

Original Research Article

Assessment of occupational health hazards and associated morbidities in sanitation workers of a metropolitan city in India: a cross-sectional study

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ABSTRACT

Background: Rapid economic development in emerging countries has accelerated urbanisation, resulting in a rise in urban population as well as sanitation issues such as garbage buildup, clogged sewers, and unhygienic streets. Sanitation employees' health and safety are impacted by increasing workloads and dangers. Numerous health hazards are highlighted in studies, including those related to their gastrointestinal system, lungs, musculoskeletal system, and infectious disorders. Concerns include psychological issues and cancer as well.

Methods: Data from sanitation employees who participated in rotary screening and health checkup activities in Mumbai were analysed in this retrospective cross-sectional research. The study collected demographic information, a self-designed questionnaire on alcohol and cigarette use, and clinical characteristics such blood pressure and haemoglobin levels from participants after they gave informed written consent.

Results: The participants in this retrospective observational research from Mumbai, India, included 793 sanitation employees in total. Age, gender, and tobacco/alcohol use were among the participant variables and targeted results that we looked at. The significant results obtained were cataract on one side 17/793, erythroplakia 1/793 and leukoplakia 26/793.

Conclusions: It is essential to acknowledge their accomplishments and provide greater assistance. Waste disposal is difficult in poor countries because of the prevalence of organic waste. To protect employees, immediate action and the appropriate protective equipment are required.

Keywords: Sanitation employees, Sanitation issues, Urban population

INTRODUCTION

Rapid economic growth in developing nations has made urbanization a common occurrence, which has led to a

significant rise in the urban population. But this has brought about a number of sanitary problems, such as an increase in waste, filthy roads, and blocked drain channels. The burden of these problems falls primarily on

sanitation workers, whose workload and working hours have significantly increased.¹ Sadly, these workers frequently face hazards to their health and safety, which can lead to illnesses, accidents, and even death.² Sanitation workers' contributions are also frequently underestimated and inadequately acknowledged or quantified.³ Urban waste has different characteristics depending on where it is produced and the level of development, with organic waste being more prevalent in developing nations.

Additionally, there are a number of issues with sanitation infrastructure and the delivery of sanitation services that street cleaners must deal with. The study's objective was to offer information and creative suggestions to sanitation workers and their employers in order to reduce risks and enhance working conditions. To safeguard sanitation workers' general health and wellbeing, it is critical to address issues like hereditary heritage, constitution, and infection susceptibility.³⁻⁵

Waste generation is averagely high in developing countries, with between 40 and 70 percent of solid waste being organic. Waste disposal has become more difficult as plastics and other inorganic materials are used more frequently. In order to address the risks faced by sanitation workers who lack the proper personal protective equipment (PPE), immediate action is required. In summary, sanitation workers are essential to recognize their contributions and provide them with adequate support and protection to carry out their duties safely and with dignity.⁶

Statistics from the Dalberg Analysis 2017 finds a total of 5 million sanitation workers with 45% of the total hailing from urban areas and 50% of urban sanitation workers being female.⁵ Sanitation laborers are exposed to occupational and environmental hazards possibly resulting in health ailments, injury, and even death.⁶ The pandemic has further worsened their condition.⁷

The characteristics of metropolitan waste are contrasting between developing and industrialized nations, and bigger and smaller towns.⁸ It has been assessed that in developing nations, the degree of natural waste is moderately high, constituting between 40-70% of strong waste in developing nations. The expanding utilization of plastics as bundling material, and other inorganic materials have made waste disposal difficult. Accordingly, due to the capability of natural waste the safety of the laborers and workers who are working without proper PPE needs to be addressed urgently.⁹

The work of sanitation workers is perilous and they suffer from a cornucopia of occupational hazards and diseases. A systematic analysis and meta-review of 65 studies conducted by Oza et al finds an elevated incidence of gastrointestinal, respiratory, musculoskeletal, and infective (especially hepatitis A and E) related adverse outcomes.¹⁰ These findings are also replicated in other

studies that have been conducted.¹¹⁻¹⁴ Other occupational hazard studies in sanitation workers are cancer and psychological disease.^{12,16}

METHODS

This is a retrospective data analysis with a cross sectional model. The drive was conducted between the months of April to August 2022. The 1st drive was organized on 4th - 5th April 2022 and 2nd drive was conducted on 2nd-4th August 2022.

Study population

All the sanitation workers who have been beneficiaries of rotary screening and health checkup check drives conducted in various localities of Mumbai.

Inclusion criteria

Participant who were a sanitation worker as per BMC and a beneficiary of rotary health checkup drives, participants who were more than 18 years of age were included.

Exclusion criteria

Patients who had refused to give consent were excluded from study.

An oral well-informed written consent explaining the participants about the methodology and implications of the screening camp and derived study and ensuring the participant that his/ her personal particulars are kept confidential was taken by the participants during the time of the health check up.

Study tools

Participant's demographic details including name, age, gender, contact details. A self designed questionnaire which was pre-tested was used. It included questions related to history of tobacco usage and alcohol consumption, frequency, duration and awareness regarding de-addiction. Participants' clinical profile were blood pressure, hemoglobin levels, visual acuity and required tests like USG to evaluate the findings of the screening camp.

Sanitation workers who were screened and a part of a health check up drive by rotary club were administered a self designed pre-tested questionnaire and clinical profile including basic laboratory investigations were done. The case reports of all the participants have been recorded by the screening physician rightfully. This data will be retrospectively investigated.

Statistical analysis

The data was collected in the form of discrete interval variables. This data was tabulated into Google Sheets and

interpreted using the SPSS latest version. The data was first checked for normal distribution by calculating kurtosis and skewness and applying Shepiro-Wilk test on the obtained values. Prevalence of the findings had been reported. For correlation and regression testing, In case of parametric data, t-test and ANOVA was used to check for the significance ($p < 0.05$) and in case of non-parametric data Mann Whitney U and Friedmann test had been used for the same. Correlation analysis will be done with the variables.

RESULTS

A total N=793 participants were recruited for this retrospective observational study. All the participants are sanitation workers in the metropolitan city of Mumbai, India. Participant characteristics and findings from the camp are provided in Table 1.

Table 1: Participant characteristics and incidence of targeted findings.

Variable	All persons (N=793)*
Median age (IQR)-years	42 (36 – 49)
Gender, n (%)	
Male	592
Female	201
Tobacco usage	243
Areca usage	72
Alcohol usage	232
Tried to quit alcohol	206 Out of n=417 participants
Wanting to quit alcohol	203 Out of n=415 participants
Awareness for adapting de-addiction	790
Median systolic blood pressure (IQR) – mmHg	130 (121-143)
Median diastolic blood pressure (IQR) – mmHg	77 (68-83)
Median random blood sugar level (IQR) – mg/mL	105 (91-128)
Median hemoglobin level (IQR)-gm%	10.4 (9.4-11.3)
Breast cancer	
B/L thickening	1
Normal	132
Oral cancer	
Erythroplakia/leukoplakia	1
Leukoplakia	26
Erythroplakia	10
OSMF	8
Normal	748
Ophthalmic examination	
B/L cataract	6
B/L pseudophakia	2
Presbyopia	103
Myopia	2
Astigmatism	1
Unilateral cataract	17
Unilateral pseudophakia	5
Pterygium	1
Normal	666

*Unless otherwise specified

Chi-square tests were applied to evaluate the relationship between tobacco use, and oral lesions, and alcohol use and oral lesions.

Participants who used tobacco were more likely to develop oral lesions than people who did not use tobacco:

$\chi^2 (1) = 62.615$, $p < .001$. $n=37$ (15.2%) of those who used tobacco developed oral lesions while $n=7$ (1.3%) of those who did not use tobacco developed oral lesions.

Participants who used alcohol were more likely to develop oral lesions than people who did not use tobacco: $\chi^2 (1) = 38.204$, $p < .001$. $n=31$ (13.4%) of those who

used tobacco developed oral lesions while $n=13$ (2.3%) of those who did not use tobacco developed oral lesions.

Participants who used areca nuts were also more likely to develop oral lesions than people who did not use tobacco: $\chi^2(1) = 10.511$, $p = .001$. $n=10$ (13.9%) who used areca nut developed oral lesions while $n=34$ (4.7%) of those who did not use areca nut developed oral lesions.

DISCUSSION

Assessment of the determinants of occupational health hazards remains a backbone in finding efficacy of public health policies implemented in the country. No previous study has been reported in the literature that have assessed the prevalence of presbyopia and astigmatism in Sanitation workers, especially not in the city of Mumbai.

Substance abuse is common in sanitation workers with 75.82% of workers suffering from addiction.¹¹ This is in sharp contrast to the study conducted by Giri et al which found the incidence of addiction in sanitation workers in Mumbai to be 97.3%.¹² Ragamani et al hypothesized that substance abuse was used by the workers as a coping method.¹³ At the end of our study, we found that 30.6% ($n=243$) sanitation workers consumed tobacco in any form. Out of which, 9.07% ($n=73$) used areca. This is a significant drop in prevalence since the last study held in 2021 in Puducherry, India which had a prevalence of 60% workers consuming tobacco but is a sharp increase from the results found in the study conducted by Madhumithra et al which found tobacco usage to be 17%.^{17,18} This is worrying as smoking was linked to an increased incidence of lower respiratory pathologies than their non-smoking counterparts.¹⁹

The percentage of workers who consumed alcohol was 29.2% ($n=232$). This prevalence is unlike those found in previous studies, which was about 47.7% in a study held in Puducherry.¹⁷ Furthermore, one of the most common causes of death in sanitation workers was alcoholic hepatitis.²⁰ Hence, deaddiction programmes become a pivotal cornerstone in the management of the morbidities caused by substance abuse. Unfortunately, no studies till now have been conducted extrapolating the willingness of sanitation workers towards attending deaddiction programmes.

Ocular pathologies were also noted in sanitation workers.²¹ 29.67% had an ocular illness which included symptoms of redness, irritation, and watering of the eye.¹¹ Giri found disorders of the eye to be the most predominant and also noted that the severity was proportional to the duration of service.¹² Thayyil Jayakrishnan also concurs with the above findings.²² In contrast to a study held on waste workers in south Asia, the percentage of sanitation workers facing eye problems has been notably reduced from 65.3% to 16.1% in our study.²³ The major occupational health hazard found as summarised by Tiwari RR in his review is 'gas eye',

showing symptoms like palpebral edema.²⁴ Our study shows presbyopia, 20.4% ($n=103$) as the major health hazard to the eyes. This was followed by unilateral cataract (3.8%) and bilateral cataract (1.2%). The cataract prevalence in adults of the general population was 33.2% in central Sri Lanka.²⁵ Another study of literature summarises prevalence of cataract being 40% in outdoor workers.²⁶ There was no similar study that concluded the prevalence of cataract in sanitation workers being a specific population. A study held on health workers in north western Nigeria, proves the prevalence of presbyopia to be around 42.1% which again is much higher than the prevalence we found in our study.²⁷ The assessment of our study is however compared to the health worker study because of few chemicals being similar in usage. Few disparity may be because of the specific population and demography we have in our study. Some of the unique findings we found in our study included prevalence of pseudophakia being 1.6% ($n=8$), prevalence of myopia in sanitation worker being the same as prevalence of pseudophakia in the study and the prevalence of pterygium and astigmatism both being <1% ($n=1$).

Our study also noted that participants who used tobacco were more likely to develop oral lesions than people who did not use tobacco $n=37$ (15.2%) of those who used tobacco developed oral lesions while $n=7$ (1.3%) of those who did not use tobacco developed oral lesions, which goes in conjunction to what was found in a study held on sanitation workers who were residents of Allahabad city.²⁸ In another study, a total of 12.1% of the participants had a history of multiple combined habits including tobacco/alcohol/betel quid.²⁹ In the same study, there were about 11.4% workers consuming alcohol who had oral lesions which makes it a likely risk factor for occurrence of any kind of oral lesions. This aligns with the results of our study where participants who used alcohol were more likely to develop oral lesions than people who did not use tobacco $n=31$ (13.4%) of those who used tobacco developed oral lesions while $n=13$ (2.3%) of those who did not use tobacco developed oral lesions. At the end of our study we also found that participants who used areca nuts were also more likely to develop oral lesions than people who did not use tobacco $n=10$ (13.9%). Participants who used areca nuts developed oral lesions while $n=34$ (4.7%) of those who did not use areca nuts developed oral lesions. Diving deeper into the lesions, leukoplakia (3%) and OSMF (3.5%) were mucosal conditions seen among the study participants followed by erythroplakia (0.3%).³⁰ Whereas in comparison to the study we conducted, the results were surprisingly similar for the cases of leukoplakia, the prevalence being 3.2% ($n=26$). The prevalence of OSMF is 1% ($n=8$) and prevalence of erythroplakia is 1.26% ($n=10$) which is a significant reduction from the previous study. The study also proved both smoking and alcohol to be a major risk factor for developing leukoplakia and erythroplakia. Another systematic review shows leukoplakia to be significantly more in males.⁹ Another study held in South India proves leukoplakia to be the

most common premalignant lesion with the prevalence being 5.7%.³¹ Similarly the prevalence of OSMF in India is proven to vary between 0.03% and 3.2% according to various studies.³² However, when compared to the Italian population the prevalence of leukoplakia was high (13.8%).³³ Furthermore, unlike other studies where the sampling frame was drawn from the general population, our study was conducted among a specific target population, making it less likely that the results could be extrapolated.

Our study finds the median systolic blood pressure of sanitation workers to be elevated than normal. In sanitation workers the prevalence of hypertension was noted by Chandra K and Arora V to be 67.3%, Jayaseelan et al to be 36.7% and by Bharti OK et al as 18.5%.^{34,35,20} Worryingly enough the study conducted by Jayaseelan V found that only 29.8% knew about their hypertension status and 41.1% of the total study participants had pre-hypertension.³⁵ The study also found 35.3% of those with known hypertension to have controlled BP which is more than their general population counterparts.³⁶ It is important to note the prevalence of hypertension as the majority of deaths in sanitation workers were attributed to heart attacks.²⁰ Hypertension was also associated with a poorer quality of life in sanitation workers.¹⁸

This study sheds light on the prevalence of occupational health hazards such as propensity to developing oral cancer, breast cancer, ophthalmic disorders, and social behavioural practices such as substance abuse. It thus brings forth the need for implementation of preventive and curative measures while calling into question the employee protection measures and health initiatives that are currently in place.

For instance, 790 out of 793 participants in the study were found to be aware of the need for deaddiction, yet only 49.4% percent of alcohol users had attempted to quit this habit. This highlights the need for intervention and de addiction treatment programs, which have been proven to improve health and social function and reduce the risk of infectious diseases.³⁷ Moreover, an appropriate pre-employment training program and issuance of effective protective gear is recommended to reduce the incidence of health issues among these workers.

Additionally, the high levels of substance abuse among this population hints at the psychological stressors that accompany this occupation.³⁸ Our study had few limitations as the data collected was from a single geographical location and was self-reported by beneficiaries and being limited by resource availability like biochemical and radiological investigations.

Hence, future research should include assessment of mental health of these workers. Lastly, it is concluded that further epidemiological studies need to be conducted to determine the physical health risk among sanitation workers.

There are some implication for this study. Calls to further delve into causes and rectifications for better healthcare for sanitation workers. Sheds light on the standards of living and social and behavioral practices of sanitation workers for employee protection measures and health initiatives to be undertaken by the government. Better health practices in sanitation works will lead to better healthcare output to the society. For future research to be planned by researchers in ergonomics.

CONCLUSION

In conclusion, the paper highlights the prevalence of occupational health hazards and social behavioral practices among sanitation workers, specifically in the city of Mumbai. The study revealed findings related to substance abuse, ocular pathologies, and oral lesions among sanitation workers. Substance abuse, including tobacco and alcohol consumption, was prevalent among the workers, with tobacco usage being linked to oral lesions and smoking being associated with lower respiratory pathologies. Ocular illnesses, such as presbyopia and cataract, were common among sanitation workers, although the prevalence was lower compared to other studies. The study also observed elevated systolic blood pressure and a high prevalence of hypertension among the workers, which is concerning given the association with heart attacks and a poorer quality of life. The discussion emphasizes the need for preventive and curative measures to address these occupational health hazards. Deaddiction treatment programs are crucial for addressing substance abuse, and interventions should be implemented to improve the awareness and quit attempts among alcohol users. Pre-employment training programs and effective protective gear are recommended to reduce health issues among sanitation workers. Furthermore, mental health assessment should be included in future research to address the psychological stressors faced by these workers. It is also important to conduct further epidemiological studies to determine the physical health risks and develop appropriate interventions for the well-being of sanitation workers. Overall, the findings underscore the importance of employee protection measures, health initiatives, and targeted interventions to improve the occupational health and well-being of sanitation workers.

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