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Occupational Morbidity among Municipal Solid Waste Loaders in Mumbai

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Abstract

Municipal solid waste loaders collect and load waste into waste carrying compactor from different areas of the Mumbai city. Waste loaders are vulnerable to develop communicable and non-communicable disease due to the nature of work. This paper attempts to understand the occupation related morbidities and health seeking behavior of solid waste loaders. A primary survey was conducted with a total 160 municipal waste loaders in M/East ward of Municipal Corporation of Greatem Mumbai. The waste loaders are found to have high prevalence rate of low back pain, shoulder pain and hip/thigh pain in past 12 months. Almost 75 per cent of them reported eye related problems; two-thirds had breathlessness and 42 per cent workers reported injuries in past six months. The years of working, smoking, alcohol consumption and chewing tobacco significantly contribute for raising the prevalence of morbidities. Loaders with higher age, income and years of working spend more on their health treatment. At the outset waste loaders have higher prevalence of injury/accident, skin disease ,respiratory disease, eye disease and musculoskeletal disorders. The municipal corporation should take preventive measures and hold periodical health camps for minimizing the health risk among the waste loaders.

Key words: Municipal waste loaders, occupational morbidity, treatment seeking, health expenditure.

I. Introduction

Outbursting urbanisation resulted in the monolithic production of solid waste materials in towns and metropolitan cities in India. Municipal Corporation of Greater Mumbai (MCGM) generates on an average of 8,500 metric tons of solid waste per day from its 24 administrative wards. Around 30,000 regular employees are associated with the collection and transportation of this waste along with a fleet of 983 municipal and private vehicles making 1,396 trips each day to dispose the waste on landfill areas (Commissioner, 2012; Davis, 2013). Workers physically handle the decaying carcasses of animals, household garbage, human and animal excreta, gully material, infectious and hazardous medical waste and other toxic wastes with their bare hands, which leads to development of communicable as well as non-communicable diseases and disorders among the loaders. Waste loaders are vulnerable at every step for these diseases due to the exposure they have during waste collection from field, transportation of waste and recycling or disposal of waste during working hours.

Past numerous cross-sectional studies in developing countries are evidence that workers associated with solid waste collection were likely to have high risk for development of various chronic health problems such as respiratory tract infection, skin diseases, injuries, strains, contusions, fractures, lacerations and musculoskeletal disorders compared to the general workforce (Aweng & Fatt, 2014; Hansen et al., 1997; Inyang, 2007; Lora, James, Huren, & Bean, 1999; Poulsen et al., 1995; Rushton, 2003; Yang et al., 2001). Similarly, studies conducted in India demonstrated that workers associated with the solid waste collection have potential risk for development of chronic respiratory diseases, anemia, hypertension, injuries, eye diseases, skin

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diseases, nail infections and musculoskeletal disorders compared with the general population (Akolkar et al., 2012; Hambach et al., 2012; Jariwala & Christian, 2013; Jayakrishnan, Jeeja, & Bhaskar, 2013; Neghab, Khodaparast-Kazerouni, Hassanzadeh, & Ahmadzadeh, 2013; Sabde & Zodpey, 2008). Municipal solid waste collectors are not only vulnerable to communicable diseases due to lack of education, poor housing condition and non-availability of proper diet but their daily substance use habits like tobacco consumption, smoking and regular drinking of alcohol also affect their immune system. Previous studies suggested that substance use such as smoking and alcohol consumption is higher among solid waste collectors and drainage cleaners (Mudalige & Dharmathilake, 2000).

In developing countries not only health affects the human production capacity but at the same time treatment seeking behaviour leads to financial burden due to high out of pocket expenditure fot treatment. For instance, a majority of population in developing countries pays for hospital care facility through out-of-pocket expenses (OPE) which push them into poverty and OPE is one of the leading factors that causes the burden of health expenditure on an individual/family. To cope with these expenditures, individuals borrowed money from friends and relatives or sold/mortgaged their assets (Bhojani et al., 2012; Saksena & Evans, 2011). The solid waste collectors have a higher burden of health expenditure due to their continuous health problems and risky profession. Workers adopt a combination of savings, selling/mortgage assets or borrow money from available sources as coping strategies. Limited studies have been conducted with municipal solid waste collectors to assess the occupation related morbidities and health seeking behaviour among municipal solid waste loaders in India. Therefore, the present study assesses the waste loading associated morbidities and health seeking behaviours of solid waste loaders in Mumbai.

II. Methods and materials

The primary survey was conducted with 160 waste loaders working in M/East ward of Municipal Corporation of Greater Mumbai. For in-depth understanding, five in-depth interviews were conducted with workers who had more than ten years of work experience.The municipal waste loaders are those who collect and load solid waste into waste carrying compactors from assigned areas throughout the 24 municipal wards in the city. During the eight working hours, waste loaders have to collect and load the solid waste from nearly 10 to 15 waste collection spots such as public markets, community dustbins of slums, residential areas, hotels and industrial zones. The data was collected with the help of semi-structured questionnaire which covered the information on demographic, socio-economic and occupational characteristics of waste loaders. Specifically, it included information on morbidities, treatment seeking behaviour, expenditure on health and information related to the protective measures. The interviews were conducted during the working hours at the reporting places of workers (Chowkis) during February to March 2013. The data entry and analyses were in STATA12 (StataCorp, 2015). The multivariate analyses were performed to identify the confounders that lead to raising the morbidities. Permission to conduct the primary survey was obtained from the MCGM and the respondents were assured that the information would be confidential.

III. Results

The results show that 59 per cent waste loaders working in M/East ward were less than 30 years of age. With regard to education, 63 per cent were educated up to secondary school and 14 per cent were uneducated. Traditionally the cleaning occupation is mainly dominated by socially weaker categories of people in India. They were systematically forced to perform this menial work from generation to generation (Ramaswamy, 2005). It was seen that 82 per cent waste loaders in this study belonged to the scheduled and other backward castes (Table 1). Alcohol consumption was found to be very high among waste loaders. Almost two-thirds of the waste loaders consumed alcohol with smoking (51 per cent) and chewing tobacco (44 per cent).

Table 1: Background characteristics of waste loaders

Characteristics	Per cent	Number
Age		
Less than 30	58.7	94
More than 30	41.3	66
Mean age	*31.8*	
Education		
Non-educated	14.4	23
Up to secondary	62.5	100
Secondary and above	23.1	37
Marital status		
Currently married	85.6	137
Never married	14.4	23
Religion		
Hindu	36.9	59
Neo-buddhist	50	80
Others#	13.1	21
Caste		
SC/ST/OBC	82.5	132
Others	17.5	28
Years of working		
Less than 5 years	33.1	53
More than 5years	66.9	107
Mean	*8.2*	
Income in Rs.		
Less than 17,000	46.3	74
Above 17,001	53.7	86
Mean	*15066.9*	
Household size		
Less than 4	35	56
More than 4	65	104
Mean	*5.1*	
Substance Use		
Smoking	51.2	82
Tobacco	44.4	71
Alcohol	65.6	105
Total	100.0	160

#Others-Muslim and Christian. SC-Scheduled Castes, ST-Scheduled Tribes, OBC-Other Backward Castes.

In the present study, prevalence rates of injury/accident, skin disease, respiratory disease, eye disease, gastrointestinal and musculoskeletal disorders were found high among waste loaders (Table 2). Workers reported pain in nine defined anatomical areas due to continuously physical activities of pulling, pushing, lifting and loading community dustbins into waste carrying compactors. Nearly nine out of ten waste loaders reported musculoskeletal disorders in past 12 months. Pain in low back, shoulder and hip/thigh were higher than the other anatomical parts. Similarly, due to direct exposure to the collection of solid waste causes higher prevalence of injury/accident in the past six months. The injury/accident was reported high particularly of laceration (80.6 per cent) due to needles and glass material, fracture (17.6 per cent) and contusion (40.6 per cent) in this period. Additionally, waste loading occupation led to the incidence of skin diseases, respiratory problems and eye infections due to contact with stagnant water, handling waste with inadequate protective measures, exposure to organic dust containing micro-organism, vehicles' exhaust, and irritant gasses during work. The prevalence of respiratory problems was high among the waste loaders compared with the skin and eye diseases. Specifically, more than

two-thirds of the waste loaders reported breathlessness (67.5 per cent) and continuous watering (60 per cent) of eyes during the past six months.

Table 2: Prevalence of disease/disorder by sub-category among waste loaders during past six months

Morbidities	Prevalence (per cent)	Number
Injuries/Accident	**87.5**	**140**
Fracture	17.6	28
Laceration*	80.6	129
Contusion	40.6	65
Skin disease	**73.1**	**117**
Rashes/Infective	52.5	84
Fungal infection	51.6	82
Respiratory disease	**78.8**	**126**
Dust allergy	8.8	14
Asthma	8.8	14
Chronic cough	26.3	42
Running nose	42.5	68
Breathlessness	67.5	108
Eye disease	**71.9**	**115**
Eye soreness	12.5	20
Redness	53.1	85
Watering	60.0	96
Itching	46.3	74
Gastrointestinal infections	**45.0**	**72**
Loose motion	2.5	4
Gastroenteritis	41.9	67
Leptospirosis	1.9	3
Worm infection	3.1	5
Musculoskeletal disorders#	**89.4**	**143**
Neck	26.9	43
Upper back	26.9	43
Shoulder	66.2	106
Elbow	22.5	36
Wrist and hand	23.1	37
Low back	71.2	114
Hip/thigh	61.9	99
Knee	33.1	53
Ankle	30.0	48
Total		160

* Laceration with needles and glass material, #reference period past 12 months.

The multivariate logistic regression shows that years of working had significant impact on development of morbidities among workers (Table 3). Workers working more than five years as waste loaders five-time (OR=5.06; $p<0.01$) are more likely to have injury/accident compared with those worked for less than five years. Similarly, workers working for more than five years are likely to have four times (OR=4.46; $p<0.05$) and two times (OR=2.27; $p<0.05$) higher musculoskeletal disorders and skin diseases respectively than those working for less than five years. Substance use among loaders significantly increase the probabilities of morbidness. Workers who consumed alcohol were fourtimes (OR= 4.32; $p<0.01$) more likely to have injury/ accident compared with non-alcoholic workers. Similarly, waste loaders with smoking habit were three times (OR=3.39; $p<0.01$) more likely to have eye problems. Chewing tobacco also significantly increased the respiratory, eye and musculoskeletal disorders among waste loaders.

Table 3: Odds ratio showing association between major morbidities and background characteristics among waste loaders

Characteristics	Injury/ accident	Skin	Respiratory	Eye	MSDs#	Gastro-intestinal
Years of working						
Less than 5®						
More than 5	5.06***	2.27**	2.06*	1.65	4.46**	1.48
	(1.43-17.84)	(0.97-5.29)	(0.52-5.13)	(0.68-3.99)	(0.69-28.60)	(0.67-3.25)
Years of schooling						
Less than 10®						
10 and above	1.00	1.12	1.31	1.07	0.78	1.35
	(0.32-3.08)	(0.49-2.52)	(0.54-3.13)	(0.46-2.48)	(0.16-3.72)	(0.66-2.74)
Smoking						
No®						
Yes	2.32	1.91*	1.81	3.39***	2.85	0.99
	(0.66-8.11)	(0.84-4.36)	(0.74-4.40)	(1.47-7.82)	(0.37-21.59)	(0.49-1.96)
Alcohol						
No®						
Yes	4.32***	1.07	1.15	1.66	2.77	1.21
	(1.30-14.33)	(0.46-2.47)	(0.47-2.80)	(0.73-3.74)	(0.46-16.36)	(0.58-2.51)
Tobacco						
No®						
Yes	1.72	2.03*	2.33**	1.91*	7.49***	1.54
	(0.55-5.31)	(0.92-4.45)	(0.99-5.49)	(0.86-4.22)	(0.82-68.45)	(0.79-2.97)
Family size						
<4® members						
>4 members	0.50	0.84	0.96	2.27**	2.47	1.45
	(0.14-1.66)	(0.36-1.89)	(0.40-2.28)	(1.02-5.05)	(0.48-12.65)	(0.71-2.95)

Musculoskeletal disorders in past 12 months; the model additionally adjusted for sge, marrital status and caste.

Workers were not only vulnerable for developing occupational morbidities but at the same time burdened by out of pocket expenditure while seeking treatment. Table 4 provides treatment seeking behaviour and mean expenditure of waste loaders by socio-economic and occupational characteristics. The mean health expenditure of workers was positively associated with age, years of working, income and household size. For seeking health treatment at the young age workers prefer to visit private health facilities but with increase in age their place of treatment changes. For instance, more than 50 per cent workers aged less than 30 years visited private health facility compared with the 47 per cent workers of more than 30 years. The expenditure on health treatment increases with increase of age. Similarly, with increase in working years, waste loaders prefer the government facility for seeking treatment compared with the private facility. Waste loaders working for more than five years in the solid waste department spend three times higher for treatment seeking compared with those who had less than five years of working experience. The analysis also shows that among workers who had above Rs. 17,000 of monthly salary, 53.5 went to private facilities and spent more than Rs. 3,000 on treatment in the past six months. No difference was found while considering the health expenditure of loaders who were habitual to substance use.

IV. Discussion

In the present study, the mean age of waste loaders was 32 years along with mean eight years of working experience. Majority of the workers were educated upto the secondary education, whereas about 15 per cent were non-literate. The Municipal Corporation of Greater Mumbai has institutionlized the age-old practice of cleaning where selected castes were enforced to do this menial cleaning. This system is sustained form generation to generation due to the caste based process of recruitment as a municipal worker. In the present study, more than 80 per cent of waste loaders were belong to the scheduled castes. The work of solid waste loading is highly associated

with the substance use. The alcoholism and smoking habits are found to be more common, and they work as anesthesia during the working hours. Due to the exposure of waste loading work, workers were vulnerable to the developemnt of communicable as well as non-communicable diseases/disorders.

Table 4: Treatment seeking behaviour and mean health expenditure of waste loaders by socio-economic and occupational characteristics.

Characteristics	No treatment	Govt. (per cent)	Private (per cent)	Mean expenditure Rs. (SD)	Number
Age					
Less than 30 years	8.5	39.4	52.1	1543 (2384)	94
More than 30 years	3.0	50.0	47.0	4201 (10982)	66
Education					
Non-educated	0.0	60.9	39.1	3682 (7807)	23
Up to secondary	7.0	44.0	49.0	2989 (8472)	100
Secondary & above	8.1	32.4	59.5	1045 (1326)	37
Marital status					
Currently married	5.1	44.5	50.3	2887 (7894)	137
Never married	13.0	39.1	47.8	1161 (2217)	23
Religion					
Hindu	8.5	40.7	50.8	2158 (4338)	59
Neo-Buddhist	6.2	45.0	48.7	3225 (9648)	21
Others#	0.0	47.6	52.4	1761 (2641)	80
Caste					
SC/ST/OBC	7.6	43.1	49.2	2827 (8005)	132
Others	0.0	46.4	53.6	1757 (2854)	28
Years of working					
Less than 5 years	11.3	35.8	52.8	1050 (2056)	53
More than 5years	3.7	47.6	48.6	3426 (8807)	107
Income					
Less than Rs. 17,000	9.5	44.6	45.9	1699 (4081)	74
Above Rs. 17,001	3.5	43.0	53.5	3448 (9270)	86
Household size					
Less than 4 members	5.4	46.4	48.2	1865 (2768)	56
More than 4 members	6.7	42.3	50.9	3056 (8906)	104
Substance use					
No addiction	15.4	30.8	53.8	2869 (6461)	26
Any one	9.7	51.6	38.7	2037 (3805)	31
Two and above	2.9	44.7	52.4	2763 (8373)	103
Total	**6.3**	**43.7**	**50**		**160**

#Others-Muslim and Christian; SD-Standard Deviation; Substances- Tobacco, Smoking and Alcohol; SC-Scheduled Castes, ST-Scheduled Tribes, OBC-Other Backward Castes, Govt.-Government

The study furhter highlights the high prevalence rate of occupation associated morbidities among waste collectors in given reference period. Mainly waste loaders were more vulnerable to the development of musculoskeletal disorders due to the continuous physical activities. Almost 90 per cent workers reported pain in nine defined anatomical areas during past 12 months. Specifically, pain in the low back (71.2 per cent), shoulder (66.2 per cent), and hip/thigh (61.9 per cent) were higher than the other musculoskeletal regions. Similarly, almost nine out of ten waste loaders suffered with injury/accident in past six months. Laceration due to needles and glass material dumped in open community dust bins were found to be common among waste loaders than fracture and contusion. Manul handiling of solid waste and exposure of various pollutants causes skin disease, respiratory problems and eye infection among workers. The problem of breathlessness was observed to be very high among waste loaders compared with the other health concerns. This may be due to the direct exposure to toxic gasses released from the garbage

compactors while loading and compressing waste. While loading the solid waste into garbage compactors, a loader has to stand behind the vehicle closely where compactor constrict the waste material which emits various gasses. This process causes various problems including redness, itching and continuous watering of eyes. The multivariate logistic regression analysis shows that the years of working and substance use had significant impact on development of morbidities among workers. As the prevalence of morbidities were high among waste loaders, the expenditure on the health seeking involved financial burden. The health expenditure was increasing with age, years of working, income and household size of waste loaders. For instance, waste loaders working for more than five years in the solid waste department tend to spend higher on treatment compared with those who had less than five years of working experience.

There are studies to show that municipal workers associated with solid waste collection and disposal tend to develop higher morbidities compared with the general population. The survey conducted among solid waste collectors in Ghana studied the pre- and post- effect of joining work in the solid waste department and suggested that in the post joining period 88 per cent reported neck pain and 79 per cent developed the low back pain compared with the 12.4 per cent and 21per cent respectively (Friedrich, Cermak, & Heiller, 2000). Likewise, the cross-section study conducted with 313 solid waste workers in Kerala highlighted that the higher prevalence of accident (22 per cent), injury (73.2 per cent), respiratory and eye diseases (ranged from 21 per cent to 47 per cent) (Jayakrishnan et al., 2013).

Initially the mechanization of solid waste management department helps to reduce the workload of workers, but at the same time it increases the risk of accident and injuries among them. The non-service vehicles like garbage compactors and mini-trucks were one of the main reason for injuries and accidents according to the waste loaders. The finding suggests that,as waste loaders were more habitual for substance use like alcohol consumption, smoking and chewing tobacco, the municipal corporation must take the initiative to reduce the substance use through taking preventive measures and introducing awarness programmes. Additionally, the municipal corporation may provide mobile medical service at the work places throughout the 24 municipal wards in Mumbai which can help to increase the accessibility of the treatment seeking behaviour. At the outset, the Municipal Corporation has to develop some policies and programmes to minimize the health risk and to improve the life standard of waste loading workers. The health of municipal workers continuously deteriorated after the service which leads to the long-term disability in post-retirement age causing premature death. In addition, further research may extend to explore the issues of out-source workers in solid waste collection work. Compared to the formal municipal employees, the heath of contract workers is worse. Out-sourced workers are mainly from Non-Government Organization (NGOs) working without job security at low wages. While hiring the out-source labours, the Municipal Corporation leaves out the responsibilities for providing necessary services such as protective measure, medical care and minimum salary for contract workers.

Limitations of the study

In this study, diseases and morbidities are mainly self-reported which may have been over- or under-reported. There may be a seasonal variation in the prevalence rate of morbidities as the nature of waste loading occupation changes according to the seasons.The survey was conducted in one out of 24 municipal wards in Mumbai and hence the result may be generalised with caution.

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