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Background. Incidence of respiratory syncytial virus (RSV) and rhinovirus (RHV) varies throughout the year. We aim to quantify the relationship between weather variables (temperature, humidity, precipitation, and aerosol concentration) and disease incidence in order to quantify how outbreaks of RSV and RHV are related to seasonal or sub-seasonal meteorology, and if these relationships can predict viral outbreaks of RSV and RHV.

Methods. Health data were collected in a community-based, prospective randomized trial of maternal influenza immunization of pregnant women and their infants conducted in rural Nepal from 2011–2014. Adult illness episodes were defined as fever plus cough, sore throat, runny nose, and/or myalgia, with infant illness defined similarly but without fever requirement. Cases were identified through longitudinal household-based weekly surveillance. Temperature, humidity, precipitation, and fine particulate matter (PM 2.5) data came from reanalysis data products NCIPER, Era-Interim, and Merra-2, which are produced by assimilating historical in-situ and satellite-based observations into a weather model.

Results. RSV exhibits a relationship with temperature after removing the seasonal cycle (r = −0.16, N = 208, P = 0.05), and RHV exhibits a strong relationship to daily temperature (r = −0.14, N = 208, P = 0.05). When lagging meteorology by up to 15 weeks, correlations with disease count and weather improve (RSV: r_max = 0.45, P < 0.05; RHV: r_max = 0.15, P = 0.05). We use an SIR model forced by lagged meteorological variables to predict RSV and RHV, suggesting that disease burden can be predicted at lead times of weeks to months.

Conclusion. Meteorological variables are associated with RSV and RHV incidence in rural Nepal and can be used to drive predictive models with a lead time of several months.

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