THE ASSOCIATION BETWEEN METEOROLOGICAL PARAMETERS AND THE PRESCRIPTION PATTERNS FOR ASTHMA AND ALLERGIC RHINITIS, AS OBSERVED IN PRETORIA DURING A ONE-YEAR PERIOD

BY

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DECLARATION

I hereby declare that this dissertation presented to the University of Pretoria for the Masters Science in Clinical Epidemiology degree is my own work and has not been presented previously to any other tertiary institution for any purpose.

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Authorship and Co-workers

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ABSTRACT

The association between meteorological parameters and the prescription patterns for asthma and allergic rhinitis, as observed in Pretoria during a one year period

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Background: Can the high incidence of allergic diseases be linked to changes in weather patterns, and can these changes then be used to predict increases in the usage of medications? This could lead to better patient awareness, as well as an improved utilization of resources.

Objectives: The hypothesis was tested that treatment rates (as evidenced by the amount of prescriptions) were associated with meteorological determinants, namely temperature, rainfall, humidity, barometric pressure, and wind speed.

Setting: Medical prescriptions as received by a General Practitioner organization from 22 practices, reflecting disease codes for Asthma an Allergic Rhinitis, and geographically representing a part of eastern Pretoria, were used. These were matched on a day-to-day basis with meteorological parameters (as mentioned above) obtained from a nearby weather station over a period of one year.

Study design: A cross-sectional, ecological study was done to determine the relationship between the two databases. To take cognizance of seasonal influences, a period of one year was analyzed.

Methods: For investigating the relationship between allergic symptomology and environmental conditions, a time series analysis, utilizing a STATA package was used. Hereby trend and seasonality could be described, in order to identify and

forecast future values. An Autoregressive integrated moving average (Arima) analysis provided both moving averages and lag analyses. The model was also evaluated in an appropriate manner, including testing of residuals.

Results: After analysis, and using alpha values of 10% for level of significance, it was found that rainfall and wind speed do not influence prescriptions for asthma, but temperature and humidity do have a significant influence, with p-values of 0.050 and 0.097 respectively. Concerning allergic rhinitis, none of the above parameters were found to influence prescriptions.

Conclusion: Certain weather parameters were shown to have an influence on prescriptions for asthma, but not for allergic rhinitis. The confounding effects of pollution and allergens were not studied.

ABSTRAK

Die assosiasie tussen weerkundige parameters en die voorskrifpatrone vir asma en allergiese rhinitis, soos waargeneem in Pretoria oor 'n een jaar tydperk

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Agtergrond: Daar is dikwels gevra of die hoë insidensie van allergiese siektes gekoppel kan word aan veranderinge in weerpatrone en of hierdie veranderinge gebruik kan word om toenames in medikasiegebruik te voorspel. Dit kan lei tot verbeterde pasiënt bewustheid, asook meer optimale gebruik van hulpbronne.

Doelstellings: Die hipotese is getoets dat voorskriffrekwensie (soos reflekteer deur die aantal voorskrifte) assosieerd is met weerparameters, naamlik temperatuur, reënval, humiditeit, barometriese druk en windspoed.

Plasing: Mediese voorskrifte, soos ontvang vanaf 22 praktyke uit die oostelike voorstede van Pretoria deur 'n algemene praktykorganisasie, is gebruik. Hierdie is gekoppel aan daaglikse weerparameters (soos bo vermeld), verkry oor 'n een jaar periode vanaf 'n nabygeleë weerstasie.

Studie ontwerp: 'n Deursnit, ekolgiese studie om die verhouding tussen die twee databasisse te bepaal, is gedoen. Om voorsiening te maak vir seisoenale invloede, is 'n periode van een jaar ontleed.

Metodes: Om die verhouding tussen allergiese simptome en omgewingsfaktore te bepaal is 'n tyd series analise, wat 'n STATA packet behels, gebruik. Hierdeur kon neigings en seisoenaliteit beskryf word, sodat toekomstige gebeure voorspel kan word. 'n Outoregressiewe integreerde bewegende gemiddelde analise verskaf beide

bewegende gemiddeldes en vertragings analyses. Die model is ook vir akkuraatheid getoets op verskeie maniere.

Resultate: Na analise en gebruik van toepaslike (10%) alfa-waardes vir die vlak van betekenisvolheid, is gevind dat reënval en windspoed voorskrifte vir asma nie beinvloed nie, maar wel temperatuur en humiditeit (p-waardes 0.050 en 0.097 respektiewelik). Dieselfde kon nie gevind word met allergiese rhinitis, waar geen van bogenoemde betekenisvol was nie.

Gevolgtrekking: Sekere weerparameters het 'n invloed op voorskrifpatrone vir asma, maar nie allergiese rhinitis nie. By laasgenoemde speel ander omgewingsfaktore soos allergene en lugbesoedeling waarskynlik 'n belangriker rol.

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