In S1, we fitted a model that assumes each ZIP code has a unique intercept (similar to M3) and unique slope which describes the relationship between year and number of overdoses such that where is the intercept for ZIP code *i* (note that an overall intercept parameter is included in ), is the slope for ZIP code *i*, *T* is the total number of years of the study, and is the mean of the unique study years (the time variable is scaled for stability). The spatially-varying random effects, and , are assumed to be spatially correlated through use of independent CAR models. Therefore, each ZIP code has a unique regression line describing the changes in overdose deaths across time, where the estimated trajectories are influenced by surrounding ZIP codes if appropriate (Bernardinelli, Clayton et al. 1995, Lee, Rushworth et al. 2017). Note that the yearly linear time trend variable is not included in for this model given its inclusion in the random effect definition.

In S2, we decompose the random effect into a spatial component, temporal component, and space-time interaction component such that where and are each modeled using CAR models (independent of each other) and is included to account for overdispersion. S2 assumes separate spatial and temporal behavior and allows us to quantify the relative contribution of each component in the analysis (Knorr‐Held 2000, Lee, Rushworth et al. 2017).