



**NATIONAL INSTITUTE FOR
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ANNUAL SURVEILLANCE REPORT

OCCUPATIONAL RESPIRATORY ALLERGY

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Glossary and Abbreviations

Allergens	A substance capable of triggering a response that starts in the human immune system and results in sensitisation or an allergic reaction
Atopic patients	Patients that tested positive to three or more tests in the aeroallergens panel
IgE	Immunoglobulin E
Industry	The industry where the patients came from were grouped into categories according the Standard Industrial Classification of all economic activities (7th Edition)
Job	The activity that the patient does while on duty
NIOH	National Institute for Occupational Health
Occupational allergy	Occupational allergies such as asthma, rhinitis, conjunctivitis, urticaria and contact dermatitis is the result of exposure to allergens or chemicals while “on the job”
ORA	Occupational respiratory allergy
OAU	Occupational Allergy Unit
Patient	All workers or persons referred internal or external to the NIOH for respiratory allergy testing
SPT	A skin prick test, also called a scratch test, checks for immediate allergic reactions to allergens and is usually done on the forearm
Type of sample	Blood, serum or bulk sample (samples from the workplace that is suspected as the causative agent)

Executive summary

In 2019, a total of 161 workers from various industries were tested for possible occupational respiratory allergies at the NIOH. Workers from the mining (n=128, 80%) and manufacturing industry (n=17, 11%) accounted for the highest number of patients. The mean age of workers were 40 years and 71% were male.

The aeroallergens panel was the most performed skin prick test amongst patients with suspected occupational respiratory allergies. Aeroallergens accounted for 37% of the tests performed in 2019 and approximately 30% of all clinic attendees tested positive for aeroallergens (18/60). Within the aeroallergen panel, Bermuda grass sensitisation (23.3%) were the highest, followed by House Dust Mite (scientific term: *Dermatophagoides pteronyssinus*) sensitization (18.3%) and London plane tree (13.3%). Seven (11.7%) patients were considered atopic (tested positive to three or more aeroallergens).

Of the occupational allergens tested the highest proportion of tests requested were platinum (34%) and platinum and nickel (29%). No patients tested positive for either platinum or nickel. No patients tested positive for flour allergens (soya, wheat, rye and corn) during the reporting year.

Background

Occupational allergies can lead to serious health problems and hence are compensable under the South African Compensation for Occupational Injuries and Disease Act, of 1993 (Act 130, 1993). Industrialisation and climate change in general has caused a significant increase in occupational allergies. In certain industries where allergens are prominent, pre-employment screening is essential in preventing allergies as a result of workplace exposure. This pre-employment screening is particularly important for atopic individuals, who have a genetic predisposition to allergies. Numerous studies have described a strong association between atopic individuals and their likelihood to develop occupational allergies.

Occupational allergens are substances used or handled in the work environment that are capable of triggering a hyper-immune response resulting in sensitisation or an allergic reaction. These agents are diverse and in many instances are complex thus proving causation of disease can be challenging. In addition, only a few occupational allergens are commercially available; and biological allergens may differ by species and region and may not be relevant to South Africa or specific provinces. The Occupational Allergy Unit (OAU) of the Immunology & Microbiology Section at the NIOH has been maintaining a database of occupational allergies since 2005. The information in this database is paramount for our understanding of occupational allergies and surveillance of occupational allergies in South Africa. Through the database common allergens and industries are identified which can inform preventative measures to reduce exposure in the workplace. Furthermore, the data in the database is an important resource for research purposes.

The OAU focuses on both respiratory [Immunoglobulin E (IgE) mediated or Type I hypersensitivity] and skin (Type IV hypersensitivity reactions or delayed reactions) allergies in occupational settings. This report focuses on respiratory allergies which were tested using the skin prick test (SPT). The OAU specialises in testing non-commercial allergens. This function is valuable since some allergens are specific to certain occupational sectors, which are found in few countries or regions (e.g. certain metal allergies such as potassium dichromate). Laboratory preparation of allergens ensures that the cause of rare or less common allergies can be identified. The laboratory maintains an extensive occupational allergen bank and a list of allergens can be made available upon request.

The data presented in this report summarises the occupational allergy test data obtained in 2019, of patients presenting with suspecting occupational respiratory allergies. This data was exported into, and analysed using STATA SE version 15 by the NIOH Epidemiology and Surveillance Section. Some of the percentage data indicated in this document must be viewed with caution, due to small sample size and may give higher percentages. The report does not include data on testing done for research.

Methods

Skin prick tests (SPT) were used to test for respiratory allergies. The SPT involves applying allergen solutions onto the patient's skin, and introducing them into the skin by pricking the patients skin. The SPT is desirable since results are available within 15 minutes.

In patients with potentially life-threatening anaphylactic shock reactions, and those on medication which cannot be stopped, SPT is not recommended. For such cases, the ImmunoCAP specific IgE test is considered for identification of the specific IgE against the suspected allergen. IgE tests results are not presented in this surveillance report.

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Respiratory allergy test data were obtained from patients referred to the Occupational Respiratory Allergy Laboratory. Patients are referred by private health practitioners or from the Occupational Medicine Clinic of the NIOH. The OAU also screens healthy workers as part of the medical screening service provided to industry.

Data from patient files were entered into an excel spreadsheet, which was then imported into STATA SE version 15 for data analysis. Summary measures consisting of means, medians and interquartile ranges for all continuous or discrete study variables were documented. Frequencies (numbers and percentages) were produced for categorical data.

Results

1. Sociodemographic characteristics

In 2019, a 161 patients attended the respiratory allergy clinic at the NIOH. The mean age of patients, attending the respiratory clinic was 40 years, ranging from 20 to 67 years. Approximately 71% of patients were male. Patients who attended the clinic worked mainly in Gauteng (83%) and some in North West Province (10%). Patients were mostly seen from the mining industry (80%). Approximately 14% were current smokers (Figure 1).

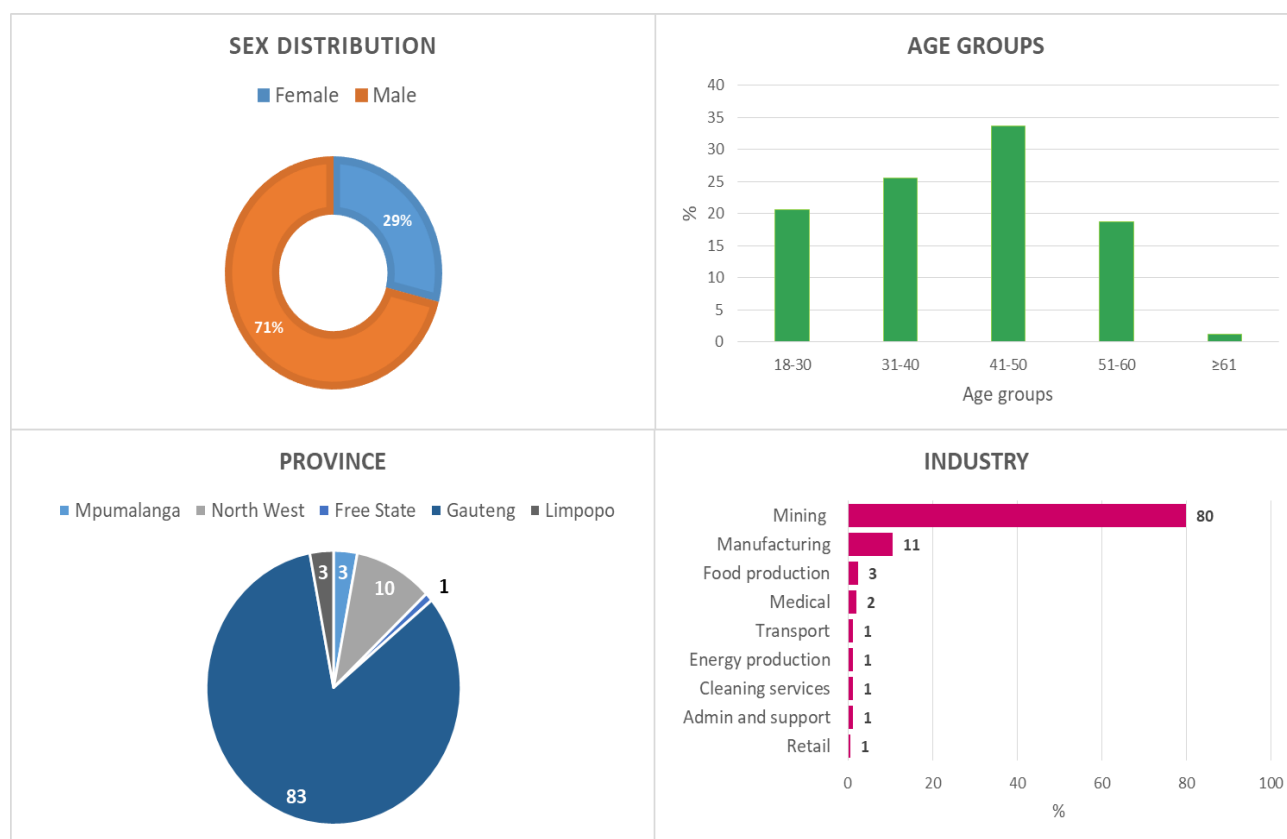


Figure 1. Sociodemographic characteristics of patients seen at the ORA at NIOH

2. Respiratory allergy screening

In total, 60 aeroallergen tests (37%) were requested (singly and combined with other tests). Platinum (34%) and platinum and nickel (29%) test were also commonly requested (Figure 2).

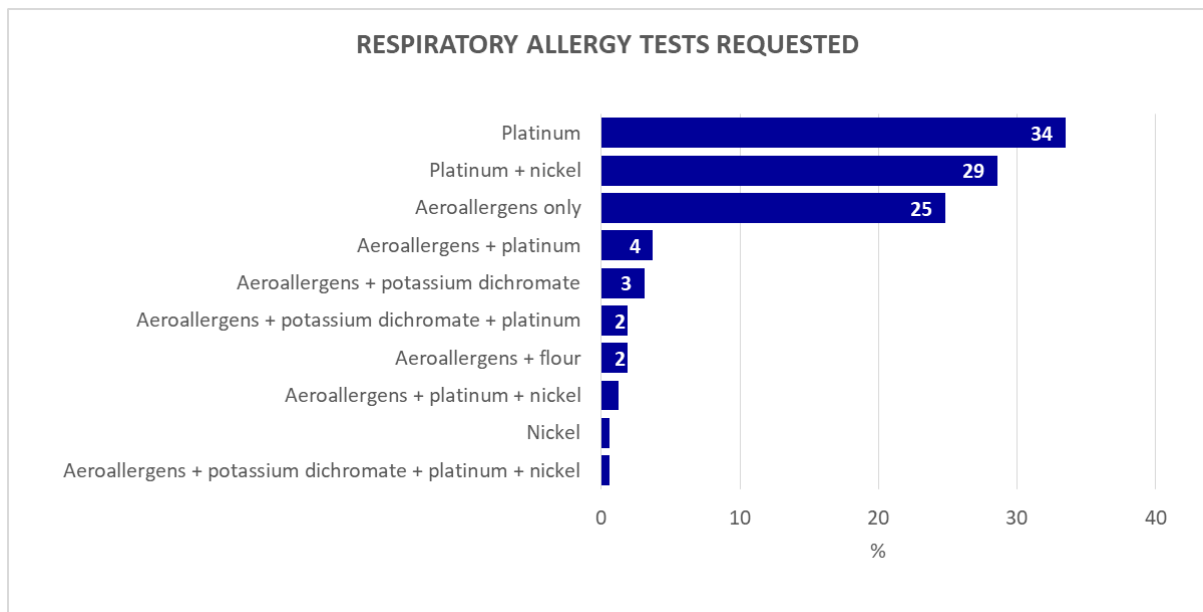


Figure 2. Percentage of respiratory allergy tests requested

Thirty percent of patients tested positive for aeroallergen tests (n=18) (Table 1).

Table 1. Number of positive tests

Tests	Number of tests	Number Tested positive	% Positive
All aeroallergen tests (single and combined)	60	18	30.0
Single aeroallergen tests	40	14	35.0
Aeroallergens + flour	3	0	0.0
Aeroallergens + platinum	6	0	0.0
Aeroallergens + platinum + nickel	2	0	0.0
Aeroallergens + potassium dichromate	5	1	20.0
Aeroallergens + potassium dichromate + platinum	3	1	33.3
Aeroallergens + potassium dichromate + platinum + nickel	1	0	0.0
Nickel	1	0	0.0
Platinum	54	0	0.0
Platinum + nickel	46	0	0.0

Among the aeroallergen tests, most patients tested positive for Bermuda grass (23.3%), house dust mites (*D. pteronyssinus*) (18.3%) and London plane tree (13.3%) (Table 2).

Table 2. Breakdown of the aeroallergen panel and the flour allergen tests (N=60)

Aeroallergen tests	Number tested positive (≥ 3 mm)	% Positive
House dust mite (<i>D. pteronyssinus</i>)	11	18.3
Cockroaches	6	10.0
Cat dander	3	5.0
Dog dander	5	8.3
Feather mix	1	1.7
Tree mix	0	0
Grass	3	5.0
Bermuda grass	14	23.3
London plane tree	8	13.3
Aspergillus fumigatus	0	0
Flour allergens		
Soya	0	0
Oats	0	0
Wheat	0	0
Rye	0	0
Corn	0	0

3. Atopy

Seven (11.7%) patients were considered atopic (tested positive to three or more aeroallergens) (Table 3).

Table 3. Description of atopic patients (n=7)

	Age	Sex	Smoking history	Occupation	Industry	Province
1	32	Male	No	Mining operator	Mining	Mpumalanga
2	55	Male	Yes	Plant operator	Energy production	Mpumalanga
3	26	Female	No	Student lab assistant	Medical	Gauteng
4	30	Male	No	Lab operator	Mining	North West
5	44	Male	No	Welder	Manufacturing	Gauteng
6	26	Male	No	Loco operator	Mining	North West
7	29	Male	No	Pipe tracks and ventilation installer	Mining	Limpopo

Limitations

Majority of the patients are from Gauteng due to the location of the laboratory in Johannesburg, Gauteng. Thus, these results cannot be generalised.

There is missing data/ information in the current data collection tool, such as the exact nature of the job within an industry and duration of employment. These and other relevant information will be added to the minimum data set for ongoing surveillance.

Conclusion

Occupational respiratory allergy surveillance is an essential component of an occupational health surveillance programme. Since approximately a third of workers seen at the ORU in 2019 were atopic, emphasises the need for continual monitoring of workers. This is because atopy is a well-known risk factor for the development of occupational allergies. More importantly, advocacy on the improvement of various control measures in industries, as a means of reducing occupational allergic disease incidents is paramount. Furthermore, to strengthen the respiratory allergy surveillance programme and provide a comprehensive picture, additional data is needed from other allergy treatment centres throughout the country.