (60%)
High B.P Systolic: 140-159 Diastolic: 90-99	6 (12%)	12 (17%)	0	9 (13%)

Table 5: Shows results of Complete Blood Count (CBC) in Control and Exposed subjects.

Complete Blood Count (CBC)		
Categories	Control (n = 50)	Exposed (n = 70)
Haemoglobin (Hb) (ns)		
< 12	26 (52%)	31 (44%)
12 -15 (Normal range)	24 (48%)	38 (54%)
> 15	0	1 (2%)
Red blood cell (R.B.C) Count (ns)		
< 3.8	3 (6%)	2 (3%)
3.8 – 4.8 (Normal range)	36 (72%)	46 (65%)
> 4.8	11 (22%)	22 (32%)
Packed cell volume (PCV) (ns)		
< 36	16 (32%)	18 (26%)
36 – 46 (Normal range)	34 (68%)	51 (72%)
> 46	0	1 (2%)
Mean corpuscular volume (MCV) (ns)		
< 83	19 (38%)	26 (37%)
83 – 101 (Normal range)	30 (60%)	44 (63%)
> 101	1 (2%)	0
Mean corpuscular haemoglobin (MCH) (ns)		
< 27	22 (44%)	28 (40%)
27 – 32 (Normal range)	27 (54%)	42 (60%)
> 32	1 (2%)	0
Mean Corpuscular Haemoglobin concentration (MCHC) (ns)		
< 31.5	17 (34%)	32 (46%)
31.5 – 34.5 (Normal range)	33 (66%)	38 (54%)
> 34.5	0	0

Red cell distribution width (RDW) (*)		
11.6 – 14 (Normal range)	14 (28%)	34 (48%)
> 14	36 (72%)	36 (52%)
White blood cell (WBC) Count (x 1000) (ns)		
< 4	1 (2%)	0
4 – 10 (Normal range)	39 (78)	52 (74%)
> 10	10 (20%)	18 (26%)
Polymorphs (ns)		
37 – 75 (Normal range)	48 (96%)	69 (98%)
> 75	2 (4%)	1 (2%)
Lymphocytes		
10 – 50 (Normal range)	50 (100%)	70 (100%)
Monocytes		
0 – 12 (Normal range)	50 (100%)	70 (100%)
Eosinophils (***)		
0 – 7 (Normal range)	45 (90%)	38 (54%)
> 7	5 (10%)	32 (46%)
Basophils		
0 – 2.5 (Normal range)	50 (100%)	70 (100%)
Platelet Count (x 10000) (ns)		
< 15	1 (2%)	1 (2%)
15 – 40 (Normal range)	45 (90%)	66 (94%)
> 40	4 (8%)	3 (4%)

Discussion

Solid waste management (SWM) issues represent major problems to the governments of developing nations. In the state of Gujarat overall there are estimated to be over 100,000 waste pickers. In Ahmedabad city there are an estimated 30,000 waste pickers out of which a large proportion are women and children^[6]. The present study has attempted to explore the health issues and living conditions of women rag pickers at Pirana dumping site of Ahmedabad city. This study conducted amongst the waste collectors focused on their health, socio- economic status, involvement in waste recovery and recycling, revealed their notable role played in waste management. Almost all age groups have been found involved in scavenging work. The basic necessities are not accessible to them and they are exposed to various health hazards. The results clearly showed the damage that has occurred to these women rag pickers and if not cured or taken care of can lead to various ailments in them and in their children as they are also present at dump site for long hours and exposed to unhealthy conditions.

Rag picking also provided livelihood to them and it was virtually a form of self-employment. They develop addictions of chewing pan, tobacco and gutkha. Thus they have high risks of getting various types of cancer, cardio-vascular disease, tooth decay, tooth loss etc. Rag pickers are exposed to harsh weather conditions surrounded by stray animals and infectious solid waste that may induce them to many diseases. From the questionnaire it was known that most of rag pickers were devoid of education and were illiterate.

Most of them have father/husband alcoholic which gives family women more burden to earn for the family. As most of them eat only once in a day, so there is decrease in body mass index (BMI) as compared to Controls and they become malnourished. They also develop Musculo-skeletal problems due to lifting of heavy scrap materials and get body pain. Headache is a common issue in them due to high stress and anxiety. Inhalation of noxious gases leads to cough, nasal irritation, dimness of vision and throat congestion amongst the rag pickers. Due to more working hours, they get fatigability, weakness and back pain. The rag pickers do not use protective masks or gloves for waste-picking. Instead, they use their bare hands and thus often get sick and injured. They wear cheap rubber sandals (usually collected from trash bins) during their work time, thus exposing a large portion of their feet and arms to pathogens, helminth eggs, and sharp materials like broken glass or used needles. They even do not wash their hands using soaps or cleansing materials before taking their meals at the landfill site. Sometimes they eat the leftover food found from the garbage. As per study of Devi et al.^[7], it was indicated that 82% had wounds or injuries; 6% had body pains; 5% had skin or lung diseases and 7% said that they had not faced any health problems. Lack of precautionary safety measures and lack of awareness regarding health were the main causes of health diseases. Rag pickers did not take care of their health because of ignorance and poverty. Manual sorting of unsegregated MSW, as done by the rag pickers while scavenging recyclable materials, may expose them to large quantities of pathogens present in MSW^[8,9,10] leading to respiratory and other health problems.

At Bombay's open dump sites, of 95 landfill workers surveyed, 80% had eye problems, 73% had respiratory ailments, 51% had gastro intestinal ailments, 40% had skin infections or allergies and 22% had orthopedic ailments. The open dumping of garbage serves as a breeding ground for disease vectors such as flies, mosquitoes, cockroaches, rats and other pests. There is high risk of spreading diseases like typhoid, cholera, dysentery, yellow fever, encephalitis, plague, malaria, and dengue fever through these vectors. Particularly during the rainy season, the water runoff and high humid conditions increase health hazards. The landfill sites, not properly maintained, are prone to groundwater contamination due to leachate percolation. Also, such waste is carried over long distances by stray animals like dogs, cows, etc., who spread the nuisance to a wider area^[11]. In the present study, many exposed rag pickers reported headache, cough, and fatigability. Most workers of this study complained of eye burning, diminished vision, redness, itching and watering. The present study also reports diminished vision in exposed as compared to controls. As most of them use public toilets, they often get urinary tract infections (UTIs) and this may be also a reason of getting fever. Also, most of rag pickers follow home remedies and do not consult doctor due to their unawareness of risks and financial issues. Results show more irregular rhythm of menstruation in Exposed subjects. This may be due to hormonal imbalance, too much exertion, Polycystic ovary syndrome (PCOS), stress, Overactive thyroid (hyperthyroidism) or underactive thyroid (hypothyroidism), Uterine fibroids etc. According to blood pressure analysis, Prehypertension and High blood pressure conditions were dominant amongst exposed subjects which clearly showed various types of stress prevailing among them. Thus, there is high risk of narrowing of arteries, Coronary artery disease, Heart failure, Stroke, Dementia and Kidney failure.

Results showed more number of Exposed subjects having less than 12 g/dl of Hb. There are many reasons for anemia such as loss of blood, nutritional deficiency (iron, vitamin B12, folate), kidney failure, and abnormal hemoglobin structure (sickle cell anemia or thalassemia). High Hb levels (as observed in exposed subjects) indicate conditions like advanced lung disease (eg. emphysema), certain tumors, premature RBC death etc. As per study of Uplap and Bhate^[5] on women rag pickers of Mumbai, the Hb levels showed that only 4.8% subjects out of 168 subjects had Hb above 12g/dl. 3% participants had severe anemia with the hemoglobin level of less than 8 gm%. 13.6% had hemoglobin level between 8 and 10 gm%. 78.6% had mild anemia with the hemoglobin level of 10-12 gm%. In the contrast, the present study shows non-significant difference in Hb levels of Control and Exposed groups. This can be explained by the dietary habits. Although many of Exposed subjects managed to eat only once in a day, their diet included mainly non-vegetarian food which can be a reason of elevated Hb levels of exposed women rag pickers of Ahmedabad.

Non-significant increase in RBC counts of subjects especially in Exposed indicate conditions like poor heart or lung function, abnormal RBC breakdown (leads to elevated haemoglobin), hypoxia etc. The results showed more Exposed individuals having low PCV as compared to Controls, while few Exposed subjects showed elevated PCV levels too. A non-significant decreased PCV in subjects generally mean red blood cell loss from any variety of reasons like cell destruction, blood loss, and failure of bone marrow production. An increased PCV indicates dehydration or an abnormal increase in red blood cell production.

The results showed non-significant increase in number of Exposed individuals having low MCV count as compared to Controls. This may be caused by iron deficiency, thalassemia, lead poisoning, chronic diseases. A non-significant increase in number of Exposed subjects with low MCH count was observed as compared to Controls. Common causes of Low MCH results include blood loss, iron deficiency and microcytic anemia^[12].

As per results, the number of Exposed subjects having low MCHC were non-significantly more as compared to Controls. When the MCHC is low, it means there is less hemoglobin in each red cell, regardless of the size of the red cell. High frequency of Exposed subjects shows low levels of MCHC. The results showed significant increase in number of controls and exposed having high RDW levels. Higher numbers in both Control and Exposed subjects indicate greater variation in cell size. In this study, the RDW level was high, but the MCV levels were low which could happen because of iron deficiency anemia or thalassemia intermedia^[12]. A non-significant increase in

Exposed subjects having high values of WBC count was observed as compared to controls. High levels of WBC count in Exposed subjects may be due to leukocytosis which is triggered by infection, tissue damage, asthma, tuberculosis, smoking, leukemia, stress, immune system disorders.

In this study, mostly all subjects had normal polymorphs count except few Control and Exposed. Few subjects show raised levels of polymorph which indicates bacterial infections such as pneumonia, boils, abscess, bronchitis, sinusitis, tonsillitis, bacillary dysentery, meningitis etc. The result indicates highly significant increase in Exposed individuals having high eosinophils as compared to Control subjects. Exposed showed higher-than-normal level of eosinophils which can lead to eosinophilia which is caused by allergies, asthma, inflammatory conditions, parasitic infections, reactions to medications etc. This study reveals the ill effects of rag picking on health of Exposed subjects. The greater presence of eosinophils could partially explain the increase rate of coughing, due to its association with bronchitis and wheezing^[13]. The results showed that the difference in platelet count was non-significant between the two groups. Elevated platelet count in few subjects (thrombocytosis) can be correlated with conditions like Cancer, Chronic Myeloid Leukemia (CML) etc. while low platelet count (thrombocytopenia) in some others point towards conditions like decrease of platelets in bone marrow or destroyed in blood stream.

Conclusion

Women rag pickers were completely unaware of the risks associated with their occupation. The study reveals that the rag pickers have financial constraints and are malnourished. The results from the tests done on their blood samples concludes that the abnormal values of the parameters like low haemoglobin, high red blood cell count, significantly high eosinophil count indicate future risks for occupation related health hazards and infections/diseases which may lead to impaired function of important organs mainly lungs, liver and kidney as compared to controls. Oral iron therapy for 3 months and other required medicines were prescribed to the needed subjects by doctor as the follow up of the study.

Unfulfilled health needs of these underprivileged rag pickers who contributes to the ecology and economy of the city need to be addressed. A long-term occupational health program with well-placed monitoring mechanism should be designed including regular medical checkup, health awareness activities about the prevailing health and related issues to the local community and their prevention and control measures is very essential.

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