

ORIGINAL ARTICLE

Assessment of health risk perception and hygiene practice among waste collectors at selected local council

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Abstract:

A study on health risk perceptions among household waste collectors of municipal council was conducted to assess their perceptions on environmental, health and safety, to identify the symptoms that workers experienced and to identify the association of health symptoms with working environment. A survey questionnaire which specific to the environmental, health and safety components perception and health symptoms experienced was used in this study. The target population of this study were household waste collectors working in municipal council (n=100). The results revealed that the workers was satisfied with their working environment while the highest unsatisfactory perception was on exposure to unpleasant odour. As for hygiene practices, washing hand with antiseptic indicated significant association for cough, sore throat, nausea and boils. Then, there was association between health symptoms and eating at workplace for phlegm, sore throat, dizziness, nausea, vomiting, abdominal pain, stye and cellulitis. Overall findings of the study suggest that generally the household waste collectors had a positive and satisfactory response towards their working environment.

Keywords: Health risk, hygiene, local council, waste collector

1. INTRODUCTION

Solid waste generation has been an environmental concerns in Malaysia and with the expansion of human population, it is expected to increase. Municipal solid waste is noted to be the main waste generated in Malaysia. It is projected the composition of solid waste in Malaysia consist more of biodegradable waste compared to non-biodegradable waste (include glass, paper, plastic and metals) [1]. The biodegradable waste is putrescible and organic in nature and they are commonly generated from handling, preparation and consumption of food. With the high capacity of waste generation, household waste collector has become an important role in managing solid waste. Waste collection process is the only activity where the population have direct encounter with the household waste collectors whom act as the 'representatives' from the municipal or district council [2]. Municipal solid waste in Malaysia is collected manually which requires repeated physical activities such as pulling and pushing of heavy household container to the roadside upon collection. Workers are also exposed to available insects and scavenger animals in storage point. Learning the nature of work for household waste collectors' i.e. direct contact with waste, it is inevitable they are vulnerable to biological and chemical health hazards. Most common

diseases include gastrointestinal disease, skin infection and respiratory symptoms. Perez [3] stated that, eye injuries, musculoskeletal illness, and cuts or abrasions are the symptoms that usually reported among waste collectors. Studies have proven that waste collectors workers are likely to risk infectious diseases. The incidence of work-related pulmonary, gastrointestinal, and skin problems may be greater in waste collectors than in the general work force [4]. With the increasing number of solid waste generation, it is imperative to allocate more household waste collectors to cope with the adeed workload.

Activities such as handling and managing of dry and biodegradable waste impart a potential development of pathogenic microorganisms in leachate [5]. Meanwhile, volatile organic compounds were generated from microbial activities during the aerobic or anaerobic decomposition processes[6]. Hansen [7] specified that household waste collectors are at risk of microorganisms exposure and it is strongly related to these factors including household utensils or equipment, type of vehicles used for collection and work organization. High volume of leachate contributes to the occurrence of aerosolized microorganism and splashing which affect the health household waste collectors. Waste worker are less protected during waste collection. Neither

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pre-employment nor periodical medical checkups are inaccessible to this group of workers. Gladding [8] has reported the lack of study case when it comes to environmental, safety and health components at the work place among household waste collectors. Hence to fill the gap, the current study seeks to identify the health risk perception among household waste collectors dedicated for municipal and/or district council in Malaysia.

2. MATERIALS AND METHODS

2.1 Study Population

A total of one hundred and fifty (n=150) household waste collectors were selected from three municipal council in Perak and Penang for this study. The respondents' inclusive criteria includes household waste collectors who are working in municipal council and excludes temporary workers, street cleaner, sweepers, industrial and clinical waste collectors. All respondents voluntarily agreed to be the respondents in this study, comprises males and the entire race from Asian.

2.2 Questionnaires

A 52-item structured, closed ended, self-administered questionnaires were used for the survey. The questionnaire comprises four main sections: The first part was about the demographic characteristics and the personal information, such as the age of the household waste collectors, gender, education status, duration of employment, working time and their monthly income. Second part cover on respondents view about the worker's perception on safety condition. Next is about the safety facilities which include the first aid and fire extinguisher provided in the compactors truck and either the workers know how to use the fire extinguisher in case of emergency. Lastly is about amenities (which cover the drinking water supply, cleanliness of rest room and toilet facilities) provided at the workplace area. The third part was to inquire on the respondent's health status, in particular the symptoms they experienced while working. Respondents were required to answer 'yes' or 'no'. In addition, the respondents were also asked on their personal hygiene. Part 4 covers the respondents perception on the environmental condition at their working place. They were required to state if they were satisfied or not satisfied with their working condition in the workplace. At the last section of part D, the respondents have to answer questions related to the cause of the injury at certain part of the body. It includes *whether* they have been experiencing any injuries during working, *fell* while pulling or pushing the waste bin, suffered any falls from up high, hit by any hard or sharp object and lifted more than his capacity and the number of waste bins that *they* handled in a day. The questionnaire had been pre-tested among 20 individuals (n=20) for validation and verification before it is being distributed for the real data collection. The scale of all variables (52 items) included in this set of questionnaire has acceptable internal consistency, with Cronbach alpha coefficient reported of 0.823.

2.3 Data Analysis

The findings were statistically interpreted by using Statistical Package for Social Sciences (SPSS) version 18 and Microsoft Excel 2010. The descriptive analysis was applied on the demographic information of the respondents such as the age of the household waste collectors, gender, level of education, duration of employment, working time and monthly income of the household waste collectors.

3. RESULTS AND DISCUSSION

3.1 Household Waste Collector's Demographic Information

A total of 150 respondents (n=150) were involved in this research. Table 1 showed the frequency and percentage of demographic information such as age, education status, duration of employment, working time and monthly income. The age of the participants ranged from 21-60 years. The duration of employment was less than 10 years (51%) and more than 10 years (49%). The result shows most of the respondents have secondary education (57%) and working for 9 hours daily (62%).

Table 1: Stratification of respondents by age, education status, duration of employment, working time and monthly income

Variables		Frequency, n	%
Age (years)	21-30	44	29
	31-40	40	27
	41-50	55	37
	51-60	11	7
Education status	Primary education	65	43
	Secondary Education	85	57
	Tertiary Education	0	0
	Not Educated	0	0
	Educated	0	0
Duration of employment	<10 years	77	51
	>10 years	73	49
Working time	9 hours	93	62
	8 hours	57	38
Monthly (RM)	901-1100	77	51
	1101-1300	66	44
	1301-2000	1	1
	More than 2000	6	4
	2000	0	0

3.2 Assessing household waste collectors’ perception on environmental quality and the overall environment

The descriptive analysis on the respondents’ perception on the environmental quality on their working place where they were required to state their satisfaction based on three criteria: (1) “dissatisfied”, (2) “neutral” or (3) “satisfied”. The perceptions of the overall environment of the working condition showed a positive feedback with (51%) of the satisfaction. Only (8%) of the respondents were not satisfied with the overall environment while the other respondents (41%) gave neutral feedback. A summary of result were shown in Figure 1.

Exposures to unpleasant odour perceived to be the most problematic with the highest unsatisfactory vote (22%). It is observed that high volume of leachate contribute to the unpleasant odour. Almost 60% of organic waste contributed to the unpleasant odour comes from the decomposition process which normally occurs as early as waste that are stored for 2 day [9]. Some of the workers are noted to refuse wearing face mask which have been provided by their municipal council. The results also revealed that the workers perceived highest satisfaction on the internal noise of the compactor with (53%) and exposure to dust as the criteria with lowest vote on dissatisfaction (41%). The findings for dissatisfaction on noise (noise level from inside the compactor lorry = 6%); followed by temperature (working in conditions with high temperature = 16%); for air quality (air quality around the workplace = 19%); dust (exposure to dust during the waste collection = 13%), odour (exposure to unpleasant odour = 22%) and overall dissatisfaction = 8%. The perceptions of overall environment quality performance were generally favourable. Workers are mostly satisfied with their surrounding environment at their working place. This might be influenced by the knowledge of the workers on the specific components mentioned or asked in the questionnaire. The workers (driver) perceived highest satisfaction on the internal noise of compactor. As for exposure to dust during working, most of the workers are satisfied with this condition and they are adapted with the surrounding environment. Besides that, some of the municipal council have provided face masks for their workers. Hence, exposure to dust during waste collection activity can be reduced.

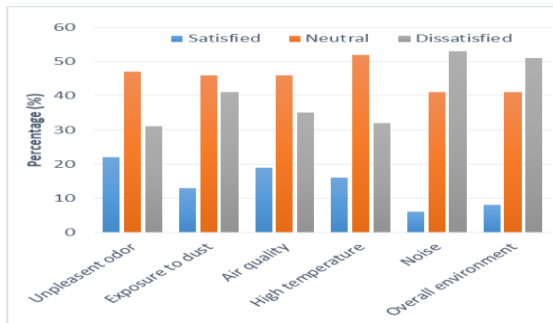


Figure 1: The respondents’ perception on the environmental quality on their working place.

3.3 Self-reported symptoms experienced by the household waste collectors

This section reports on the symptoms experienced by the household waste collectors which includes respiratory symptoms (e.g cough, phlegm, dyspnoea, sore throat), gastrointestinal symptoms (e.g bloody diarrhoea, nausea, vomiting, abdominal pain), skin infection (e.g stye, boils, skin abscesses, cellulitis) and musculoskeletal symptoms (e.g shoulder pain, low back pain, elbow or wrist pain and muscular pain). The survey revealed that cough was the most widely-reported symptom that is perceived to be experienced while working to collect the household waste. The (88%) of respondents have chosen ‘yes’ while (12%) of respondents have chosen ‘no’. Apart from cough, Table 2 showed the percentages of other reported symptoms among household waste collectors including respiratory symptoms (e.g cough, phlegm, dyspnoea, sore throat), gastrointestinal symptoms (e.g bloody diarrhoea, nausea, vomiting, abdominal pain), skin infection (e.g stye, boils, skin abscesses, cellulitis) and musculoskeletal symptoms (e.g shoulder pain, low back pain, elbow or wrist pain and muscular pain). Cellulitis appears to be the least prevalent, with only 43%.

Table 2: Results of the questionnaire survey on the occurrence symptoms and perceived relationship to the working environment

Symptoms	Reports of Symptoms	
	Yes (%)	No (%)
Cough	88	12
Phlegm	84	16
Dyspnoea	75	25
Sore throat	44	56
Bloody Diarrhoea	69	31
Nausea	75	25
Vomiting	81	19
Abdominal Pain	57	43
Stye	62	38
Boils	71	29
Skin abscesses	51	49
Cellulitis	43	57
Shoulder pain	73	27
Low back pain	81	19
Elbow or wrist pain	82	18
Muscular pain	86	14

It is noted from Table 2, cough was the common health symptom experienced by them i.e. household waste collectors. The respondents suspected that cough is easily affected due to dust inhalation during waste collection. Vimercati [10] noted that respiratory symptoms include coughing, phlegm, and chronic bronchitis are the common symptoms experienced by household waste collectors. Meanwhile, exposure to diesel fumes may also contribute to respiratory symptoms. This is due to dusty roadways and hazardous fumes from public transportation. Second

common symptoms in is ergonomic related problems such as lower back pain, elbow or wrist pain and muscular pain. This pain is generally caused by heavy weight lifting activity while involved in pushing, carrying and pulling of too heavy waste [11]. The results shows the percentage of muscular pain (86%) is highest as compared to elbow and wrist pain (82%) and low back pain (81%). Due to the nature of work activity that includes repetitive and forceful movements, ergonomic issues are inevitable. It is also noted that the pain are influenced by secondary factor such as controlling heavy machineries i.e. compactor tract which requires strength. According to Thayyil Jayakrishnan [12], incidents of occupational accidents in household collectors workers are noted to be greater as compared to the general workers force/

3.4 Associating Health symptoms with the duration of employment

Table 3: Health symptoms experienced based on the duration of employment.

Variables		Duration of employment (n=150)		X ² (df) ^a	p-value
		<10 years (n=77)	>10 years (n=73)		
		n (%)	n (%)		
Cough	Yes	68 (88.3)	64 (87.7)	0.015 (1)	0.904
	No	9 (11.7)	9 (12.3)		
Phlegm	Yes	65 (84.4)	61 (83.6)	0.020 (1)	0.887
	No	12 (15.6)	12 (16.4)		
Sore throat	Yes	56 (72.7)	56 (76.7)	0.315 (1)	0.708
	No	21 (27.3)	17 (23.3)		
Dizziness	Yes	34 (44.2)	32 (43.8)	0.002 (1)	0.968
	No	43 (55.8)	41 (56.2)		
Bloody diarrhoea	Yes	53 (68.8)	50 (68.5)	0.002 (1)	0.964
	No	24 (31.2)	23 (31.5)		
Nausea	Yes	57 (74.0)	56 (76.7)	0.146 (1)	0.703
	No	20 (26.0)	17 (23.3)		
Vomiting	Yes	63 (81.8)	58 (79.5)	0.135 (1)	0.714
	No	14 (18.2)	15 (20.5)		
Abdominal Pain	Yes	45 (58.4)	40 (54.8)	0.203 (1)	0.652
	No	32 (41.6)	33 (45.2)		
Stye	Yes	48 (62.3)	45 (61.6)	0.008 (1)	0.930
	No	29 (37.7)	28 (38.4)		
Boils	Yes	55 (71.4)	51 (69.9)	0.044 (1)	0.833
	No	22 (28.6)	22 (30.1)		
Skin abscesses	Yes	38 (49.4)	38 (52.1)	0.110 (1)	0.741
	No	39 (50.6)	35 (47.9)		
Cellulitis	Yes	29 (37.7)	36 (49.3)	2.072 (1)	0.150
	No	48 (62.3)	37 (50.7)		
Shoulder Pain	Yes	54 (70.1)	55 (75.3)	0.513 (1)	0.474
	No	23 (29.9)	18 (24.7)		
Low back Pain	Yes	65 (84.4)	56 (76.7)	1.426 (1)	0.232
	No	12 (15.6)	17 (23.3)		
Elbow/wrist Pain	Yes	65 (84.4)	58 (79.5)	0.625 (1)	0.429
	No	12 (15.6)	15 (20.5)		
Muscular pain	Yes	65 (84.4)	64 (87.7)	0.330 (1)	0.566
	No	12 (15.6)	9 (12.3)		

^a Pearson Chi-square test

In order to understand the correlation between health symptoms versus duration of employment, the data collected are compared to SPSS Program (see Table 3). From the result, it is noted that there are no significant association

between duration of employment with health symptoms experienced by household waste collectors (cough, phlegm, sore throat, dizziness, bloody diarrhoea, nausea, vomiting, abdominal pain, stye, boils, skin abscesses, cellulitis, shoulder pain, low back pain, elbow or wrist pain and muscular pain) with $p > 0.05$. Poulsen [4] have asserted the number of injuries reduced with the increased in seniority. The analysis however showed a different results on the perception of usage for personal protective equipment (PPE), hand washing with antiseptic, wash work clothes at home and eating at workplace where none of the health symptoms were found to have significant association ($p > 0.05$) with the duration of employment. The principal findings on the analysis can be summarised as health symptoms are not correlated with working duration (more or less than ten years).

3.4 Personal Protecting Equipment (PPE) practice among waste collector.

Table 4: Health symptoms experienced based on the use of PPE

Variables		Use of PPE (n=150)		X ² (df) ^a	p-value
		Yes	No		
Cough	Yes	90 (85.7)	42 (93.3)	1.732 (1)	0.188
	No	15 (14.3)	3 (6.7)		
Phlegm	Yes	85 (81.0)	41 (91.1)	2.419 (1)	0.120
	No	20 (19.0)	4 (8.9)		
Sore throat	Yes	72 (68.6)	40 (88.9)	6.874 (1)	0.009
	No	33 (31.4)	5 (11.1)		
Dizziness	Yes	44 (41.9)	22 (48.9)	0.624 (1)	0.430
	No	61 (58.1)	23 (51.1)		
Bloody diarrhoea	Yes	67 (63.8)	36 (80.0)	3.838 (1)	0.050
	No	38 (36.2)	9 (20.0)		
Nausea	Yes	73 (69.5)	40 (88.9)	6.357 (1)	0.012
	No	32 (30.5)	5 (11.1)		
Vomiting	Yes	81 (77.1)	40 (88.9)	2.787 (1)	0.095
	No	24 (22.9)	5 (11.1)		
Abdominal Pain	Yes	55 (52.4)	30 (66.7)	2.618 (1)	0.106
	No	50 (47.6)	15 (33.3)		
Stye	Yes	60 (57.1)	33 (73.3)	3.505 (1)	0.061
	No	45 (42.9)	12 (26.7)		
Boils	Yes	65 (61.9)	41 (91.1)	12.983 (1)	0.001
	No	40 (38.1)	4 (8.9)		
Skin abscesses	Yes	45 (42.9)	31 (68.9)	8.540 (1)	0.003
	No	60 (57.1)	14 (31.1)		
Cellulitis	Yes	43 (41.0)	22 (48.9)	0.808 (1)	0.369
	No	62 (59.0)	23 (51.1)		
Shoulder pain	Yes	73 (69.5)	36 (80.0)	1.741 (1)	0.187
	No	32 (30.5)	9 (20.0)		
Low back pain	Yes	83 (79.0)	38 (84.4)	0.588 (1)	0.443
	No	22 (21.0)	7 (15.6)		
Elbow/wrist pain	Yes	79 (75.2)	44 (97.8)	10.842 (1)	0.001
	No	26 (24.8)	1 (2.2)		
Muscular pain	Yes	89 (84.8)	40 (88.9)	0.446 (1)	0.504
	No	16 (15.2)	5 (11.1)		

Practice of PPE is important among waste collectors as their work activities associate with handling of potential biological, chemical and physical hazard. The common items of PPE for the workers include face mask, safety boot, overall (long sleeve and pants) and glove. Pearson chi-square test indicated significant association between the use of PPE six identified health symptoms i.e. sore throat ($p=0.009$), bloody diarrhoea ($p=0.050$), nausea ($p=0.012$), boils ($p=0.001$), skin abscesses ($p=0.003$) and elbow or wrist pain ($p=0.001$). Other health symptoms as listed in Table 4 below are identified as not significant.

Results of Pearson Chi Square Test have clearly demonstrated only six health symptoms to have significant association with the usage of personal protective equipment (PPE) ($p<0.05$) (see also Table 4). It is aware that most municipal council that involved in this study has provided the necessary PPE including gloves, rubber boots and face masks to their employee. Nevertheless, it is noted that some of the workers did not comply with this requirement during household waste collection. Thus, direct contact with the waste material and contagious trash are inevitable. Bogale [13], has expressed the importance of PPE to waste collectors which enable to protect themselves from direct contact with waste material and hazardous trash. Failure in PPE usage will enable the pathogenic microorganisms to spread and stick at the household waste collectors hand surface. In addition, *Escherichia coli* and *Staphylococcus aureus* also can spread through inhalation. A similar finding has been advocated by Athanasiou [14] whereafter the household waste collectors are also potentially affected by upper airway inflammation due to exposure to bioaerosols, dust, and exhaust fumes. Hence, usage of PPE are urgently required to reduce health symptoms among household waste collectors.

3.5 Hygiene practicing among waste collector

3.5.1 Hand washing

Result of Chi Square Test indicated there is significant association between hand washing with antiseptic as well as other health symptoms i.e. cough ($p=0.027$), sore throat ($p=0.011$), nausea ($p=0.046$) and boils ($p=0.012$). No significant association between wash hand with antiseptic and other health symptoms with $p>0.05$. Table 5.0 depicts there is a significant association between household waste collectors' health symptoms and hand washing practice using antiseptic. The health symptoms that are recognized to have significant symptoms include cough, sore throat and nausea and boils. The key essentials to minimize transmission of microorganism through personal hygiene awareness. The household waste collectors must at all times practice hand washing whenever they have direct contact with the waste material. In addition, this hand washing practice will not only contribute to a healthier waste collectors but as a prevention towards pathogenic microorganism transmission to other party such as family and the public [15-16]. A similar practice i.e. hand washing if done right will also control bioaerosol contamination

which occurs during inhalation. Table 5.0 showed both cough and sore throat have significant association ($p<0.05$). Büniger [16] have asserted that handling and collection of waste contribute to aerosolized microorganism. Subsequently, the household waste collectors are at higher risk of bioaerosol exposure generated from the waste. Inhaling contaminated air will risk the respiratory system to be susceptible to infection. Furthermore, pathogenic microorganism are easily spread via skin contact during waste collection. To avoid any infection with these microorganism, hand washing with antiseptic is vital to eliminate microorganism entering the body.

Table 5: Health symptoms experienced based on hand washing with antiseptic

Variables		Wash hand with antiseptic (n=150)		X ² (df) ^a	p-value
		Yes (%)	No (%)		
Cough	Yes	103 (85.1)	29 (100.0)	4.902 (1)	0.027
	No	18 (14.9)	0 (0.0)		
Phlegm	Yes	99 (81.8)	27 (93.1)	2.217 (1)	0.137
	No	22 (18.2)	2 (6.9)		
Sore throat	Yes	85 (70.2)	27 (93.1)	6.460 (1)	0.011
	No	36 (29.8)	2 (6.9)		
Dizziness	Yes	51 (42.1)	15 (51.7)	0.870 (1)	0.351
	No	70 (57.9)	14 (48.3)		
Bloody diarrhoea	Yes	80 (66.1)	23 (79.3)	1.893 (1)	0.169
	No	41 (33.9)	6 (20.7)		
Nausea	Yes	87 (71.9)	26 (89.7)	3.968 (1)	0.046
	No	34 (28.1)	3 (10.3)		
Vomiting	Yes	95 (78.5)	26 (89.7)	1.862 (1)	0.172
	No	26 (21.5)	3 (10.3)		
Adominal pain	Yes	67 (55.4)	18 (62.1)	0.427 (1)	0.513
	No	54 (44.6)	11 (37.9)		
Stye	Yes	71 (58.7)	22 (75.9)	2.932 (1)	0.087
	No	50 (41.3)	7 (24.1)		
Boils	Yes	80 (66.1)	26 (89.7)	6.253 (1)	0.012
	No	41 (33.9)	3 (10.3)		
Skin abscesses	Yes	60 (49.6)	16 (55.2)	0.292 (1)	0.589
	No	61 (50.4)	13 (44.8)		
Cellulitis	Yes	51 (42.1)	14 (48.3)	0.358 (1)	0.550
	No	70 (57.9)	85 (56.7)		
Shoulder pain	Yes	85 (70.2)	24 (82.5)	1.843 (1)	0.175
	No	36 (29.8)	5 (17.2)		
Low back pain	Yes	96 (79.3)	25 (80.7)	0.708 (1)	0.400
	No	25 (20.7)	4 (13.8)		
Elbow/wrist pain	Yes	95 (78.5)	28 (96.6)	5.158 (1)	0.203
	No	26 (21.5)	1 (3.4)		
Muscular pain	Yes	101 (83.5)	28 (86.0)	3.324 (1)	0.068
	No	20 (16.5)	1 (3.4)		

^a Pearson Chi-square test

4. CONCLUSION

It is imperative to conclude that majority of household waste collector experiences various health symptoms such as cough, phlegm, vomiting, low back pain, elbow or wrist pain and muscular pain. From the analysis, there is correlation between health symptoms for sore throat, bloody diarrhoea, nausea, boils, skin abscesses and elbow or wrist pain with the use of PPE; cough, sore throat, nausea and boils with washing hand with antiseptic and sore throat, dizziness, nausea, vomiting and stye with eating at workplace. However, no evidence shows the correlation between health symptoms with duration of employment. The analysis also indicates that the household waste collectors are satisfied with their surrounding working environment whilst exposure to unpleasant odour with the highest unsatisfactory level. Thus, practicing and the use of PPE in proper manner as one of the requirement for the waste collector in order to protect and prevent them from injuries and health problem in the future.

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