Sanitation and water supply coverage thresholds associated with active trachoma

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Background: Trachoma

- Leading cause of preventable blindness
- Blinding caused by repeated infection by Chlamydia trachomatis
  - Flies act as a vector
- **SAFE** strategy
  - Surgery to fix trichiasis
  - Antibiotics for already infected
  - **Facial cleanliness**
    - Dirty faces attract flies
    - Children touch their eyes when their face is dirty
  - **Environmental improvements**
    - Improved sanitation (eliminates fly breeding)
Research questions

Can community-level WASH access confer herd protection against trachoma?

• What are the associations between household access to water and sanitation and trachoma?
  • This has already been described in the literature
• Are there community coverage thresholds for water or sanitation that confer herd protection against trachoma?
  • Unique contribution to the literature
Methods

Study Context

• Data from **Global Trachoma Mapping Project (GTMP)**
• Data collected from 2012-2016
• Cross-sectional, cluster sampling in trachoma-endemic districts
• Our data
  • 13 countries in sub-Saharan Africa and Oceania
  • N=884,850 children ages 1-9
Methods
Statistical Analyses

• Used Multivariable mixed effects modified Poisson model

• **Outcome**: Active trachoma (right eyes, left eye, or both eyes)

• **Exposures**:
  • Household-level sanitation access (JMP definition)
  • Household-level access to improved water (JMP definition) in compound
  • Community-level sanitation coverage
  • Community-level improved water coverage

• Different types of “effects”
  • **Direct effect**: Contribution from own water/sanitation access
  • **Indirect/herd effect**: Contribution from neighboring water/sanitation coverage levels (can even protect those without household access)
  • **Total effect**: Contribution from direct and indirect/herd protection
Results

Sanitation coverage and trachoma

- Herd/indirect effects for sanitation:
  - Linear trend
  - Suggests threshold at 80% or 90%
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- Household-level sanitation/direct effect was protective PR=0.87 (0.83, 0.91)
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Sanitation coverage and trachoma

• Herd/indirect effects for sanitation:
  • Linear trend
  • Suggests threshold at 80% or 90%

• Household-level sanitation/direct effect was protective PR=0.87 (0.83, 0.91)

• Herd effects for sanitation
  • Suggests protection among those without HH latrines

![Graph showing prevalence ratio for different sanitation coverage levels]
Results

Water supply coverage and trachoma

• Herd/indirect effects for water:
  • Linear trend
  • No clear threshold

• Household-level water/direct effect was protective PR=0.81 (0.75, 0.88)
Results

Water supply coverage and trachoma

• Herd/indirect effects for water:
  • Linear trend
  • No clear threshold

• Household-level water/direct effect was protective PR=0.81 (0.75, 0.88)

• No clear herd effect for water coverage and trachoma
Summary

High community sanitation coverage confers herd protection against trachoma

• Largest ecological study of the association between W&S and trachoma
  • “Hypothesis generating” study to inform global SAFE strategies

• Observed associations between household W&S and trachoma

• Study shows the importance of reaching high sanitation coverage levels
  • Higher levels of sanitation coverage is associated with lower trachoma
  • Protective associations for both those with and without latrines
Limitations

Several limitations important for study interpretation

• Potential for unmeasured confounding with cross-sectional data
• Exposures were primarily self-report
• Used a single observation to capture a complex time-varying WASH history
• Water quantity was not taken into account
• Sanitation utilization was not captured
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Sanitation and water supply coverage thresholds associated with active trachoma: Modeling cross-sectional data from 13 countries