

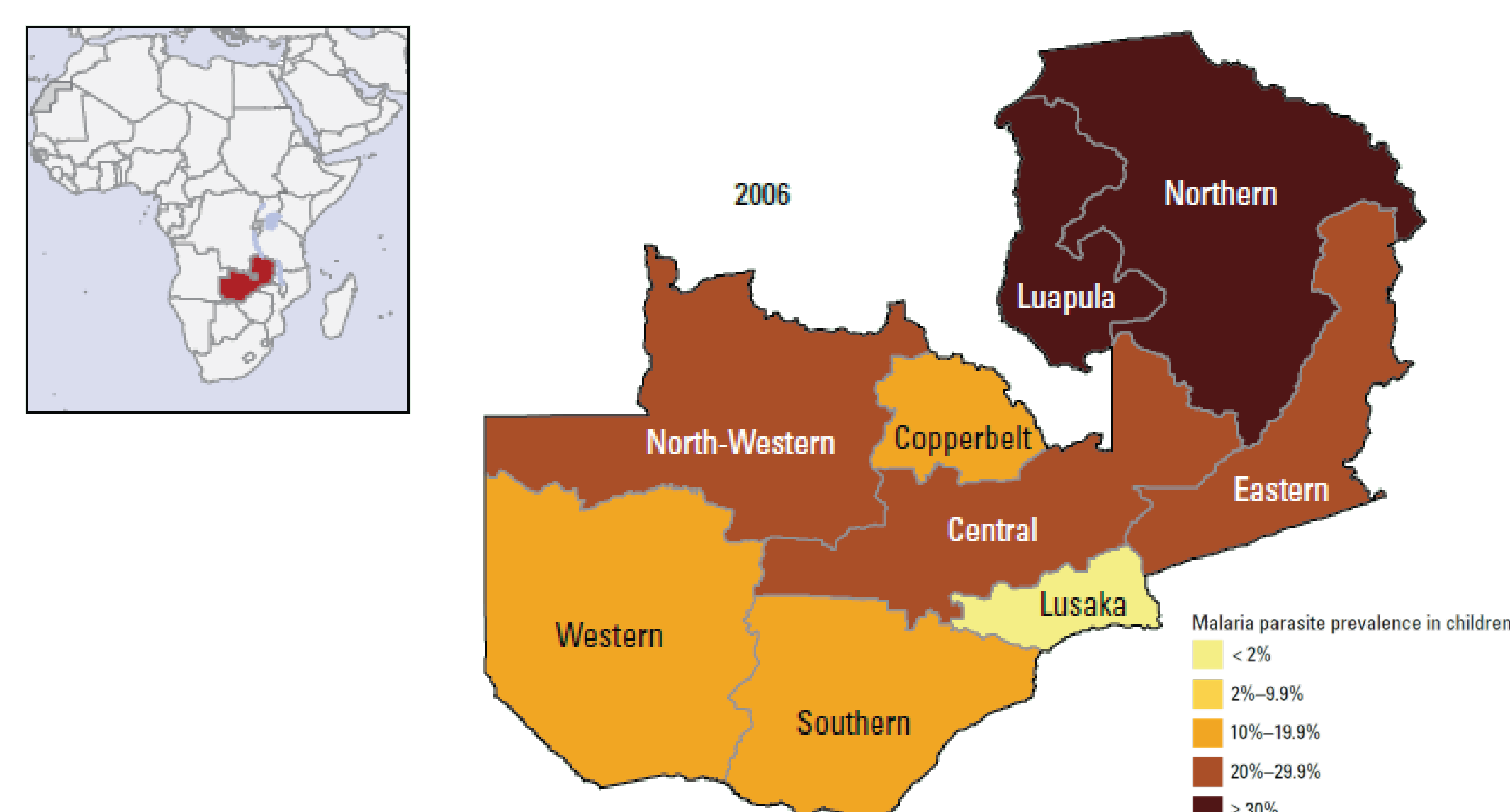
Association between Malaria Control Scale-Up and Microeconomic Outcomes: Evidence from a Retrospective Analysis In Zambia

Anthony Leegwater¹, Alison Comfort², Sharon Nakhimovsky¹, Benjamin Johns¹, Lauren Olsho², Martin Alilio³, Henry Kansembe⁴, Benson Bwalya⁵, Kelley Ambrose², Busiku Hamainza⁶

¹Abt Associates, Bethesda, MD, United States, ²Abt Associates, Inc, Cambridge, MA, United States, ³President's Malaria Initiative/USAID, Washington, DC, United States, ⁴Ministry of Health, Lusaka, Zambia, ⁵Abt Associates, Inc, Lusaka, Zambia, ⁶National Malaria Control Center, Lusaka, Zambia

Background

- The intensive scale-up of malaria control efforts in recent years has significantly reduced the malaria burden worldwide.
- There is limited but growing evidence of the impact of malaria control on household microeconomic outcomes such as food consumption, total consumption, agricultural production, and educational attainment.



2011 Focus on Zambia, Roll Back Malaria

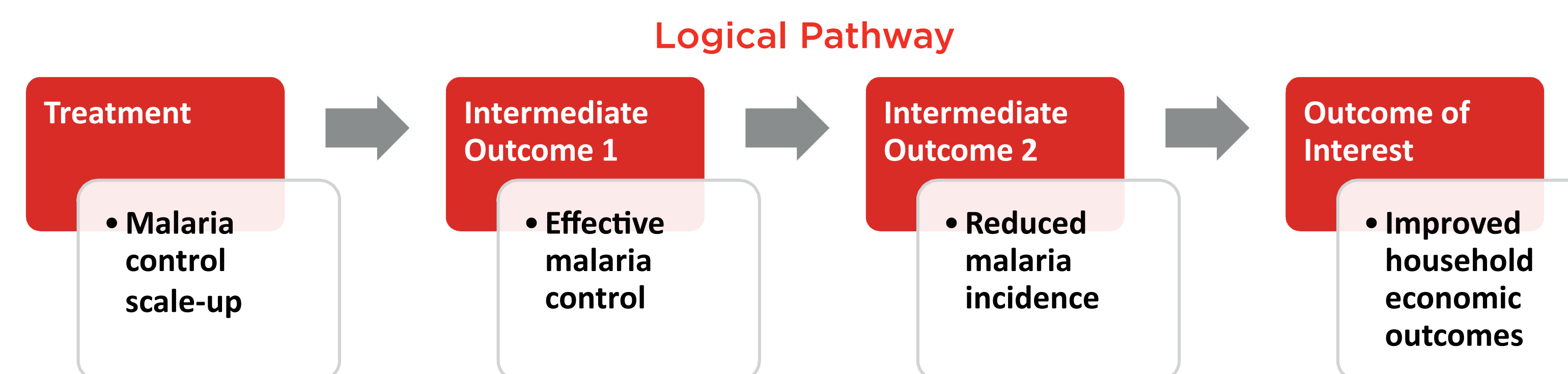
Data

- Retrospective analysis focused on 2006-2010, when the government and partners in Zambia scaled-up malaria control efforts.
- District-level data collated for 72 districts.
- Primary measure of malaria control is cumulative distribution of insecticide-treated nets (ITNs) and indoor residual spraying (IRS) by 2010.
 - Based on National Malaria Control Centre (NMCC) data, this measure represents the percentage of the population in a district that either received ITNs and/or whose housing structures was sprayed.
- Our key microeconomic outcomes are household consumption (including spending on food) and agricultural production.
 - Data from the Living Conditions Monitoring Surveys (LCMS) represent household (HH) measures at the district level.

| Data | Link to Causal Pathway | Source | Year and Frequency | Definition of Variables in Model |
|--|----------------------------|--|--|--|
| Distribution of ITNs and IRS activities | Primary treatment variable | NMCC | Activities from 2006-2010; annual | <ul style="list-style-type: none"> Population benefiting by #ITNs distributed Population benefiting from IRS |
| Use and ownership of ITNs/IRS conducted | Intermediate outcome 1 | Malaria Indicator Survey (MIS) | HH survey data for 2006, 2008, and 2010; annual | <ul style="list-style-type: none"> % HH with at least 1 ITN per 2 HH members by district % of HH members, children under five, and pregnant women sleeping under ITN last night |
| Total outpatient malaria visits (adult and children) | Intermediate outcome 2 | NMCC's Health Management Information System (HMIS) | Quarterly data for 2005-2008; monthly data 2009-2010 | <ul style="list-style-type: none"> Total # cases of malaria (confirmed and clinical) |
| HH expenditures and agricultural production | Outcome | LCMS | HH surveys in Dec. 2006 and Feb. 2010; annual | <ul style="list-style-type: none"> HH monthly food expenditure % HH falling below poverty line Total HH monthly expenditure HH monthly borrowing HH production of maize and cassava in kg |
| District-level characteristics | Control variables | LCMS | Dec. 2006 and Feb. 2010; annual | <ul style="list-style-type: none"> % of workers and those looking for work by business type % HH heads with completed primary education % HH with female HH head % HH in district that are rural |

Methods

- Expected logical pathway between the scale-up of malaria control activities and household economic outcomes.

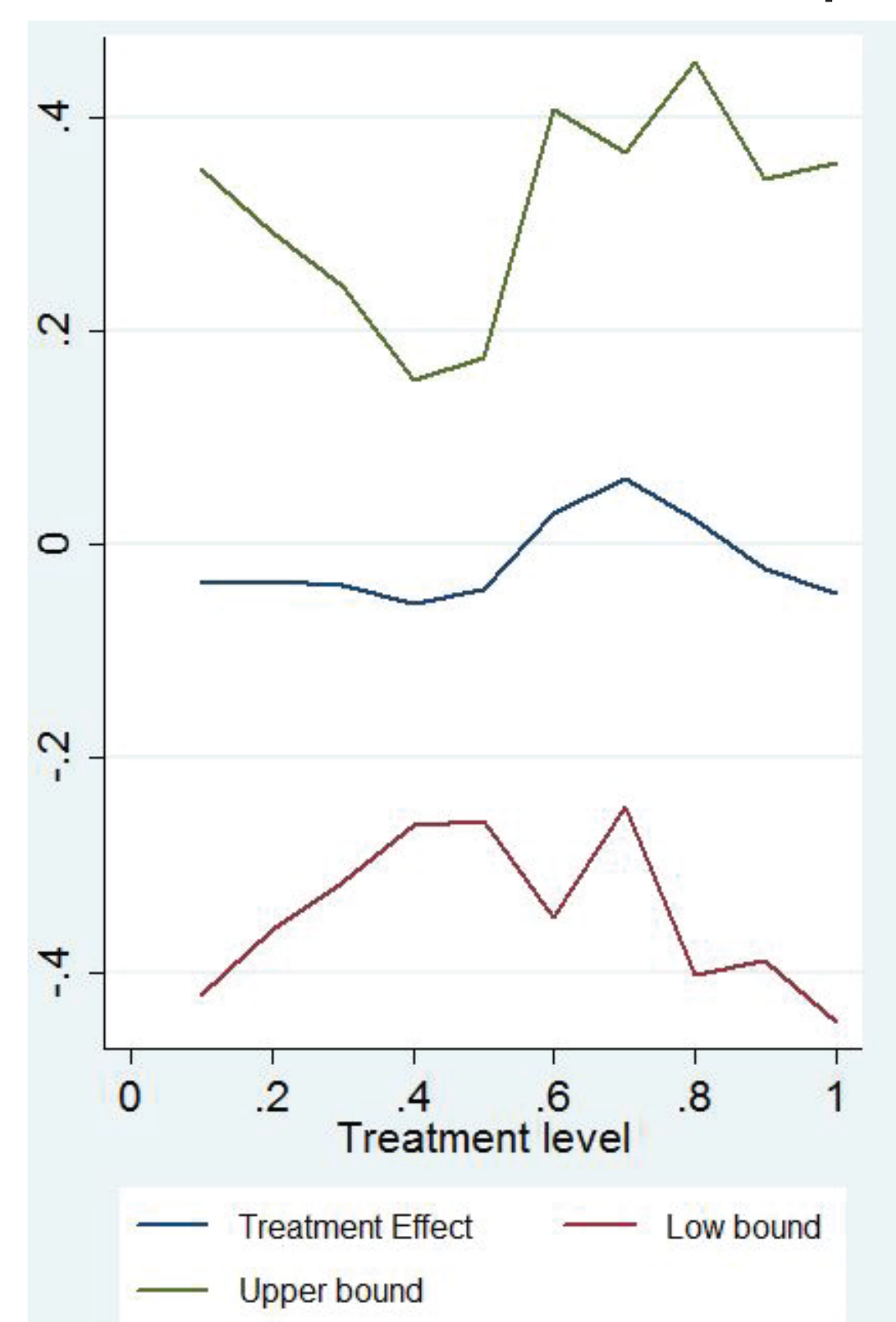


- Our main analytic approach uses Generalized Propensity Score (GPS), developed by Hirano and Imbens (2004) for continuous treatment measures.
- GPS method attempts to control for observable factors that influence the level of malaria control efforts in a district, using a two-stage process.
- First stage generates a propensity score for each district observation, which represents the probability of achieving a given level of malaria control provision as a function of these baseline variables.
 - Baseline variables for the first stage include: total number of 2006 outpatient malaria cases, average household size, percent rural, percent of household heads with primary schooling, percent of households employed in various sectors, and the equivalent economic outcome measure for 2006.
- Second stage uses the GPS estimate (which matches districts with similar coverage of malaria control efforts as a function of baseline characteristics) and the treatment variable (malaria control efforts by 2010) to predict a key outcome.
- As an alternative approach to GPS, we also conduct a fixed-effects model, which looks at changes over time in the outcome of interest as a function of changes in malaria control efforts.

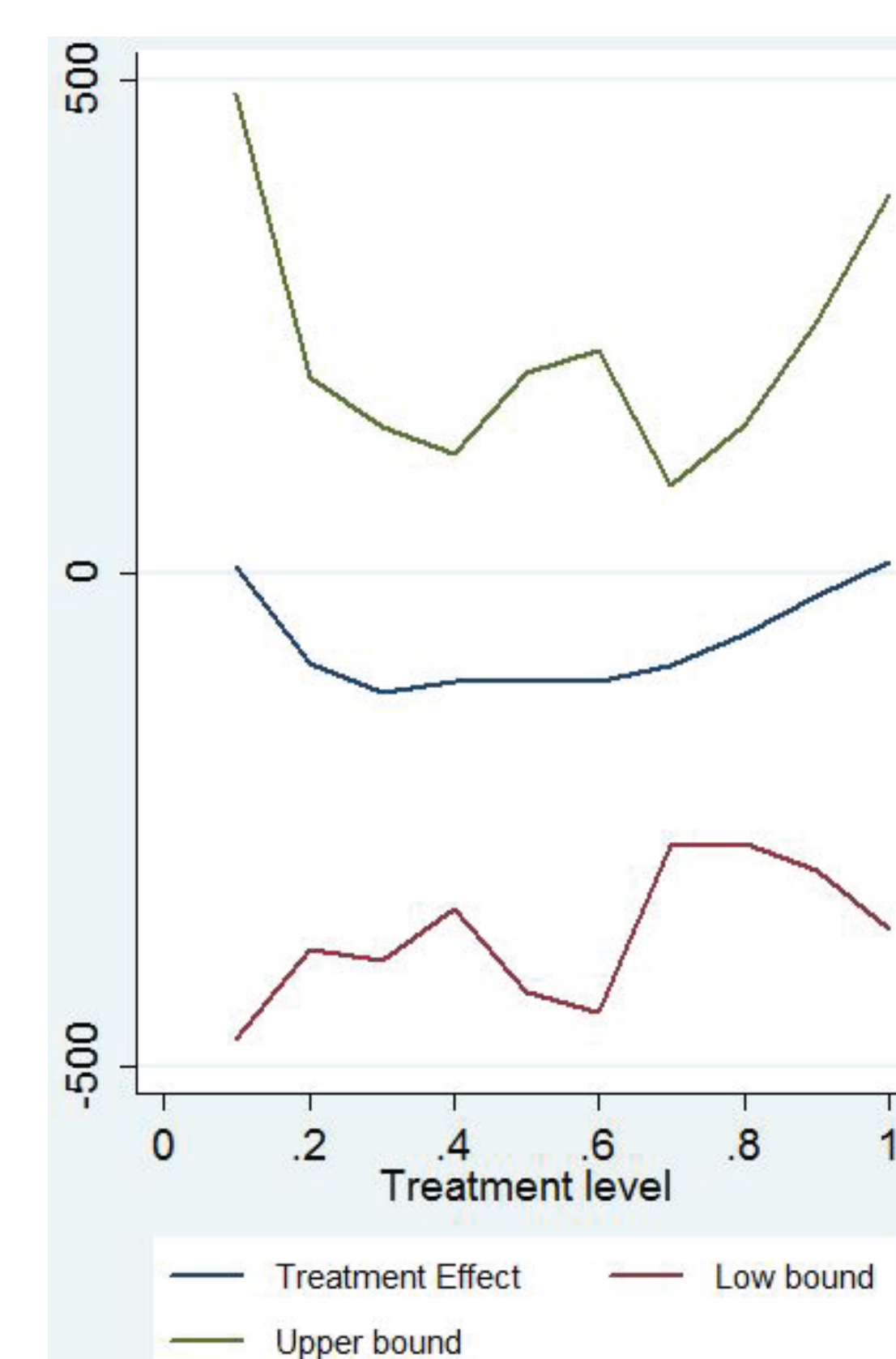
Results

- Our preliminary finding shows no detectable relationship between malaria control scale-up and food consumption (see graph below).
- Confidence intervals are similar for other key outcomes, including for maize production (see graph below), such that we find no detectable relationships.
- As shown in the graph, confidence intervals are quite large meaning that there could be an association that we are just not able to detect given our sample size.
- Additional exploratory analysis indicates that ITN distribution and IRS are targeted to poorer districts with lower maize production.

Treatment Effect: Food Consumption (ln)



Treatment Effect: Maize Production (kg)



Discussion

- We are insufficiently powered to detect an association between malaria control efforts and our outcomes of interest.
 - Because our confidence intervals are so large, this does not rule out a potential positive association or null effect.
- Certain key limitations may explain these inconclusive results:
 - Limited sample size, high variance for outcome measures, absence of certain baseline characteristics, and limited variation in treatment measure at endline.
- These challenges tell us something about the realities of retrospective analysis of malaria control efforts.
- Analyses at the district level limit our sample size, yet only in exceptional cases is data available at a more granular level.
- Matching effectively requires a rich set of baseline characteristics that can simulate decision-making behind malaria control efforts. We are exploring additional data that may improve our matching.
- Household-level data integrating control efforts and economic outcomes is a potential, but likely expensive, solution.



credit: Abt Associates

Contact:
anthony_leegwater@abtassoc.com

