Estimating the Undiagnosed Fraction:

Disseminating the "Testing History" Method

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presenting on behalf of
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Overview

The Method

- Summary and assumptions
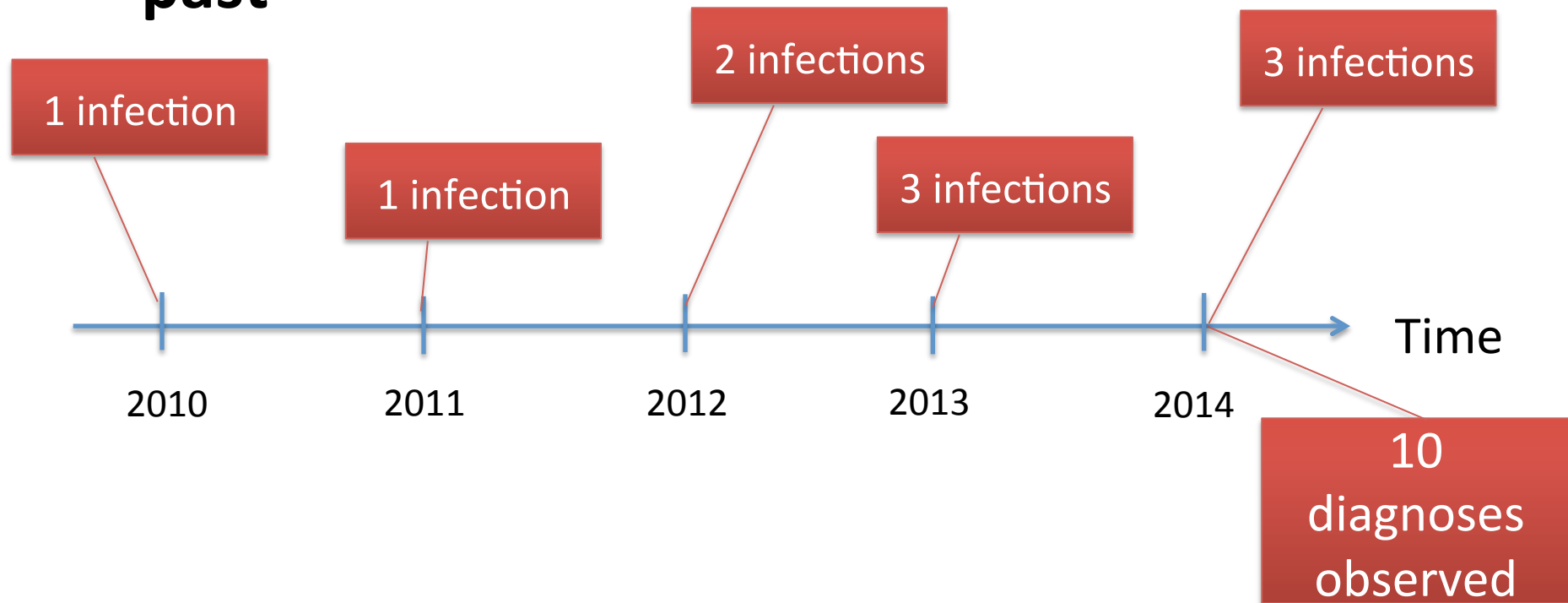- KC & WA state analyses

Dissemination

- Prototype "Rshiny" web app

Your Feedback

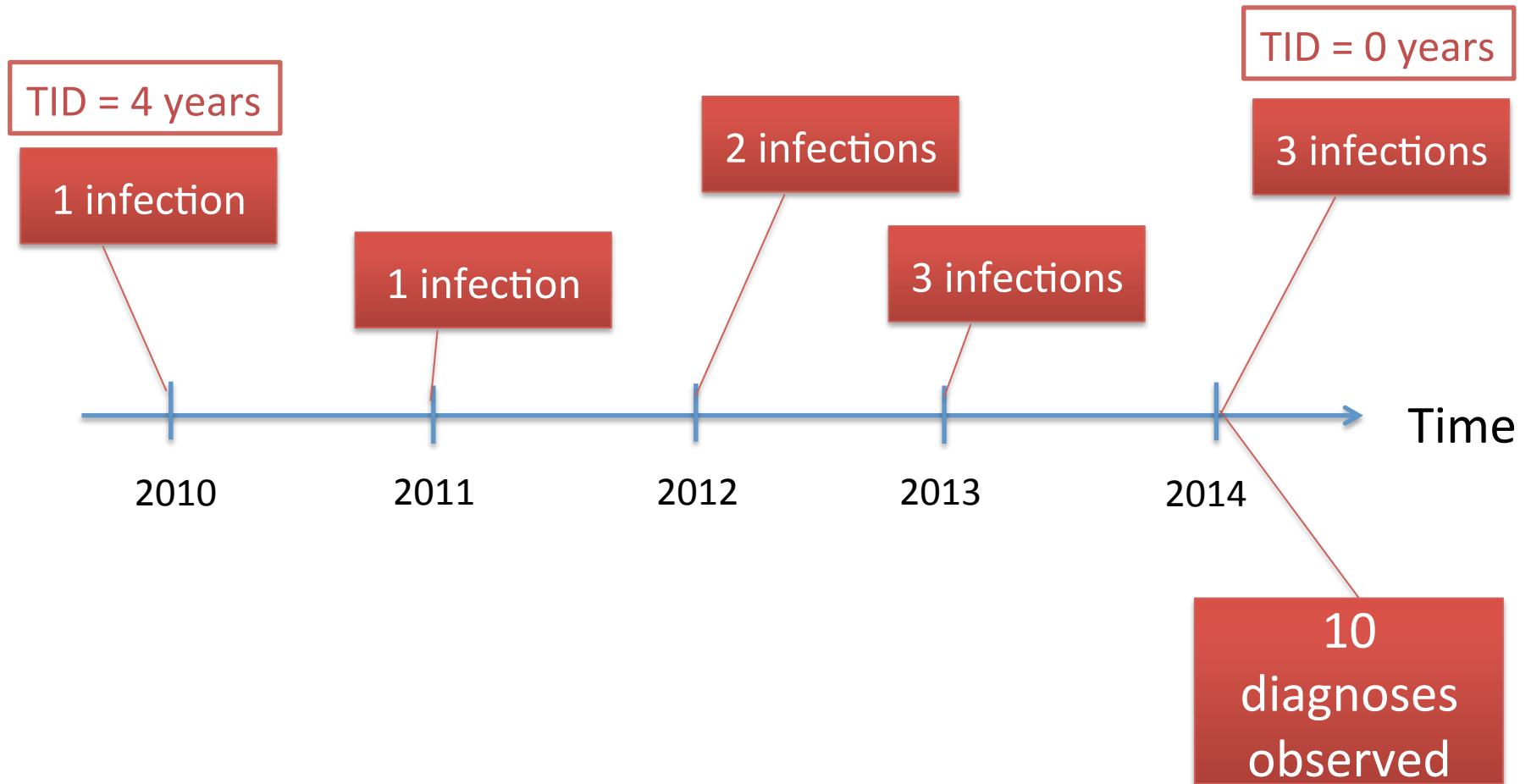- Refining the method
- Working with stakeholders

The Testing History Method

SPRC PHC

Approach: Backcalculation

- New diagnoses **today**…
- …are based on infections that occurred in the **past**

Time from Infection to Diagnosis (TID)

TID = 4 years

TID = 0 years

1 infection

2 infections

3 infections

1 infection

3 infections

Time

2010   2011   2012   2013   2014

10 diagnoses observed

Backcalculation's 3 Components

OBSERVED

Cases diagnosed at T   =

BACKCALCULATE
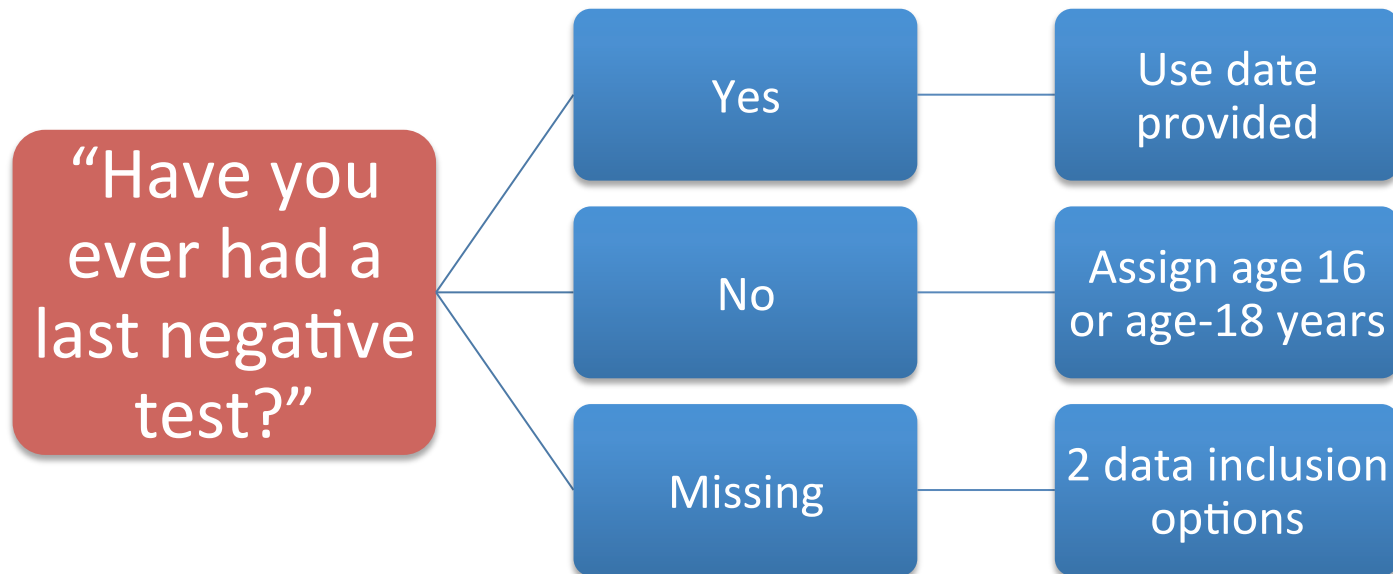
Sum of (Incidence at X yrs ago   *

TID probability for X yrs ago   )

NEED AN ESTIMATE

TID from Testing History

Infection window = [Date of last negative test -> Date of diagnosis]

1) Get date of last negative test

"Have you ever had a last negative test?"	Yes	Use date provided
	No	Assign age 16 or age-18 years
	Missing	2 data inclusion options

2) Determine time of infection within the infection window

Impact of TID Assumptions on TID
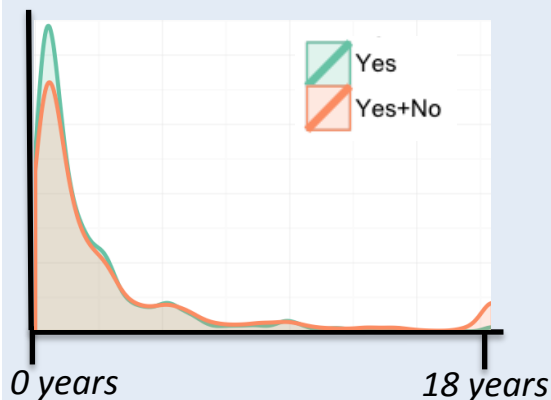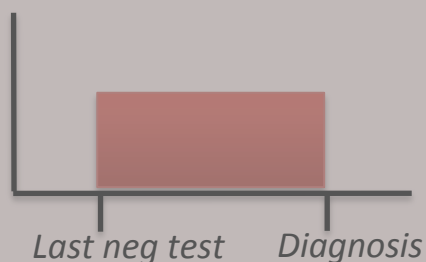
DATA INCLUSION	TIME OF INFECTION	TID DISTRIBUTION

OBSERVED ONLY

Density of last negative tests

UNIFORM

infections
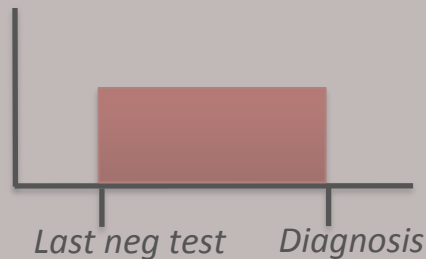
Last neg test   Diagnosis

"BASE CASE"

% undiagnosed

18 years

AT LAST NEG TEST

infections

Last neg test   Diagnosis

"WORST CASE (OBS)"

% undiagnosed

18 years

DATA INCLUSION	TIME OF INFECTION	TID DISTRIBUTION

OBSERVED ONLY

Density of last negative tests

Yes
Yes+No

0 years — 18 years
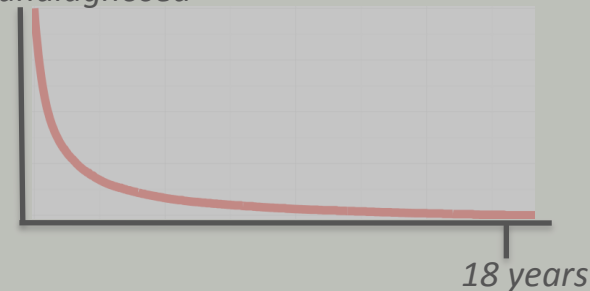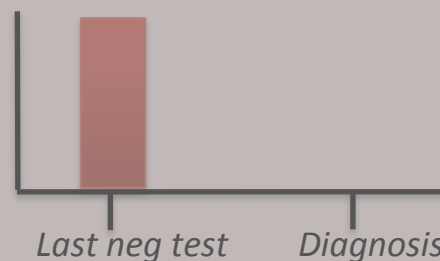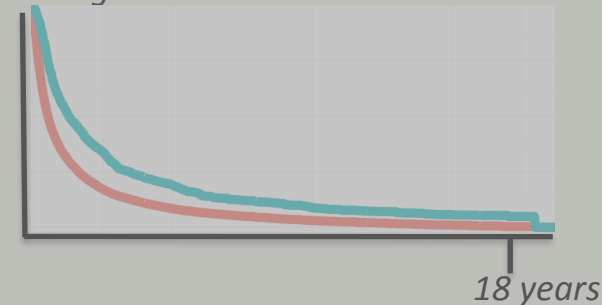
INCLUDING MISSING

Density of last negative tests

Yes
Yes+No
Yes+No+Miss

0 years — 18 years

UNIFORM

infections

Last neg test — Diagnosis

AT LAST NEG TEST

infections

Last neg test — Diagnosis

AT LAST NEG TEST

infections

Last neg test — Diagnosis

"BASE CASE"

% undiagnosed

18 years
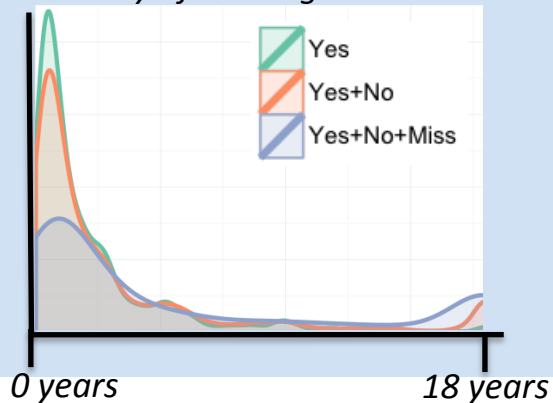
"WORST CASE (OBS)"

% undiagnosed

18 years
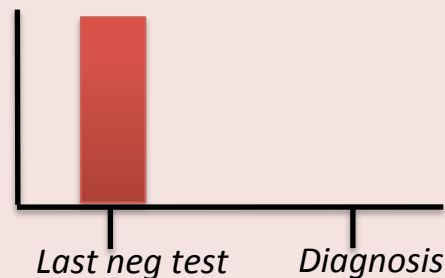
"WORST CASE (MISS)"

% undiagnosed

18 years
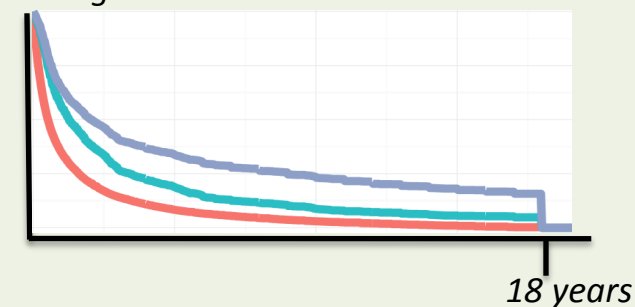
Applications to KC and WA State

KC MSM: Incidence ~ Constant
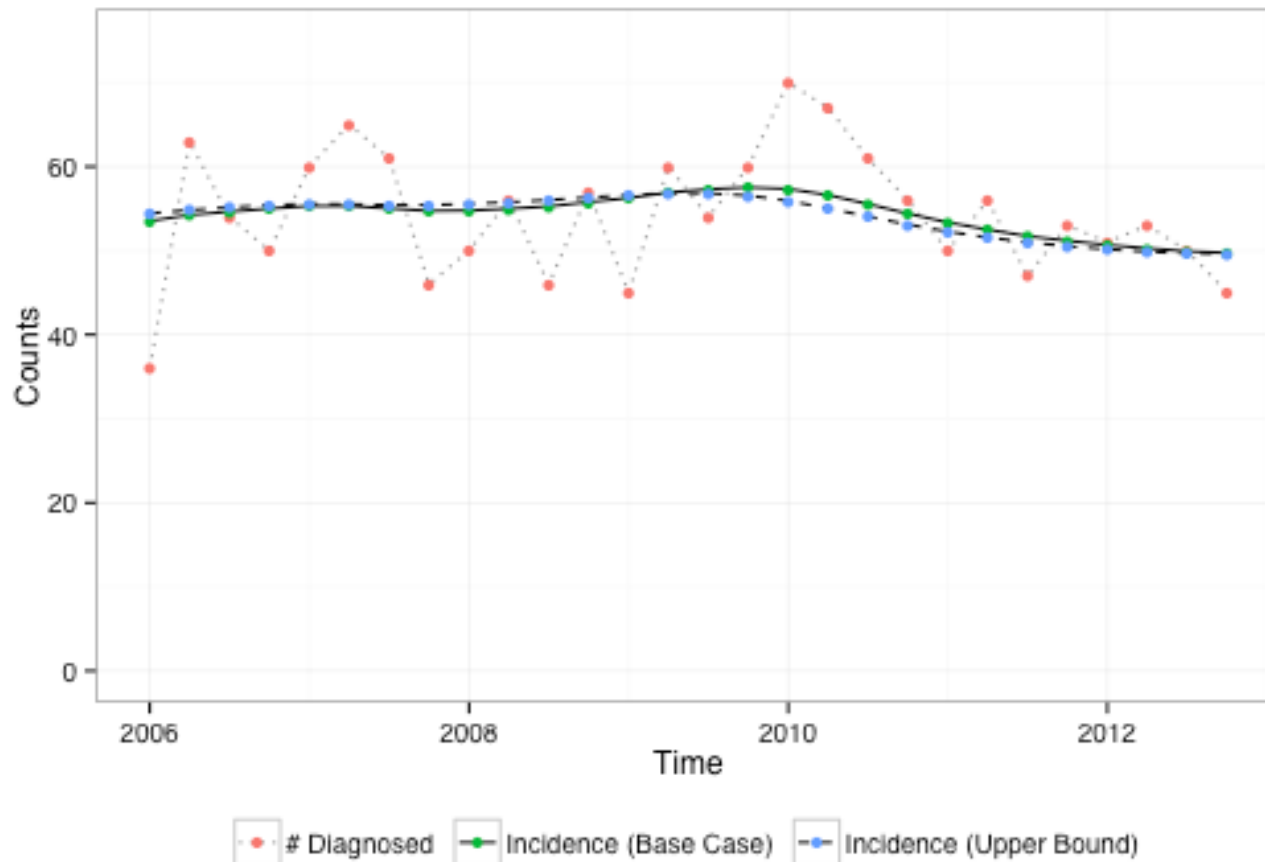
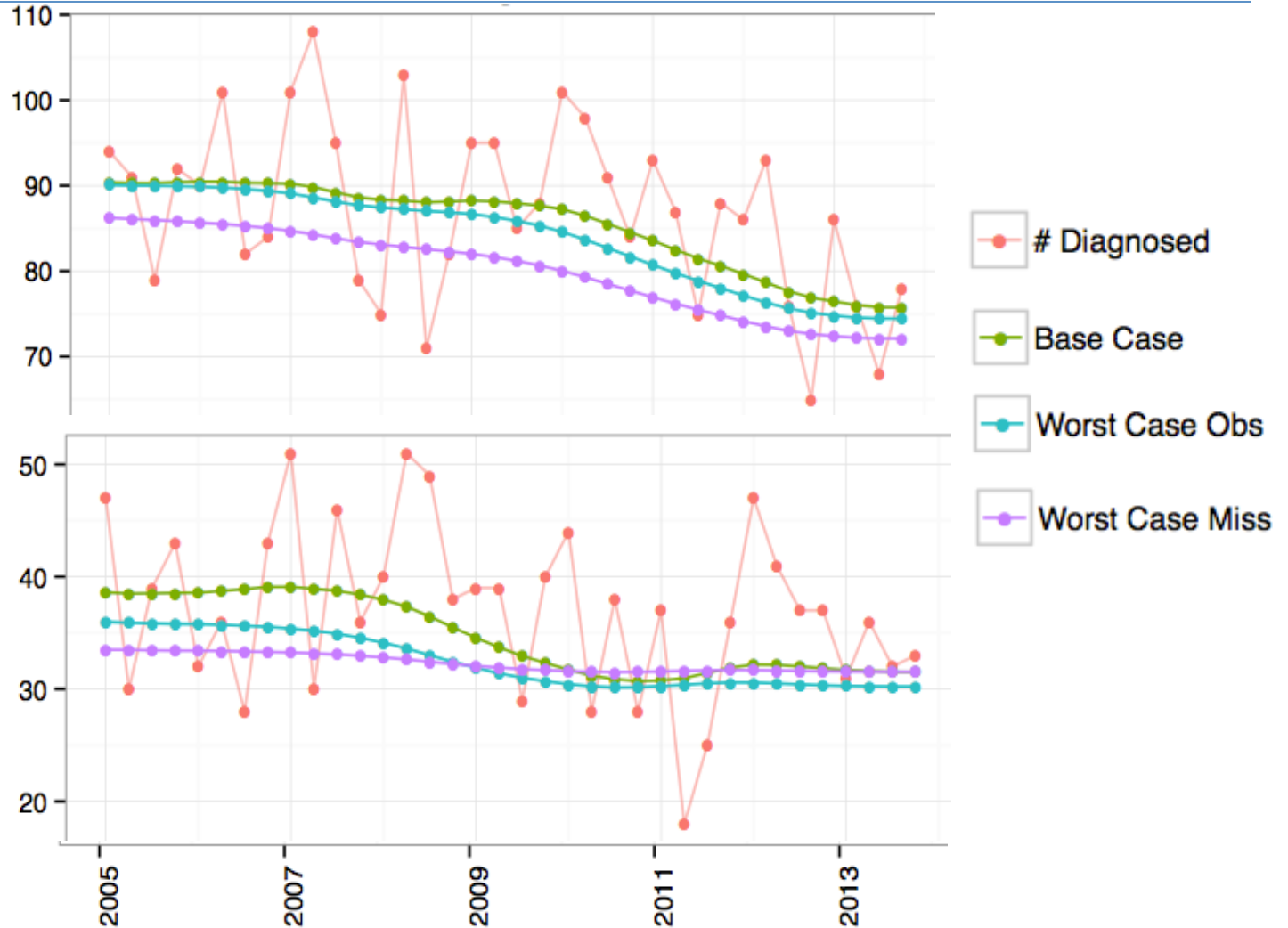### 15% missing testing history

KC MSM: Undiagnosed Varies by Race
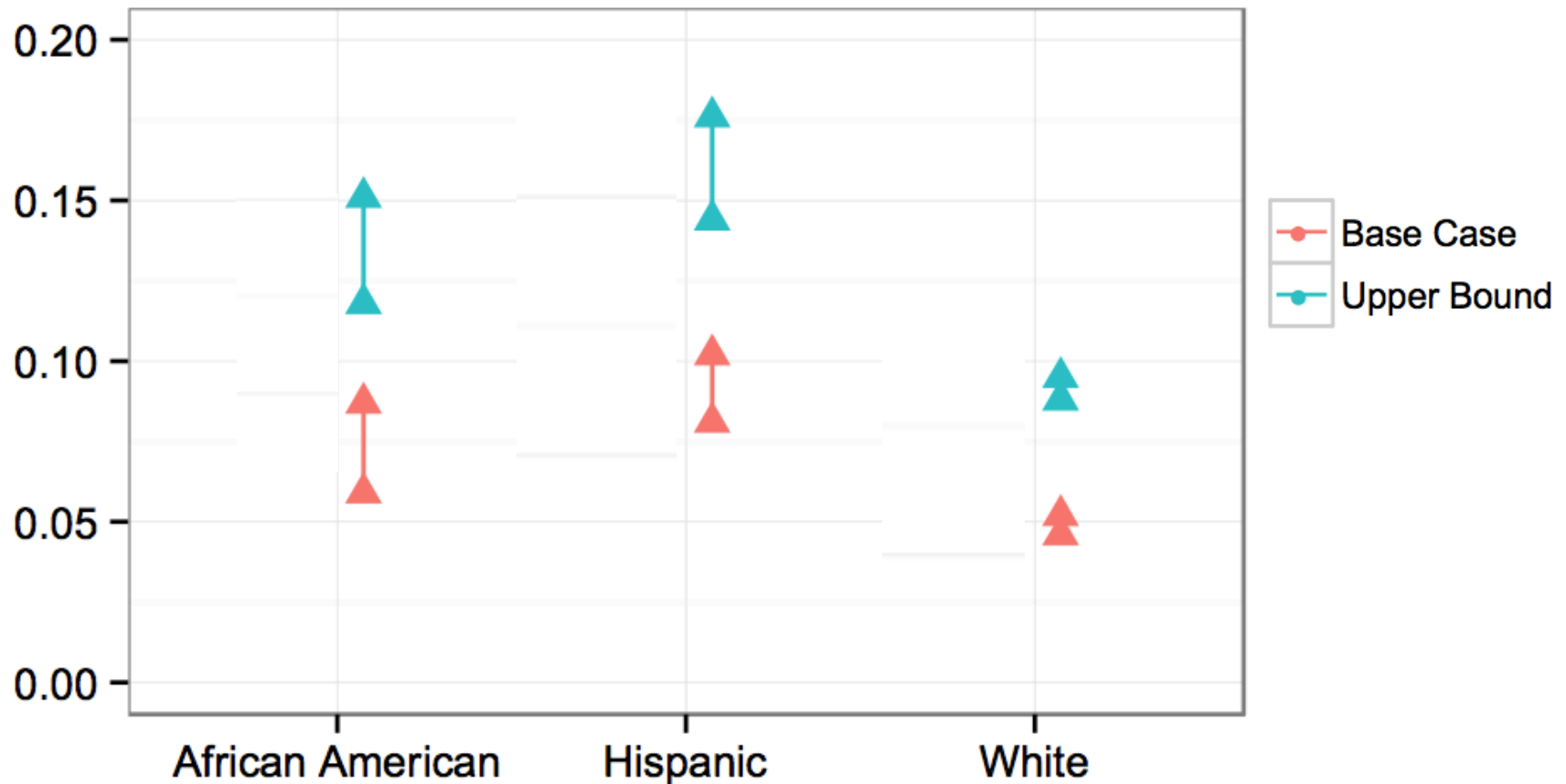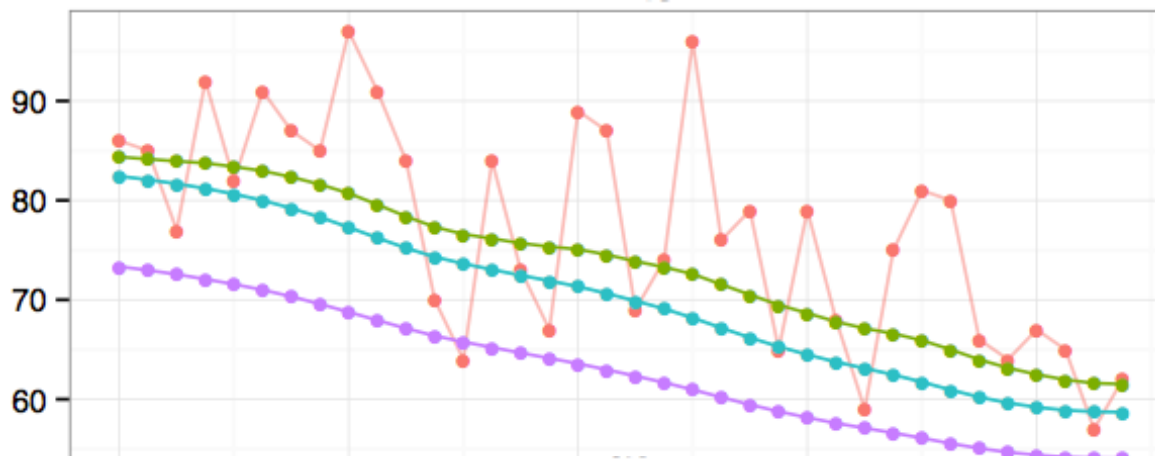
WA: Incidence is Declining

MSM

35% missing

Hetero

60% missing

Legend:
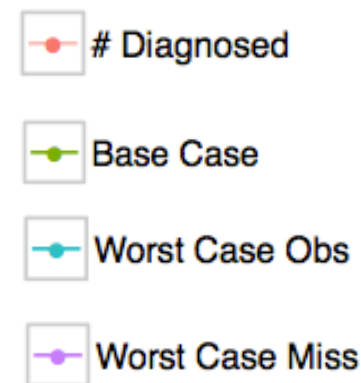- # Diagnosed
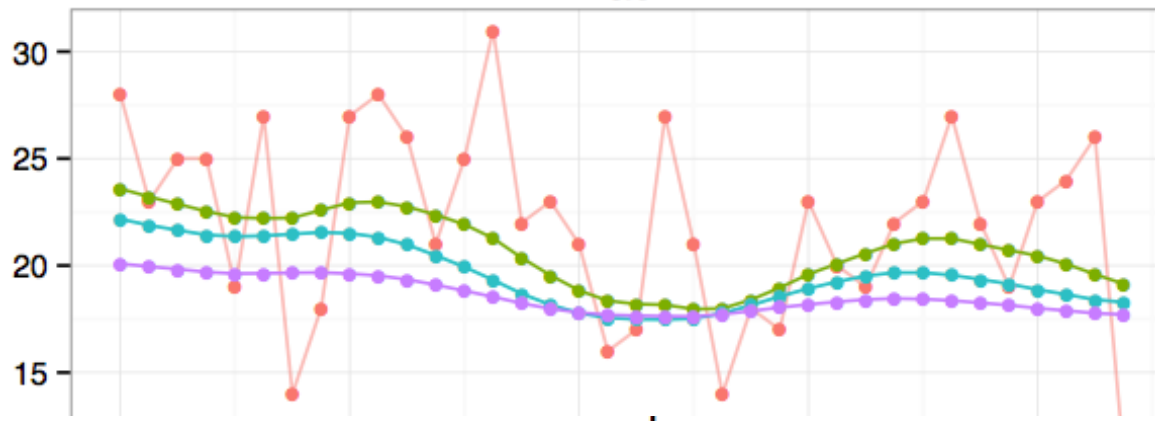- Base Case
- Worst Case Obs
- Worst Case Miss

White

40% missing

Black

49% missing

Hispanic

48% missing

Diagnosed

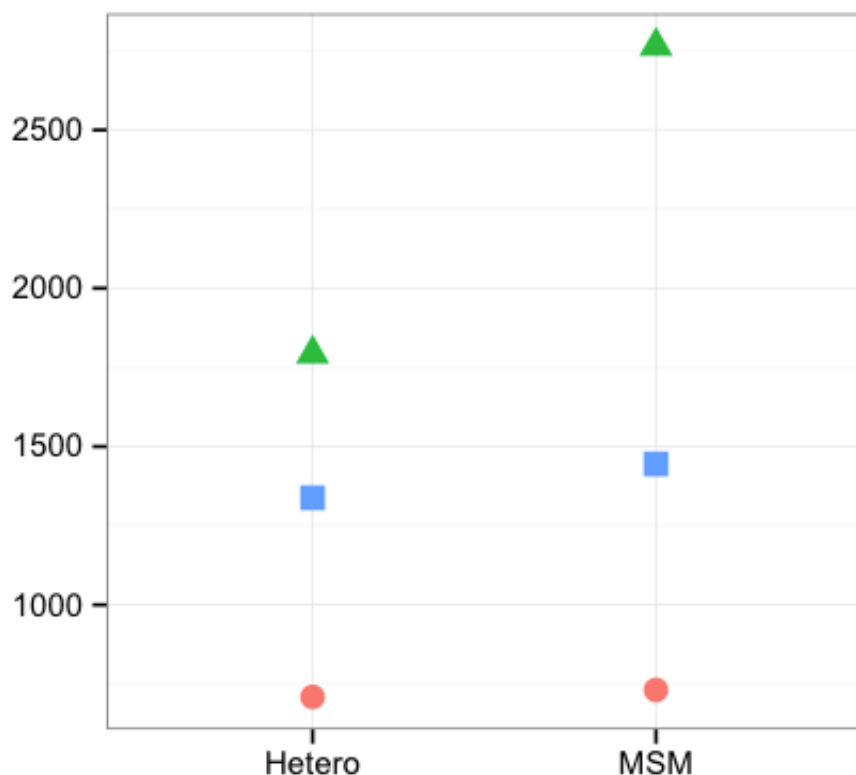Base Case

Worst Case Obs
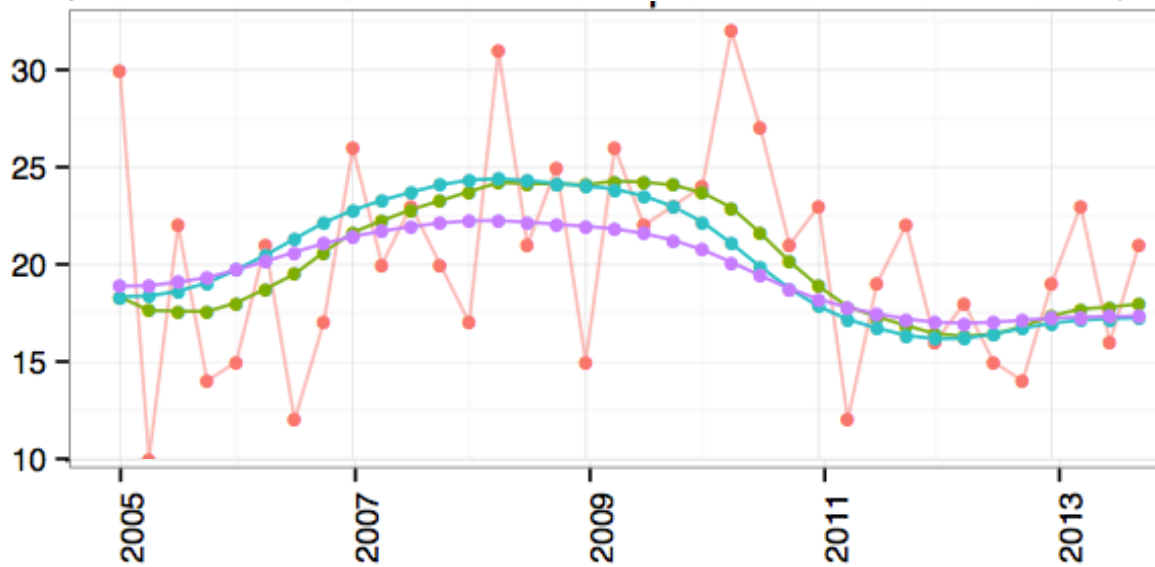
Worst Case Miss

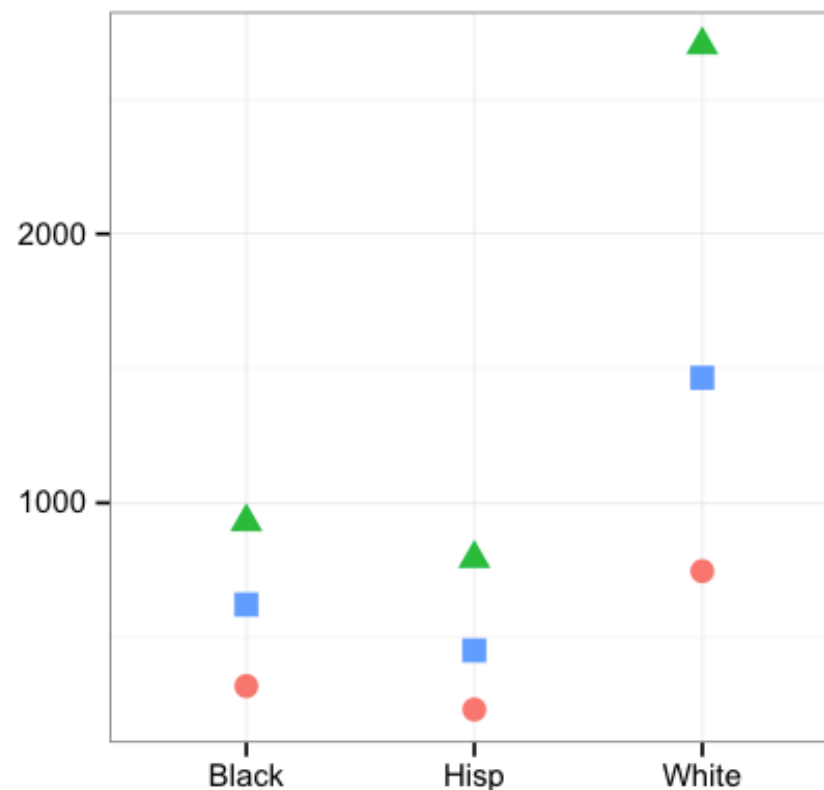# **WA**: Undiagnosed *Counts* by Group

Hetero vs MSM

Race

Legend: ● Base Case   ■ Worst Case (Obs)   ▲ Worst Case (Miss)

Dissemination to
Public Health Departments

Web Portal

- Goals:
  - Provide self-guided access to model for local use
  - Minimal learning curve
  - Minimal pre-processing of data
  - Outputs presented in most policy-relevant form
- Mechanism
  - "Rshiny" interface

Protoype Rshiny App

https://hivbackcalc.shinyapps.io/HIVBackCalc_App/

Your Feedback

Issues

- Data privacy requirements
  - Local, protected upload, unprotected upload
- Detail in outputs
  - Race, mode, sex subgroup results?
  - Impact of missing data (suggestions for better assumptions?)
- Training for users

Thank you!

Impact of TID Assumptions

DATA INCLUSION	TIME OF INFECTION	TID DISTRIBUTION

DATA INCLUSION	TIME OF INFECTION	TID DISTRIBUTION