



**NATIONAL INSTITUTE FOR  
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# **ANNUAL SURVEILLANCE REPORT**

# **OCCUPATIONAL RESPIRATORY ALLERGY**

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## Table of Contents

<b>Glossary and Abbreviations</b> .....	3
<b>Executive summary</b> .....	4
<b>Background</b> .....	5
<b>Methods</b> .....	7
<b>Results</b> .....	8
1. Sociodemographic characteristics .....	8
2. Allergy testing .....	9
3. Atopy .....	10
<b>Limitations</b> .....	10
<b>Conclusion</b> .....	11

## Glossary and Abbreviations

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

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## Executive summary

In 2018, a total of 170 workers from various industries were tested for possible occupational respiratory allergies at the NIOH. Mining and industry accounted for the highest number of patients (58%), followed by the manufacturing industry (20%). The patients were predominantly Black African (81%) followed by White patients (12%), with a mean age of 42 years.

The aeroallergens panel was the most performed skin prick test amongst patients with occupational respiratory allergies. Aeroallergens accounted for 34% of the tests performed in 2018 and approximately 58% of all clinic attendees tested positive for aeroallergens (49/85). Within the aeroallergen panel, house dust mite had the highest sensitization at 36%, followed by cockroach (25%), London plane tree (13%) and Bermuda grass (13%).

Seventeen (20%) patients were considered atopic (tested positive to three or more aeroallergens). Atopic patients were predominantly male (81%), with a mean age of 38 years. The population group was 85% Black African, followed by 8% White and 8% Asian. Atopic patients worked mostly in mining (65%), followed by manufacturing (12%) and food industries (12%).

Of the occupational allergens tested the highest proportion of tests requested were platinum and nickel (28%), and platinum only (20%). Only 1% (1/95) tested positive for platinum and 2% (1/55) tested positive for nickel. No patients tested positive for chrome 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 2018, 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. This report can be accessed at [www.nioh.ac.za](http://www.nioh.ac.za).

## 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. These healthy workers are screened in their places of work by staff of the OAU.

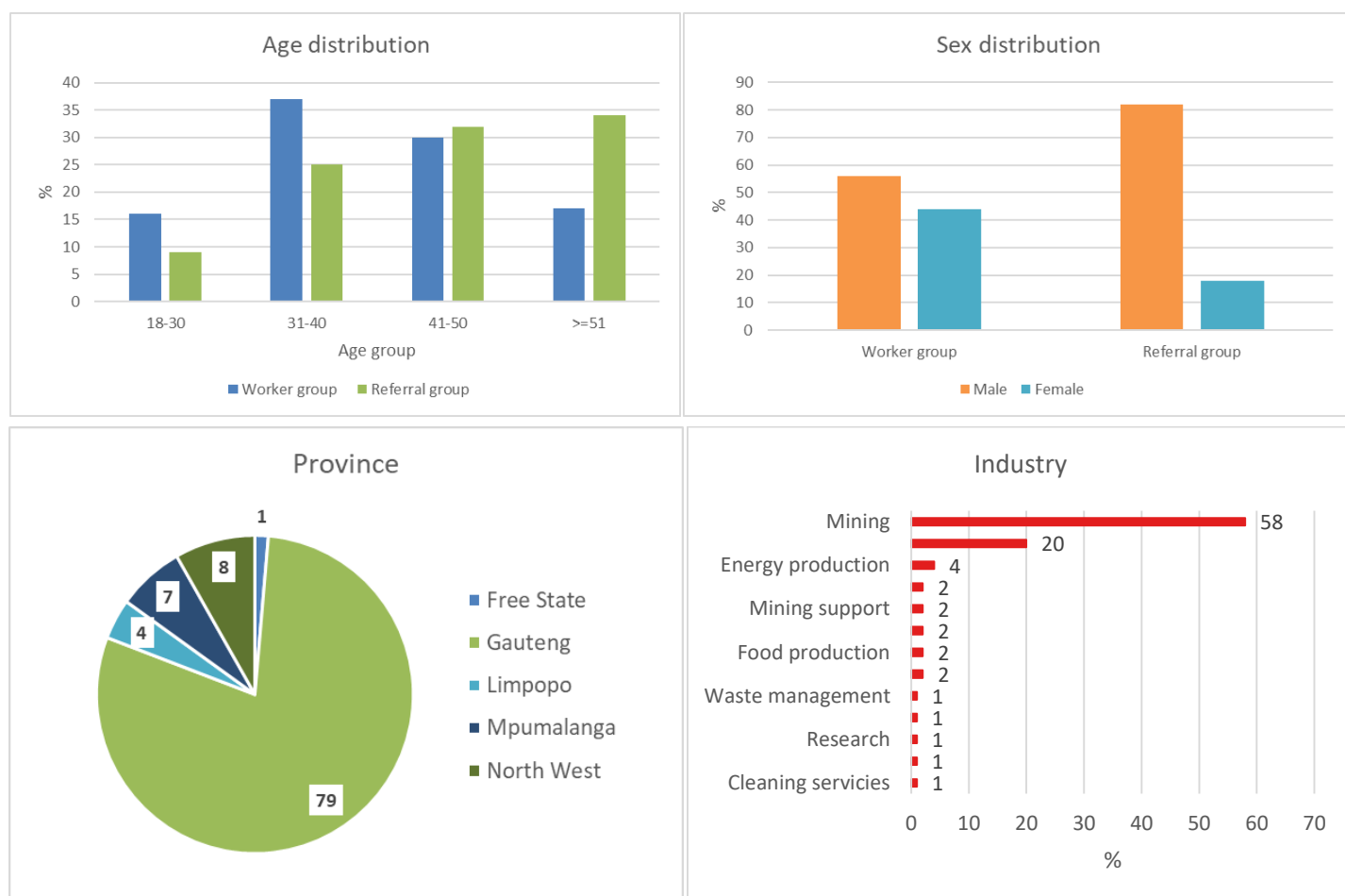
Data from patient files were entered into an excel spreadsheet, which was then imported into STATA SE version 15 for data analysis. Summary measures consisting of means, medians and interquartile ranges for all continuous or discrete study variables were documented. Frequencies (numbers and percentages)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

## Results

In total, 170 patients were tested with SPT in the year 2018. There were 82 (48%) workers for routine medical screening and 88 (52%) patients that were referred to the clinic because of their symptoms.

### 1. Sociodemographic characteristics

The mean age of patients, attending the respiratory clinic were 42 years, ranging from 22 to 62 years. Workers for routine screening were on average younger than the referral group (40 years vs 44 years). Approximately 69% of patients were male. The patients were predominantly Black African (81%) followed by White patients (12%). A larger proportion worked in Gauteng (79%), followed by North West Province (8%) and Mpumalanga (7%). Majority of the workers came from the mining industry (58%), followed by those from the manufacturing industry (20%).



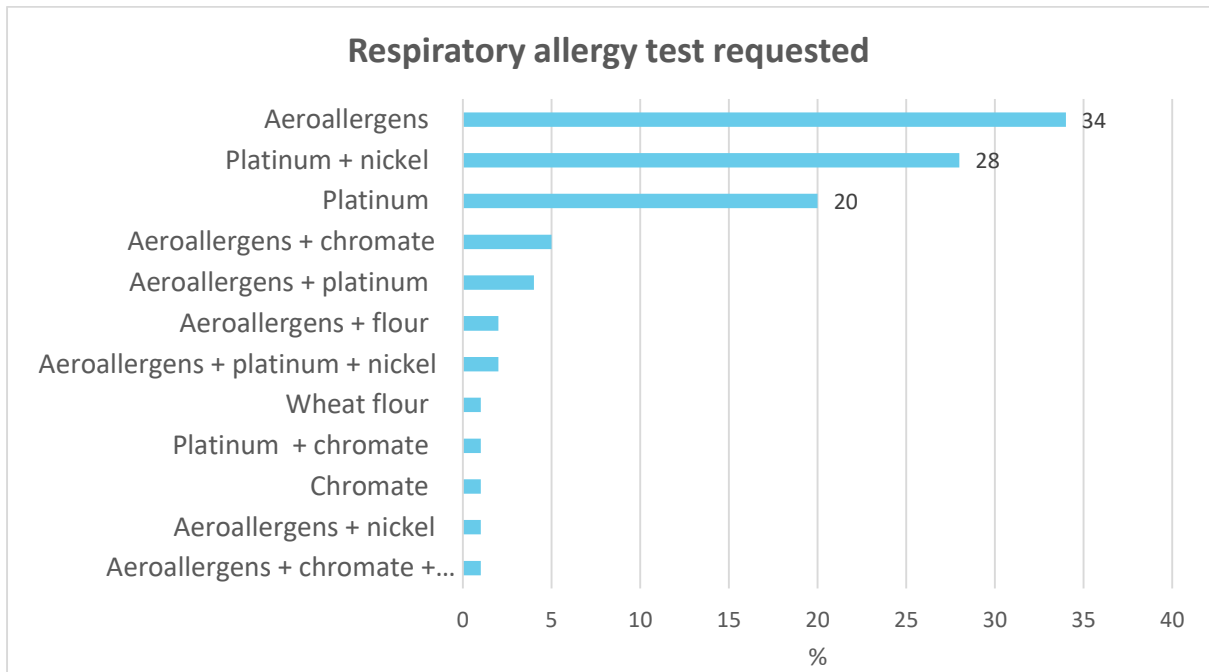
**Figure 1:** Sociodemographic characteristics of worker and referral groups

*\*Worker group refers to workers without symptoms undergoing medical surveillance screening*



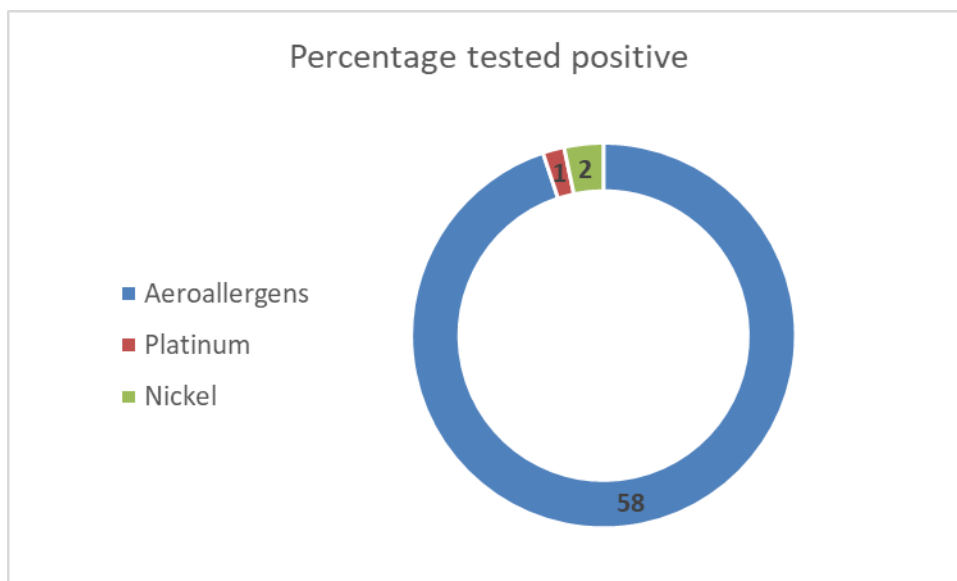
## 2. Allergy testing

The highest proportion of tests requested were aeroallergens only (34%), platinum and nickel (28%), and platinum only (20%) (Figure 2).



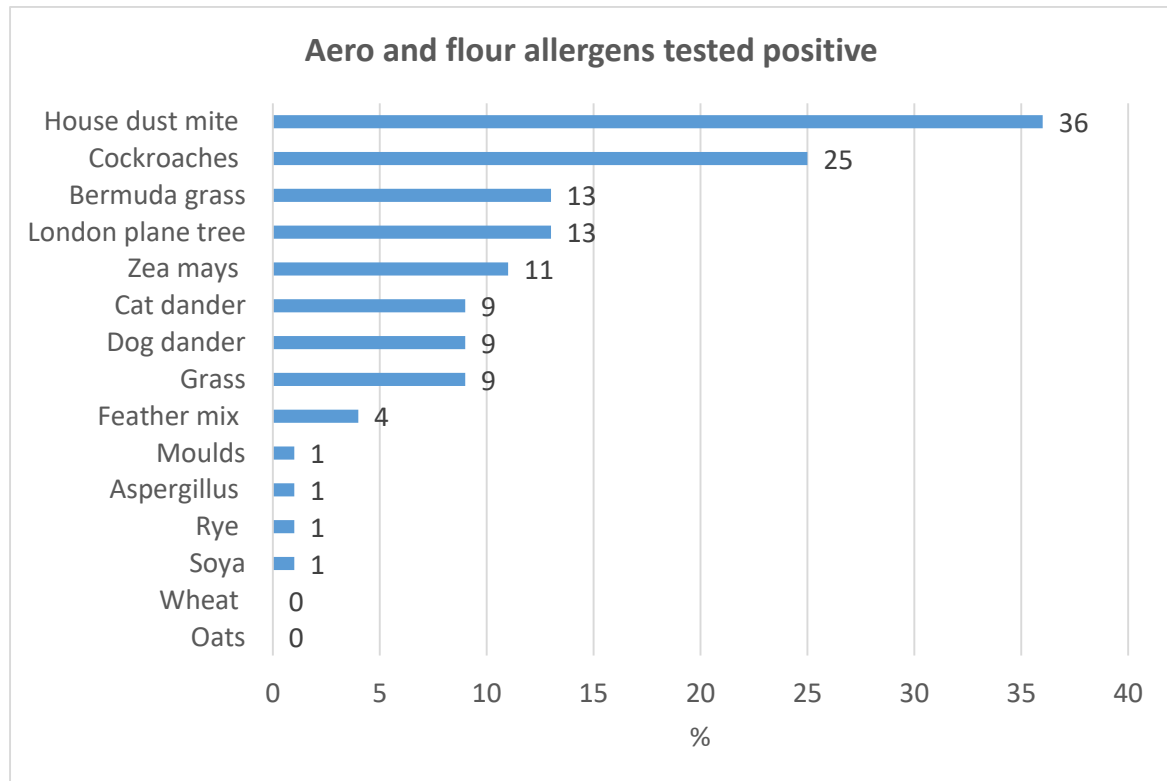
**Figure 2:** Percentage of respiratory allergy tests requested

Approximately 58% of all clinic attendees tested positive for aeroallergens (49/85), 1% (1/95) tested positive for platinum and 2% (1/55) tested positive for nickel. No patients tested positive for chrome (potassium dichromate) (Figure 3).



**Figure 3:** Percentage of positives for the various allergy tests

The top four positive aeroallergens were house dust mite (36%), cockroaches (25%), London plane tree (13%) and Bermuda grass (13%). Only two (rye and soya) of the four flour allergens tested positive (Figure 4).



**Figure 4:** Percentage of positive aero and flour allergen tests

### 3. Atopy

Seventeen (20%) patients were considered atopic (tested positive to three or more aeroallergens). Atopic patients were predominantly male (81%), with a mean age of 38 years. The population group was 85% Black African, followed by 8% White and 8% Asian. Atopic patients worked mostly in mining (65%), followed by manufacturing (12%) and food industries (12%).

### Limitations

Majority of the patients are from Gauteng due to the location of the laboratory in Johannesburg, Gauteng. Thus, these results cannot be generalised. Other centres assessing respiratory allergies (public and private) need to provide data to develop a comprehensive occupational respiratory surveillance system.

There is missing data/ information in the current data collection tool, such as the exact nature of the job within an industry is not known and duration of employment. These and other relevant information will be added to the minimum data set for future surveillance.

## Conclusion

Occupational respiratory allergy surveillance is an essential component of an occupational health surveillance programme. The prevalence of atopy observed among workers seen at the ORU in 2018, 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 should remain on the improvement of various control measures in industries, as a means of reducing occupational allergy disease incidents. 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.