

## **Minor psychiatric disorders among Brazilian ragpickers: a cross-sectional study**

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## **ABSTRACT**

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**Background:** Ragpickers are informal workers who collect recyclable materials to earn a small wage. Their life and working conditions are extremely precarious. We examined minor psychiatric disorders (MPD) among a cohort of ragpickers in Pelotas, a city in southern Brazil. **Methods:** Ragpickers were matched by sex, age, and years of schooling with a sample of non-ragpickers from the same poor neighborhoods. The cross-sectional study gathered data by interview on 990 individuals in 2004. MPD were assessed using a standard self-reporting questionnaire, the SRQ-20. **Results:** The prevalence of MPD among ragpickers was 44.7%, higher than reported by neighborhood controls (33.6%). MPD were more common among females, those of lower economic level, smokers and alcoholics. Among occupational characteristics, MPD prevalence was associated with frequent static postures, low job satisfaction and recent work accidents. **Conclusions:** Ragpickers more frequently report MPD than other poor workers living in the same neighborhoods, with many of the same life conditions. Improving the work lives of these precarious workers should address not only the physical hazards of their jobs but their mental and emotional health as well.

**Key words:** ragpickers; informal work, epidemiology; minor psychiatric disorders, mental health

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### **Background**

Mental illness may not, in itself, be fatal but it causes extensive disability in rich and poor countries alike, and is increasing in prevalence in many populations. Mental disorders rank almost as high as cardiovascular diseases in the total global burden of diseases (9.7% versus 10.5%, respectively)[1]. It is estimated by WHO[2] that depression will be the single most important cause of disability by the year 2020 in the developing world.

Female gender, social, economic and interpersonal factors remain the most consistently demonstrated risk factors for minor psychiatric disorders (MPD) in industrialized society[3]. To this list, Mari et al.[4] add other factors that may explain the strong burden of MPD, including: the improvement in life expectancy, fast population growth in populated cities (urbanization and industrialization), inadequate housing, changes in family structures and nutritional problems.

Minor psychiatric disorders have long been associated with work, and in 1991 were the second leading cause lost work time in the United States[5]. Studies have demonstrated that the socioeconomic deprivation, resulting from unemployment is associated with various psychological disorders[3, 6].

A new study by the International Labour Organization Office (ILO) reported that 2.8 billion people in the world were employed in 2003. Of these, nearly 1.4 billion were living on less than the equivalent of US\$2 a day and some 550 million were living under the US\$1 a day poverty line[7]. In Brazil, the official estimate for the number of unemployed people in December 2002 was 2.1 million people[8], although non-official

sources say the real number may be three times higher. A large number of these unemployed in Brazil have found an alternative to survive by working in garbage. The ragpickers (“*catadores de material reciclável*”) survive from the collection, separation, classification and sale of municipal solid waste.

It is not known how many people work as ragpickers in Brazil, but a recent study estimated 500,000 in 2003, comprising both adults and children[9]. The majority of these workers have incomes less than twice the level defined by the Brazilian government as a minimum living wage, which comes to about \$173 U.S. per month. They often live near dumps or in the low income areas of cities (Figure 1), and collect recyclable materials and food at dumpsites, riverbanks, street corners and residential areas[9]. (Figure 2)

The ragpickers work in hazardous conditions. When moving around in the garbage, searching for materials that can be resold, the ragpickers are exposed to a wide range of health and safety hazards; ranging from infectious agents and toxic chemicals, the handling of sharp or broken materials and serious musculoskeletal strain[10, 11]. The ergonomic hazards include those experienced in other manual materials handling jobs, including static or awkward postures, physical efforts, such as, lifting, loading or pushing heavy weights, and repetitive movements[12-15].

Although more than 60% of the workforce in Brazil is in the informal sector, there are few studies on work and health of this population segment[16], and ragpickers are no exception. The studies in the literature are few and only descriptive. One reason for this lack of research is the considerable logistical challenge of conducting epidemiologic studies of people without regular places of work or residence. The objective of this article was to examine the association of minor psychiatric disorders with the conditions of life

and work of the ragpickers and compare these to non-ragpickers from the same city. A companion paper focused on work-related musculoskeletal symptoms in the same population is being prepared for publication (Silva MC, Fassa AG, Kriebel D: **Musculoskeletal Disorders among Ragpickers in a Southern City in Brazil**, submitted to American Journal of Industrial Medicine 2005).

## **Methods**

### **1. Survey populations and questionnaire**

Pelotas is a city located in the state of Rio Grande do Sul, southern Brazil. It has a population of 338,000 inhabitants, the majority of them (94%) living in urban area. Almost 25% of the population earns less than twice the national minimum wage (US\$ 138.50/month in 2002) with 14.6% receiving more than ten times the minimum wage. Eighty five percent of the city population are of white race with most of the rest of mixed African and European descent. Until the past decade, the city was known for a heavy concentration of food production industries: first meat packing and latter canning and processing of fruits and vegetables. This industry has been in serious decline recently, and the number of unemployed has increased substantially.

A cross-sectional study was carried with ragpickers and neighborhood matched referents from March to July 2004. In order to identify the ragpickers, field researchers went to the main points of sale of recycled materials and gathered names and addresses of everyone that came to sell materials. Ragpickers were also identified in cooperatives of recycled materials, by key-informants in poor neighborhoods, and by other ragpickers who led us to other people in the neighborhoods where they lived. After developed a list

of ragpickers, the interviewers visited their places of residence. Only people 18 years or older were asked to participate.

The referent group was composed of other workers that lived in the same neighborhoods as the ragpickers. From each ragpicker's house, interviewers went to immediately neighboring houses in order to locate a suitable non-ragpicker to interview. These people were matched by gender, age ( $\pm 5$  years old), and years of schooling ( $\pm 1$  year) to the neighboring ragpicker. Potential referents were excluded if they were unemployed, retired or out of work because of any health problem.

Trained interviewers used a structured questionnaire to gather data on living conditions, health and work. The interview lasted approximately 40 minutes. Five percent of interviews were repeated by the principal investigator as a check on quality of data collection.

The prevalence of minor psychiatric disorders was assessed using the Self-Reporting Questionnaire – SRQ-20[17]. This instrument was designed by Harding et al. for World Health Organization (WHO) to study common mental disorders in primary health care, and is applicable in different cultural settings, especially in developing countries[18]. This instrument is used to screen minor psychiatric disorders like depression and anxiety and is composed of 20 “yes-no” questions: four on physical symptoms and sixteen on psycho-emotional disturbance. An advantage for us of using SRQ-20 was that it has been validated in Brazilian urban settings[4, 19] and is available in a Portuguese. The cutoff points used to identify the presence of minor psychiatric disorders were 6 or more for men and 8 or more for women; following standard protocols for interpretation of SRQ-20[20].

In this paper, we also investigated the degree to which ragpickers' exposures and outcomes varied according to several demographic and personal factors. These were: age, gender, skin color (white/non white), marital status (living with or without a partner), monthly income (categories of multiples of minimum wage), years of schooling, smoking (never smokers; ex-smokers; current smokers), alcoholism (using the standard CAGE instrument)[21] and economic level. This last characteristic was assessed using a standard Brazilian scale[22]. Using a series of 10 questions on household items owned by the respondent (radio, television, refrigerator, vacuum, wash machine, and so on), a score is calculated and respondents are placed in one of five levels from A (highest) to E (lowest) economic level. There were no respondents in our study in economic level A.

Static posture at work ("do you stay in the same position for a long time at work?")[23], work accidents ("did you have any work accident in the last 12 months?") and job satisfaction ("Are you satisfied with your work?") were also evaluated.

Musculoskeletal pain was assessed by Standardized Nordic Questionnaire[24] and the pain was divided into three regions: lower back, the lower extremities (upper leg, knee, lower leg and ankle) and upper extremities (neck, shoulder, elbow and wrist) (Silva MC, Fassa AG, Kriebel D: **Musculoskeletal Disorders among Ragpickers in a Southern City in Brazil**, submitted to American Journal of Industrial Medicine 2005).

## **2. Statistical analysis**

The data were entered into a computer database twice by different technicians and compared. Discrepancies were resolved by reference to the original survey. Analyses were conducted using Stata 8.0. Prevalence and prevalence ratios were calculated to

compare exposures and outcomes among groups. Poisson regression was used to investigate potential confounding and effect modification, as well as to calculate adjusted prevalence ratios[25]. Multivariate modeling to identify factors associated with MPD used the approach of Victora et al.[26] in which the effects of demographic variables (age, sex, gender, marital status, education) were investigated first. Smoking, alcoholism and an indicator variable for being a ragpicker were added in a second stage, and finally work hazards and job satisfaction were then added in a third stage. After this, musculoskeletal disorders and work accidents were added to the model. This four-step “hierarchical” method helps the researchers to understand when a proximal factor related to work (lifting for example) may be acting as a mediator for a more distal social factor like education. Multivariate modeling began by adding Level One variables one at a time, to identify important predictors. Then, jobs/exposure variables were added one at a time. Two-way interactions between first and second level variables were evaluated using product terms.

## **Results**

We successfully interviewed 455 of the 546 ragpickers initially identified (83.3%). The 91 who were not successfully interviewed were those whose residence could not be located. This occurred when a ragpicker reported a non-existent address at first contact, the interviewer failed to find the address through lack of street signs or names, or because some had moved away between first contact and household visit. Neighborhood referents were successfully identified and interviewed for each of the 455 ragpickers, bringing the study population to 990. There were 80 households members

residing with the matched referents that were excluded from analyses in order to match one ragpicker to one non-ragpicker. There were many more non-ragpickers with high levels of education (4.6% versus 3.1% with more than 8 years of schooling, respectively). Because education was a potentially important modifier of job characteristics, we chose to study only those respondents with 8 or less years of schooling. Our final sample was 879 individuals (441 ragpickers and 438 non-ragpickers).

In our study, the ragpickers presented considerably poorer living conditions than their neighbors with other occupations[10]. For example, the majority (54.0%) of ragpickers lived in poor quality houses built of plastic, metal or wood, while only a quarter of their matched neighbors (25.0%) lived in such houses. Fifteen percent of ragpickers had no running water, but only 4.8% of non-ragpickers. Nearly twice as many ragpickers as non-ragpickers had no electricity (11.0% versus 5.7%). Eighteen percent of ragpickers, but only 3.0% of referents reported having no toilet. On average, there were 4.7 residents in a ragpicker's home, and only 3.9 in a non-ragpicker's.

As noted, there were no ragpickers in the highest economic level, ABIPEME category A, while 21.9% were in the intermediate categories B or C, and 78.1% in the lowest economic level categories D or E. For comparison, data from a recent survey of Pelotas general population found 5.6%, 62.8% and 31.6% in categories A, B or C and D or E, respectively[27].

Both ragpickers and referents had a mean age of 38 years, and were 63.0% male (matching variables). Despite matching to within one year on schooling, ragpickers were still more poorly educated than their neighbors. Most strikingly, 23.1% of ragpickers, but only 15.2% of non-ragpickers had not completed one year of schooling. This discrepancy

would have been much larger without matching; a non-ragpicker with one year of schooling was often matched to a ragpicker with no schooling. There were large racial differences between groups: 46.9% of ragpickers were non-white compared to 33.0% of their neighbors. The average monthly incomes of ragpickers and non-ragpickers were respectively \$U.S. 80.10 and 182.30. Almost all (94.6%) of ragpickers reported less than twice the Brazilian basic wage (equivalent 86.70 \$U.S./month) compared to 64.7% of non-ragpickers. Domestic work (28.0%), day labourers (33.4%) retail sales (14.6%) and construction (13.4%) were the most frequently reported occupations of the non-ragpickers neighborhood referents.

More than 90.0% of ragpickers reported that their work was highly repetitive, compared to 65.5% of their neighbors[10]. Frequent lifting, static postures and vibration were all considerably more prevalent in the work of ragpickers than in the comparison group. Frequent squatting was almost twice as common among ragpickers than non-ragpickers (43.1% vs 22.1%).

#### Minor psychiatric disorders (MPD)

The prevalence of MPD in ragpickers (44.7%) and non-ragpickers (33.6%) was different ( $p=0.001$ ). When the non-ragpickers were sub-divided by occupation, the prevalences of MPD among domestic workers, day labourers, retail and construction workers were 39.0%, 36.3%, 35.9%, 23.7% respectively. Thus, all other occupations reported MPD prevalences inferior to ragpickers.

Univariate models identified female gender, and working as ragpicker as being associated with the studied outcome (Table 1). People from economic levels C, D and E

showed higher prevalence than level B and years of schooling had an inverse trend with the outcome. MPD prevalence was not associated with age, marital status or skin color (data not shown). Current smokers had 30% more risk for MPD than non-smokers, and there was a similar prevalence ratio comparing alcoholics to non-alcoholics. Workers who reported frequent static postures, a recent work accident, or low job satisfaction were also more likely to report MPD (Table 1). Low back pain (LBP), lower extremity pain (LEP) and upper extremity pain (UEP) were each associated with a 70 to 80% higher prevalence of MPD compared to the absence of these symptoms (data not shown).

These univariate associations with MPD prevalence were then evaluated for potential confounding and effect modification in Poisson regression models. First we analyzed the demographic and behaviour variables. Women consistently reported a higher prevalence of MPD than men, and this association was not diminished after controlling for economic level and schooling. Lower economic level showed an inverse trend with MPD, being the individuals in the lowest level E more at risk (PR= 1.6). When adjusted for gender and economic level, schooling became only weakly associated with MPD (p=0.4). Alcoholism (PR 1.3, 95%CI 1.2-1.4) was significantly associated with MPD. There was a borderline statistical significance for the association between smoking and MPD (p= 0.09) when a 3 level smoking variable was included. The current smokers' prevalence ratio was 1.3 (95%CI 1.0-1.5) compared to non-smokers (Table 2).

After characterizing these demographic and behavior characteristics of symptom prevalence, we then investigated the possibility that the lack of strong differences in symptom prevalence between ragpickers and non-ragpickers might be explained by confounding by one or more of these characteristics. Because we had matched closely on

age and gender, these could not confound the ragpicker-symptom associations. The sample was also matched on schooling, but as noted above, there was a substantial residual difference in schooling between ragpickers and non-ragpickers. Despite this, models with and without schooling showed no differences in other factors, and so models with schooling are not discussed further.

Table 2 shows a single model with all potential confounders included, and the ragpicker/non-ragpicker effect is only slightly reduced. Similarly, models with each of the variables in Table 2 added one at a time, did not change the ragpicker-MPD association materially.

We therefore investigated the associations between occupation (ragpicker/non-ragpicker), static posture, job satisfaction and work accidents with MPD. We investigated confounding and effect modification of these associations by economic level. Being a ragpicker was associated with a 20% higher prevalence of MPD. Static posture, job satisfaction and work accidents were associated with increases of 30% (95% CI= 1.1-1.6), 50% (95% CI=1.3-1.8) and 40% (95% CI= 1.2-1.7) respectively in the symptom prevalence (Table 2).

## **Discussion**

Work in the informal sector is increasing in most countries, and involves an estimated 60% of the workforce in Brazil, a large developing nation. Understanding the health, environmental, social and economic implications of this trend presents important challenges to public health researchers and administrators. This paper examined the risk factors for MPD among ragpickers and their non-ragpickers neighbors in Pelotas, Brazil.

A household survey by trained interviewers provided insights into many aspects of these workers' lives. The problem of MPD has been described in many occupations in Brazil[28-30], but rarely among those in the informal sector. This study is one of the first to use a quantitative analytic approach to studying the ragpickers' lives and working and health conditions, especially MPD.

Before discussing the results, it is important to address certain methodological aspects of the study. Data were collected using a standardized instrument, by a trained team, and in an identical fashion in both groups, thus contributing to the internal validity of the study.

In the present study, we employed the Self-Reporting Questionnaire (SRQ-20)[31]. This instrument was chosen because it has been previously validated in other studies of worker health, showing high sensitivity and specificity[32]. Moreover, this instrument has been used in a number of studies of worker health in Brazil[28-30, 33-35], thus allowing for a better comparison of our results to those identified in other occupational categories.

Cross-sectional studies like MPD are often biased towards underestimation of effects through healthy worker selection[36]. Selection out of the work force of those with MPD is particularly problematic in cross-sectional studies. In our study, we believe that this bias may not have been strong because the people that perform this kind of job are those who are unemployed, and have very few alternatives but to continue this work, regardless of their health status. The most important thing for them is to perform their work in order to earn some money to survive.

The higher prevalence reported by the ragpickers for most ergonomic hazards (repetitive work, heavy lifting, static postures, vibration and squatting position) when compared to their neighbors provide useful insights into the great work load exerted by these workers. Minor psychiatric disorders are not the only, or perhaps even the most important morbidity that ragpickers face[10]. Rather, we wanted to show that careful application of standard epidemiologic methods enabled us to systematically evaluate a range of problems faced by workers in the informal sector.

The reported prevalence of MPD (44.7%) was higher than that reported for formal sector workers in other studies using the same instrument. For example, prevalence of about 12.1% and 13.0% have been reported for studies in bus drivers[28, 30], 23.9% among managers in a state-owned company[37] and 24.6% and 19.1% among dentists and college professors respectively[34].

Alcoholism and smoking were associated with MPD even after controlling for confounders. Alcoholism is associated with a range of memory and executive deficits[38], among which depression and anxiety are the most frequent[39, 40]. Smoking is associated with a variety of mental disorders in many studies[41], and because nicotine is addictive, being a smoker is a relatively stable marker for low mental well being[42].

The socioeconomic factors that condition the life of these poor people are likely to have a close connection to MPD[27]. In our study, the people included in the lowest economic level, D and E, had prevalence ratios of 1.5 and 1.6 respectively when compared to those in Level B. These relative risks would probably have been higher if in the study there had been people in economic Level A. Low income groups are more

vulnerable to suffer MPD, irrespective of the overall state of development of the society they live[3].

Minor psychiatric disorders were considerably more common among women than men in our study. This pattern has been reported in many other populations[27, 43-45]. This difference in prevalence occurred despite the common practice of using a higher cutoff for identifying MPD in women (8) than in men (6)[20].

An earlier study of ragpickers in Brazil found a high prevalence of anxiety among this population[46]. Informal workers, especially ragpickers, have lower status than formal workers, lack security of employment and have less control over their working conditions[35]. Ragpickers recycle materials and food in dangerous areas (dumpsites, riverbanks, street corners and residential areas) with no personnel protection equipment; work amidst heavy traffic at intense traffic hours being at risk to be hit by traffic; work in irregular hours often including night; being discriminated against by society; and the uncertainty about the future can have negative impacts on their mental health[10].

The work of ragpickers involves frequent static postures[10], and this has been previously linked with musculoskeletal pain[14, 47, 48]. These in turn may lead to depression and anxiety[49]. Monotonous work has been associated with psychological distress[50].

Job satisfaction and work accidents seem to be associated with MPD in our study. Similarly, Jurado et al.[44] found that low job satisfaction increased the risk of depressive symptoms among school teachers. It is not hard to imagine that a recent accident could increase anxiety and depression among workers who are barely subsisting, and have no safety net if they cannot work. Despite this, caution is needed in interpreting cross-

sectional studies causally; we cannot be confident that the low job satisfaction and work accidents preceded MPD.

## **Conclusions**

Unemployment has been acknowledged as an important determinant of MPD in both developed and developing countries. Research concerned with the relationship between employment and health has often focused on the experience of relatively affluent countries, where several forms of welfare provide at least minimal protections for the unemployed. But in Brazil and many other developing countries, a large fraction of the population work outside the formal labor market and have no social safety net. Over the past 20 years in Brazil, the number of people who work in the collection of recycle materials (ragpickers) has increased dramatically. We have found that their MPD are higher than their neighbors who worked in more traditional manual labor, such as domestic work and construction. More attention should be paid to these workers that play an increasingly important role in the Brazilian economy and its environmental management. Educational programs should be introduced, adequate job training, appropriate awareness of the risks of the job and of the health problems that may arise. They should have access to personal protective equipment, materials handling devices, and safe means of transportation.

Perhaps most importantly, means must be found to bring these workers into the formal economy; ensuring them a basic wage, job security, and the social status that comes with a “real” job. Some Brazilian cities, including Pelotas, have begun to support the establishment of ragpicker cooperatives to help these workers pull themselves up into

decent jobs[51, 52]. More than an occupational health issue, the ultimate goal must be for ragpickers to escape their current marginality and to obtain respect and dignity. One small step in that direction was the recent inclusion of the occupation of “*ragpicker*” in the new Brazilian Occupation classification in 2002.

Understanding causes of MPD in different societies and jobs requires an understanding of the different socioeconomic circumstances around the world. Working outside the protection of employment legislation is very common in many poorer countries. It is an aspect of socioeconomic inequalities that has a particular meaning in a society like Brazil and that may have important consequences for mental health[35].

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

### **Competing interests**

The authors declare that they have no competing interests.

### **Authors' contributions**

MCS participated in the design of the study, supervised data collection, performed the data analyses and drafted the manuscript, AGF participated in the design of the study and helped to draft the manuscript, DK helped in data analyses and to draft the manuscript.

All authors read and approved the final manuscript.

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### **Figure Captions:**

**Figure 1.** Ragpickers live in poor quality houses, often with no running water or electricity.

**Figure 2.** Pushcarts are one of the most common means to transport waste. Ragpickers are a common sight on the streets of Pelotas city.

**Table 1.** Prevalence, prevalence ratios and confidence intervals for minor psychiatric diseases for socio-demographic, behavior, occupation, work hazard and work related characteristics for the sample with scholary until 8 years (n=879)

<b>Variables</b>	<b>Prevalence (%)</b>	<b>PR (CI 95%)</b>	<b>P value</b>
<b>Gender*</b>			0.001
Male	35.1	1.0	
Female	45.9	1.3 (1.1 – 1.5)	
<b>Economic Level (ABIPEME)</b>			0.01 <sup>&amp;</sup>
Level B (Highest)**	26.3	1.0	
Level C	31.8	1.2 (0.5 – 2.5)	
Level D	39.9	1.5 (0.7 – 3.1)	
Level E (Lowest)	43.4	1.6 (0.8 – 3.4)	
<b>Schooling (Years)</b>			0.02 <sup>&amp;</sup>
<1	46.2	1.0	
1 a 4 years	39.3	0.9 (0.7 – 1.0)	
5 a 8 years	34.8	0.8 (0.6 – 1.0)	
<b>Smoking Status</b>			0.01 <sup>&amp;</sup>
Never	33.9	1.0	
Ex	36.7	1.1 (0.8 – 1.4)	
Current	43.3	1.3 (1.1 – 1.5)	
<b>Alcoholism</b>			<0.001
CAGE Negative	36.1	1.0	
CAGE Positive	58.3	1.3 (1.2 – 1.4)	
<b>Ragpickers</b>			0.001
No	33.6	1.0	
Yes	44.7	1.3 (1.1 – 1.6)	
<b>Static Posture</b>			0.001
No	30.6	1.0	
Yes	42.4	1.4 (1.1 – 1.7)	
<b>Work accidents</b>			<0.001
No	36.1	1.0	
Yes	58.3	1.6 (1.4 – 1.9)	
<b>Job satisfaction</b>			<0.001
Yes	36.1	1.0	
No	58.3	1.6 (1.4 – 1.9)	

<sup>&</sup> p for trend

\* Cut-points defining MPD: Males  $\geq 6$  Females  $\geq 8$ . See text for details

\*\*There were no participants from economic level A

**Table 2.** Poisson regression models estimating prevalence ratios, confidence intervals for minor psychiatric diseases for behavior characteristics\*

<b>VARIABLES</b>	<b>PR Adjusted** PR (95% CI)</b>	<b>P value</b>
<b>Economic Level<sup>1</sup></b>		0.008
Level B	1.0	
Level C	1.2 (0.5 – 2.5)	
Level D	1.5 (0.7 – 3.1)	
Level E	1.6 (0.8 – 3.4)	
<b>Smoking Status<sup>2</sup></b>		0.09
Never	1.0	
Ex	1.1 (0.9 – 1.5)	
Current	1.3 (1.0 – 1.5)	
<b>Alcoholism<sup>2</sup></b>		<0.001
CAGE Negative	1.0	
CAGE Positive	1.3 (1.2 – 1.5)	
<b>Ragpickers<sup>3</sup></b>		0.01
No	1.0	
Yes	1.3 (1.0 – 1.5)	
<b>Static Posture<sup>4</sup></b>		0.02
No	1.0	
Yes	1.3 (1.1 -1.6)	
<b>Job satisfaction<sup>4</sup></b>		<0.001
Yes	1.0	
No	1.5 (1.3 – 1.8)	
<b>Work accidents<sup>4</sup></b>		<0.001
No	1.0	
Yes	1.4 (1.2 – 1.7)	

\* Only those variables shown to have univariate association with MPD are shown (gender, age and schooling were associated with MPD but because they were matching variables, they could not confound other associations, and so they are not shown here)

\*\* PR adjusted for all variables in the same level and the previous level.

<sup>1</sup>First level <sup>2</sup>Second level <sup>3</sup>Third level <sup>4</sup>Fourth level

**- File names:**

Figure 1 – ragpickers' homes

Figure 2 – pushcarts

**- File format:**

JPEG

**- Title of data:**

**Figure 1.** Ragpickers live in poor quality houses, often with no running water or electricity.

**Figure 2.** Pushcarts are one of the most common means to transport waste. Ragpickers are a common sight on the streets of Pelotas city.

**- Description of data**

**Figure 1.** Ragpickers live in poor quality houses, often with no running water or electricity.

**Figure 2.** Pushcarts are one of the most common means to transport waste. Ragpickers are a common sight on the streets of Pelotas city.



Figure 1



Figure 2