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Socio-Ecological Drivers and 2009 Pandemic Influenza A (H1N1): A Bayesian Dynamic Spatiotemporal Model.

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INTRODUCTION: A pandemic influenza A (H1N1) in human spread rapidly around the world in 2009. However, the dynamics
spatiotemporal patterns of H1N1 still poorly understood in Queensland, Australia. This study aimed to explore the dynamic spatiotemporal variation at postal area and investigate the effects of temperature factor and socio-economic factor in 2009 pandemic H1N1 influenza in Queensland, Australia.

METHODS: Daily laboratory confirmed H1N1 cases were supplied by Queensland Health for the period of May to December 2009. Data on socio-economic indexes for areas (SEIFA) and population size were obtained from Australian Bureau of Statistics. Temperature data by postal area were obtained from the global climate data project. A Bayesian spatiotemporal susceptible, infectious and removed (SIR) model and a Bayesian conditional autoregressive (CAR) model were used to investigate the relationship between temperature, SEIFA and H1N1 incidence and to determine dynamic spatiotemporal patterns of H1N1.

RESULTS: A significant dynamic spatiotemporal variation on H1N1 incidence based on postal area in Queensland was found. Our results showed that monthly H1N1 cases were significantly negative associated with monthly mean maximum temperature (Relative Risk (RR): 0.84; 95% CI 0.81–0.90). However, no any significant association between weekly H1N1 cases and weekly mean rainfall and SEIFA was observed at postal area. The SIR showed that a H1N1 transmission rate posterior mean was 42/100,000 (95% CI 6–222/100,000).

CONCLUSIONS: We concluded that temperature played an important role in the H1N1 transmission. A combination of flexible Bayesian spatiotemporal SIR can CAR model could facilitate greater understanding of the relationship between the covariates and H1N1 cases and detection of spatiotemporal variation in H1N1 transmission with the potential for the development of early warning system.