The Open Nursing Journal

Content list available at: https://opennursingjournal.com

RESEARCH ARTICLE

Health and Work Conditions of Garbage Collectors: A Cross-Sectional Study

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Abstract:

Background:

Waste is considered everything that has lost utility after being use; therefore, it no longer has value to a person or a community. After objects have lost their value, they need to be removed from homes, workplaces, stores, markets, *etc*. Hence, waste collectors remove the garbage left on the streets and allocate it to appropriate places. From a historical perspective, waste disposal is closely related to consumption and values of cleanliness, purity, and organization of the current society.

Objective:

To analyze health and work conditions of waste collectors and the association of these parameters with the length of service.

Methods:

Cross-sectional study. The sample consisted of 112 participants. Questionnaires addressing sociodemographic, work, and health conditions were used. The analysis of the association between health conditions and length of service was performed using Fisher's exact test with a significance level of $p < 0.05$.

Results:

There was a statistically significant difference between the length of service (more than two years) and a higher occurrence of injuries such as sharp injuries ($p < 0.001$), headache ($p = 0.036$), back pain ($p = 0.008$) and work leave ($p = 0.021$).

Conclusion:

The working health conditions of waste collectors described in this study are associated with back pain, headache, and work and sick leave.

Keywords: Waste pickers, Accidents at work, Workers' health, Wrong waste management, Technological advancement, Brazil.

Article History	Received: August 17, 2020	Revised: December 15, 2020	Accepted: December 18, 2020

1. INTRODUCTION

Brazil is considered the fifth country with the highest production of garbage [1], where each inhabitant produces almost one kilogram of waste per day [2].Waste is considered everything that has lost utility after being use; therefore, it no longer has value to a person or a community. After losing its value, waste must be collected and properly allocated; a role that is performed by waste collectors [3].These professionals handle garbage manually, going at households to gather the disposed material and allocating it in the compactor truck [4].

Wrong waste management is a significant factor in preventing its volume from decreasing. Communities dump their waste in landfills and open areas without proper management and handling. Such attitudes cause an enormous potential for environmental contamination (in the soil, water, air, springs, and water tables), due to the residue produced by

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the waste deterioration [5, 6]. Technological advances provided mechanisms that can mitigate the harmful effects of waste accumulation in inappropriate places through recycling, incineration, sterilization, and disinfection [5 - 7].

Considering this context, professionals responsible for handling, transportation, and final disposal of solid residues are in a vulnerable condition as they are subjected to many risks while performing their work. Mainly, these risks are a result of work accidents caused by the lack of training, inadequate working conditions, and the scarce technology used in the work process [8].

In many developing countries, waste collection occurs in precarious conditions. A study carried out in Brazil [9] with household waste collectors identified problems with the technology used in the waste collection process. The old compactor trucks exhaled toxic smoke and made a lot of noise, which could cause headaches. Furthermore, the working tool of waste collectors is their own body, and they have to deal with poor garbage disposal and heavy weight of the packaging. Also, as garbage collection is frequently carried out at high speed, there are greater risks of accidents at work, possibly which can result in acute injuries and cause muscle or spinal cord problems [9, 10].

Other conditions observed include disposal of hospital waste in sites where there should only be household waste, the structure of the place, strong odors that can undermine health, presence of insects in landfills and dumps, and smoke resulting from the irregular burning of the waste. Such pollution causes serious respiratory problems, compromising the quality of life [5 - 9].

These working conditions to which the garbage collectors are exposed pose a potential risk to their health. This problematic situation justifies the interest that Nursing and other health professions should give to these workers who grow numerically every day and integrate the clientele of health services. A nurse, who gives in his ethical commitment to the health and quality of life of the community, must extend his attention and care to the vulnerable worker, in order to contribute to the construction of an effective and comprehensive health care network. Modifying structures, working conditions, and behaviors that increase occupational risks are possible only when these workers are fully aware of the significant aspects involved, challenges, and risks faced by them [5 - 10].

Workers health is one of the focuses of the sustainable development goals (SDG). SDG 3 establishes the goal of promoting social well-being to workers and reduces occupational risk. This study brings this goal into focus,aiming at analyzing the health and working conditions of waste collectors and the association of these factors with the length of service.

2. METHODS

This research is a cross-sectional study carried out in an urban waste disposal/managment in the city of Teresina, Piauí, located in the Northeast Region of Brazil.

Participants in this study were waste collectors in urban areas. At the time of the study, 192 workers performed the work of household waste collection. The sample size was calculated considering $\alpha = 0.05$ (5% chance of a type I error), $1-\beta = 0.90$ (% of the sample power), and the total number of workers (n = 192). The formula n = Z2 x Px Q x N/e2 x (N-1) + Z2 x P x Q was used; in which Z = Confidence level (90%); P = Amount of hits expected (%); Q = Amount of Error expected (%); N = Total population; e = Accuracy level (%). The sample consisted of a minimum number of 112 participants. The participants were included by means of a simple drawing of lots, divided into morning and afternoon shifts.

The researcher approached the collectors before the work day had started to schedule the data collection, according to the availability of the respondent. Data collection took place inside the company, in a reserved room, between April and November 2019. Participants were eligible if they were among the selected workers, 18 years old or over, and have been working as a waste collector for more than six months. The exclusion criteria were: being on vacation, on leave,or absent from work for any other reason.

The instrument used for data collection consisted of a structured questionnaire, elaborated by the researchers, containing questions about sociodemographic data and work, and health conditions of the workers.

The first part of the questionnaire comprised the sociodemographic data, namely: birth date, age, place of residence, marital status, number of people in the household (including respondent), education, monthly family income (calculated by dividing the family income by the minimum wage in force in Brazil of US$190.82).

The second part aimed at assessing the occupational risks to which the participants were exposed and their health conditions. It included length of service, average of neighborhoods covered daily, use of Personal Protective Equipment (PPE) and discomfort caused by its use, provision of PPE by the company, periodic health exams, health insurance, training, frequency of the main symptoms caused by exposure to waste(headache, back pain, and sleep disturbance), occupational accidents (puncture or cut), the measures taken after the accident, health habits, and health conditions (alcoholism, smoking, use of illicit drugs, frequency of visits to health care service, and sick leaves).

The researchers interviewed the participants, and recorded the answers on the questionnaire. Previously, a pre-test of the questionnaire was carried out to find possible inconsistencies or difficulties in understanding the questions and guidelines. No inadequacies were found in the questionnaire developed for this research.

The outcome (dependent) variable was the length of service, which was divided into two categories: less than two years and more than two years of service. This period was defined according to recent studies [1 - 3, 6], which followed the same methodology and pointed out that this is the period needed for workers to know the service they have to perform in and experience challenging situations related to it. The explanatory variables were the waste collectors' health

conditions which were organized as follows: puncture or cut (never, 1 or 2 times, more than 3 times); headache (never, 2 to 5 times a week), back pain (never, 2 to 5 times a week, daily), change in sleep (never, 2 to 5 times a week, daily), alcohol use (does not drink alcohol, rarely, weekly, daily), smoking (yes or no), use of illicit drugs (yes or no), absence from work due to illness (yes or no), pre-existing disease (yes or no), visits to health care services (never, 2 to 5 times a year, >5 times per year).

Data were entered into a Microsoft Office Excel 2016 spreadsheet and processed using the statistical package Stata® version 12. For analyzing the association between the dependent variable and the factors considered in the study (covariables), we used Fisher's exact test.We adopted it as relevant when the p-value was less than or equal to 0.05.

The research was carried out after the approval by the Research Ethics Committee of Uninovafapi University Center, under Opinion 2,999,619, being accepted on October 10, 2018. The fundamental ethical and scientific requirements for research involving human beings were met, according to Resolution 466/12 of the Brazilian National Health Council. All the participants signed an Informed Consent Form (ICF). There were no refusals to participate in the study.

3. RESULTS

One hundred and twelve (112) waste collectors participated in the study. Of these, 66.1% were between 18 and 29 years old; 52.7% were single; 65.2% lived at home with 3 to 5 other people, including the interviewee; 39.3% had completed elementary school, and 89.3% received a monthly family income of up to 2 minimum wages. Table **1** describes these sociodemographic data.

Table 1. Sociodemographic characteristics of waste collectors. Teresina, Brazil, 2019 (n = 112).

Variables	n	%
Age (years)		
18 – 29	74	66.1
30 – 39	31	27.7
≥ 40	7	6.2
Marital status		
Single	59	52.7
Domestic partnsership	30	26.8
Married	23	20.5
Number of people in the household		
1 to 2	25	22.3
3 to 5	73	65.2
> 5	14	12.5
Residence zone		
South	70	62.5
North	13	11.6
East	17	15.2
Southeast	9	8.0
Timon	3	2.7
Education		
Incomplete elementary education	23	20.5
Complete elementary education	21	18.8
Incomplete high school	27	24.1
Complete high school	41	36.6
Monthly family income (in numbers of minimum wages - US$ 190.82)		
1 to 2	100	89.3
3 to 4	12	10.7

#1 individual had complete higher education.

Table 2. Working conditions of waste collectors. Teresina, Brazil, 2019 (n = 112).

Variables	n	%
Reason for practicing the profession		
Contributing to family income	91	81.2
Dedicating to urban cleaning	21	18.8
Number of neighborhoods covered		

(Table 2) contd.....

Variables	n	%
1 to 2	31	27.7
3 to 4	25	22.3
> 5	56	50.0
Use of face mask		
Yes	4	3.6
No	108	96.4
Discomfort caused by usingPPE		
Yes	10	8.9
No	102	91.1
Measurestakenin case of accidents with sharp objects		
Sought the health service immediately	58	82.9
Sought the health service at the end of the day	4	5.7
Sought the health service in the day off	1	1.4
Did not seek health care	7	10.0
Length of service		
<2 years	63	56.25
≥ 2 years	49	43.75

Table **2** describes the working conditions of the waste collectors. We observed that 81.2% worked in the profession to contribute to family income; 50% covered more than five neighborhoods daily; 96.4% did not use a face mask; 91.1% did not feel discomfort in using PPE; 82.9% sought health care after accidents with sharp objects, and 56.25% have worked at the company for less than two years.

Table **3** shows that there was a statistically significant association between the health conditions of the workers and the length of service atthe company. The health conditions that were associated were: getting punctured or cut (p <0.001), headache (p = 0.036), and back pain (p = 0.008).Employees working for more 2 years in the service presented more unfavorable conditions. Regarding sick leaves, 36.7% of employees having more than two years in the service have taken sick leaves, while only 17.5% of those working in the company for less than two years were absent for the same reason (p = 0.018) (Table **3**).

Table 3. Association between health conditions of waste collectors and the length of service. Teresina, Brazil, 2019 (n = 112).

Variables	Total		<2 years		≥2 years		p-value*
	N°	%	N°	%	N°	%	
Getting punctured or cut							
Never	41	36.6	33	52.4	8	16.3	<0.001
1 or 2 times	55	49.1	27	42.9	28	57.1	
More than 3 times	16	14.3	3	4.8	13	26.5	
Headache							
Never	82	73.2	51	81.0	31	63.3	0.036
2 to 5 times a week	30	26.8	12	19.0	18	36.7	
Back pain							
Never	51	45.5	34	54.0	17	34.7	0.008
2 to 5 times a week	44	39.3	25	39.7	19	38.8	
Daily	17	15.2	4	6.3	13	26.5	
Changes in sleep							
Never	89	79.5	51	81.0	38	77.5	0.448
2 to 5 times a week	16	14.3	7	11.1	9	18.4	
Daily	7	6.2	5	7.9	2	4.1	
Use of alcohol							
Does not drink alcohol	32	28.6	14	22.2	18	36.7	0.189
Rarely	24	21.4	15	23.8	9	18.4	
Weekly	55	49.1	34	54.0	21	42.9	
Daily	1	0.9	-	-	1	2.0	
Smoking							
Yes	22	19.6	12	19.0	10	20.4	0.521
No	90	80.4	51	81.0	39	79.6	

(Table 3) contd.....

Variables	Total		<2 years		≥2 years		p-value*
	N°	%	N°	%	N°	%	
Use of illicit drugs							
Yes	9	8.0	6	9.5	3	6.1	0.385
No	103	92.0	57	90.5	46	93.9	
Leaving work because of illness							
Yes	29	25.9	11	17.5	18	36.7	0.018
No	83	74.1	52	82.5	31	63.3	
Pre-existing diseases							
Yes	3	2.7	1	1.6	2	4.1	0.406
No	109	97.3	62	98.4	47	95.9	
Seeking health services							
Never	17	15.2	11	17.4	6	12.2	0.516
2 to 5 times a year	80	71.4	42	66.7	38	77.6	
>5 times per year	15	13.3	10	15.9	5	10.2	

*Fisher's exacttest

4. DISCUSSION

The study described the sociodemographic profile and health and work conditions of waste collectors in a Brazilian capital, focusing on the association between the length of service and the conditions that affect these workers.

Although not frequent in the health complaints reported by collectors, headache is an occupational disease that can be triggered by the strong smell of the garbage. However, this health issue can be minimized when contrasted to other more complex problems of this work [6 - 13]. Nevertheless, headaches are related to garbage odors, exposure to the sun, sudden climatic variation, and even the large amount of carbon dioxide inhaled by the workers. Besides headaches, such factors can also cause nausea and vomiting [5 - 12].

Back pain, on the other hand, was reported by more than half of the interviewees. This problem may be associated with ergonomics due to exhaustive physical effort or even the overloaded weight lifted by the collectors during a workday. Previous studies highlight that the pain caused by work activities can accompany the professionals throughout life, affecting not only the back, but also muscles and other joints, such as ankle, knees, and shoulders. In addition to the spine, due to frequent jumps to reach the truck, irregular pavement and sidewalks, and the long trajectories which must be covered every day [12 - 17].

When asked about accidents with sharp objects, workers informed having suffered punctures or cuts, even when using protective gloves. This finding was already reported in similar studies whose results showed a high proportion of household waste collectors suffering from these types of injuries but also reported a lack of use of PPE, making them even more vulnerable to risks of contamination [12].

Our results showed an association between accidents with sharp objects and length of service in the household waste collection. Other studies also found the same evidence, in which exposure to risks compromised workers' health, as most diseases are related to poor working conditions and inadequate garbage packaging [6]. It is worth mentioning that such injuries can be caused through direct contact of the lower and upper limbs with sharp objects that are inside the bags, due to the low protection that the gloves offer to workers or even the non-use of PPE [5 - 10]. It is essential that these professionals receive free PPE and training about its proper use and cleaning, as well about the prophylaxis of preventable diseases [4 - 8].

Another study carried out with waste collectors showed that biological risks are posed by syringes with uncapped needles discarded in household waste, resulting in injuries which are gateways to biological agents present in the garbage, such as bacteria, fungi, and viruses [12 - 14]. For minimizing these accidents,the population must be aware of proper packaging and disposal of waste [12 - 18].

The health risks faced by waste collectors are caused by various factors, from the amount of waste collected from different types of residues. Therefore, it is of utmost importance that waste collectors use protection equipment during work, and the population adopts better measures, such as properly disposing the waste, separating items, and packing them properly [14]. Such measures could greatly reduce occupational accidents.

Other studies reveal significant findings regarding factors that can compromise the health of waste collectors, such as sudden temperature fluctuations, the noises and vibration generated by the truck compactor, the movements of cars and the truck during traffic, andworkers' rapid movements without correct ergonomics when lowering and lifting heavy bags and boxes [3 - 6].

The current study showed that the majority of the victims of accidents with sharp objects sought the health service immediately, which is the recommended attitude. However, a small group of the participants sought health care at the end of the day, others sought it on the day off, and some even said they did not seek health care at all. We stress the importance of quickly seeking medical services to minimize risks and injuries, and, if necessary, take prophylactic measures.

Household waste collectors have exhaustive workdays and face stressful situations that can lead to seek refuge in the abuse of alcoholic beverages or drugs [14 - 22]. Among all the participants interviewed, only one reported drinking alcoholic beverages daily, and a small groupof the participants reported using drugs. A study emphasized that some work environments

are the triggers for the use of illicit substances, as the drugs can make the workers to feel relaxed after the work routine, which is a way of seeking relief, a type of pleasure that work, and other situations do not bring [18 - 22].

Regarding the legal regulations aimed at household waste collectors, they establish that the working day should last 6 hours, according to standards set by regulatory authorities (Norma Regulamentadora 17) [17], which regulates unhealthy professions. However, our results showed a daily work routine of 8 hours, pointing out the work load.

Some studies describe an association between the number of neighborhoods covered and the workers' health condition [8]. An unavoidable consequence of occupational diseases is recurrent absences and leaves [8], which this study confirmed, as the participants who have been in this profession for longer have had more health complications (back pain, headache, and accidents with sharp objects) and consequently,needed work and sick leaves more often [18 - 25].

Other norm set by regulatory authorities that support urban waste collectors is the Norm 21, which standardized open-air work routines. However, it was last updated in 1999 [17] thus it needs to be revised and expanded to support household waste collectors.

The findings of this study are of utmost importance for nursing and health practices, as these professionals must be aware of the different situations faced by the community, they provide care. As for the health of household waste collectors, nurses have an essential role in preventing accidents with sharp objects that can cause perforations;therefore, minimizing the risks of infections [14]. They must also act resolutely in the care of work-related diseases, such as headache and musculoskeletal, and osteoarticular pain, in addition to educating the community, demonstrating the correct disposal of garbage and advising the reduction in weight of the garbage bags [8]. Nurses' participation is fundamental to reduce the risks related waste collectors face.

The current study had as limitation the fact that the researchers developed the tool of data collection; therefore, it was not validated. This point can lead to errors in measurement and difficulties in comparing our results with those of other researches. Besides, the study had a cross-sectional design, portraying the reality of a specific community in a specific city, thus not making possible generalizations about health and working conditions of waste collectors from other places.

CONCLUSION

The working conditions of waste collectors described in this study are related to the occurrence of health problems such as back pain and headaches, which can lead to more work and sick leaves. It is noteworthy that populations' lack of care in properly disposing of waste favors accidents with sharp objects. It is fundamental to develop strategic actions aimed at improving working conditions and minimizing the harmful routine of waste collectors. The EstratégiaSaúde da Família (Family Health Strategy - FHS) and the community need to work together in reducing such risks. Under this perspective, the FHS must provide health education for the population, helping them to be more conscious about the proper packaging of sharp objects, waste sorting, and reducing the weight of the garbage bags.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The research was carried out after the approval by the Research Ethics Committee of Uninovafapi University Center, Brazil under Opinion No. 2.999.619 being accepted on October 10, 2018.

HUMAN AND ANIMAL RIGHTS

The fundamental ethical and scientific requirements for research involving human beings were met, according to Resolution 466/12 of the Brazilian National Health Council.

CONSENT FOR PUBLICATION

All the participants signed an Informed Consent Form (ICF). There were no refusals to participate in the study.

STANDARD OF REPORTING

STROBE guidelines and methodologies were followed for this study.

AVAILABILITY OF DATA AND MATERIALS

Not applicable.

FUNDING

Not applicable.

CONFLICT OF INTEREST

Not applicable.

ACKNOWLEDGEMENTS

Not applicable.

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