

Analysis of Rainfall and Malaria Trends in Limpopo Province, South Africa

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Abstract : There was a surge in malaria morbidity as well as mortality in 2016/2017 malaria season in malaria-endemic regions of South Africa. Rainfall is a major climatic driver of malaria transmission and has potential use for predicting malaria. Annual and seasonal trends and cross-correlation analyses were performed on time series of monthly total rainfall (derived from interpolated weather station data) and monthly malaria cases in five districts of Limpopo Province for the period of 1998 to 2017. The time series analysis indicated that an average of 629.5mm of rainfall was received over the period of study. The rainfall has an annual variation of about 0.46%. Rainfall amount varies among the five districts, with the north-eastern part receiving more rainfall. Spearman's correlation analysis indicated that total monthly rainfall with one to two months lagged effect is significant in malaria transmission in all the five districts. The strongest correlation is noticed in Mopani ($r=0.54$; $p\text{-value} = < 0.001$), Vhembe ($r=0.53$; $p\text{-value} = < 0.001$), Waterberg ($r=0.40$; $p\text{-value} = < 0.001$), Capricorn ($r=0.37$; $p\text{-value} = < 0.001$) and lowest in Sekhukhune ($r=0.36$; $p\text{-value} = < 0.001$). More particularly, malaria morbidity showed a strong relationship with an episode of rainfall above 5-year running means of rainfall of 400 mm. Both annual and seasonal analyses showed that the effect of rainfall on malaria varied across the districts and it is seasonally dependent. Adequate understanding of climatic variables dynamics annually and seasonally is imperative in seeking answers to malaria morbidity among other factors, particularly in the wake of the sudden spike of the disease in the province.

Keywords : correlation, malaria, rainfall, seasonal, trends

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