

World at work: Brazilian ragpickers

M C da Silva, A G Fassa, C E Siqueira, D Kriebel

A job with contradictions: environmental stewards and exploited workers of the informal sector

Solid waste is an environmental concern throughout the world. The work of handling this waste involves diverse hazards, and is the focus of many prevention activities.¹⁻⁴ In Brazil, as elsewhere, the increasing consumption of goods has generated a huge volume of waste, raising questions about the impacts of inadequate collection and traditional waste disposal technologies on the health of workers, the public, and the environment.⁵⁻⁷ Recycling presents many benefits, but like any new productive enterprise, its effects on those who do the physical labour must be weighed when assessing its full societal and environmental impact.

High unemployment, combined with proliferating amounts of solid waste, and a growing global market for recycled materials, have created the conditions for the rapid expansion of the work of collecting and selling trash. In Brazilian cities today, ragpickers (*catadores de lixo* in Portuguese) collect, separate, classify, and sell all types of recyclable materials. It is not known how many people work as ragpickers in Brazil, but a recent study estimated 500 000 in 2003, including adults and children (Forum Lixo e Cidadania, 2003). The majority of these workers rely solely or primarily on ragpicking for their livelihood, and have incomes less than twice the level defined by the Brazilian government as a minimum living wage, which comes to about US\$173. They often live near dumps or in the low income areas of cities, and collect recyclable materials and food at dumpsites, riverbanks, street corners, and residential areas (Fórum Nacional Lixo e Cidadania, 2003). This relatively new and apparently growing labour force is responsible for handling a large share of all Brazilian recycled materials. Their work, entirely informal and lacking in almost any controls, employment benefits, or regulations, has led Brazil to become one of the largest recyclers in the world, in particular, of aluminium.^{7 8} They help cities reduce waste in landfills, support recycling companies, and feed their families through their work.^{7 8}

The purpose of this article is to describe the working conditions and health hazards for a sample of ragpickers in one Brazilian city, highlighting their work and living conditions.

METHODS

We conducted a cross-sectional study of ragpickers older than 17 years in Pelotas, a city of 320 000 in southern Brazil, in 2004. For comparison, we identified a sample of non-ragpickers who were residents of the same neighbourhoods, and of similar gender, age, and years of schooling. Data were collected through a survey that included questions on occupational, sociodemographic, behavioural, and health factors. Because ragpickers and non-ragpickers in our sample both came from poor neighbourhoods, it was also useful to

compare their physical activities and symptoms to a sample of the entire adult population of the city. To accomplish this, we were able to take advantage of a recent survey based on a stratified random sample of the entire city population (n = 3182), which used many of the same survey items.⁹

This study was approved by the Ethics Committee of the Medical School of the Federal University of Pelotas.

RESULTS

The ragpickers' survey involved 990 subjects, of whom 455 were ragpickers and 535 non-ragpickers (table 1). Because our survey involved household interviews, the very poorest ragpickers, living entirely on the street, were not studied. Despite this, our ragpickers had considerably poorer living conditions than their neighbours with other occupations. For example, most (54%) of ragpickers' houses were of wood, metal, or other poor materials, compared to only 24% of their neighbours' houses. Three times as many ragpickers as non-ragpickers had no running water (15% versus 5%); there was a similar difference for lack of electricity (11% versus 5%). Eighteen per cent of the ragpickers had no toilet in their house, compared to only 3% of their neighbours.

Table 1 Sociodemographic characteristics of ragpickers, non-ragpickers, and a sample of the general population of Pelotas

Variable	Ragpickers %	Non-ragpickers %	Sample of Pelotas population %
Monthly income, multiples of minimum wage (\$US)			
Less than the minimum (\$87)	67.0	25.7	14.0
1-2× (\$174)	26.8	36.6	25.3
2-3× (\$261)	4.0	19.5	18.0
3-4× (\$348)	1.6	8.0	12.6
>4×	0.6	10.2	30.1
Age			
18-29 years	31.6	26.4	22.6
30-39 years	27.0	31.0	21.4
40-49 years	24.0	24.7	21.0
50-59 years	10.8	13.1	16.7
60-69 years	6.6	4.8	18.3
Schooling			
0 years	22.4	12.5	1.0
1-4 years	43.7	45.1	20.6
5-8 years	30.8	38.5	33.5
9 or more years	3.1	3.9	44.9
Marital status			
No	36.7	38.7	38.7
Yes	63.3	61.3	61.3
Skin colour			
White	52.5	68.4	84.7
Non-white	47.5	31.6	15.3
Gender			
Male	62.9	63.9	43.2
Female	37.1	36.1	56.8
Smoking status			
Never smoker	28.8	40.9	52.4
Ex-smoker	12.7	14.8	27.9
Current smoker	58.5	44.3	19.7



Figure 1 Houses of ragpickers are often of very poor condition. They bring garbage back to the house to separate it, and there are often piles of non-recyclable waste dumped nearby.

Almost half (47%) of the ragpickers were non-white, compared to 32% of non-ragpickers, and only 15% of the Pelotas general population. Although we attempted to match non-ragpickers to ragpickers to within one year of schooling, the differences were so marked that our samples retained some striking differences in education. Fully 22% of ragpickers had not completed a single year of schooling, while only 12% of the non-ragpicker sample had no schooling. In the general population sample, only 1% reported less than one year of schooling (table 1).

The average monthly income of ragpickers was about US\$81.64 (SD \$62.76), while non-ragpickers reported more than twice the average income (\$188.53, SD \$170.71). In Brazil, incomes are often compared in multiples of the government's minimum wage (approximately US\$86.67 per month). Ninety four per cent of ragpickers reported income less than twice the minimum wage, compared to 62% of non-ragpickers and 39% of the population of Pelotas (table 1).

The average age for ragpickers to start working in this occupation was 32.5 years (SD 13.6 years), and they reported a median time on the job of three years. Most ragpickers (57%) are between 18 and 40 years old. These data suggest that many have taken up this work relatively recently. The ragpickers worked an average of 6 hours/day, which is less than the average reported work day of their non-ragpickers neighbours (8 hours/day).

Many city governments have begun to encourage the formation of cooperatives of ragpickers, to try to improve their working conditions.⁸ In Pelotas, only 6.8% of the ragpickers surveyed belonged to a cooperative, however.

Ragpickers' work

The work process of ragpickers can be summarised in three phases: collection, separation, and sale of materials. The most commonly collected wastes, in

decreasing order, are: plastics, paper/cardboard, aluminium, and iron. These materials are collected from the streets and doorways of households and businesses, and brought to some location where they can be separated. Separation is often performed in or just outside of the ragpickers' houses, or on abandoned land along roadways, rivers, and old industrial sites (fig 1). This process is not regulated or licensed. Personal protective equipment is rarely worn; only 22% reported wearing gloves, 16% boots, and 1% facemasks. The most common equipment used to carry materials is the horse cart, followed by the pushcart (fig 2). Occasionally bicycles may be used or the ragpickers carry their loads themselves.

The majority of ragpickers (86%) perform the most labour intensive separation of materials (removing copper wire from appliances for example) in their own homes; they dispose of whatever they cannot sell by dumping it in regular trash bins (56%) or burning it (30%). This process is performed manually, without the use of any tools, and often involves the whole family, including children. The ragpickers select edible food for their own consumption (fruits, produce, canned vegetables) from organic wastes collected.

Recyclable materials are transported from the ragpickers' households to local "middle man" businesses that purchase recycled products (*sucateiros* in Portuguese) (fig 3). The ragpickers bring their collections to these businesses for weighing; and they are paid directly in cash, on the basis of the current market



Figure 2 Ragpickers at work in the streets of Pelotas. Pushcarts are commonly used to collect and transport waste.



Figure 3 A ragpicker, on his horse-drawn cart. He has brought material to a collection point, where a middle man will weigh his material, and pay him cash for it.

rate. Sometimes, they may be paid in food products in addition to cash.

Ragpickers' hazards

Ergonomic hazards faced by ragpickers include walking long distances on foot,⁶ often pulling heavy carts and in awkward positions as they collect and separate waste. Most (91%) reported frequent repetitive motion, and nearly as many (84%) reported frequently carrying heavy (>10 kg) loads. Their frequent repetitive motion seems to be a defining characteristic, as it was reported 40% more often in ragpickers than non-ragpickers (prevalence ratio (PR) 1.4, 95% confidence interval (CI) 1.3 to 1.5). Fifty four per cent of ragpickers also reported frequent whole body vibration—probably often from their carts bouncing over city streets (fig 4).

Chemical hazards result from the hazardous substances found in municipal solid wastes, which ragpickers may inadvertently come into contact with. The most common are: car and regular batteries, oils and greases, insecticides/herbicides, solvents, paints, cleaning products, cosmetics, drugs, and aerosol containers under pressure.¹⁰ A significant portion of the wastes is classified as dangerous and can be harmful to human health and the environment.¹¹ Ragpickers in Pelotas reported a high prevalence of contact with many of those products, and we found significant differences in these exposures compared to their non-ragpicker neighbours (fig 5).

Biological hazards reported by ragpickers in our survey included bandages, disposable diapers, toilet paper, sanitary napkins, disposable needles or syringes, and condoms. In addition, wastes from small clinics, pharmacies, and labs, and even hospital wastes, may also be found mixed with residential trash and carrying microorganisms responsible for

more serious diseases.^{6, 12} About a quarter (27%) of the ragpickers reported having contact with hospital wastes such as needles, syringes, and gauze, among other wastes (fig 5).

Safety hazards include risks from working amid heavy traffic, as trash collection schedules often coincide with intense traffic hours. When combined with poor compliance with traffic laws, high workload, and fast pace of work, there is a substantial risk of ragpickers being hit by traffic. Some of the most common injuries to workers who handle solid wastes are cuts and punctures by glass, cans, and sharp objects. Many of these injuries are caused by inadequate storage of trash.^{3, 6}

Psychosocial hazards result from the long and irregular workdays of this population, often including night work.¹³ In addition, the daily struggle for survival, the uncertainty about the future, the lack of prospects for a better life, low wages, and job discrimination all can have negative impacts on their mental health. About 50% of the ragpickers interviewed felt discriminated against by society. In contrast, 14% of their non-ragpicker neighbours reported feeling this way.

Job related injuries

The reported prevalence of low back pain in the 12 months prior to survey was similar among ragpickers and their non-ragpicker neighbours (49.2% versus

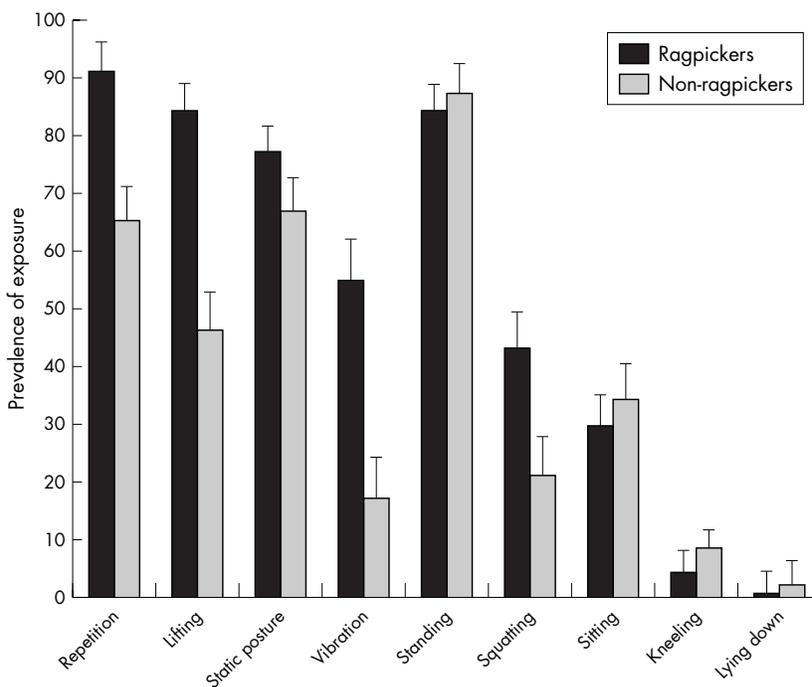


Figure 4 Prevalence of ergonomic exposures among ragpickers and non-ragpickers. Bars represent percentages reporting “generally or always” exposed during work, with whiskers representing 95% confidence limits on prevalence.

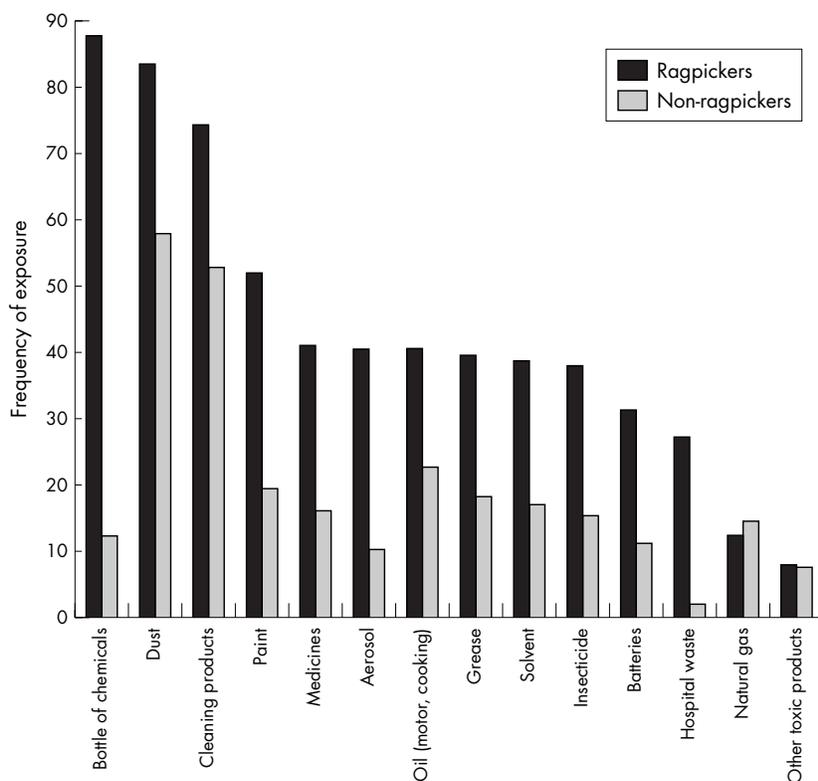


Figure 5 Prevalence of physical, chemical, and biological exposures among ragpickers and non-ragpickers.

47.5%), but well above the prevalence found in the general population (35.1%). The prevalence of pain in the lower extremities (upper leg, knee, lower leg, and ankle) was higher in ragpickers than in non-ragpickers (45.1% versus 38.3%, $p = 0.03$). In contrast, there was no difference in the prevalence of upper extremity (neck, shoulder, elbow, wrist) pain in these two groups. We did not assess the latter two outcomes in the population of Pelotas.

Eighty per cent of ragpickers believed they could get injured on the job, and 71% believed their job was dangerous. Twenty per cent reported having had a work related accident the previous year. The most common injuries among those who had a workplace injury were cuts (59%), scrapes (15%), hits/contusions (10%), and punctures (9%). The most affected body parts were the hands (50%), lower extremities (20%), and feet (8%).

CONCLUSIONS

A recent World at Work article in this journal described refuse collectors in the United States and Europe.⁴ It would be hard to conceive of a more striking contrast in working conditions within a single occupation than is provided by a comparison of the Dutch and Brazilian workers described in these two articles. To begin to address the dire conditions

under which ragpickers labour, it is perhaps most important to note that they are informal workers, entirely lacking in even the minimum guarantees found in regulated jobs. There are also formal jobs in refuse collection in Brazil^{2,3} and while these workers may face somewhat greater risks than their Dutch colleagues, they are considerably better off than the ragpickers.

The recycling "system" in Brazil contains complicated contradictions. From an environmental management perspective, ragpickers serve a very useful function to society, and regulations that inadvertently discouraged this work would mean even greater suffering for the population, as well as a bigger waste disposal problem. Ragpickers are discriminated against for the work that they do, and yet they play a very relevant public health role.¹⁴ There are some promising efforts in a number of Brazilian cities to promote cooperatives of ragpickers, as a way to improve their lives and provide them certain limited benefits.^{8,15} Some cities, for example, have provided the cooperatives with warehouses and trucks, the former to improve the collection and sorting work, and the latter so that they can get a fairer price for their materials by having the ability to sell directly to recycling industries instead of the local middle man.

Ragpickers should receive education on how to properly handle and dispose of wastes, as well as on the full range of health and safety issues. They should have access to personal protective equipment, materials handling devices, and safe means of transport. Our survey did not include children, and yet we observed many children engaged in recycling work that is clearly too dangerous for them. Improving the economic prospects of their parents is probably an important way to eliminate this unacceptable form of child labour.

The ultimate goal of the cooperative movement and other government sponsored or assisted programmes is to gradually introduce formal labour markets into the recycling sector. Only then will this important work be recognised and respected. Improving the working conditions of Brazilian ragpickers will require coordinated actions between civil society and governments to restore their social value and human dignity.

Occup Environ Med 2005;**62**:736–740.

doi: 10.1136/oem.2005.020164

Authors' affiliations

M C da Silva, A G Fassa, School of Medicine, Department of Social Medicine, Post-graduate Program in Epidemiology, Federal University of Pelotas, Brazil

C E Siqueira, D Kriebel, Department of Work Environment, University of Massachusetts, Lowell, USA

Correspondence to: Mrs M C da Silva, Post-graduate Program in Epidemiology, Federal University of Pelotas, Brazil, Av. Duque de Caxias, 250, Third floor, Pelotas, Rio Grande do Sul 96030-002, Brazil; cozzensa@terra.com.br

Financial support: CAPES, Coordination for the Improvement of Higher Education Personnel, Brazil. Partially supported by grant #D43TW005749, "Work and Health in Brazil and Mexico" from the John E. Fogarty International Center of the US National Institutes of Health

Competing interests: none

REFERENCES

- Paulsen OM**, Breum NO, Ebbehøj N, *et al*. Collection of domestic waste. Review of occupational health problems and their possible causes. *Sci Total Environ* 1995;**170**:1–19.
- Robazzi MLCC**, Moriya TM, Favero M, *et al*. Garbage collectors: occupational accidents and coefficients of frequency and severity per accident. *Ann Agric Environ Med* 1997;**4**:91–6.
- Velloso MP**, Santos EM, Anjos LA. The labor process and work-related accidents among garbage collectors in Rio de Janeiro, Brazil [in Portuguese]. *Cadernos de Saúde Pública* 1997;**13**:693–700.
- Kuijjer PPFM**, Frings-Dresen MHW. World at work: Refuse collectors. *Occup Environ Med* 2004;**61**:282–6.
- Rêgo RCF**, Barreto ML, Killinger CL. What is garbage, anyway? The opinions of women from an outlying neighborhood in a large Brazilian city [in Portuguese]. *Cadernos de Saúde Pública* 2002;**18**:1583–92.

- 6 **Ferreira JA**. Solid waste and nosocomial waste: an ethical discussion [in Portuguese]. *Cadernos de Saúde Pública* 1995;11:314–20.
- 7 **Calderoni S**. *Billions wasted in the garbage* [in Portuguese], 4th edn. São Paulo: Humanitas 2003.
- 8 **Conceição MM**. Garbage entrepreneurs: a modernity paradox [in Portuguese]. Campinas: Atomo, 2003.
- 9 **Silva MC**, Fassa AG, Valle NCJ. Chronic low back pain in a Southern Brazilian adult population: prevalence and associated factors [in Portuguese]. *Cadernos de Saúde Pública* 2004;20:377–85.
- 10 **Ferreira JA**, Anjos LA. Public and occupational health issues related to municipal solid waste management [in Portuguese]. *Cadernos de Saúde Pública* 2001;17:689–96.
- 11 **Kupchella CD**, Hyland MC. *Environmental science—living within the system of nature*. London: Prentice-Hall International, 1993.
- 12 **Collins CHK**. The microbiological hazards of municipal and clinical wastes. *J Appl Bacteriol* 1992;73:1–6.
- 13 **Carranza AC**, Zelaya L, Iglesias S. *El Salvador—child labour in the garbage dumps: a rapid assessment* [in Spanish]. Geneva: International Labour Organisation, 2002.
- 14 **Porto MFS**, Juncá DCM, Gonçalves RS, et al. Garbage, work, and health: a case study of garbage pickers at the metropolitan landfill in Rio de Janeiro, Brazil [in Portuguese]. *Cadernos de Saúde Pública* 2004;20:1503–14.
- 15 **Juncá DCM**, Gonçalves MP, Azevedo VG. *The hand that creates from garbage* [in Portuguese]. Niterói: Universidade Federal Fluminense, 2000.

Clinical Evidence—Call for contributors

Clinical Evidence is a regularly updated evidence-based journal available worldwide both as a paper version and on the internet. *Clinical Evidence* needs to recruit a number of new contributors. Contributors are healthcare professionals or epidemiologists with experience in evidence-based medicine and the ability to write in a concise and structured way.

Areas for which we are currently seeking authors:

- Child health: nocturnal enuresis
- Eye disorders: bacterial conjunctivitis
- Male health: prostate cancer (metastatic)
- Women's health: pre-menstrual syndrome; pyelonephritis in non-pregnant women

However, we are always looking for others, so do not let this list discourage you.

Being a contributor involves:

- Selecting from a validated, screened search (performed by in-house Information Specialists) epidemiologically sound studies for inclusion.
- Documenting your decisions about which studies to include on an inclusion and exclusion form, which we keep on file.
- Writing the text to a highly structured template (about 1500–3000 words), using evidence from the final studies chosen, within 8–10 weeks of receiving the literature search.
- Working with *Clinical Evidence* editors to ensure that the final text meets epidemiological and style standards.
- Updating the text every six months using any new, sound evidence that becomes available. The *Clinical Evidence* in-house team will conduct the searches for contributors; your task is simply to filter out high quality studies and incorporate them in the existing text.
- To expand the topic to include a new question about once every 12–18 months.

If you would like to become a contributor for *Clinical Evidence* or require more information about what this involves please send your contact details and a copy of your CV, clearly stating the clinical area you are interested in, to Klara Brunnhuber (kbrunnhuber@bmjgroup.com).

Call for peer reviewers

Clinical Evidence also needs to recruit a number of new peer reviewers specifically with an interest in the clinical areas stated above, and also others related to general practice. Peer reviewers are healthcare professionals or epidemiologists with experience in evidence-based medicine. As a peer reviewer you would be asked for your views on the clinical relevance, validity, and accessibility of specific topics within the journal, and their usefulness to the intended audience (international generalists and healthcare professionals, possibly with limited statistical knowledge). Topics are usually 1500–3000 words in length and we would ask you to review between 2–5 topics per year. The peer review process takes place throughout the year, and our turnaround time for each review is ideally 10–14 days.

If you are interested in becoming a peer reviewer for *Clinical Evidence*, please complete the peer review questionnaire at www.clinicalevidence.com or contact Klara Brunnhuber (kbrunnhuber@bmjgroup.com).