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Context of work and elements of risk faced by waste pickers from the Cancharani sanitary landfill, Puno, Peru

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ABSTRACT

The study was carried out in the sanitary landfill of Puno, from December 2017 to January 2018 and aimed to determine the relationship between working conditions and the risk factors faced by waste pickers from the Cancharani sanitary landfill, Puno-Peru. The methodology applied corresponds to the transversal correlational design, with a census-type study sample. The statistical tests applied were the Spearman correlation test and the Mann Whitney U test. The results indicate that there is no correlation (r = 0.102; α = 0.01), between working conditions and the risk factors that workers face. With regard to gender, it was found that women admit the inadequate working conditions in which they work (U = 60.00), considering that they are the same who manipulate solid waste from dangerous places such as pharmacies and others without optimal protection. On the other hand, men are the ones who perceive more the risk factors they face (U = 50.00) and are the ones who handle the waste coming from the homes. According to the age ranges, it was obtained that those aged 18 to 29 identify and perceive the inadequate working conditions in which they work (RP = 96.50). Likewise, it is those of this age range who identify the risk factors to which they are subject (PR = 91.00). We can conclude that the work situations and the risk factors are not significantly related.

KEYWORDS: landfill, recyclers; risk factors; working conditions.

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Contexto de trabajo y elementos de riesgo que enfrentan los recicladores del botadero sanitario de Cancharani, Puno, Perú

RESUMEN

El estudio se llevó a cabo en el relleno sanitario de Puno, periodo 2017-2018, y tuvo como objetivo determinar la relación entre las condiciones de trabajo y los factores de riesgo que enfrentan los recicladores del relleno sanitario de Cancharani, Puno, Perú. Se basó en un diseño correlacional transversal, con una muestra de estudio tipo censo. Las pruebas estadísticas aplicadas fueron la prueba de correlación de Spearman y la prueba U de Mann Whitney. Los resultados indican que no hay correlación (r = 0.102; α = 0.01), entre las condiciones de trabajo y los factores de riesgo que enfrentan los trabajadores. Con respecto al género, se encontró que las mujeres admiten las condiciones de trabajo inadecuadas en las que trabajan (U = 60.00), considerando que son las mismas que manipulan los desechos sólidos de lugares peligrosos como farmacias y otros sin una protección óptima. Por otro lado, los hombres son los que perciben más los factores de riesgo que enfrentan (U = 50.00) y son los que manejan los desechos provenientes de los hogares. De acuerdo con los rangos de edad, se obtuvo que las personas de 18 a 29 años identifican y perciben las condiciones de trabajo inadecuadas en las que trabajan (RP = 96.50). Asimismo, son los de este rango de edad quienes identifican los factores de riesgo a los que están sujetos (PR = 91.00). Podemos concluir que las condiciones de trabajo y los factores de riesgo no están significativamente relacionados.

PALABRAS CLAVE: vertedero; recicladores; factores de riesgo; condiciones de trabajo.

Introduction

The benefit and valorization of the Municipal Solid Waste (MSW) is an option that allows reincorporation into the productive cycle already discarded materials, which helps the performance of resources, to understand the problem of waste pickers garbage dump in the city of Puno. The prevention of the disease transcends the biological plane and positions itself in a social space for the individual (Kruta de Araújo & de Oliveira Sato, 2018), in which the most significant are the results that can generate for themselves, their work group and their family (Porras Bulla & Climent Sanjuán, 2018). In this context, recycling is a source of income for thousands of families (Cavé, (2013); Chen, *et al.*, 2018), unfortunately in most cases, an informal source (Conke, 2019).

Various elements associated with the productivity of the recycler are identified, among which it is worth highlighting: the way to obtain the recovered products, the collection and transport mechanisms used, the treatment given to the material and its

commercialization, which impact in different ways the work of the recovery population, the informal part of waste management refers to natural individuals (individuals and families) and small private companies that participate in waste management, however they do not have a contractual link, are supported, formally recognized in charge of waste management services by the competent authorities (Gunsilius, *et al.*, 2011); (Gupta, 2012).

Waste pickers have knowledge about prevention and practices that promote health and well-being, but the latter are not applied because they diminish their performance, they do not consider them necessary, they do not depend on them to execute them or they lack the economic resources. The recuperator's self-care practices are supported more by the primacy of the group's history than by scientific knowledge, constituting potential policy implementers oriented to waste management (Coletto & Bisschop, 2017). In addition, the informal sector is present in almost all stages of the recycling chain of recyclable waste (Conke, 2019). The collection of recyclable waste, proximity marketing, wholesale marketing to specialized companies by type of material is not present in the last stage, the processing or export (Gerold, 2009; Durand, 2011).

Simmel (2000), if "labor power" could function as a measure of value, then money would become superfluous. Work, however, is a synthesis of material and spiritual elements. The reduction of work to muscular force, says Simmel, is a nonsense of the superficial gaze, work properly means presence of spirit. So, the same amount of work contains more work, the greater the degree of condensation. In this way, most recyclers do not have the legal, financial and technical resources to establish companies capable of competing with other service providers. These exclusion effects also come from modernization (Florin, 2010) of municipal waste management when the informal sector is considered archaic (Wilson, *et al.*, 2006).

The progress of working conditions is one of the important objectives of the International Labor Organization - ILO. Although there are wage increases in many countries, many workers still earn very little and have difficulty in meeting their basic needs. On the other hand, in some countries there is a reduction in time dedicated to work, but it is also true that this change is often accompanied by an uncertainty that can weaken the security of employment and pose new problems to combine work and family. Hazardous or

unhygienic working conditions tend to disappear in the industrialized world, but they are still common in the developing world (Oficina Internacional del Trabajo - Ginebra, 2010).

Work conditions are considered to be any work characteristic that may have a significant influence on the generation of risks for the safety and health of workers (Simmel, 2000). The word "risk" that implies the presence of a particularity or element (or of several) that increases the probability of adverse consequences. In this way, risk constitutes a measure of statistical probability that in the future there will be an event that is generally undesirable. An element of risk is any particularity or detectable circumstance of a person or group of people that is known to be associated with a growth in the probability of suffering, developing or being specially exposed to a morbid process, and these risk factors may be: biological, environmental, behavioral, socio-cultural, and economic (World Health Organization / World Economic Forum, 2008).

Despite this unfavorable context, the way recyclers are considered is evolving little by little. With rising environmental concerns, a consensus in favor of the integration of waste pickers was manifested in the 2000s to implement selective collection without harming a local economy and effective despite its informality (Gupta, 2012). Experts began to recognize the economic, social and environmental benefits of the informal sector of waste recovery and recycling (Wilson *et al.*, 2006). Regulating and formalizing this endogenous sector prevails over the creation of an exogenous selective collection system.

The Law of the Recycler and the models implemented by the districts in Peru do not take into account the limits of the amount of recyclable waste. That is, there are too many recyclers so that the amount of recyclable waste generated in the districts can assure all decent income. Added to this is the constant growth in the number of informal recyclers. Although an ideal and illusory application of selective collection would eliminate the availability of recyclable waste in waste bags and thereby prevent informal recycling. This remains an illusion because even in countries with an established selective collection, informal practices were not eliminated (Duclos, 2015).

Reason for which has been determined the existing differences between the waste pickers of Cancharani men and women with respect to their condition of work, likewise, the existing differences between the recyclers of the dump of Cancharani with respect to the risk factors were determined. In effect, establish the existing differences between the waste

pickers of Cancharani taking their age range, in relation to their working condition. To establish the existing differences among waste pickers in Cancharani considering their age range, with respect to risk factors.

1.   Methodology

The present investigation has as scope of study the dump of garbage to open sky of Cancharani - Puno, highway exit to Moquegua, Peru, until the height of 7,0 km. where all solid waste produced in the city of Puno is deposited.

The type of research is correlational, whose approach under which the present work was oriented, is a cross-sectional quantitative investigation because it is a research study that once the information and data were completed and collected, allowed to study the problem as it was presented, and then the interpretation of the data, presentation of results and thus achieve the objectives of the investigation (Hernández Sampieri, Fernández Collado, & Baptista Lucio, 2010).

For the investigation, the non-probabilistic intentional sampling technique was used. Arias (2006) states "the elements are selected based on criteria or judgments pre-established by the researcher." In that understanding, our research considers the total number of recyclers, 23, who work in the Cancharani dump and are registered in the municipality of Puno. It was considered 23 surveys in total made to the dump workers; the reason is that in the month of January where the application of the data collection instruments was made, only that number of workers worked.

The results obtained by the questionnaires product of the surveys applied to the study sample proceeded with the emptying to a spreadsheet of the statistical package SPSS v.18, by which it was subjected to data collection. Statistical tests were applied, according to the research level, based on the data obtained and the purpose embodied in the research design. In the processing of the data, one of the statistics that was used at the beginning to test the hypothesis was the correlation with the Spearman coefficient and the Mann Whitney U-test of mean comparison and finally the interpretation.

2.   Results and discussion

As can be seen in Table 1, regarding the gender of the study sample 52.2% of women they are engaged in recycling landfill in Puno.

Table 1: Gender of the sample

Gender	Frequency	Percentage (%)
Male	11	47.83%
Female	12	52.17%
Total	23	100.00%

Table 2 shows the degree of instruction of the study sample in which it was found that the highest percentages correspond to incomplete and complete primary education degrees with 26.1% of the total number of respondents.

Table 2: Degree of instruction of the study sample

Degree of instruction	Frequency	Percentage(%)
Any	3	13.04%
Incomplete primary	6	26.09%
Complete primary	6	26.09%
Incomplete secondary	5	21.74%
Completed secondary	3	13.04%
Total	23	100.00%

Table 3 shows that the ages of 39-45 years are the ages with a higher percentage with 34.8%, compared to the other ages.

Table 3: Age of the study sample

Age	Frequency	Percentage(%)
13	2	8.70%
15- 34	13	56.52%
39-45	4	17.39%
50-81	4	17.39%
Total	23	100.00%

With regard to the marital status of the study sample, table 4 shows that both marital status and cohabiting are the ones that obtain the highest percentage with 34.8% with respect to the other civil status.

Table 4: Marital status of the study sample

Civil status	Frequency	Percentage(%)
Single	8	34.78%
Cohabitant	8	34.78%
Married	6	26.09%
Widower	1	4.35%
Total	23	100.00%

2.1. Determining the relationship between working conditions and the risk factors faced by waste pickers in the Cancharani dump in the city of Puno

As can be seen in Table 5, the analysis of correlations made with the rho Spearman coefficient, r = 0.102, which indicates that there are no significant correlations can be highlighted the correlation between the total working conditions with the total of the risk factors which is not significant at a level of 0.01, so we can affirm that the general hypothesis is not accepted.

Table 5: Correlation Analysis between working conditions and risk factors

Variables	Working conditions	Working conditions	Working conditions	Total
Risk factor's	0.142	0.278	0.092	0.323
Risk factor's	-0.371	0.252	0.072	-0.186
Total	-0.126	0.365	0.091	0.102

* $p < .05$ N = 23

This result shows that both the working conditions and the risk factors faced by the waste picker workers of Cancharani do not have a significant statistical relationship; without neglecting that these working conditions are obviously precarious considering all the factors surrounding the reality in which they develop the activity of recycling without taking into account the adequate measures of protection all work is carried out in a specific physical space, with limits approximately accurate, whether it is carried out indoors or in the open air, that is, they must have a series of determining aspects to develop a job in good working conditions and adequate safety, which implies the use of techniques that allow to

eliminate or reduce the risk of suffering injuries individually or material damage to equipment, machines, tools and premises (Oficina Internacional del Trabajo - Ginebra, 2010).

Taking into account that informal recyclers are exposed to different elements of biological risk little or almost no prevention, making it a vulnerable population for the acquisition of infectious diseases (Ballesteros, *et al.*, 2005). In the present study only recyclers that are formalized in the municipality of Puno were considered, this result can be explained considering the difficult work situations, and the poor quality of life of the population materialize in a limited body structure, with an average short stature, presence of chronic malnutrition in children and a tendency to overweight mainly in ladies as a result of inappropriate food consumption (Ballesteros, *et al.*, 2005).

2.2. Determining the differences between the recyclers of the Cancharani dump men and women regarding their work condition

Table 6: Mann Whitney U test of comparison of means of the scores of working conditions by gender

Variable	Gender	N°	Average range	Mann-Whit U	Z	Sig. Asymptote
Risk factor's	Male	13.64	13.41	48	-12	0.245
	Female	10.5	10.71			
Risk factor's	Male	13.82	9.95	46	-13	0.191
	Female	10.33	13.88			
Risk factor's	Male	11.45	9.95	60	-0.4	0.683
	Female	12.5	13.88			
Total	Male	14.55	11.91	38	-18	0.08
	Female	9.67	12.08			

*p < .05   N = 23

The analysis of the differences between male and female workers regarding their working conditions, made through the Mann-Whitney U shows that there are significant statistical differences between men and women with an average range of 12.50, compared to the average range of males of 11.45. Demonstrating that women are the ones who perceive the

working conditions in the Cancharani dump more intensely, this condition occurs because they are the women who mostly dedicate themselves to recycling as the only subsistence activity that generates an economic income. Likewise, we can take into account those indicated by the World Health Organization/World Economic Forum (2008) in terms of occupational health is determined in an appropriate work environment, with fair work situations, where workers can develop an activity with dignity and wherever possible cooperation for the improvement of health and safety conditions.

With this result, one of the great challenges currently facing societies is to have decent and fair work in which there is a continuous improvement that involves considering the integrity of people, related to each other and to the environment in which they live and work. That is why the recyclers and their families, form a social group that resides mainly in peripheral neighborhoods of the locality of Puno and in lower socioeconomic conditions is by what is taken into account the results obtained in previous studies. Problems were found in housing, low educational level, difficulties in accessing health services and infectious and chronic morbidity, just like (Palacio-Prieto, *et al.*,2004) did.

2.3. Determining the differences between the recyclers of the Cancharani dump with respect to the risk factors

Table 7: Mann Whitney U test of comparison of means of the scores of working conditions by sex

Variable	Gender	N°	Rank Average	Mann-Whit U	Z	Sig. Asymptote
Risk factor's	Male	11	13.41	50.5	-1.5	0.133
	Female	12	10.71			
Risk factor's	Male	11	9.95	43.5	-0.98	0.328
	Female	12	13.88			
Total	Male	11	11.91	65	-0.07	0.948
	Female	12	12.08			

* p < .05   N = 23

The study of the differences between male and female workers regarding the risk factors they face, elaborated through the Mann-Whitney U, shows that there are statistical

differences in the risk factors in which men with an average range of 13.41 and women of 10.71, showing that men perceive risk factors with greater intensity, which are related to the risks of handling solid waste from pharmacies, hospitals and others. men who have a preference in the use of protective instruments such as rubber and metal punches, otherwise women do not measure the consequences and the high risk of handling with the hands free most of the solid waste directly.

Table 8: Analysis of Variance by Kruskal-Wallis Ranks of Working Conditions by Age Range

Variable	Average range			Chi squared	degrees of freedom	Sig. Asymptote
	Age	Less than 18-29	30-35	35 to more		
	N	9	5	9		
Working conditions		96.5	79.5	31.5	16.693	7	0.475

* p < .05   N = 23

The Kruskall-Wallis Range Variance Test of Working Conditions by Age Range shows that there are significant statistical differences in the age range between 18 to 29 years of age, so it can be stated that all workers who are between these age ranges they perceive work conditions with greater intensity.

Through work, says the Oficina Internacional del Trabajo (2010), individuals get access to a series of favorable issues for the maintenance of a good state of health. A community or a country improves the level of health of its citizen when they ensure that all individuals able to work can access a job that satisfies not only their basic economic needs, of which only a few are listed here.

Table 9: Analysis of Variance by Kruskal-Wallis Ranges of Risk Factors by Age Range

Variable	Average range			Chi squared	degrees of freedom	Sig. Asymptote
	Age	Less than 18-29	30-35	35 to more		
	N	9	5	9		
Working conditions		91	70	34	18.17	7	0.378

* **p < .05   N = 23**

The Kruskall-Wallis Range Variance Test of the risk factors faced by waste picker workers by Age Range, points out that significant statistical differences only in the case of those that fluctuate between the younger ages of the respondents less than 18 to 29 years of age with an average range of 91.00, noting that the workers outperform the workers of the other age ranges, which makes us affirm that it is the younger recyclers who perceive more the risk factors they face every time they recycle in the Cancharani dump. According to the World Health Organization / World Economic Forum (2008), through work, people no matter what age they are, whether young or adult, through which we can gain access to a series of favorable issues for the maintenance of a good state of health and social welfare. A society or a country improves the level of its citizen when they ensure that all individuals able to work can access a job that satisfies not only their basic economic needs.

Conclusions

The statistical analyzes carried out show that the work situations and the risk factors are not significantly related to r = 0.102, in the waste pickers of the Cancharani waste dump in the city of Puno.

The study of the differences between male and female workers with respect to their working conditions, indicates that there are significant statistical differences, noting that the highest rating corresponds to female workers with a U = 60.00.

The study of the differences between male and female workers regarding the risk factors faced when recycling the results indicates that there are significant statistical differences, noting that the highest score corresponds to male workers with a U = 50.50.

The analysis of variance of working conditions by age range indicates that there are significant statistical differences in the case of the range of less than 18 years to 29 years of age with RP = 96.50, and are those who perceive the working conditions.

The analysis of variance of the risk factors by age range indicates that there are significant statistical differences in the case of the range of less than 18 years to 29 years of age with a PR = 91.00 who have greater knowledge of all the risk factors a those who are exposed.

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