



# How health professionals understand the term allergy: a clear and concise lexical evidence about a great challenge in education

*Compreensão do termo alergia por profissionais na área da saúde: uma evidência lexical clara e concisa sobre um grande desafio na educação*

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## ABSTRACT

The term allergy has been misinterpreted, although this condition may affect more than half of the population in some countries. This study aimed to evaluate how health professionals living in the city of Sao Paulo, Brazil, understand the term allergy. Two questions were asked to participants: 1) What is an allergy? and 2) Have you ever developed or seen anyone developing allergies? To what? Data were obtained by interviewing more than 1,000 volunteers. After exclusion criteria were applied, 886 answers were analyzed, 606 from health professionals and 280 from individuals from other fields. The texts were submitted to lexical analysis and word cloud generation. As an additional control, a lexical analysis of a reference text defining the term allergy was used. Results revealed that this method yielded good knowledge of how allergy is understood and that health professionals failed to define the term with accuracy.

**Keywords:** Allergy and immunology, health personnel, education.

## Introduction

The discussion about the idea of allergy started over 100 years ago. Today, according to the revised nomenclature for allergy stated by the European Academy of Allergy and Clinical Immunology [EAACI]<sup>1</sup> and supported by the World Allergy Organization

## RESUMO

O termo alergia tem sido mal interpretado, embora a doença possa acometer até metade da população em alguns países. Este trabalho objetivou avaliar a compreensão desse termo por profissionais da área da saúde que residem na cidade de São Paulo. Duas questões foram feitas aos participantes: (1) O que é alergia? e (2) Você já desenvolveu ou já viu alguém desenvolvendo uma alergia? Contra o quê? Os dados foram obtidos após entrevistas com mais de 1.000 voluntários. Após a aplicação dos critérios de exclusão, 886 respostas foram consideradas, sendo 606 de profissionais atuantes na área da saúde e 280 de profissionais de outras áreas. Os textos foram submetidos a análise lexical e geração de nuvem de palavras. Como controle adicional, foi utilizada a análise lexical de um texto de referência que define o termo alergia. Os resultados mostraram que a metodologia de análise gerou um bom conhecimento sobre a compreensão do termo alergia e que os profissionais não conseguiram descrever o significado desse termo com precisão.

**Descritores:** Alergia e imunologia, profissionais de saúde, educação.

[WAO]<sup>2</sup>, allergy is “a hypersensitivity reaction initiated by specific immunologic mechanisms” (i.e., allergic hypersensitivity), and when other mechanisms can be proven the term “nonallergic hypersensitivity” should be used.

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Most of allergic hypersensitivities are mediated by immunoglobulin E (IgE) antibodies, and the prevalence of sensitization considering only environmental aeroallergens has reached 54.8% in British adults<sup>3</sup>. In South America, there are few epidemiological studies, but the increasing prevalence of allergy in the world, including developing countries, has been suggested by WAO. In Brazil, a 2012 study using the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire estimated that 35.3% of adolescents living in the city of Belo Horizonte could develop the most frequent allergic hypersensitivity, i.e., rhinitis<sup>4</sup>.

Because of the high frequency of allergic diseases worldwide, investigating how the term allergy is understood is of great importance in public health. Even when using an internationally standardized questionnaire, the main difficulty to precisely identify allergic individuals is the confusing popular understanding of the term allergy. In health care, this represents a major problem that may directly influence the efficiency of diagnosis and treatment of allergies.

In order to generate data capable of guiding health care educators, especially in immunology, the present study evaluated how health professionals understand the term allergy.

## Methods

A questionnaire was randomly administered to more than 1,000 adult volunteers living in the city of São Paulo, São Paulo, Brazil, between February and March 2018. The questionnaire was completed by health professionals and, as a control group, by professionals from other fields including engineering, law, commerce, business, administration, and communication. Two questions were asked to all participants: 1) What is an allergy? and 2) Have you ever developed or seen anyone developing allergies? To what?

All participants provided written answers without any previous guidance or any limitation of characters or time. The answers were grouped together according to professional field (health professionals vs. professionals from other fields) and then translated to English. The text corpus was analyzed using Iramuteq 0.7 alpha 2 software (Laboratoire LERASS, Toulouse, France) to generate word clouds based on the frequency of common allergy-related nouns used in the text. The text corpus of a manuscript describing WAO definition of allergy was used as a reference

text<sup>2</sup>. Answers consisting of less than five words and/or those showing no connection with the study proposal were excluded, resulting in 886 evaluated answers. The terms allergy and allergic were also excluded from all evaluated answers. All word clouds were limited to the 50 most frequent terms. Table 1 presents additional information about the participants. This research was approved by the local ethics committee.

## Results

Figure 1A shows that the most common words in the reference text that define the term allergy, in order of frequency, were the following: IgE, mechanism, antibody, allergen, reaction, and hypersensitivity. Taken together, these words provide a definition as follows: “a mechanism of hypersensitivity reaction mediated by allergens and IgE antibodies”. Next, the same analysis was performed using the text corpus of answers to the question “What is an allergy?” provided by health professionals or professionals from other fields. As shown in Figure 1B, the most common words that health professionals used to define the term allergy, in order of frequency, were the following: reaction, immune, substance, system and response; in turn, professionals from other fields (Figure 1C) used the following words: reaction, body, substance, organism, and response. Based on the same approach adopted above, the words used by health professionals provided the definition “immune system reaction or response to a substance”, while the words used by professionals from other fields offered the definition “body/organism reaction/response to a substance”.

To assess each group’s ability to identify allergens, a word cloud analysis was performed using the text corpus obtained from the answers to the question “Have you ever developed or seen anyone developing allergies? To what?”. As demonstrated in Figure 1C and 1D, both groups used the words dust and food with the highest frequencies and additional words were similar. Proteins of dust and food origin are in fact the most frequent allergens, and more than 50% of participants reported to be atopic at the time of questionnaire administration.

## Discussion

For health professionals, word cloud analysis revealed a definition detached from the correct definition of the term allergy because of the absence

of the main molecule responsible for allergy induction, i.e., IgE. Moreover, not even the term antibody was observed in the analysis, suggesting that health professionals failed to establish an adequate relationship between allergic reaction and induction of a specific immune reaction. This finding is especially important and may impact the identification and treatment of allergies. Thus, an additional question could have been asked for the group of health professionals: What is the mechanism of an allergic reaction? Unfortunately, this question was not originally included in the study, but this will possibly be the focus of future investigations.

As expected, the answers obtained from participants from fields other than health care generated an even more detached definition, in which allergy seems to be a reaction of the body. The absence of references

to immunological factors on the definitions of allergy obtained from both groups may have a negative impact on the identification of allergy. In addition, it agrees with the suggestion made by Igea that “the ambiguity of the word ‘allergy’ is broader” among professionals from non-medical fields<sup>5</sup>.

The ability to identify allergens was similar in both groups, which reported proteins of dust and food origin as the most frequent allergens. This may be explained by the fact that more than 50% of the participants reported being atopic at the time of questionnaire administration, which is why both groups presented similar potential to indicate allergens.

Historically, even in the scientific field, the use of the word allergy has been misinterpreted<sup>5</sup>. However, a correct understanding of the term allergy is crucial

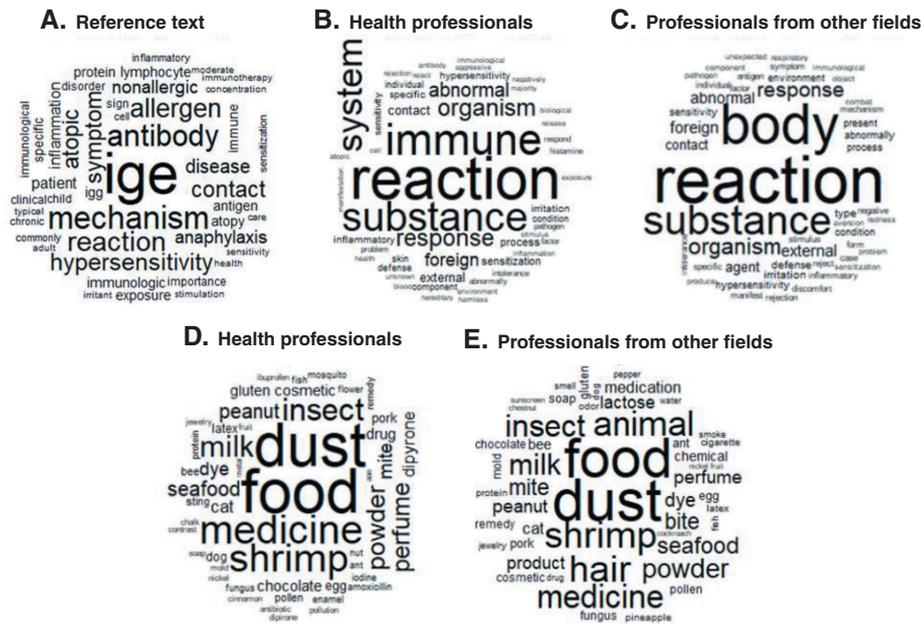
**Table 1**

Characteristics of study volunteers. The number of participants and the number and frequency of each age range, educational level, and atopic state in both groups (health professionals vs. professionals from other fields) are shown above

|                            |               | Health professionals | Professionals from other fields |
|----------------------------|---------------|----------------------|---------------------------------|
|                            |               | n (%)                | n (%)                           |
| <b>Total number:</b>       |               | <b>606 (100)</b>     | <b>280 (100)</b>                |
| <b>Age rangers (y.o.):</b> | 18 to 25      | 412 (67.9)           | 178 (63.5)                      |
|                            | 26 to 30      | 78 (12.9)            | 32 (11.4)                       |
|                            | 31 to 40      | 90 (14.8)            | 45 (16.1)                       |
|                            | 41 to 49      | 22 (3.6)             | 15 (5.3)                        |
|                            | More than 50  | 4 (0.7)              | 10 (3.6)                        |
| <b>Education level:</b>    | Undergraduate | 86 (14.2)            | 75 (26.8)                       |
|                            | Graduate      | 489 (80.7)           | 182 (65.0)                      |
|                            | Specialist    | 18 (3.0)             | 13 (4.6)                        |
|                            | Msc or PhD    | 12 (2.1)             | 10 (3.6)                        |
| <b>Atopic state*</b>       | Atopic        | 342 (56.4)           | 147 (52.5)                      |
|                            | Non-atopic    | 264 (43.6)           | 133 (47.5)                      |

y.o. = years old, MSc = Master of Science, PhD= Doctor of Philosophy.

\*Atopic state declared by the participants at the time of questionnaire administration.



**Figure 1**

Word cloud analyses of the text corpus consisting of reference text and study participants' answers. The reference text (A) and participants' answers to the questions "What is an allergy?" (B and C) and "Have you ever developed or seen anyone developing allergies? To what?" (D and E) were divided, and the text corpus was analyzed to generate a representative word cloud for each group. Figures B and D show results obtained from health professionals, while C and E show results of professionals from other fields

in health education and may contribute to the identification and management of allergic reactions.

As recently shown, educational interventions may generate a positive outcome similar to environmental interventions in reducing the development of asthma<sup>6</sup>. Also, educational interventions may be functional even with the use of online education programs<sup>7</sup>. The effectiveness of an educational intervention depends on the chosen population understanding the subject to be discussed. The present evidence suggests that the understanding of the mechanism of allergy was potentially compromised even among health professionals in the study population, although the identification of allergy-inducing factors was less compromised.

In conclusion, the present method of analysis was efficient at demonstrating differences in the understanding of the term allergy, showing that

this term remains poorly understood among health professionals. Additionally, the results may be used by health educators in the development of educational interventions to avoid allergy misinterpretation among health professionals in the future.

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