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Occurrence of respiratory symptoms in elderly persons heard by the family health strategy in Águas Lindas, Ananindeua, Pará State

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ABSTRACT. Respiratory diseases are among the five leading causes of death in Brazil, particularly among the elderly. This study identified the occurrence of respiratory symptoms in older persons. Specifically, a descriptive, observational, and quantitative study was conducted using a sample of elderly people enrolled in the Hypertension and Diabetes sessions of the Family Health Strategy program in a Brazilian city. MRC-ATS-DLD78 questionnaires were used to analyze respiratory symptoms with a sample comprised of 50 volunteers (mean age = 69.96 years). The median time living in a dwelling within a polluted sample area was 30 years, with 82% reporting spending more time per day at home or in the neighborhood. The presence of coughing was reported by 18% persons, expectoration (17%), productive cough (14%), wheezing (34%), dyspnea (12%), and respiratory diseases (26%). Physiological changes in aging associated with the effects of pollution exposure leave elderly people more vulnerable to respiratory diseases because they are predisposed to diseases, such as decreased pulmonary elasticity, elevated lung compliance, reduced oxygen diffusion capacity, reduced expiratory flow, and premature closure of airways. The occurrence of respiratory symptoms in the elderly was 30% with one symptom, two (22%), three (10%), four (6%), and five (2%).

Keywords: aging; environmental pollution; public health.

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Introduction

In Brazil, two enacted laws consider elderly persons as those ⩾ 60 years old, namely, the National Policy on the Elderly (Law No.8.842, January 4th; Brasil, 1994), and the Statute of the Elderly (Law No.10.741, October 1st; Brasil, 2003). The World Health Organization (WHO) defines the elderly differently after taking into consideration the socioeconomic level of each country (WHO, 2002). Therefore, persons 60 years of age or older are considered elderly in developing countries, whereas the age considered elderly is extended to 65 years of age or more in developed countries.

Accelerated demographic aging has caused significant repercussions for society, such as the additional costs to the social security system. Both the Brazilian and world populations have undergone significant changes as evidenced by the decrease in the percentages of children and young people (Soares & Istoe, 2015) to such an extent that a reversal of the population pyramid is foreseen as early as 2025 in Brazil (Instituto Brasileiro de Geografia e Estatística [IBGE], 2015).

The elderly population is increasing faster than all others in Brazil with an estimated average growth rate of more than 4% per year between 2012 and 2022, thereby suggesting that the population of elderly people may reach an estimated 41.5 million by 2030 (IBGE, 2015). Based on an aging population, several problems related to the morbimortality of this age group arise. They represent a vulnerable population with weakened immune systems and a higher incidence of chronic diseases and respiratory alterations (Mendes et al, 2014).

Respiratory system diseases are among the five main causes of death in Brazil, particularly in the elderly. Respiratory diseases result from pathogens, allergens, chemical agents, and traumatic physical events (Francisco, Donalisio, & Marín-León, 2013). Factors associated with low immunity and the reduction of ciliary function add to the impact of respiratory diseases related to environmental pollutants (Gonçalves, Castro, & Hacon, 2012). Long-term tobacco exposure includes smoking (active and passive). Smoking,

occupational fumes, and indoor/outdoor air pollution are all risk factors for the development of respiratory diseases. Based on aging characteristics, risks may be even greater when associated with obesity, diabetes, and other conditions (Pérez-Padilla, Stelmach, Soto-Quiroz, & Cruz, 2014).

Global urbanization has resulted in increased emissions of pollutants from burning fossil fuels. Approximately half of the world's population lives in urban areas where citizens are exposed daily to very high levels of air pollutants (Arbex et al., 2012). In this sense, air quality directly affects respiratory health through the excessive contact between human respiratory systems and the environment. The WHO reports that air pollution causes approximately 20,000 deaths per year. This represents a fivefold increase in the number of deaths caused by smoking (Arbex et al., 2012).

When examining pulmonary disorders, it is important to emphasize that smoking, environmental pollution, occupational exposure, pulmonary disease history, and socioeconomic differences are all factors that may affect pulmonary function and have negative consequences on the elderly (Pinto, Soares, Reveles, & Shimoya-Bittencourt, 2014).

In the Águas Lindas neighborhood of Ananindeua, an open-air dump was created in the 1990s and was expanded exponentially for over a decade, thereby causing severe soil and water contamination while serving as a natural incubator for the proliferation of diseases based on the presence of several factors (Pinheiro et al., 2019). The dump received as many as 1,000 tons of waste per day from the surrounding municipalities of Belém, Ananindeua, and Marituba. In July 2015, these activities were finally suspended, and the land became a designated controlled landfill site. However, even though it was deactivated approximately five years ago, this land is used for the combustion of solid waste that continues to pollute the air (verbal information provided by local authorities), and the emission of methane gas in the Aurá dump is equivalent to the burning of 34,000 hectares of forest.

The identification of respiratory symptoms in the region's elderly population is important to assist planners when implementing preventive programs and actions as well as early health interventions through the Family Health Strategy team. Therefore, this study identified the prevalence of respiratory symptoms in a group of elderly individuals enrolled in the Family Health Strategy program in the city of Ananindeua, Pará.

Material and methods

This cross-sectional, descriptive, observational, and exploratory study with a quantitative design was conducted with elderly volunteers enrolled in Family Health Strategy II in the neighborhood of Águas Lindas, located in the municipality of Ananindeua, Pará where five clandestine dumps were deactivated approximately five years ago.

The study was conducted between June–August in 2016. It was authorized by the health secretary of the Municipality of Ananindeua in Pará state and approved by the Human Research Ethics Committee of the State University of Pará under opinion number 1.548,117.

A total of 70 elderly individuals were registered in the Hypertension and Diabetes sessions of the Family Health Strategy II program in Águas Lindas in 2015. Excluded from this study were 8 elderly patients with cognitive alterations as evaluated using the Mini-Mental State examination, 3 who lived outside the neighborhood, 4 who could not be contacted by telephone or home visit, 4 who were deceased, and 1 who chose not to participate. Therefore, the final sample comprised 50 elderly volunteers of all ethnicities and both genders.

After the sample was defined, the researchers contacted all volunteers by telephone calls and home visits to formally invite them to participate in the survey. Their acceptance was confirmed by signing informed consent forms, where after the Mini-Mental State examination was administered followed by the adapted MRC-ATS-DLD78 questionnaire that had been previously validated for the analysis of respiratory symptoms (Aguiar, Beppu, Romaldini, Ratto, & Nakatani, 1998).

In order to obtain more information, the following demographic data were added to the questionnaire: age, gender, ethnicity, educational level, length of residence in the neighborhood, length of stay in the residence during the day, and place of work. The data collected were tabulated in a spreadsheet in order to perform the statistical analyses.

According to the nature of the variables, a descriptive analysis was performed, and the percentage values of the results were reported. The database and tables were built with spreadsheet, and text editor was used for text preparation.

Results

Fifty elderly volunteers between 60–85 years of age (M = 69.96. ± 6.58) participated in the study, of which 31 were female (62%) and 19 were male (38%). For ethnic grouping, 68% declared themselves *pardos* (brown skinned), 30% black, and 2% indigenous. Regarding educational level, 66% had incomplete elementary education, 16% were illiterate, 8% completed elementary school, 6% completed high school, and 4% had incomplete secondary education.

Regarding the time of dwelling within the research site, the minimum was 2 years and the maximum was 50, with a median of 30 years of occupancy. Table 1 shows the descriptive analysis of the dwelling time of the elderly in the zone where the study was conducted, while Table 2 shows the longevity of these volunteers in their current residences.

Table 1. Quantity and percentage of participants by time in current dwelling.

Length of stay (years)	Quantity	Percentage
1–10	9	18.00
11–20	7	14.00
21–30	15	30.00
31–40	18	36.00
4 –50	1	2.00
Total	50	100.00

Table 2. Quantity and percentage of participants by length of stay in the residence.

Length of Stay	Quantity	Percentage
Always at home or in the neighborhood	41	82.0
Only at night and weekends	7	14.0
4 times per week	2	4.0
Total	50	100.0

The results of the MRC-ATS-DLD78 questionnaire regarding respiratory symptoms are shown in Table 3.

Table 3. Percentage of participants with specific respiratory symptoms.

1. Cough		
Do you usually have a cough? (Count coughs with first smoke or when going outdoors for the first time. Exclude	n	%
Yes	9	18.0
No	41	82.0
Total	50	100.0
2. Phlegm		
Do you usually bring up phlegm from your chest? (Count phlegm with first smoke or after going outdoors. Exclude	n	%
Yes	17	34.0
No	33	66.0
Total	50	100.0
3. Episodes of Cough and Phlegm		
Have you had periods/episodes of (increased*) cough and phlegm lasting for three weeks or more each year?	n	%
Yes	7	14.0
No	43	86.0
Total	50	100.0
4. Wheezing		
Does your chest ever sound wheezy or as if it is whistling?	n	%
Yes	17	34.0
No	33	66.0
Total	50	100.0
5. Breathlessness		
Are you troubled by shortness of breath when rushing on the level or when walking up a slight hill?	n	%
Yes	6	12.0
No	44	88.0
Total	50	100.0
6. Chest Colds and Chest Illnesses		
When you get a cold, does it usually reach your chest?	n	%
Yes	13	26.0
No	37	74.0
Total	50	100.0

n: Quantity; %: Percentage.

Table 4 refers to the occurrences of respiratory symptoms in the 50 elderly volunteers enrolled in the Hypertension and Diabetes program in the Águas Lindas neighborhood who completed the MRC-ATS-DLD78 questionnaire.

Table 4. Occurrence of respiratory symptoms.

Occurrence of respiratory symptoms	%
Absence of respiratory symptoms	30.0
1 Respiratory symptom	30.0
2 Respiratory symptoms	22.0
3 Respiratory symptoms	10.0
4 Respiratory symptoms	6.0
5 Respiratory symptoms	2.0

Regarding occupational exposure, 82% of the elderly persons interviewed reported working in environments where they were exposed to harmful substances, including dust, fumes, or irritating vapors, while 46% reported that they were habitual smokers.

Table 5 shows the relationship between the dwelling time in years within the polluted zone covered in the research and the percentage of respiratory symptoms of the participants. Based on an average dwelling time of 25 years, it is clear that the longer the dwelling time, the more susceptible the person was to coughing, expectoration, productive cough, and respiratory diseases.

Table 5. Percentage of respiratory symptoms of participants in relation to length of stay.

Length of dwelling (years)	n	Cough (%)	Expectoration (%)	Productive cough (%)	Wheezing (%)	Shortness of breath (%)	Respiratory diseases (%)
1–25	22	13.64	31.82	13.64	36.36	4.55	27.27
26–50	28	21.43	35.71	14.29	32.14	17.86	25.00

n: Quantity, %: Percentage.

Discussion

According to the Brazilian Institute of Geography and Statistics (IBGE, 2011), women have greater longevity than men because they have lower exposure to certain risk factors of external or violent causes, such as traffic accidents and homicides, both of which are far more frequent in males. This finding also corroborates the present study in which a greater percentage of female participants (62%) were included in the study.

Regarding ethnicity, in the last census taken in 2010, more people declared themselves to be brown (43%), black (7.6%), and yellow (1.1%) in relation to the previous census. The highest percentage of *pardos* lived in the north and northeast regions. These results are similar to those found in this study where a predominance of brown people (68%) was reported followed by black ethnicity (30%).

In this study, we observed that the most prevalent level of education among the elderly was incomplete primary education (66%) followed by illiteracy (16%). This result is also observed in other localities of the country, as reported by Pilger, Menon, and Mathias (2011) who described the sociodemographic and health characteristics of the elderly in the city of Guarapuava, Paraná. They obtained similar results with 54% of the elderly with incomplete primary education followed by illiteracy (20.9%).

Physiological changes in aging associated with the effects of exposure to air pollution leave the elderly more vulnerable to respiratory problems. This can occur because the elderly are predisposed to decreased pulmonary elasticity, increased pulmonary compliance, reduced oxygen diffusion capacity, reduction of expiratory flow, premature airway closure, and closure of the smaller air passages (Fechine & Trompieri, 2012).

In the present study, even though 38% of the volunteers had lived in the contaminated neighborhood for at least 30 years and were exposed to significant air pollution from the nearby old dumping grounds, the majority reported no respiratory symptoms. Among those who presented symptoms, the most prevalent were expectoration (34%), chest wheezing (34%), and coughing (20%).

Mendes et al. (2014) studied 148 elderly people to examine the quality of indoor air in Portuguese homes. Sputum (12%) and cough (23%) were the most common respiratory symptoms reported.

In another study conducted in the city of Cezarina, Goiás, by Augusto Junior, Carmo Filho, and Sousa (2014), the prevalence of respiratory signs and symptoms and their possible relationship with the proximity of the city's cement factory were analyzed using a sample comprising 171 individuals with proximity (23.1%), expectoration (22.8%), shortness of breath (29.3%), and wheezing in the chest (17.9%) being most prevalent. However, there were no significant associations between respiratory signs and symptoms and proximity to the cement factory.

Quiroz (2011) conducted a survey in Colombia on a population living near two cement factories. The objective was to identify changes in pulmonary functions and concentrations of particulate matter produced by the factories. A total of 264 residents participated in the study. High prevalences of respiratory symptoms and irregular lung functioning were found in people who had lived for more than 21 years in the adjacent neighborhoods, and lack of air and sputum were the most common symptoms.

In the present study, it has been reported that local responses to related research have been negligible for over 26 years, and local elderly residents remain vulnerable to the development of respiratory symptoms and diseases. The most frequent symptoms have been coughing (21.43%), expectoration (21.43%), productive cough (35.71%), and shortness of breath (17.86%), while 25.0% of the elderly who have lived there for more than 26 years have respiratory diseases.

Among the elderly who reported having a history of respiratory disease, the most common disease was pneumonia (47.37%) followed by asthma (21.05%). Of these, 42.10% started to develop respiratory diseases after the age of 40, and only 5.6% still have the disease. It is worth mentioning that the elderly in the Hypertension and Diabetes program often have access to medical care at the health clinic in their neighborhoods. This facilitates the availability of timely and proper care.

Ribeiro, Sancho, and Lago (2015) investigated the costs of the three prevalent pathologies identified in the elderly population in private intensive care services in three capitals of the Southeast region: São Paulo, Rio de Janeiro, and Belo Horizonte. Pneumonia represented the highest percentage with 53.70% of the total sample expenditure covering 980 admissions.

According to the Department of Information Technology of the Single Health System, R$ 24,857,960.21 were spent in 2015 on hospitalization for elderly patients receiving pneumonia and asthma treatment, of which R$ 2,144,576.39 corresponded to the municipality of Ananindeua. In hospitalizations for pneumonia only, R$ 20,434,204.97 was spent nationwide, of which R$ 2,087,676.54 was related to Ananindeua (Brasil, 2016). These data point to the importance of healthcare provided through primary care and trained professionals.

Inevitably, the population of large cities has suffered from the environmental pollution caused by urbanization, and the consequences primarily affect the respiratory health of the most vulnerable age groups. Some factors may influence the prevalence of respiratory signs and symptoms, such as the length of exposure to environmental pollutants and old age based on physiological alterations over time. These combine to increase public expenditures for hospitalization of the elderly caused by the increased frequency and severity of respiratory diseases.

Conclusion

In the present study, the most frequently observed respiratory symptoms in the elderly persons who attended the Family Health Strategy program were coughing, expectoration, productive cough, and wheezing. Approximately 25% of the volunteers had respiratory diseases. Also, additional local health education programs are recommended for the elderly to enable them to adopt healthier living practices. Other studies should be performed to evaluate their respiratory functions because many of the elderly patients may already have altered functionality even though they are asymptomatic.

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