



## OCCUPATIONAL HEALTH HAZARDS IN SANITARY WORKERS OF CHANDRAPUR CITY, CENTRAL INDIA

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### Abstract

About 198 sanitary workers work in Chandrapur Municipal Corporation, out of which 20 workers (10% of the population) was selected as a sample size (all male workers). The study was carried out from November 2015 to January 2016. Occupational health hazards of these workers were analyzed through questionnaire survey and Peak Expiratory Flow Rate (PEFR) analysis. The results of the study showed that, these workers were exposed to a number of environmental and occupational hazards leading to musculoskeletal disorders (85%), exposure to harmful gases (65%), respiratory problems (45%), headache (40%), dermatological problem (35%), gastrointestinal (10%) and leptospirosis (10%) during work. It was further observed that the workers were suffering from cough and cold (90%), skin problems (50%), allergies (15%), malaria and typhoid (15%), bronchitis lung and asthmatic problems (10%) and hearing disorder (5%) etc. after completion of work. The PEFR values were lower in exposed workers. Reduction in PEFR values was directly proportional with exposure duration. To reduce occupational health hazards, workers must be made alert and aware of potential health risk arising from their work. Reduction in exposure and use of personal protective equipments such as face mask, gloves, gum boots, caps, apron etc. should be encouraged.

Keywords: Chandrapur, Environmental health, Occupational health, Sanitary worker

## **Introduction**

Sewage includes used water of a community, domestic wastewater and industrial wastewater. Combined sewer systems include storm water such as road runoff which carries oils, salts, metals and asbestos. Many systems, especially older ones, receive infiltration which carries pesticides and herbicides from soil application (Brown, 1997).

The working conditions of the sanitary workers have remained virtually unchanged for over a century. Using only a stick brooms tin plate, the sanitary workers clear feces in public and private latrines into basket or other contaminants. A few, however, were provided with wheelbarrows or carts by the municipal authorities. Apart from the social atrocities that workers face, they are also exposed to certain health problems by virtue of their occupation. These health hazards include exposure to harmful gases, cardiovascular degeneration, musculoskeletal disorders, infections, skin problems and respiratory systems (Tiwari, 2008).

Limited studies were carried out pertaining to occupational health hazards of sanitary workers. Some of the studies carried out includes Yan *et al.*, (2015) reported that sanitation workers had much more occupational dermatological problems and higher rate of harmful ultraviolet rays. Jaykrishnan *et al.*, (2013) reported among municipal solid waste management workers high range of morbidity *w.r.t.* respiratory, vision, dermatology, nail infection (21-47%), further accidents and injuries (73.2%), fall (63.6%) and water borne diseases (7.1%) were high. Nayak *et al.* (2013) reported only one of 87 street sanitation worker used hand glove while working and none were using mask or properly covered footwear like boots during the working hours.

## **Methods**

### *Study area*

Chandrapur formerly Chanda (19.57° N latitude and 79.18° E longitude) is a city and municipal corporation in Chandrapur district of Maharashtra state of India (Figure 1). The city is located at the confluence of Irai and Zarpal River. The city has higher elevation at north side whereas lower elevation at south side. The city is situated at an altitude of 189.90 m above mean sea level and has an area of 70.02 sq

km. The north-south length of the city is about 10.6 km, while the east-west is about 7.6 km. According to 2011 census, the city had a population of 3,20,379 (Census of India, 2011). In a 2011 state cabinet decision, Chandrapur Municipal Corporation was elevated to D grade Municipal Corporation. The city has 67 wards and divided into 3 zones.

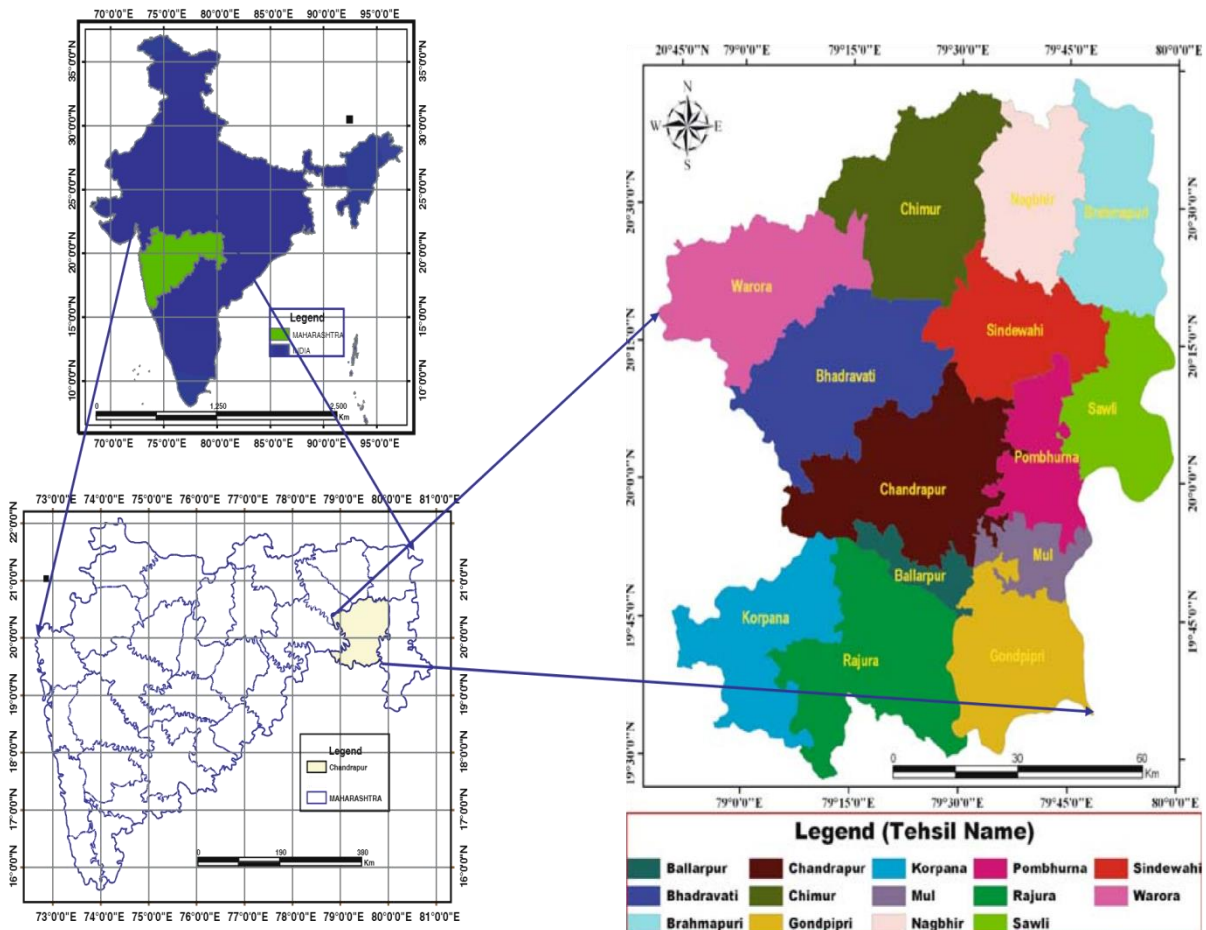


Figure 1. Chandrapur district with different talukas in central India

Total 198 sanitary workers work in Chandrapur Municipal Corporation. The wastewater generated from the domestic activities is collected through an underground drainage system and is being discharged into Irai river. The wastewater collection and treatment system is poorly developed and existed only in selected part of the city.

#### Sample population

Sample population was randomly selected from the study area comprising of all 20 males workers (10% of the sanitary worker population) of the in the age group of 25-65 years working in this job for more

than 10 years with daily exposure of 8-9 hours. It was confirmed from the sample population that none of the subject was suffering from any major health related disorder during Breath-o metric testing for Peak Expiratory Flow Rate analysis

Data pertaining to health conditions of sample population was collected by using structured questionnaire especially designed and developed for this study. This structured questionnaire made emphasis upon work profile, occupation health related issues, cover of life/health insurance, morbidity pattern and disease calendar. Peak Expiratory Flow Rate (PEFR) analysis was carried out by Breath-o meter (Cipla, India, as per European Union scale) by comparing it with standard chart prepared by Chest Research Foundation (CRF), Pune, India according to age and height of an individual (Cipla, 2016). Working environmental conditions of sanitary workers were observed in the field to obtain first-hand information on occupational health, composition of wastes, types of tools used for its collection, uniform and other safety measures used.

## Results and Discussion

Results of the study are presented in Tables 1-4 and Figures 2-3.

Table 1: Health problems in sanitary workers during work

Health problem	Number (%)
Musculoskeletal symptoms (low back pain, elbow and wrist pain)	17 (85%)
Exposure to harmful gases	13 (65%)
Respiratory symptoms (cough, phlegm, asphyxiate and wheezing)	9 (45%)
Headache	8 (40%)
Dermatological symptoms (itching and rashes)	7 (35%)
Gastrointestinal symptoms (nausea and diarrhea)	2 (10%)
Leptospirosis	2 (10%)

From the results presented in Table 1, it is observed that out of 20 sanitary workers selected for the study, during work health related ailments reported by them includes musculoskeletal symptoms such as low back pain and wrist pain in 17 (85%) workers, 13 (65%) workers had reported exposure to harmful gases, 9 (45%) had reported respiratory symptoms such as cough, phlegm, asphyxiate and wheezing, 8 (40%) workers reported headache problem, 7 (35%) workers were suffering from dermatological symptoms

such as itching and rashes, 2 (10%) workers had gastrointestinal symptoms (nausea and diarrhoea). Two (10%) workers reported leptospirosis problems caused may be by animal infection from wastewater (Figure 2).

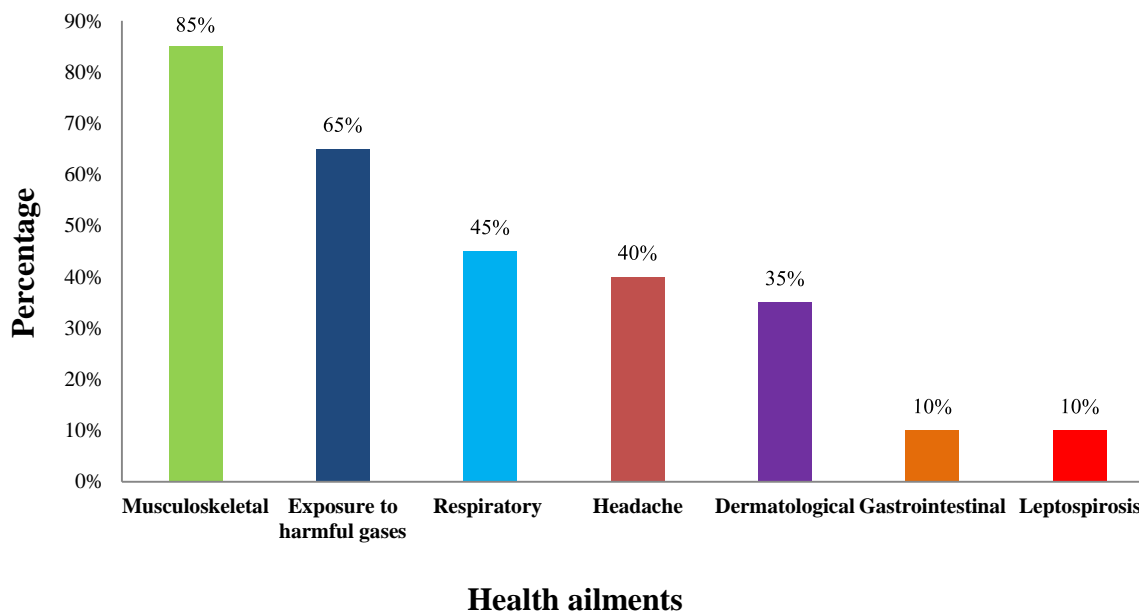


Figure 2: Health problems in sanitary workers during work

Table 3: Peak Expiratory Flow Rate in sanitary workers

PEFR (L min <sup>-1</sup> )	Exposure period (Year)					
	10-20		21-24		>25	
	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.
Male	465	430	470	453	468	430
	466	462	423	420	443	400
	432	430	486	475	443	415
	428	400	481	470	470	450
	445	423	443	465	430	402
	483	462	486	430	423	400
	465	460	454	329	-	-
	n = 7		n = 7		n = 6	

Exp. = Expected, Obs. = Observed

Table 4: Statistical summary of Peak Expiratory Flow Rate observations for different exposure periods

		Exposure period (Years)			
		10-20	21-24	>25	
Gender	PEFR (L min <sup>-1</sup> )				
	Minimum	400	329	400	
	Maximum	462	475	450	
	Spread	62.0	146	50	
	Male	SD (±)	23.91	50.88	20.30
		Variance	572.14	2588.92	412.16
		Kurtosis	-1.04	3.61	0.02

SD = Standard Deviation

Various health ailments reported after completion of work includes cough and cold in 18 (90%) workers, skin problem in 10 (50%), allergies and typhoid in 3 (15%) workers each, bronchitis lungs and asthma in 2 (10%) workers each. One (5%) worker reported hearing disorder (Table 2, Figure 3). Exposure to disease causing pathogenic microorganisms and unhygienic conditions due to wastewater may be responsible factors for occupational diseases in the workers.

Tables 3 and 4 depicts Peak Expiratory Flow Rate in sanitary workers with exposure period of 10-20 years, 21-24 years and >24 years. From the results it is observed that sanitary workers had lower PEFR than expected values. With increase in exposure period due to road dust, pathogenic microorganisms present in wastewater and obnoxious gases leads to reduction in PEFR values were observed. Moreover, PEFR values decline with increasing year of exposure of workers (Figure 4). These observations highlight that, these workers owing to their exposure to vehicular exhaust, road dust, exposure to harmful gases and pathogenic harmful bacteria from sewage, cleaning sewer system may have reduced their lung capacity. More than 80% of the workers engaged in this occupation belong to socio-economically weaker section of the society and perhaps it may be additional reason for their health status as they can't afford balanced diet and regular visit to private hospital for health related ailments.

About 45% workers were provided with protective equipment while 55% workers were deprived of them. Duration of sanitary workers is 8-9 hours each day. About 80% of the workers were aware of the importance and timing of hand washing and hygiene practices. Nevertheless, no convenient washing

facilities (soap and water) were made available near collection points, work station for the workers. All workers wash their hand before eating, while 18 (90%) before drinking and 5 (25%) before smoking. These workers abuse substance like tobacco 3 (15%), *ghutka* 18 (90%) and consumption of alcohol 2 (10%).

Statistical analysis of PEFR observations of sanitary workers for different exposure periods for spread, standard deviation, variance and kurtosis were carried out (Table 4). From statistical analysis it is observed that as exposure period of sanitary workers increases PEFR values decreases (except second exposure group of 21-25 years). These statistical parameters confirms that exposure period reduces the PEFR values and maximum reduction in it was observed in those workers which had exposure period of >25 years.

Table 2: Health problems in sanitary workers after completion of work

Health problem	Number (%)
Cough and cold	18 (90%)
Skin problems	10 (50%)
Allergies (Sneezing)	3 (15%)
Malaria	3 (15%)
Typhoid	3 (15%)
Bronchitis lungs	2 (10%)
Asthma	2 (10%)
Hearing disorder	1 (5%)

The results of the study are in accordance with Athanasiou *et al.*, (2010), Shrinivasan *et al.*, (2012), Tiwari (2008), Wassim *et al.*, (2013). According to Athanasiou *et al.*, (2010), prevalence of all respiratory symptoms were higher in sanitary workers. Shrinivasan *et al.*, (2012), reported Peak Expiratory Flow Rate analysis had lower observed value than their own predicted values. Wassim *et al.*, (2013), found that gastrointestinal problems (25.5%) and musculoskeletal problems such as low back pain, elbow pain and wrist pain were higher (17.3%) in sanitary workers. According to Tiwari (2008), sanitary workers were highly exposed to harmful gases such as methane, hydrogen sulphide, cardiovascular degeneration, musculoskeletal disorder, leptospirosis and skin problems, respiratory problems and pulmonary function parameters were higher in sanitary workers.

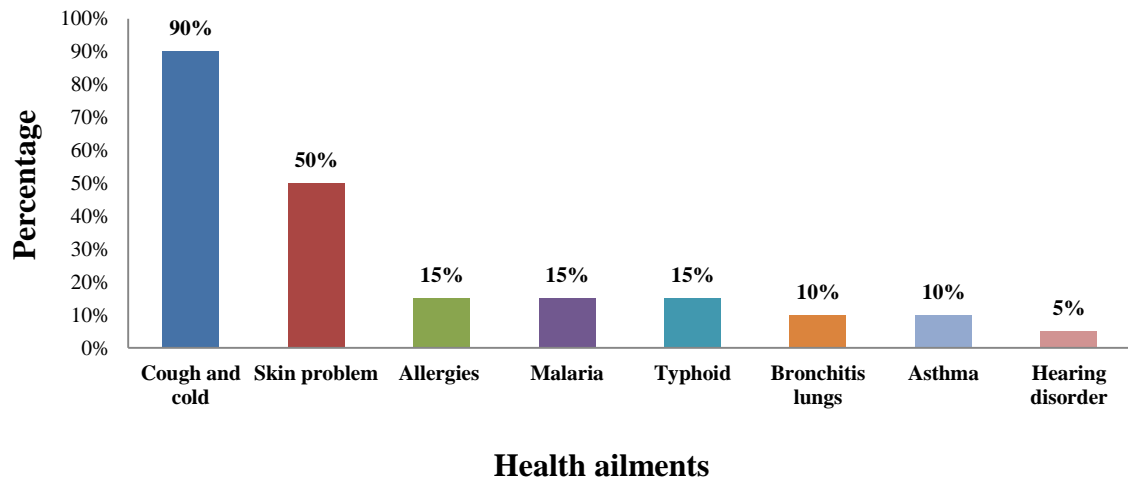


Figure 3: Health problems in sanitary workers after completion of work

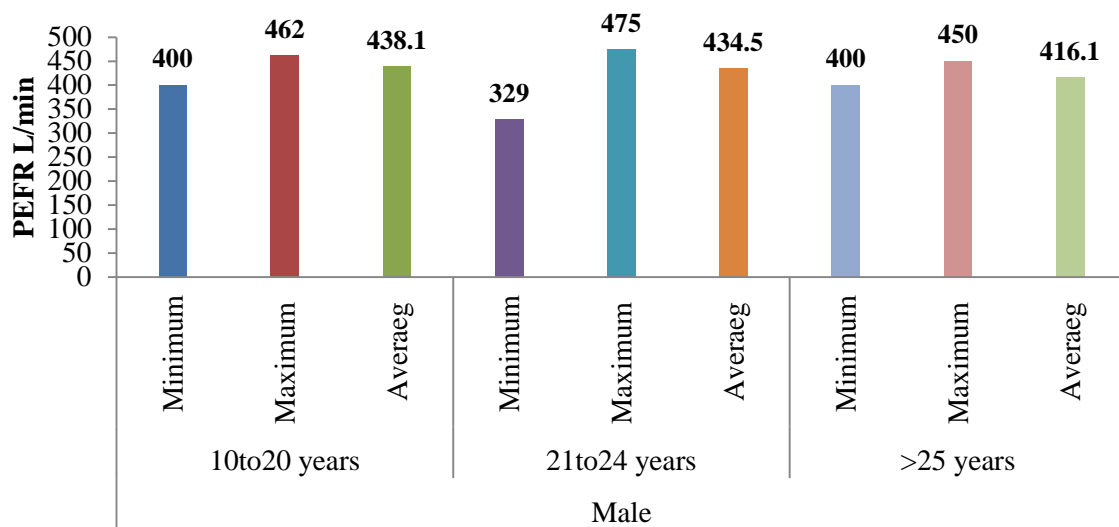


Figure 4: PEFR values in different exposure periods in sanitary workers

## Conclusion

The findings of the study showed that sanitary workers were suffering from number of health ailments such as musculoskeletal, exposure to harmful gases, respiratory, headache, dermatological and gastrointestinal during work and cough and cold, skin problems, allergies, malaria, typhoid, bronchitis lungs, asthma, and hearing disorder after completion of work. Sanitary workers will face more amount of exposure and risk on their health during their work compare to other workers. Sanitary workers exposed to high concentration of airborne gram negative bacteria since waste handling may cause dust full of



microorganisms and bacterial endotoxin to become aerosolized. Moreover, direct skin contact of these waste matter stuffed with fungal spores, bacteria, viruses and parasitic ova that can cause diarrhoea. Dermal injuries comprised of needle stick injuries caused by disposable needles originated from residential and health care sources. Cut wounds that were also found infected into sanitary workers were reported to cause by sharp objects bumped into skin, broken glass, pins, sharp items and hazards waste. Further, exposure to unhygienic conditions, pathogenic microorganisms in sewage, flies and mosquitoes, solid waste leachate, wet waste, obnoxious odour, harmful gases and continuous working in such conditions for 8-9 hours a day through a year may had lead to adverse effects on their body. Inadequate personal protective equipments, no personal cleaning facilities like water and soap and no restroom amenities augment problems faced by sanitary workers. Reduction in PEFR values was directly proportional to exposure duration. As exposure duration increases reduction in PEFR values were observed. Use of personal protective equipments such as face mask, gloves, gum boots, caps, apron, etc. should be encouraged in workers.

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