# Greenness as a protective factor for pediatric IBD?

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# Greenness??

# Presentation overview

BACKGROUND

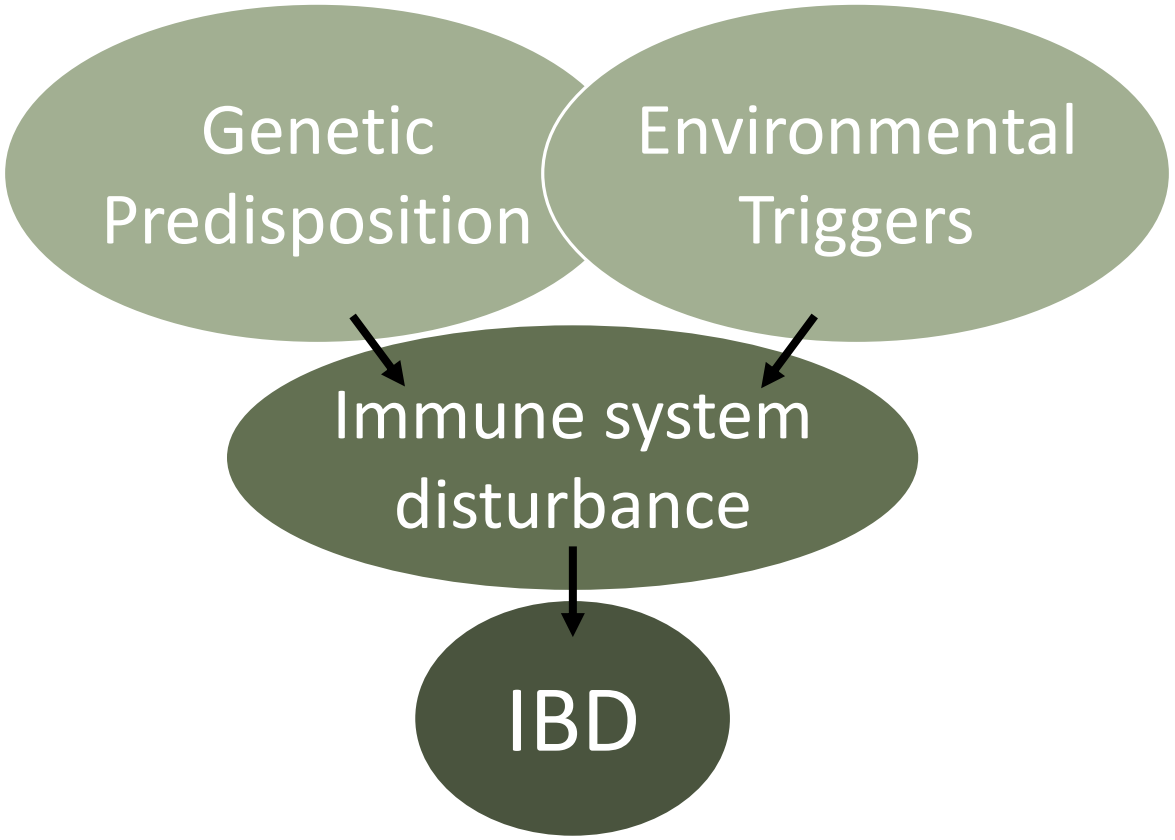
METHODS

RESULTS

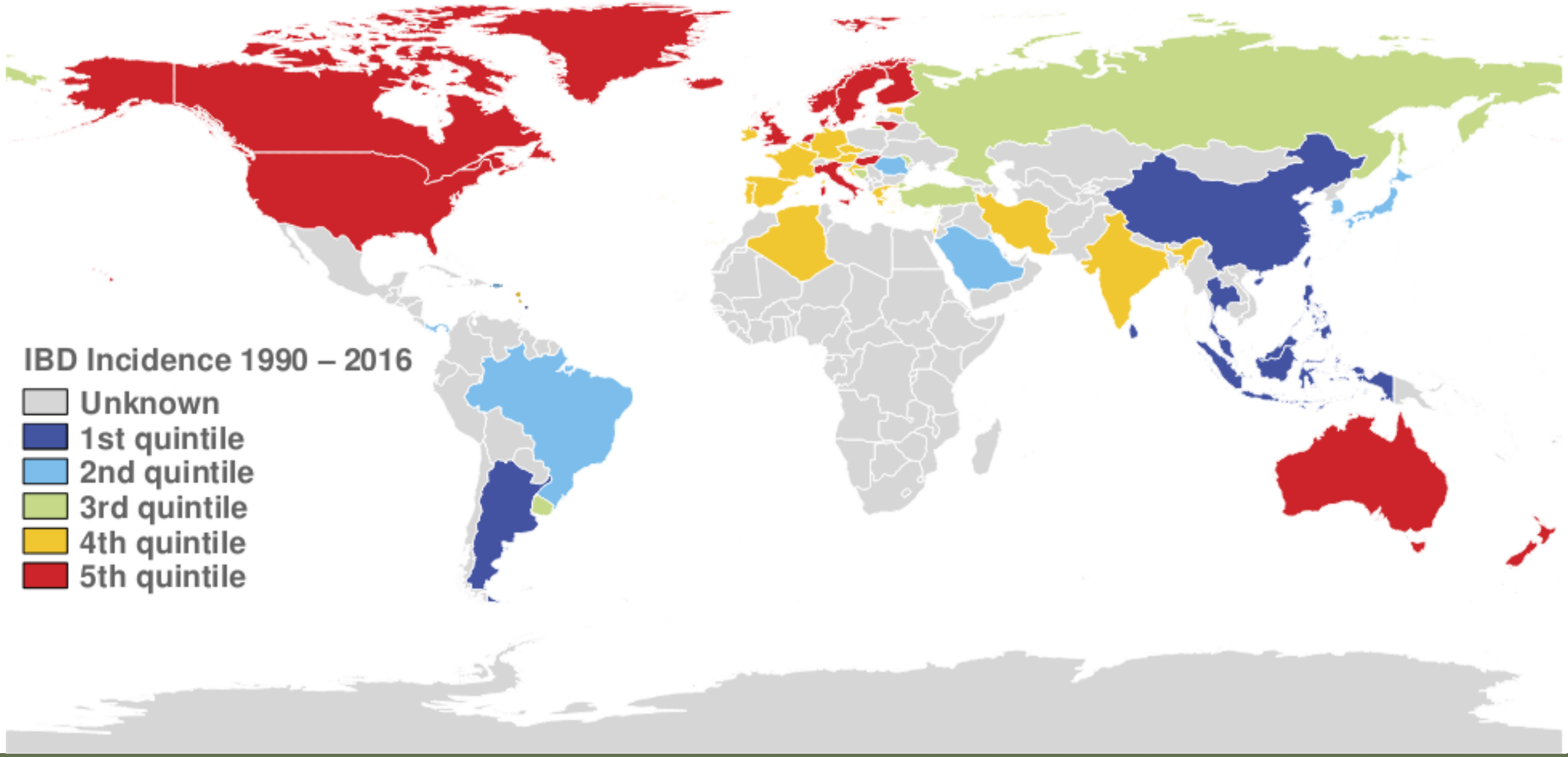
DISCUSSION

# Inflammatory Bowel Disease

- Two subtypes:
  - Crohn's disease (CD)
  - Ulcerative colitis (UC)
- Childhood-onset IBD tends to be more severe
- No current cure

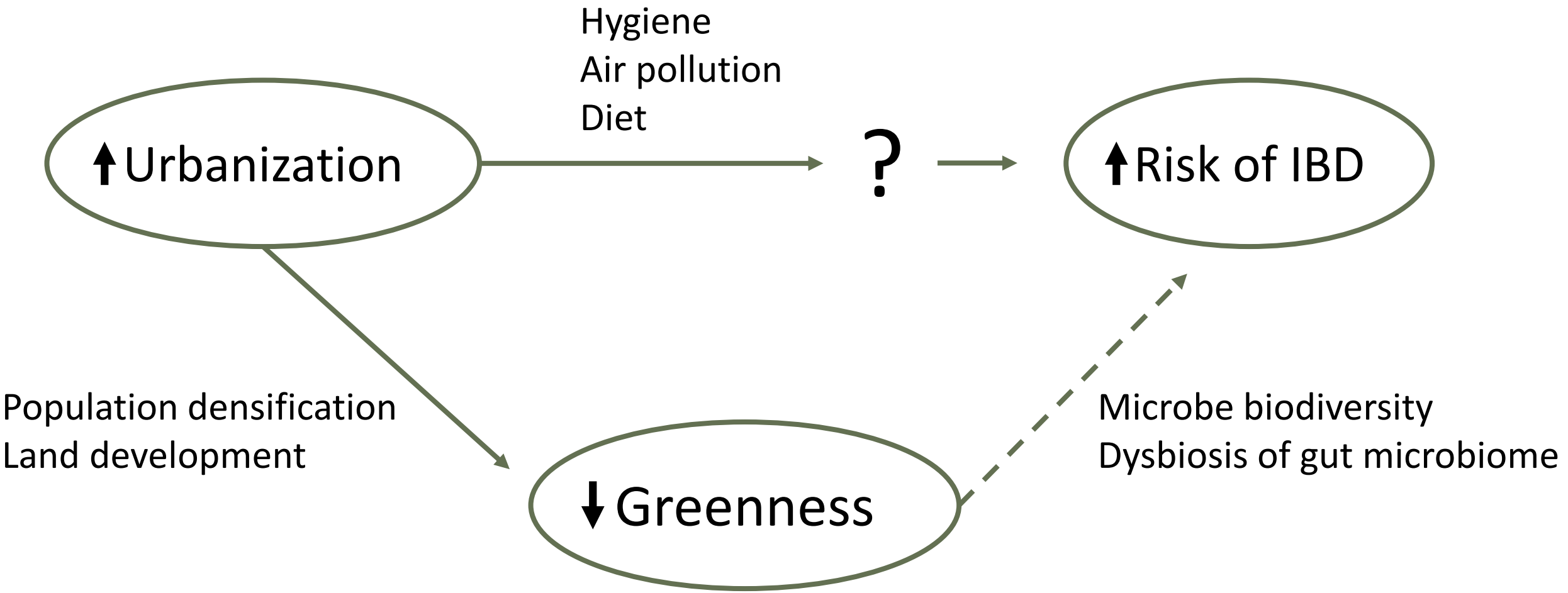


# Global Incidence of IBD




Kaplan et al. 2016.

# What we know so far



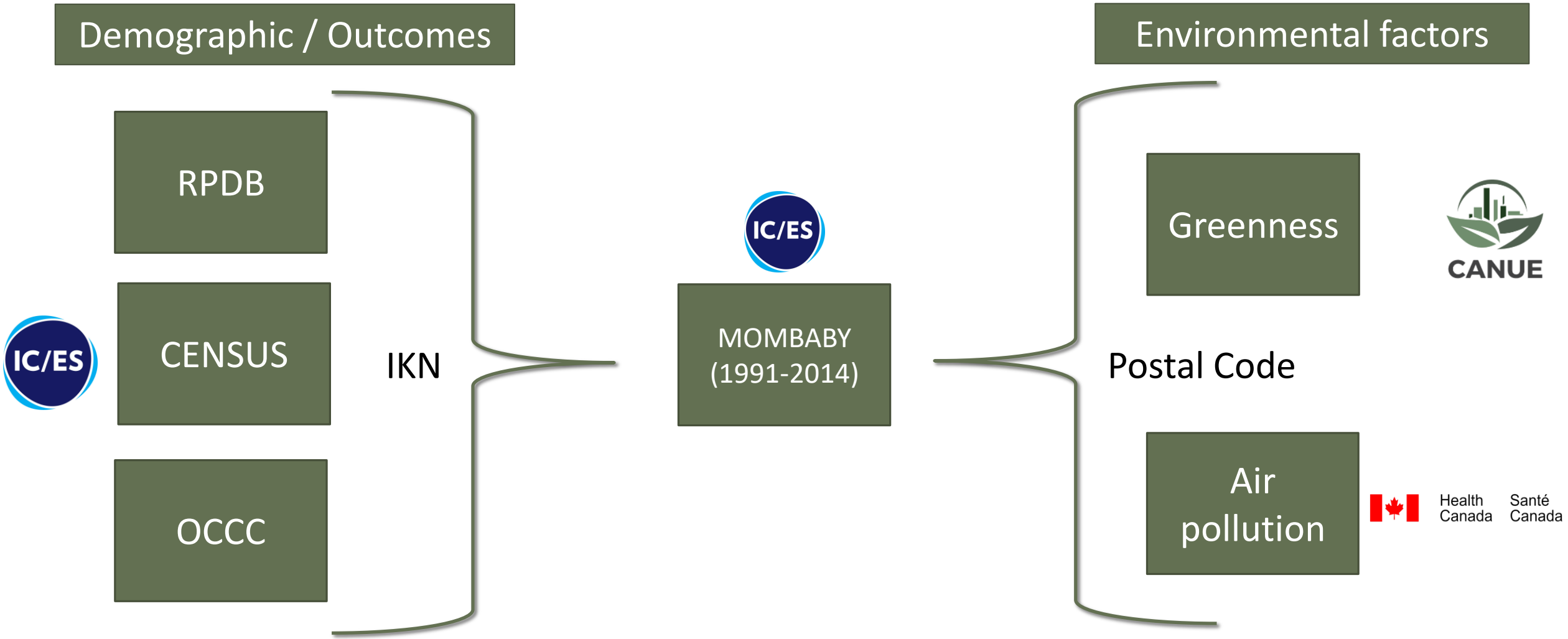
# Research Question

Is there an association between residential greenness and risk of developing childhood-onset IBD?

# Exposure Assessment - Greenness

1. Estimates of greenness from the Landsat satellite (NDVI)
2. Max greenness in 250m buffer of each postal code
3. Annual estimates modelled as a time-varying predictor
4. Split into quartiles

# Data Linkage map



# Statistical Analysis

- Cox proportional hazards model
  - Outcomes: Overall IBD and disease subtypes
  - Follow-up time: from birth until event or age 18
  - Exposure: time-varying quartile of residential greenness
  - Hazard ratios (HR) show the risk of developing IBD compared to lowest level of greenness

# Population characteristics

2,725,994 children in study population

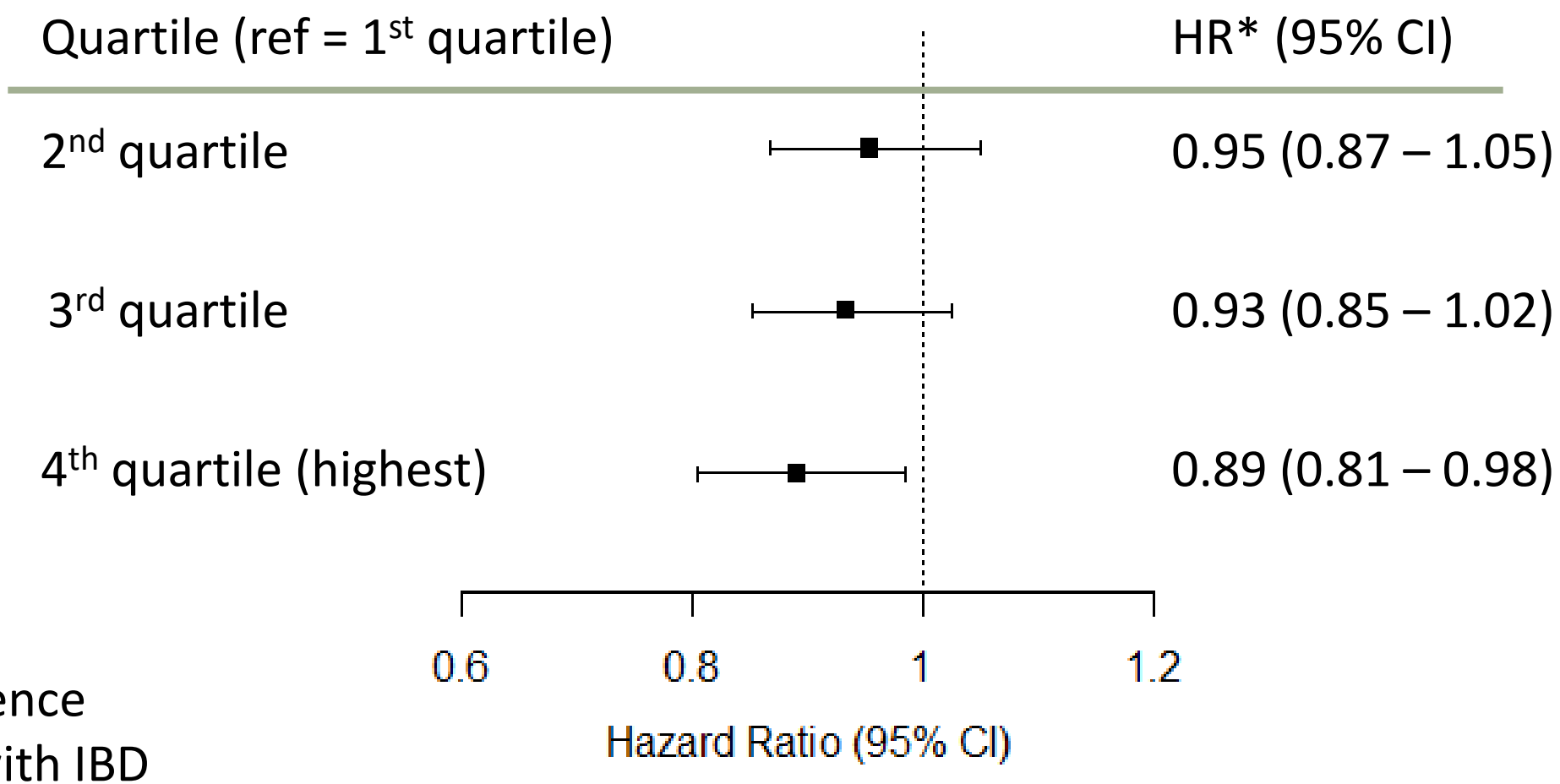
3464 children developed IBD

- 1915 (55%) Crohn's disease
- 1253 (36%) Ulcerative colitis
- 296 (9%) Unclassifiable

Urban more common among IBD cases

- 90% of IBD lived in urban areas
- 87% of non-IBD lived in urban areas

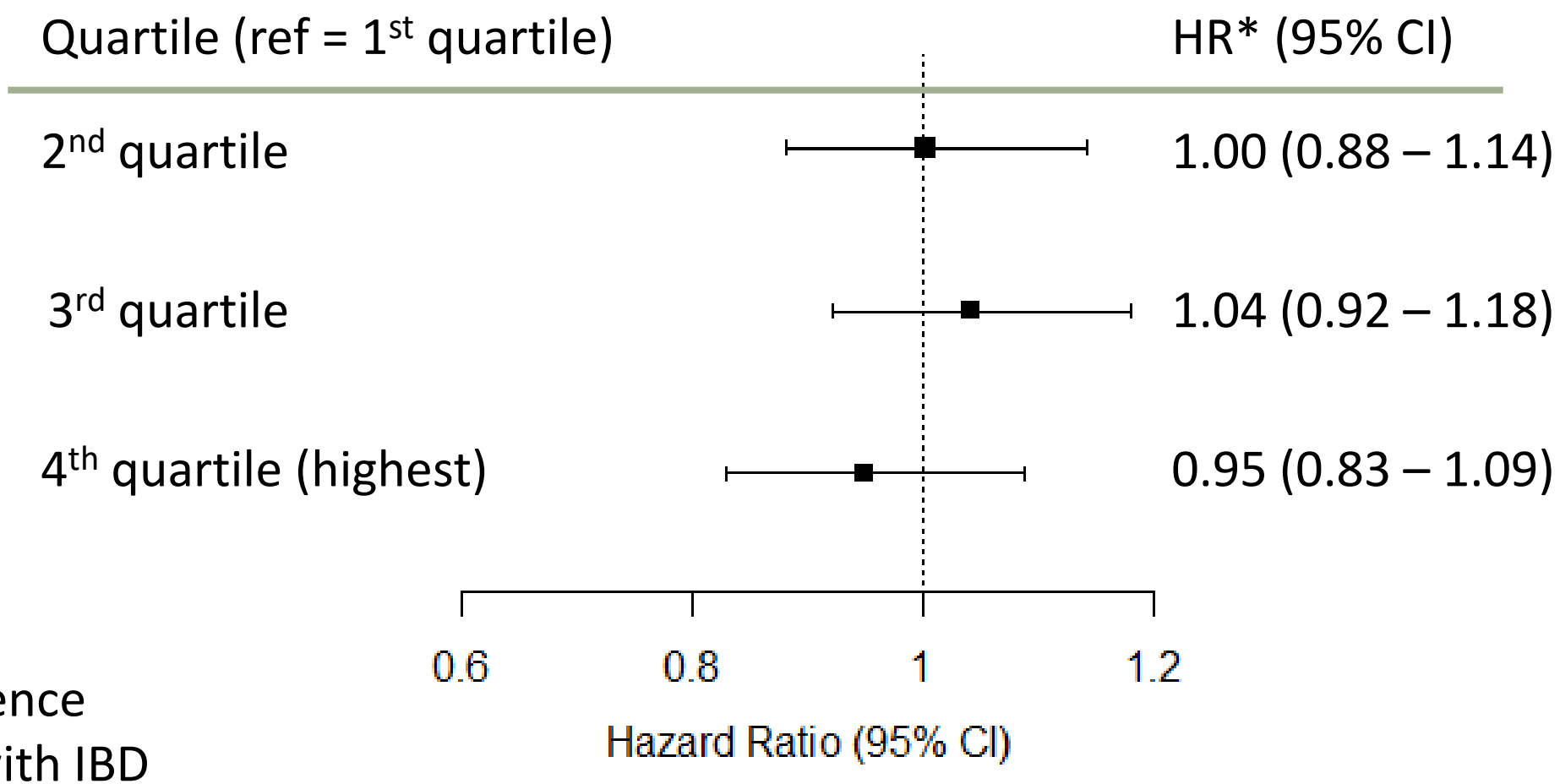
# Greenness and: Overall IBD Events: 3401




*adjusted for:

- Rural / urban residence
- Mother or sibling with IBD
- Household income quintile

# Greenness and: Crohn's disease Events: 1880




*adjusted for:

- Rural / urban residence
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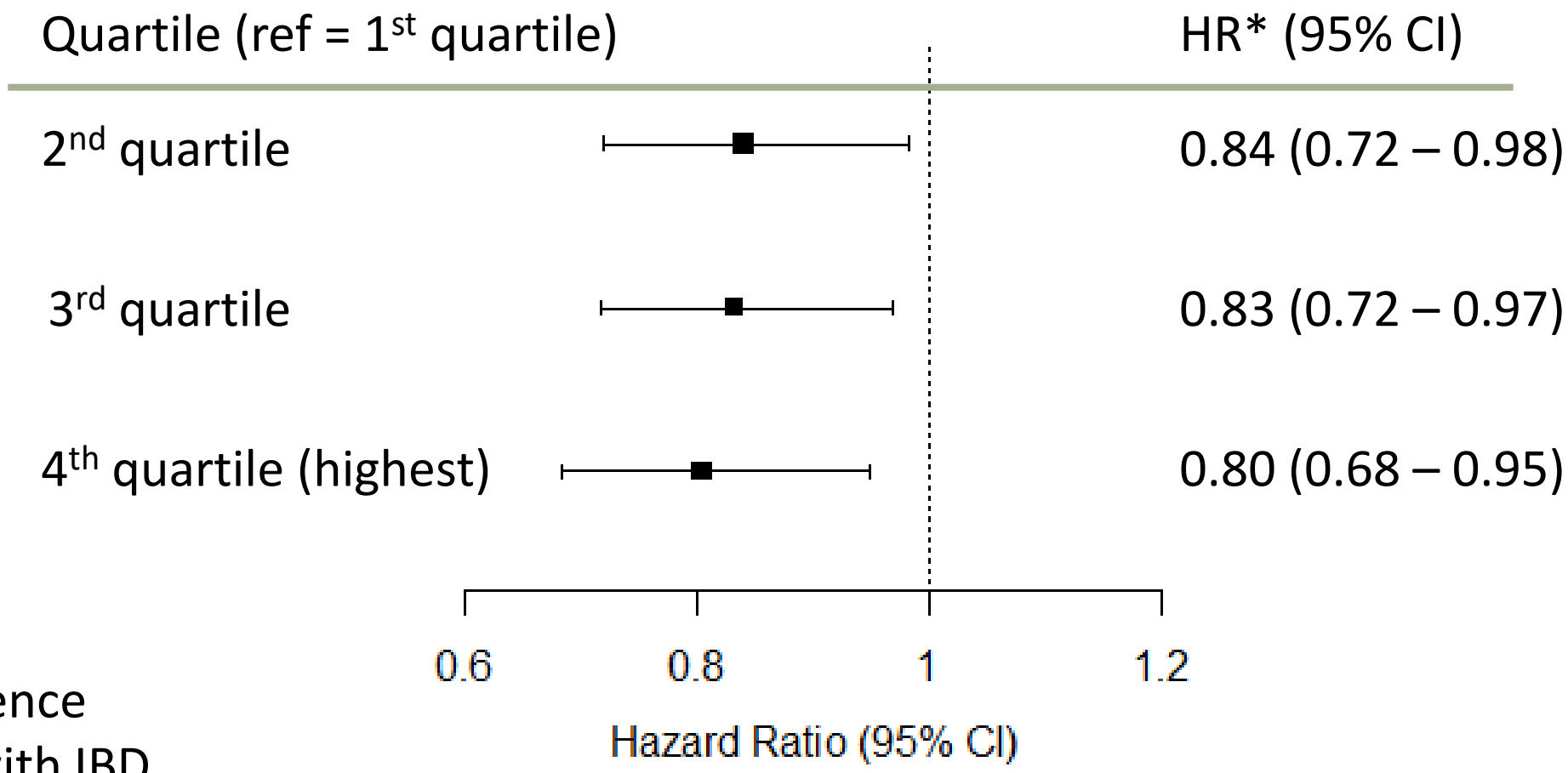
# Greenness and: Ulcerative Colitis Events: 1236




*adjusted for:

- Rural / urban residence
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# Overall Conclusions

Greenness may be a protective factor in childhood-onset UC

Differences in disease subtypes

Early childhood period should be investigated further

# Acknowledgements


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- Dr. Eric Benchimol
- Dr. Deshayne Fell

Unofficial advisory committee:

- Dr. Ellen Kuenzig
- Dr. Gilaad Kaplan
- Dr. Hong Chen
- Dr. Antonio Gasparini

# Questions / Feedback?

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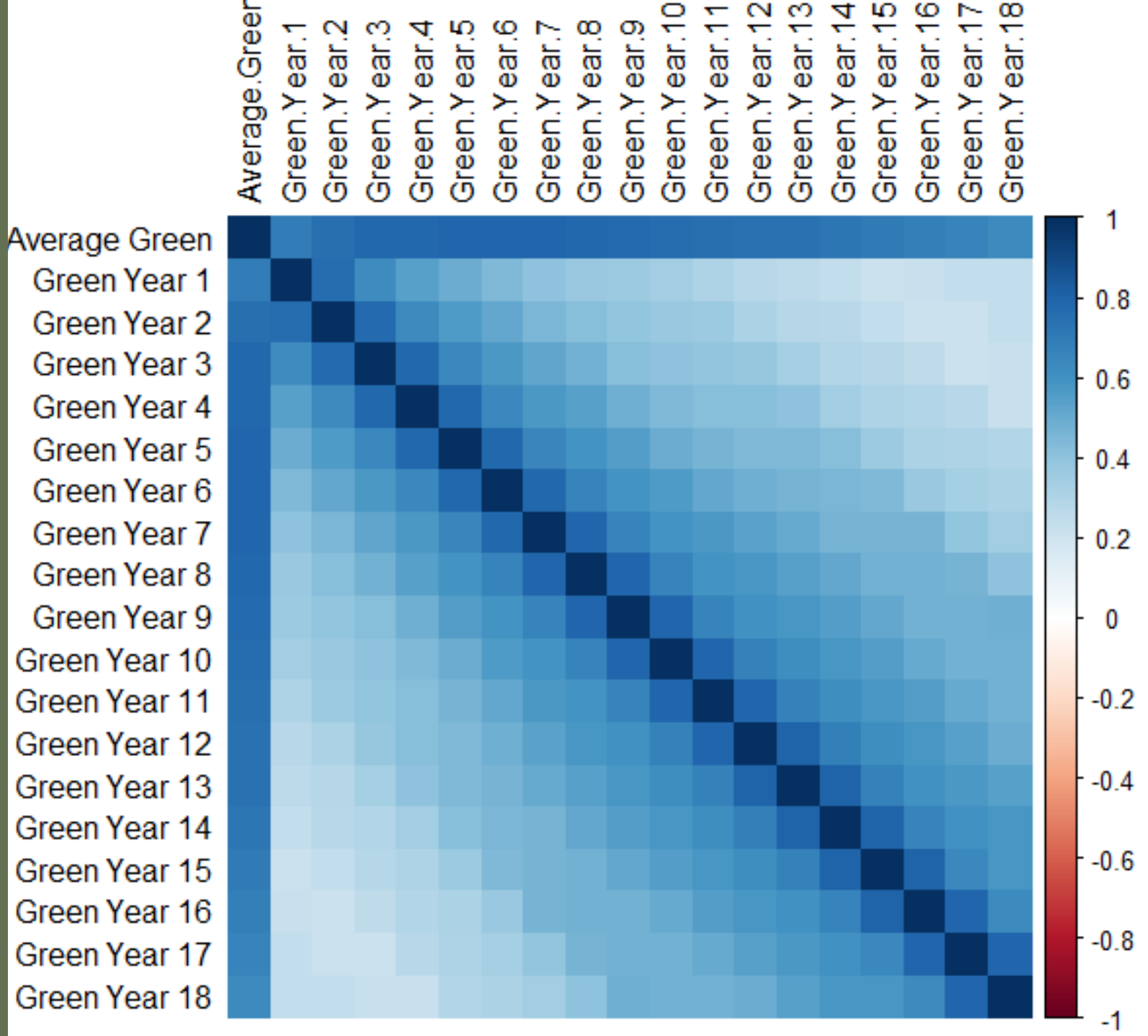
# Supplemental Slides

# Baseline characteristics

| Characteristic | IBD (n=3464) | Non-IBD (n=2,722,530) |
|---|---|---|
| Sex | | |
| Male | 1991 (57%) | 1,395,884 (51%) |
| Female | 1473 (43%) | 1,326,646 (49%) |
| Mean birthweight (g) | | |
| | 3,442.43 | 3,410.53 |
| Mean maternal age (years) | | |
| | 30.0 | 29.5 |
| Area of residence | | |
| Rural | 333 (10%) | 347,710 (13%) |
| Urban | 3131 (90%) | 2,374,820 (87%) |
| Median neighborhood income quintile | | |
| 5 (Highest) | 798 (23.0%) | 540,140 (19.8%) |
| 4 | 699 (20.2%) | 540,092 (19.8%) |
| 3 | 692 (20.0%) | 540,304 (19.9%) |
| 2 | 698 (20.2%) | 540,239 (19.8%) |
| 1 (Lowest) | 564 (16.3%) | 540,363 (19.9%) |
| Missing | 13 (0.4%) | 21,392 (0.8%) |
| Mother or sibling with IBD | | |
| Yes | 206 (6%) | 14,410 (0.5%) |
| No | 3258 (94%) | 2,708,120 (99.5%) |

# Greenness Correlation Matrix



# Model Building

Entered into the model based on previous literature:

- ✓ Family history of IBD
- ✓ Rural/Urban status
- ✓ Median neighborhood household income quintile

Considered as potential confounders through change in estimate (CIE) method:

- × Gestational weeks (0% Change)
- × Season of conception (0% Change)
- × Weight at birth (0% Change)
- × Maternal age (0% Change)
- × Parity (0% Change)
- × Birth weight (0.13% Change)
- × Baby's sex (0.13% Change)

# Greenness and Ulcerative Colitis (Urban areas only)

| Pollutant | # events | Quartile(ref=1st) | |
|---|---|---|---|
| $NO_2$ | 930 | 2nd | 0.84 (0.67 – 1.07) |
| | | 3rd | 0.88 (0.69 – 1.10) |
| | | 4th | 0.70 (0.53 – 0.92) |
| $PM_{25}$ | 934 | 2nd | 0.94 (0.69 – 1.28) |
| | | 3rd | 0.96 (0.72 – 1.29) |
| | | 4th | 0.72 (0.52 – 1.00) |
| $O_3$ | 989 | 2nd | 0.96 (0.78 – 1.18) |
| | | 3rd | 0.89 (0.72 – 1.09) |
| | | 4th | 0.76 (0.60 – 0.96) |