

# EMD 538 - Lecture 02

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## Table of contents

<b>Importance of infectious diseases</b>	<b>1</b>
Modes of Transmission . . . . .	1
Differences of infectious diseases . . . . .	2

## Importance of infectious diseases

Infectious disease: “illness due to specific infectious agent (pathogen) or it’s products that arises through transmission of that agent from an infected person, animal, reservoir or vector...”

## Modes of Transmission

- direct transmission
  - MMR, TB, flu, STIs
- vector-borne transmission
  - passes from person to person via an athropod vector
- indirect transmission
  - contaminated water or sewage (e.g. cholera, typhoid, etc.)
- zoonoses
  - transmitted directly or through some host, or you can get it from something like food and then pass it on

- the pathogen is maintained in the “animal” species, and then you may have transmission from humans to other humans, but it’s generally maintained in the wildlife reservoir
- environmental pathogens
  - harboured in the environment and then will pass on the disease (includes tetanus and botulism)

## Differences of infectious diseases

- cases can be the source of infection
  - there’s a simple model of this infection process  $y_i = \beta_0 + \beta_1 x_{1,i} + \dots + \beta_n x_{n,i}$ , or you could do the same thing for a logistic regression  $\log(\frac{p_i}{1-p_i})$ , and also a cox proportional hazard model  $\log(\lambda_i(t))$
  - the basic assumption that underlies all these models is that the outcome of an individual in this population is independent
  - pathogen exposure is the ultimate effect modifier - even if you have lots of risk factors, if you’re never exposed you’re not going to get the disease
  - Dealing with non-independence
    - \* ignore them (sometimest this is fine)
    - \* condition on exposure
    - \* design studies and analyses to account for transmission (focus of this course)
- cases can be sources without being recognized (e.g. infection that doesn’t cause a lot of disease but then is a source of illness to others)
  - asymptomatic infections are a common state in these system (e.g. strep, staph, etc)
  - diseases are a pretty small amount (often), but the infections that are not reported (asymptomatic) may account for the majority of transmission
- immunity -> not everyone is at risk
- enormous variations in incidence / prevalence