

Research Proposal: Predicting Pertussis

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Background:

Pertussis, colloquially known as whooping cough, is a highly contagious respiratory disease that impedes the ability to breathe normally and can cause death. It is usually prevented by a vaccine, given in four doses over the first two years of life. Pertussis has an R_0 , or basic reproduction number, of approximately 18, which makes it moderately contagious (higher R_0 s mean the disease tends to spread among a population quicker). Given this higher R_0 , community protection by vaccination is imperative - but this protection is only conferred when a certain percentage of the community, or threshold, is vaccinated. In recent years, anti-vaccination sentiment has become a familiar topic of discussion.

Goals:

The Center for Disease Control and Prevention has periodic regional data for cases of certain notifiable diseases, including pertussis. Using this data as well as vaccination coverage data I would like to assess whether there have been a recent increase in incidences, and if this increase can be attributed to a decrease in vaccine coverage over the past few years.

Furthermore, I would like to map out the cases over time. Using literature on the factors affecting the infection and spread of pertussis, in addition to other socio-demographic factors associated with disease outbreaks, I will try to estimate and create a model for pertussis outbreaks in the future.

Resources:

CDC Data:

<https://wonder.cdc.gov/mmwr/mmwr morb.asp>

<https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/data-reports/dtap/dashboard/2015.html>

<https://www.cdc.gov/vaccines/imz-managers/coverage/nis/child/data/tables-2014.html>

Literature:

Althouse BM, Scarpino SV (2015) Asymptomatic transmission and the resurgence of *Bordetella Pertussis*. BMC Medicine.

<https://bmcmmedicine.biomedcentral.com/articles/10.1186/s12916-015-0382-8>

Masseria, C., Martin, C. K., Krishnarajah, G., Becker, L. K., Buikema, A., & Tan, T. Q. (2017). Incidence and Burden of Pertussis Among Infants Less Than 1 Year of Age. *The Pediatric Infectious Disease Journal*, 36(3), e54–e61.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5312729/>

McGirr AA, Tuite AR, Fisman DN (2013) Estimation of the Underlying Burden of Pertussis in Adolescents and Adults in Southern Ontario, Canada. PLOS ONE 8(12): e83850.

<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0083850>

Winter K, Harriman K (2016) Risk Factors for Pertussis Infection Among Infants in California

<https://cste.confex.com/cste/2016/webprogram/Paper6805.html>