

# Neck, Wrist and Back Pain Among Solid Waste Collectors: Case Study of a Ghanaian Waste Management Company

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**Abstract:** Prevalence of Neck Wrist and Back pain (NWBPs) among solid waste collectors (SWCs) of Zoom Lion Company (ZL) is 44.7%, 48.2% and 73.5% respectively, irrespective of pre-existing periodic pains. It was established that 42/340 (12.4%) SWCs of ZL had neck pain before joining ZL, whilst 298/340 (87.6%) developed neck pain after joining ZL ( $P$ -value = 0.001). Again, 32/340 (9.4%) had wrist pain before joining ZL, whilst 308/340 (90.6%) developed wrist pain after joining ZL ( $P$ -value = 0.000). Finally, SWCs who had back pain before joining ZL were 71/340 (20.9%) whilst 269/340 (79.1%) developed back pain after joining ZL ( $P$ -value = 0.000). These outcomes indicate that SWCs are predisposed to such NWBPs. Zoom Lion, needs to conduct periodic health checks of their staff to determine the degree of NWBPs experienced by their workers and help to relieve the workers of the economic burden of managing the pain.

**Keywords:** Back, neck, pain, prevalence, wrist, zoom lion.

## INTRODUCTION

Neck, Wrist and Back Pains (NWBPs) are often work-related [1]. Persons whose routine work involve strenuous physical activities such as pulling, pushing, lifting, carrying, picking, sweeping, or bending for long hours are the most vulnerable [2-4]. In Solid Waste Collectors (SWCs), for example, these activities are predominant. Zoom Lion (ZL) Ghana Limited, a leading waste management company in Ghana, employs SWCs who help to keep towns and cities clean and healthy. Specific working groups of SWCs in ZL include sweepers, garbage collectors, garbage van and tricycle drivers, those engaged in weeding as well as team leaders.

Increasing population and rapid urbanization in cities of most Sub-Saharan African countries, like Kenya, Nigeria, Zambia, Zimbabwe, including Ghana, have accompanying repercussions on solid waste generation and management problems [5, 6]. Accra, being the capital city of Ghana, is urbanized and with a population density of 1,019 persons per square kilometer is no exception to the dilemma of solid waste management [7]. Available data suggest that increasing population growth in Accra Metropolitan Area (AMA) is linked with increased total solid waste production per unit area of the metropolis. In 2005, for example, while the population of Accra was approximately 3.6 million, average solid waste generated per individual was estimated at 0.0006 metric tons with a total of about 1,800 metric tons generated daily [8-10]. About five years later, when the population of Accra had increased to about 4 million, approximately 2,200 metric tons of solid waste is generated daily [11, 12].

Out of the about 55% (1,200 metric tons) of solid waste collected daily in the city of Accra, SWCs of Zoom Lion Ghana Limited collect the largest proportion of about half (25%) i.e. 298.8 metric tons daily. Consequently, the burden of strenuous physical activity of SWCs in maintaining clean and healthy environments in the city of Accra could lead to developing NWBPs. Meanwhile the consequences of NWBPs among SWCs may not only cause considerable personal suffering because of pain, but also disability, reduced income due to treatment as well as impaired quality of work in general, which could result in great socioeconomic burden on both the SWC and the entire Ghanaian society at large [13-15].

In the United States, for example, low back pain accounts for approximately 175.8 million days of restricted activity annually due to absenteeism and hospitalization [16, 17]. Furthermore, a review of health data from 1994 in Ghana on health risks of solid waste and construction workers revealed that SWCs experience higher incidence of sick days (47.6% versus 33% construction workers), work-related accidents, and mortality (3.6% versus 0.6% construction workers) and higher percentage of absenteeism due to sickness (0.7% versus 0.5% construction workers) [18]. Thus suggesting that SWCs experience higher incidence of sick days, work related accidents and mortality [18]. This obviously worrying statistics calls for more research on SWCs, especially in Accra, Ghana focusing on prevalence of NWBPs to understand the situation and recommend appropriate public health and medical interventions, and propose ways of enhanced collective bargaining agreement of SWCs to relieve the workers of the economic burden of having to pay for NWBPs due to waste collection from their own pockets. This study sought to: a. determine prevalence of NWBPs among specific activity groups of SWCs b. establish proportional differences in NWBPs among SWCs before and after joining Zoom Lion c.

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determine treatment patterns and cost of treatment for NWBPs among SWCs of Zoom Lion.

## METHODS

### Ethics Statement

This study received ethical clearance from the Ghana Health Service Ethical Review Committee (GHS-ERC). The special identification number is *GHS-ERC: 12/2/11*. Individual consent was sought from each Zoom Lion worker before administration of questionnaire.

### Study Population and Sampling Procedure

A cross-sectional study was conducted with SWCs of Zoom Lion Ghana Limited in Accra. The study was conducted within three months period (between May and August). Using prevalence ( $p$ ) of reported NWBP among SWCs in Ghana as 0.476, [18] and by substituting ( $p$ ) in the formula  $N = (z/e)^2 \times p(1-p)$  [19], a sample size of 340 SWCs of ZL was obtained. Stratified sampling technique was used to identify the study sites. Each of the eleven Sub-metropolitan areas within the Accra Metropolitan Area (AMA) was considered a stratum, out of which four randomly selected Sub-metros including Nungua, La, Ablekuma South, and Ayawaso West were randomly chosen. Simple random sampling was used to select solid waste collectors in proportion with the relative populations of the four strata. Self administered structured questionnaire was then used to collect data from individual SWCs. Each SWC was given a questionnaire in a sealed envelope, which was filled individually and returned without their names on the question-

naire or the envelope. The questionnaire was translated to the local language (Twi or Ga) for waste collectors who could not read English. The identity and information on volunteers who consented to participate in the study were not disclosed.

### Data Analysis Plan

Data analysis was done using SPSS version 16.0 for Windows 7 (SPSS, Inc., Chicago, IL.). Pearson's chi-square test was used to determine differences between variables. Parametric tests were used to determine means and proportions of neck, wrist and back pain suffered by solid waste collectors of Zoom Lion. *P-values* < 0.05 were considered significant in comparing differences in proportion of SWCs who had NWBPs before and after joining Zoom Lion.

## RESULTS

### About Demography

The age of SWCs ranged from 18-59 years and above. The mean and modal ages were 41 and 45 respectively. Two hundred and seventy two (272/340 - 80%) of SWCs were females, whilst 68/340 (20%) were males (Table 1). Seventy (20.6%) of SWCs had no formal education, 108 (31.8%) had primary education, whilst only two (6%) had tertiary education (Table 2). The number of years of work with Zoom Lion range from less than one year to four years and above (Table 3).

### About Prevalence

A total of one hundred and fifty-two (152) respondents had neck pain, one hundred and sixty-four (164) wrist pain,

**Table 1. Demographic Information**

Age	Sex		Total (n %)
	Male (n %)	Female (n %)	
18-28	15 (4.4)	15 (4.4)	30 (8.8)
29-38	26 (7.6)	77 (22.6)	103 (30.2)
39-48	14 (4.1)	111 (32.6)	125 (36.7)
49-58	10 (2.9)	64 (18.8)	74 (21.7)
59 +	3 (0.9)	5 (1.4)	8 (2.3)
Total	68 (20)	272 (80)	340 (100)
Mean age = 41	Modal age = 45		Standard Deviation = 9.6

**Table 2. Level of Education Completed**

Education	Male (n %)	Female (n %)	Total (n %)
None	13 (3.8)	57 (16.8)	70 (20.6)
Primary	19 (5.6)	89 (26.2)	108 (31.8)
*JHS/MSLC	10 (2.9)	69 (20.3)	79 (23.2)
Secondary	24 (7.0)	57 (16.8)	81 (23.8)
Tertiary	2 (0.6)	0 (0)	2 (6)

\*JHS/MSLC: Junior High School/Middle School Leaving Certificate

**Table 3. Number of Years with Zoom Lion**

Years	Males (n %)	Females (n %)	Total (n %)
>1	10 (2.9)	59 (17.4)	69 (20.3)
1 – 2	8 (2.4)	63 (18.5)	71 (20.9)
3 – 4	17 (5.0)	37 (10.9)	54 (15.9)
4+	33 (9.7)	113 (33.2)	146 (42.9)

and two hundred and fifty (250) had back pain. The occurrence of back pain recorded highest prevalence (73.5%) among solid waste collectors of Zoom Lion followed by wrist pain (48.2%) and then neck pain (44.7%), irrespective of pre-existing periodic pains. The most vulnerable group among solid waste collectors who experience Neck Wrist and Back Pains are sweepers (Table 4).

#### About Pain Before and After Joining Zoom Lion

This study also gathered information concerning periodic pains among solid waste collectors before they were employed at Zoom Lion, to determine whether the nature of their present work predisposed them to neck, wrist and back pain. It was found that 42/340 (12.4%) had neck pain before joining Zoom Lion, whilst 298/340 (87.6%) had neck pain after joining Zoom Lion ( $P$ -value = 0.001). Again 32/340 (9.4%) had wrist pain before joining Zoom Lion, whilst 308/340 (90.6%) had wrist pain after joining Zoom Lion ( $P$ -value = 0.000). Finally, those who had back pain before joining Zoom Lion were 71/340 (20.9%) whilst 269/340 (79.1%) had back pain after joining Zoom Lion ( $P$ -value = 0.000). This data suggests majority of the solid waste collectors developed neck, wrist and back pains after joining Zoom Lion and the differences are significant (Tables 5a and 5b).

#### About Treatment Options and Cost of Treatment

Solid waste collectors who had neck pain sought treatment from four different options, thus hospital/clinic, pharmacy, herbalists and through self-medication. The propor-

tions among males and females were 24.60% and 75.40%, 16.70% and 83.30%, 15.00% and 85.00% as well as 19.00%, and 81.00% respectively (Fig. 1). Thus the most assessed treatment option for neck pain among SWCs was from herbalists. For the treatment of wrist pain, three options were sought, thus hospital, prayer camp and self medication. Even though the use of herbalists was not a treatment option for wrist pain, 100% of males sought treatment for wrist pain at prayer camps. The percentage of SWCs who used self-medication as treatment option for wrist pain was the same among males and females (Fig. 2). Treatment options for back pain were hospital, prayer camp, self-medication and body massage. The least option for treatment of back pain among SWCs was hospital attendance among males; however 100% of females preferred massaging for back pains to any other treatment option (Fig. 3). On the whole, more females sought for treatment than males and spent more money in treating NWBPs (Table 7). The highest average cost of treatment for NWBPs among SWCs of Zoom Lion was (GH¢ 52.0) and this amount was used for treatment of back pain (Table 6).

#### DISCUSSION

It is often understood that symptoms of NWBPs are either caused or aggravated by physical activities at work. Therefore many investigations of NWBPs have been conducted in work-related settings. Such work-related physical activities, as identified in SWCs of Zoom Lion, include sweeping, garbage collection/carrying/lifting, weeding as well as driving garbage vans or garbage tricycles. These physical activities have been found to contribute to

**Table 4. Prevalence of NWBPs in Different Activity Groups of SWCs of ZL**

Category (N =340)			
Activity Groups	Neck Pain (n %)	Wrist Pain (n %)	Back Pain (n %)
Sweepers (251)	109 (43.43)	113 (45.02)	174 (69.32)
Garbage collectors (22)	9 (40.91)	12 (54.55)	18 (81.82)
Garbage van drivers (3)	0 (0.00)	1 (33.33)	3 (100.00)
Garbage tricycle riders (56)	30 (53.57)	32 (57.14)	47 (83.93)
Those who weed (6)	3 (50.00)	5 (83.33)	6 (100.00)
Team leaders (2)	1 (50.00)	1 (50.00)	2 (100)
Total (340)	152	164	250
Prevalence	44.7%	48.2%	73.5%

**Table 5a. Distribution of Neck, Wrist and Back Pain among Activity Groups in SWC before and after joining Zoom Lion**

Activity Groups	Neck Pain		Wrist Pain		Back Pain	
	Before (n %)	After (n %)	Before (n %)	After (n %)	Before (n %)	After (n %)
Sweepers (251)	16 (6.37)	109 (43.43)	12 (47.81)	113 (45.01)	35 (13.94)	174 (69.32)
Garbage Collectors (22)	11 (50.00)	9 (40.91)	9 (40.91)	12 (54.54)	17 (77.27)	18 (81.82)
Garbage Van Drivers (3)	0 (0.00)	0 (0.00)	1 (33.33)	1 (33.33)	0 (0.00)	3 (100.00)
Garbage Tricycle Riders (56)	7 (12.50)	30 (53.57)	6 (10.70)	32 (57.14)	13 (23.21)	47 (83.93)
Those who weed (6)	6 (100.00)	3 (50.00)	4 (66.67)	5 (83.33)	6 (100.0)	6 (100.00)
Team Leaders (2)	2 (100.00)	1 (50.00)	0 (0.00)	1 (50.00)	0 (0.00)	2 (100.00)
Total	42	152*	32	164*	71	250*

\*Proportions of SWCs who developed pain after joining ZL are higher than for those who developed pain before joining ZL

**Table 5b. Neck, Wrist and Back Pain among Solid Waste Collectors before and after joining Zoom Lion**

Neck Pain Before (N = 340)				
Neck Pain After	Yes (n %)	No (n %)	Total	P-value
Yes	29 (8.5)	123 (36.2)	152 (44.7)	0.001*
No	13 (3.0)	175 (51.5)	188 (55.3)	
Total	42 (12.4)	298 (87.6)	340 (100.0)	
Wrist Pain Before (N = 340)				
Wrist Pain After	Yes (n %)	No (n %)	Total	P-value
Yes	28 (8.2)	136 (40.0)	164 (48.2)	0.000*
No	4 (1.2)	172 (50.6)	176 (51.8)	
Total	32 (9.4)	308 (90.6)	340 (100.0)	
Back Pain Before (N = 340)				
Back Pain After	Yes (n %)	No (n %)	Total	P-value
Yes	67 (19.7)	183 (53.8)	250 (73.5)	0.000*
No	4 (1.2)	86 (25.3)	90 (26.5)	
Total	71 (20.9)	269 (79.1)	340 (100.0)	

\*Strong significant differences between Neck, Wrist and Back Pains before and after joining Zoom Lion

prevalence of NWBPs in SWCs of Zoom Lion. All information about prevalence of NWBPs among SWCs of Zoom Lion was self-reported through quantitative research. The highest number 125 (36.7%) of SWCs in ZL were between the ages of 39-48 years. Persons with this age group are considered most active and form the bulk of the Ghanaian working population. Even though females constitute higher percentage of SWCs, [80% (272)] with higher proportion of

working years 113 (33.2%) with ZL company, it was observed that the most strenuous physical activities were performed by males. The overall low level of educational attainment among SWCs of ZL might contribute to their low remuneration. Despite high occupational health risks in solid waste collection especially in developing countries, like Ghana [20, 21], solid waste collection is one of the least paid occupations. Some of the risks involved may be due use of

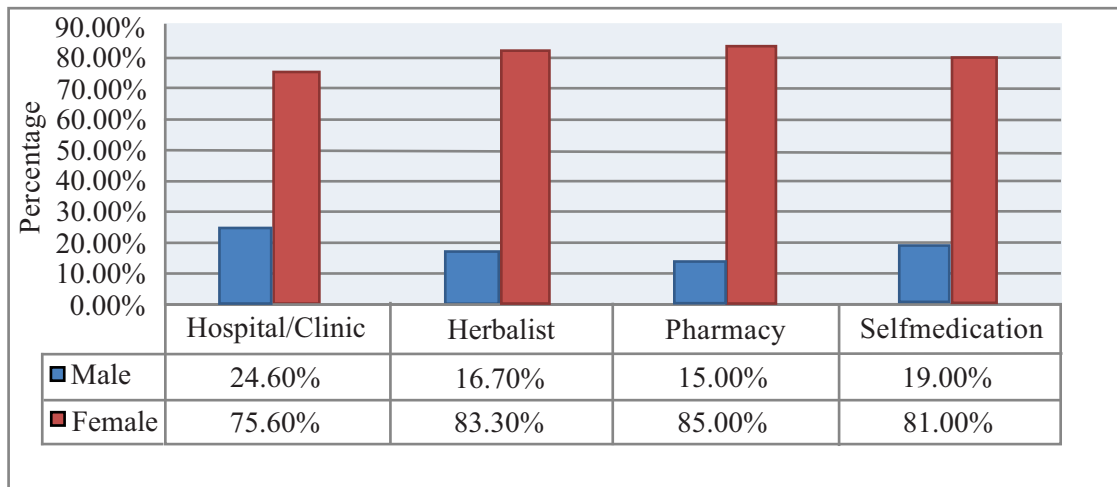


Fig. (1). Treatment of Neck Pain.

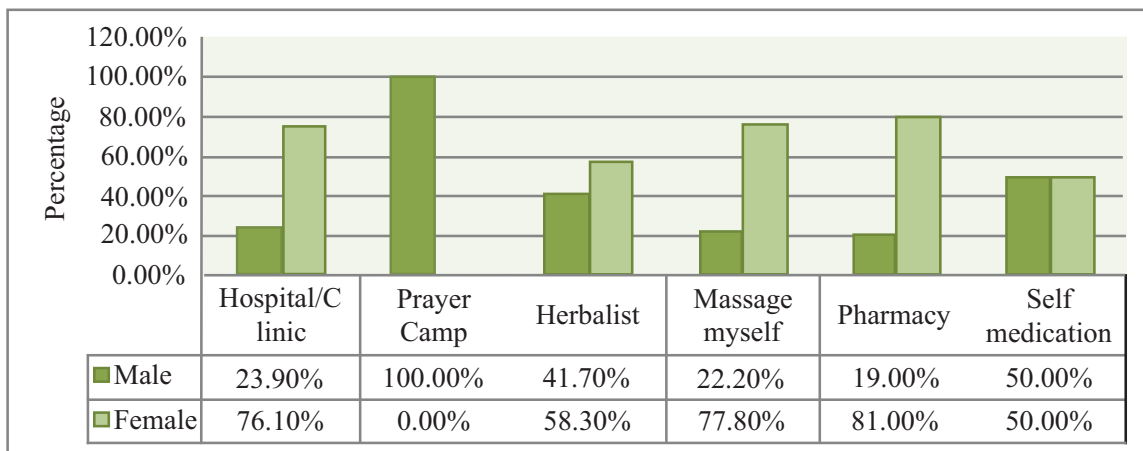


Fig. (2). Treatment of Wrist Pain.

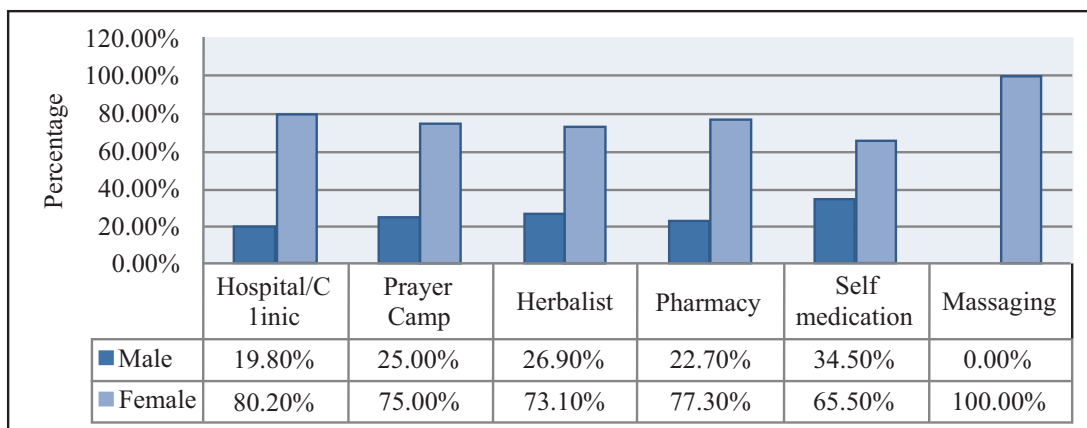


Fig. (3). Treatment of Back Pain.

antiquated equipment, primitive working methods and improper protective clothing [20, 21]. With the introduction of Single Spine Salary Structure (SSSS) in Ghana, government salaries are paid according to educational attainment. Solid waste collectors of ZL therefore have to improve upon their education to attract higher salaries.

In a related study in Iran, Mehrad and colleagues (2008) [16], reported prevalence of back and neck pains as 45% and

22% respectively. Even though the study did not consider prevalence of wrist pains, the results of back and neck pains parallels our finding in terms of prevalence trend (i.e. 73.5% and 44.7% respectively). Thus, confirming that back pain is more prevalent than neck pain among SWCs, even though the Ghanaian study reported higher prevalence in both cases. The difference in prevalence may be attributed to different working conditions among the study populations, in

**Table 6. Average Cost of Treatment for Neck, Wrist and Back Pains**

Pain	Minimum Cost (GH¢)	Maximum Cost (GH¢)	Average Cost	
			GH¢	US \$
Neck	2	250	47.83	27.2
Wrist	2	100	29.45	16.75
Back	2	300	52.00	29.57

**Table 7. Cost of Treatment by Sex among SWCs**

Amount		Male (n %)	Female (n %)	Total (n %)
GH¢	US\$			
50	28.4	55 (16.2)	261 (76.8)	316 (93)
60	34.1	13 (3.8)	10 (2.9)	23 (6.7)
70	39.8	0 (0)	1 (0.3)	1(0.3)

that working condition among SWCs in Accra, Ghana may be poorer compared with Iran. Complaints about back and neck pains among SWCs of ZL is also mentioned among waste pickers in Bangalore- India who complained of back pain when seated for long period of time to sort wastes as well as carry heavy loads of waste materials [20]. Furthermore, Mufamadi, (2003) who cited Riihimaki, 1991 and Hagberg, 1992 [22] also claimed that solid waste collectors bend to sweep for long hours in twisted positions such that these physical demands can cause degenerative changes in the disc and joints of the neck [23]. Wrist pain is the second most prevalent pain (48.2%), reported by this study, following back pain. A growing body of evidence now links wrist pain with physical risk factors in workplaces such as repetition, force, duration, short cycle, time and awkwardness of body posture during work, as factors responsible, similar to what solid waste collectors of ZL experience. Of particular mention of SWCs of ZL in Accra with highest risk of wrist pain are sweepers and garbage collectors who bend to pick solid waste as well as drivers of garbage tricycles and vans. These groups of solid waste collectors use the wrist a lot in their daily work routines coupled with high speed of work associated with wrist pain [24]. Two studies carried out in Europe over the last ten years, have found a prevalence of wrist pain preventing normal activity of 5–10% in working-age adults sampled from age-sex registers of general practitioners [25, 26]. These studies further indicate that such pains are more commonly reported at older ages.

It is interesting to note from this study that irrespective of periodic pains experienced among persons before joining ZL, activities of solid waste collection caused or aggravated NWBPs significantly (*P-values of 0.001, 0.000 and 0.000* of reported neck wrist and back pains respectively after joining Zoom Lion). Thus, work-related physical activities, identified in SWCs of Zoom Lion, including sweeping, garbage collection/carrying/lifting, weeding as well as driving garbage vans or garbage tricycles predisposed these workers to NWBPs. This finding is similar to reported findings which

attribute physical activities like lifting of heavy load, carrying, lowering, pulling, pushing, repetition of manual work, forceful movements, awkward working postures, working in a standing position for a long time and lack of rest to NWBPs [15, 16, 27-29]. This finding further confirms the reality that amount of tonnage of solid waste material generated in the city of Accra is not compensated for by number of solid waste collectors. The attempt of solid waste collectors to collect significant amounts of solid waste in a day therefore places a huge demand on their physical activities and further deterioration to their health.

For improved public health among SWCs of Zoom Lion, formulation and implementation of National Occupational Health and Safety Policy (NOHSP) with special emphasis on health needs of solid waste collectors should be considered in Ghana. The policy among other aspects should include provision for continuous and periodic monitoring of health and safety of SWCs. They must be provided with proper training as well as with adequate equipment and clothing for personal protection. Training in health and safety should ensure that SWCs know of and understand the potential risks associated with solid waste collection. Furthermore in addition to assessing National Health Insurance Scheme, it is suggested here that specialized health care facilities be provided to cater for SWCs and their families. The average monthly salary of a solid waste collector of Zoom Lion is 60 Ghana Cedis [34.1 US dollars]. Many SWCs could not afford the average cost of hospital treatment for Neck, Wrist and Back pain of 47.83 Ghana Cedis [26.79 US\$], 29.45 Ghana Cedis [16.50 US\$] and 52 Ghana Cedis [29.13 US\$]. The options for treatment therefore become either using their savings for hospital treatment and plunge their families into debt or seek unorthodox treatment options, some of which may have adverse future health implications. Among the treatment options sought for SWCs of ZL for NWBPs, were hospital, herbalist, pharmacy, self-medication, prayer camps and body massage. The options for prayer camps and body massage were both 100% for males and females respec-

tively. These options even though are the cheapest, yet are the least effective for treatment of NWBPs. The dangers of sub-optimal treatment and its accompanying effects on productivity at work among SWCs of ZL could be immense.

### LIMITATIONS OF STUDY

The use of cross-sectional survey to collect data might underestimate the true prevalence of NWBPs among SWCs. Only healthy workers, who survived pain or were present on the day of distribution of questionnaire, responded. Secondly, SWCs in an attempt to portray good health to avoid being sacked would rather under-report or not report pain at all. Thirdly, response on pain could be exaggerated as evidence for hard work. Bias in recall could also over or underestimate overall prevalence values of NWBP among SWCs of ZL.

### CONCLUSION/RECOMMENDATION

Neck, wrist and back pain affect all age groups, and often cause frequent disabilities and handicaps, especially among SWCs. Zoom Lion and other solid waste collection companies need to conduct periodic health checks of their staff to determine the degree of NWBPs experienced by their workers. This is due to the continuous strenuous activities they perform involve pulling, pushing, lifting and carrying of heavy objects as well as bending to pick items or to sweep the ground for long hours. The appropriate health and medical interventions should be provided to the workers, as part of their collective bargaining agreement to relieve the workers of the economic burden of occupational risks. To reduce the cost of such occupational injuries, Zoom Lion should explore the possibility of purchasing insurance coverage under the Workmen's Compensation Law of 1987.

In future studies, we would aim to use of clear cut biological and clinical diagnosis of NWBPs, (such as rheumatoid arthritis, osteoarthritis, osteoporosis, malformations, injuries, infections or tumours). Again, the use of functional assessment to measure reduced function of SWCs with time in a cohort study would give a clearer indication of prevalence of NWBP among SWCs after joining ZL. Also, it will be useful to assess psychosocial problems resulting from coping with or managing pain among SWCs of ZL.

### CONFLICT OF INTEREST

The author(s) confirm that this article content has no conflicts of interest.

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