**ORIGINAL ARTICLE /** *ARTIGO ORIGINAL*

# Satisfaction with physical and social surroundings and the habit of smoking cigarettes in the metropolitan area of Belo Horizonte, Brazil

*A satisfação com o entorno físico e social e o hábito de fumar cigarros na região metropolitana de Belo Horizonte*

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**ABSTRACT:** The objective of this study was to examine the association between individual satisfaction with social and physical surroundings and the habit of smoking cigarettes. Data from the Health Survey of Adults from the metropolitan area of Belo Horizonte, Minas Gerais, Brazil, were used. Based on a probability sample, participants (n = 12,299) were selected among residents aged 20 years old or more. The response variable was the smoking habit and the explanatory variable of interest was the neighborhood perception. Potential confounding variables included demographic characteristics, health behaviors and other indicators of socioeconomic position. The prevalence of current smokers, former smokers and never smokers were 20.8, 14.1 and 65.1%, respectively; 74.4 and 25.5% of the participants were categorized as being more satisfied and less satisfied with the neighborhood, respectively. Compared to those who never smoked, former smokers (adjusted odds ratio = 1.40, 95% confidence interval 1.20 – 1.62) and current smokers (adjusted odds ratio = 1.17, 95% confidence interval 1.03 – 1.34) were less satisfied with the neighborhood compared to those who never smoked. The results of this study indicate there is an independent association between the smoking habit and a less satisfying neighborhood perception in the metropolitan region of Belo Horizonte, which does not depend on individual characteristics, traditionally reported as being associated with smoking.

*Keywords:* Smoking. Housing. Residence characteristics. Health survey. Perception. Social perception.

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**RESUMO:** O objetivo do trabalho foi examinar a associação entre a satisfação com o entorno físico e social da vizinhança e o hábito de fumar cigarros. Foram utilizados dados do Inquérito de Saúde dos Adultos da Região Metropolitana de Belo Horizonte. Os participantes do estudo (n = 12.299) foram selecionados por meio de amostra probabilística entre os residentes com 20 anos ou mais de idade. A variável resposta foi o hábito de fumar e a variável explicativa de interesse foi a percepção da vizinhança. Potenciais variáveis de confusão incluíram características demográficas, outros comportamentos em saúde e indicadores de posição socioeconômica. As prevalências de fumantes atuais, ex-fumantes e dos que nunca fumaram foram 20,8; 14,1 e 65,1%, respectivamente; 74,4% e 25,5% dos participantes foram categorizados como mais satisfeitos e menos satisfeitos com a vizinhança, respectivamente. Em comparação aos que jamais fumaram, os ex-fumantes (*odds ratio* ajustado = 1,40; intervalo de confiança de 95% 1,20 – 1,62) e os fumantes atuais (*odds ratio* ajustado = 1,17; intervalo de confiança de 95% 1,03 – 1,34) eram menos satisfeitos com a vizinhança em comparação aos que nunca fumaram. Os resultados deste trabalho mostraram que existe associação independente entre o hábito de fumar e pior percepção da vizinhança na região metropolitana de Belo Horizonte, que independe de características individuais, tradicionalmente reportadas como associadas ao hábito de fumar.

*Palavras-chave:* Hábito de fumar. Habitação. Distribuição Espacial da População. Inquéritos epidemiológicos. Percepção. Percepção Social.

# INTRODUCTION

The smoking habit is a risk factor for ischemic heart disease, cerebrovascular disease, lower respiratory tract infections, chronic obstructive pulmonary disease, respiratory system cancer and tuberculosis, among others[1]. Nowadays, tobacco is the most used drug in the world, responsible for approximately 5.4 million deaths a year, out of which 50% occur in mid and low-income countries[2]. The habit of smoking cigarettes can be associated with 25% of cerebrovascular diseases, 30% of deaths caused by malignant neoplasms, 45% of heart diseases and 85% of respiratory diseases[3]. Additionally, passive smoking is the 3rd major preventable cause of death in the world, after the habit of smoking cigarettes and excessive alcohol consumption[4]. In Brazil, it is estimated that about 200 thousand deaths a year are associated with the smoking habit[5].

In 2008, approximately 3.3 billion individuals, that is, more than half of the world population, lived in cities. In 2030, it is estimated that around 5 billion people will live in urban areas. Therefore, globally, the future population growth will take place in the cities, which are already densely populated[6]. In Brazil, the proportion of people living in urban areas increased from 31.3%, in 1940, to 84.3%, in 2011[7]; consequently, urban centers will have most of the smokers in the country.

Recent studies have shown that the physical and social surroundings (PSS) of the household are associated with the smoking habit[8,9]. Some of these studies suggest that such an association can be independent from individual socioeconomic status[10-13]. In Brazil, the influence of PSS of the neighborhood and the habit of smoking cigarettes has been little analyzed, and, to our knowledge, there are no population-based epidemiological studies in major urban centers on the subject.

This study aims at examining and quantifying the association between perception of the neighborhood and smoking habit among adults living in the metropolitan rea of Belo Horizonte, Minas Gerais.

## METHODS

### DATA SOURCE AND POPULATION

The data source for this study was the Health Survey from the Metropolitan Region of Belo Horizonte (RMBH), conducted from May to July, 2003. The survey sample was designed to produce estimates of the non-institutionalized population aged 10 years old or more, living in the 20 cities that composed the RMBH. This is a two-stage probability cluster sample. The census sectors from the Brazilian Institute of Geography and Statistics (IBGE) were used as the primary selection unit, and the sampling unit was the household. The estimated loss in the sampling calculation accounted for 20%. All of the people living in the household aged 10 years old or more were eligible for a face to face interview. Out of the 7,500 sample households, 5,922 (79%) participated in the survey. More details are demonstrated in another publication[14]. For this study, all of the participants in the health survey aged 20 years old or more were selected.

### RESPONSE VARIABLE

The smoking habit was defined by the following question: *"Which of the following sentences defines your habits regarding cigarettes better?"*, with six alternatives: (1) never smoked; (2) never smoked 100 cigarettes in a lifetime; (3) already smoked 100 cigarettes in a lifetime, but quit it; (4) less than 20 cigarettes a day; (5) from 21 to 40 cigarettes a day; and (6) more than 40 cigarettes a day. Those who gave positive answers to options 1 and 2 were classified as non-smokers; the ones who gave a positive response to option 3 were considered to be former smokers; and current smokers were the ones who gave positive responses to the other options. Questions concerning the use of cigarettes used in this study were translated to Portuguese from the questionnaire of the National Center for Health Statistics (NCHS)[15].

## EXPLANATORY VARIABLES

The main explanatory variable was the perception of the neighborhood, categorized as satisfactory and unsatisfactory. These categories were built based on the responses (yes/no) to the following questions: (1) *"Do you feel comfortable in the neighborhood where you live, that is, do you feel at home?"*, (2) *"Are you satisfied about how the block where you live is taken care of?"*; (3) *"Is your neighborhood a good place to live?"*; (4) *"Are you proud to tell others about the place where you live?"*; (5) *"Do your neighbors help each other?"*; (6) *"Do children and teenagers in your neighborhood treat adults with respect?"*; and (7) *"Is your neighborhood a good place for children to play and to raise adolescents?"*. More than three positive responses (yes) were defined as a satisfactory perception of the neighborhood. Three or fewer positive responses were defined as a less pleasant perception of the neighborhood. This variable was built by the authors for being the mean point of the seven possible responses, after factorial analysis.

Other explanatory variables constituted four domains: (1) socioeconomic and demographic characteristics (age, sex, marital status, time of household in RMBH, schooling years, filiation to a private health insurance plan and current job); (2) health behaviors (excessive alcohol consumption, physical activities at leisure times and daily intake of fruits, vegetables or greens in the past 30 days); (3) history of medical diagnosis for diseases and chronic conditions. Excessive alcohol consumption was defined by the intake of 5 or more doses in a single occasion in the past 30 days[16]. Physical activities during leisure time were defined by the weekly frequency, in the past 90 days, of activities of any intensity for 20 to 30 minutes. The consumption of greens, fruits and vegetables was defined by the daily intake, regardless of the amount, in the past 30 days. The condition of having one or more chronic diseases was defined by the question "Has any doctor ever said you have", considering the following diseases or chronic conditions: arthritis, cancer, hypertension, asthma/bronchitis, diabetes, angina, infarction, another heart disease, stroke, chronic kidney disease and depression.

## STATISTICAL ANALYSIS

The non-adjusted data analysis was based on the $\chi^2$ test for comparisons between frequencies, and on the analysis of variance for comparisons between means. The multivariate analysis was based on *odds ratio* (OR) and 95% confidence intervals (95%CI), estimated by multinomial logistic regression. The main explanatory variable was built based on the studied literature and on the factorial analysis of the responses in the survey that originated this study. All of the variables that presented associations with the smoking habit lower than 20% (p < 0.20) in the non-adjusted analysis were included in the logistic model; the ones who had associations with the smoking habit lower than 5% (p < 0.05) remained in the final multivariate model. The condition of the respondent (the person or a substitute) was at first considered as a confounding variable in the study, being maintained in the final model. Analyses were conducted with

the software Stata 10.0 (Stata Corporation, College Station, Texas). The survey (svy) procedure was used for population surveys with complex samples, which considers the design effect[17], the weight of the individuals in the sample and the household cluster.

The Health Survey in the Metropolitan Region of Belo Horizonte was approved by the Ethics Committee from the Research Institute René Rachou, in Fundação Oswaldo Cruz, Belo Horizonte, Minas Gerais (Report n. 011, from 20/12/2001).

## RESULTS

Out of the 13,636 participants of the Heath Survey in the RMBH aged 20 years old or more, 12,129 (88.9%) had complete information for all of the study variables and were included in this analysis. Participants and non-participants were similar (p < 0.05) with regard to sex, age, schooling years, smoking habit and perception of the neighborhood.

Concerning the habit of smoking cigarettes, 65.1% of the participants had never smoked, 14.1% were former smokers and 20.8% were current smokers. Satisfaction about the neighborhood was prevalent in the studied population (74.5%).

Among participants, mean age was of 40.5 years old, and the age group between 20 and 29 years old was prevalent (29.9%), as well as the female gender (54.3%) with lower schooling (44.4% had not completed elementary school or were illiterate); as observed in Table 1.

Table 2 shows the results of the univariate analysis of the association between perception of the neighborhood and socioeconomic and demographic characteristics with the smoking habit. The perception of the neighborhood, age, sex, marital status, time of household in the RMBH, schooling years, filiation to a private health insurance plan and current job presented statistically significant associations with the smoking habit. The excessive alcohol consumption, physical activities during leisure time, the daily intake of vegetables, fruits and greens and the condition of having at least one chronic disease presented statistically significant associations with the smoking habit.

The final results of the multivariate analysis (Table 3) show that the perception of the neighborhood, age group and sex presented statistically significant associations with the smoking habit. In comparison to those who never smoked, former smokers were less satisfied about their neighborhood, mostly older men. In comparison to those who never smoked, current smokers were less satisfied about their neighborhood, mostly men aged between 30 and 59 years old.

## DISCUSSION

The results in this study indicate the association between the least satisfactory perception of the neighborhood and being a smoker in the RMBH. This association

Table 1. Distribution of frequency according to the selected variables for 12,299 participants. Health Survey of Adults, metropolitan region of Belo Horizonte, MG, Brazil. 2003.

| Characteristics | % |
|---|---|
| Smoker | 20.8 |
| Positive perception of the neighborhood | 73.8 |
| Aged between 20 and 29 years old | 29.6 |
| Female | 54.1 |
| Married or stable union | 56.5 |
| At least higher education | 8.0 |
| Private health insurance plan | 34.9 |
| Unemployed | 12.5 |
| Consumption of more than five doses of alcohol in the past week | 4.4 |
| Frequency of less than three times a week for physical activities lasting from 20 to 30 minutes during leisure time, in the past 90 days | 82.7 |
| Chronic diseases | 34.2 |
| Daily intake of fruits, vegetables and greens in the past 30 days | 58.8 |
| Time of household in the metropolitan region of Belo Horizonte, years (mean ± standard deviation) | 30.1 ± 15.4 |

persisted even after adjustments by socioeconomic and demographic characteristics, health-related behaviors and self-reported health conditions.

In general, these results are in accordance with studies conducted in cities from high-income countries, like Amsterdam, in the Netherlands, and Minneapolis, in the United States[18,19]. Some studies are conclusive with regard to the importance of the neighborhood for the habit of smoking cigarettes. An analysis conducted in London, England, used a multilevel model and reported that living in more vulnerable areas, in relation to the characteristics of the physical and social surroundings, would be related to the higher frequency of cigarette use and the habit of smoking cigarettes[20]. Besides, in Manchester, England, living in more vulnerable places with regard to physical and social surroundings was a predictive factor for the number of cigarettes smoked by the participants[21]. More recently, a study conducted in several cities of France showed that the risk of being a smoker was comparatively higher in areas with lower income, even after individual factors were controlled (education, income, occupation)[22]. In Austin, in the United States, a study involving the afro-descendants showed that physical and social surroundings were more strongly associated with the habit of smoking cigarettes than

Table 2. Univariate analysis of the association between satisfaction concerning physical and social surroundings, sociodemographic characteristics and the habit of smoking cigarettes. Health Survey of the metropolitan region of Belo Horizonte, MG, Brazil. 2003.

| Characteristics | Habit of smoking cigarettes (%)[a,b] | | | | |
| --- | --- | --- | --- | --- | --- |
| | Total n = 12.299 | Never smoker n = 8.003 | Former smoker n = 1.739 | Smoker n = 2.557 | p-value |
| Satisfaction about physical and social surroundings | | | | | |
| Satisfactory | 74.4 | 75.9 | 71.62 | 71.8 | < 0.01 |
| Unsatisfactory | 25.5 | 24.1 | 28.38 | 28.2 | |
| Age (years) | | | | | |
| 20 – 29 | 29.8 | 34.9 | 13.29 | 24.9 | < 0.01 |
| 30 – 39 | 23.3 | 23.5 | 17.37 | 27.0 | |
| 40 – 49 | 20.3 | 17.0 | 27.21 | 26.0 | |
| 50 – 59 | 14.2 | 12.9 | 20.54 | 14.3 | |
| > 60 | 12.1 | 11.5 | 21.58 | 7.7 | |
| Sex | | | | | |
| Female | 54.1 | 60.1 | 41.02 | 43.6 | < 0.01 |
| Male | 45.9 | 39.9 | 58.98 | 56.4 | |
| Marital status | | | | | |
| Married or stable union | 56.9 | 54.4 | 67.98 | 57.3 | < 0.01 |
| Single | 30.4 | 34 | 16.38 | 28.7 | |
| Widow(er) | 6.1 | 6.4 | 8.04 | 4.0 | |
| Divorced | 6.4 | 5.1 | 7.60 | 10.0 | |
| Time of household in the MRBH in years, mean (SD)[c] | 30.1 (15.4) | 29.3 (15.4) | 33.47 (16.2) | 30.0 (14.6) | < 0.01 |
| Schooling years (complete) | | | | | |
| Higher education | 9.7 | 10.7 | 10.18 | 6.5 | < 0.01 |
| High school | 30.3 | 34.9 | 21.32 | 21.5 | |
| Elementary school | 15.5 | 14.9 | 14.93 | 17.8 | |
| Incomplete elementar school or illiterate | 44.4 | 39.4 | 53.56 | 54.2 | |

Tabela 2. Continuation.

| Characteristics | Habit of smoking cigarettes (%)[a,b] | | | | |
| --- | --- | --- | --- | --- | --- |
| | Total n = 12.299 | Never smoker n = 8.003 | Former smoker n = 1.739 | Smoker n = 2.557 | p-value |
| Private health insurance plan | | | | | |
| No | 63 | 60.5 | 61.46 | 72.0 | < 0.01 |
| Yes | 37.0 | 39.5 | 38.54 | 27.9 | |
| Current occupation | | | | | |
| Unemployed | 12.7 | 14.2 | 10.32 | 9.4 | < 0.01 |
| Retired | 14.2 | 13.1 | 22.18 | 12.4 | |
| Employed | 58.2 | 58.5 | 55.57 | 59.0 | |
| Housekeeper or student | 11.4 | 11.1 | 8.79 | 14.3 | |
| Inactive | 3.4 | 3.0 | 3.15 | 4.8 | |
| Excessive alcohol consumption | | | | | |
| No | 95.9 | 97.9 | 94.93 | 90.1 | < 0.01 |
| Yes | 4.1 | 2.1 | 5.07 | 10.0 | |
| Frequency of physical exercises in leisure times, for 20 to 30 minutes three or more times a week | | | | | |
| Less than 3 times a week | 82.4 | 81.8 | 78.91 | 86.7 | < 0.01 |
| Three times a week or more | 17.6 | 18.2 | 21.09 | 13.3 | |
| Daily intake of vegetables, fruits and greens in the past 30 days | | | | | |
| No | 40.2 | 38.6 | 38.21 | 46.7 | < 0.01 |
| Yes | 59.8 | 61.3 | 61.79 | 53.2 | |
| History of medical diagnosis for at least one disease or chronic condition | | | | | |
| No | 66.6 | 69.6 | 54.87 | 65.0 | < 0.01 |
| Yes | 33.4 | 30.4 | 45.13 | 35.0 | |

[a]p value: Pearson's $\chi^2$ test for differences between frequencies and analysis of variance for differences between means; [b]estimated percentages considering sampling weight; [c]test of analysis of variance.

Table 3. Multinomial logistic regression for the habit of smoking cigarettes according to the satisfaction concerning physical and social surroundings, age and sex, for 12,299 participants. Health Survey of Adults, metropolitan region of Belo Horizonte, MG, Brazil. 2003

| Characteristics | Habit of smoking cigarettes (non-adjusted value) | | Habit of smoking cigarettes (OR; 95%CI) | |
|---|---|---|---|---|
| | Smoker | Former smoker | Smoker | Former smoker |
| Satisfaction about physical and social surroundings | | | | |
| Satisfactory | 1.0 | 1.0 | 1.0 | 1.0 |
| Less satisfactory | 1.2 (1.1 – 1.4) | 1.2 (1.1 – 1.4) | 1.4 (1.2 – 1.6) | 1.2 (1.0 – 1.3) |
| Age (years) | | | | |
| 20 – 29 | | | 1.0 | 1.00 |
| 30 – 39 | | | 1.7 (1.3 – 2.1) | 1.5 (1.3 – 1.8) |
| 40 – 49 | | | 3.6 (2.8 – 4.6) | 1.9 (1.5 – 2.3) |
| 50 – 59 | | | 3.5 (2.7 – 4.6) | 1.3 (1.1 – 1.6) |
| > 60 | | | 4.4 (3.2 – 6.1) | 0.8 (0.6 – 1.1) |
| Sex | | | | |
| Female | | | 1.0 | 1.00 |
| Male | | | 2.5 (2.2 – 2.9) | 1.9 (1.6 – 2.1) |

OR: odds ratio; 95%CI: 95% confidence interval adjusted for all of the variables listed in the table and type of respondent, marital status, sex, age, time of household, schooling years, health plan, occupation, alcohol consumption, physical activities, intake of fruits, vegetables and greens and self-reported chronic diseases (reference category: never smoked).

the individual characteristics of the people living there[23]. A multilevel study conducted in cities from the count of Norfolk, in England, demonstrated that the higher the level of social vulnerability (worst socioeconomic status of the individuals and lower schooling), the higher the chances of these individuals being smokers[24]. In another study, men living in Minneapolis, United States, who assessed their neighborhood as having more social cohesion, had less chances of being smokers[19]. A multilevel study conducted in Adelaide, Australia, showed that aggregated features (indicator of relative socioeconomic disadvantage, obesity and quality of life) to the household area contribute with smoking, regardless of individual factors[9]. A recent study conducted in the Netherlands showed that people who live in more vulnerable areas presented less chances of abandoning the use of tobacco[20].

There are some limitations in this study. In sectional studies, it is not possible to establish temporal relationships or to ensure the asymmetry between exposure and

event of interest. With regard to the response variable, our study did not measure the duration of cigarette use. Therefore, among smokers, some individuals have used cigarettes for very different periods of time. Yet, potential participants of this study, who would be the "inveterate smokers", may not have participated in the survey for having died or for being very ill and hospitalized. Also, a possible reason for the higher magnitude of the association for former smokers found in our study can be related to its cross-sectional design; therefore, it is possible that the group of former smokers is composed of individuals who recently abandoned the smoking habit, and others who did so a long time ago.

On the other hand, there are some positive aspects in this study, such as the sample size, the geographic scope of the third largest metropolitan region in the country and, in a recent literature review, the absence of a similar study in Brazil.

Our results suggest that programs against smoking should consider the importance of the physical and social surroundings of the neighborhood, which is an often neglected health determinant. Interventions on the physical and social surroundings of the neighborhood, which are not traditionally associated with the health field, may have a positive impact on the habit of smoking cigarettes[25,26].

## CONCLUSION

The results can be associated with the unfavorable conditions of the most vulnerable physical and social surroundings of the neighborhood. Further studies should take place in Brazil to investigate other factors associated with the use of cigarettes, other than individual ones[5], in order to better understand this and other public health problems. Besides, public programs against smoking should consider the importance of the physical and social surroundings (PSS) of the neighborhood, which is an often neglected health determinant. Therefore, interventions on the physical and social surroundings of the neighborhood, which are not traditionally associated with the health field, may have a positive impact on behaviors and lifestyles, such as the habit of smoking cigarettes.

## ACKNOWLEDGEMENTS

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