

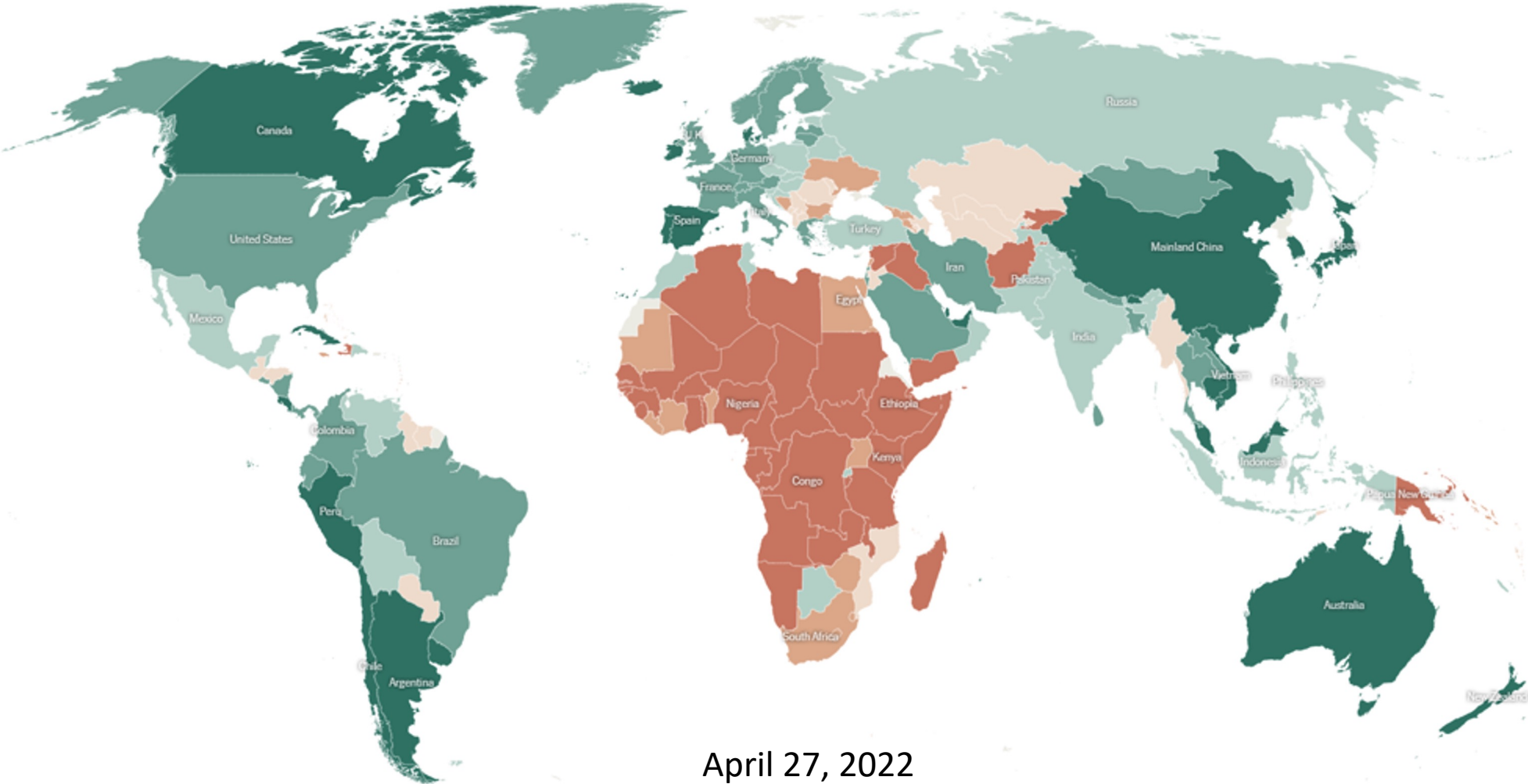
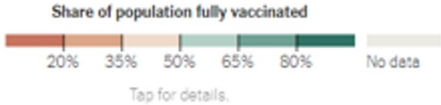
# Last-Mile Delivery Increases Vaccine Uptake in Sierra Leone

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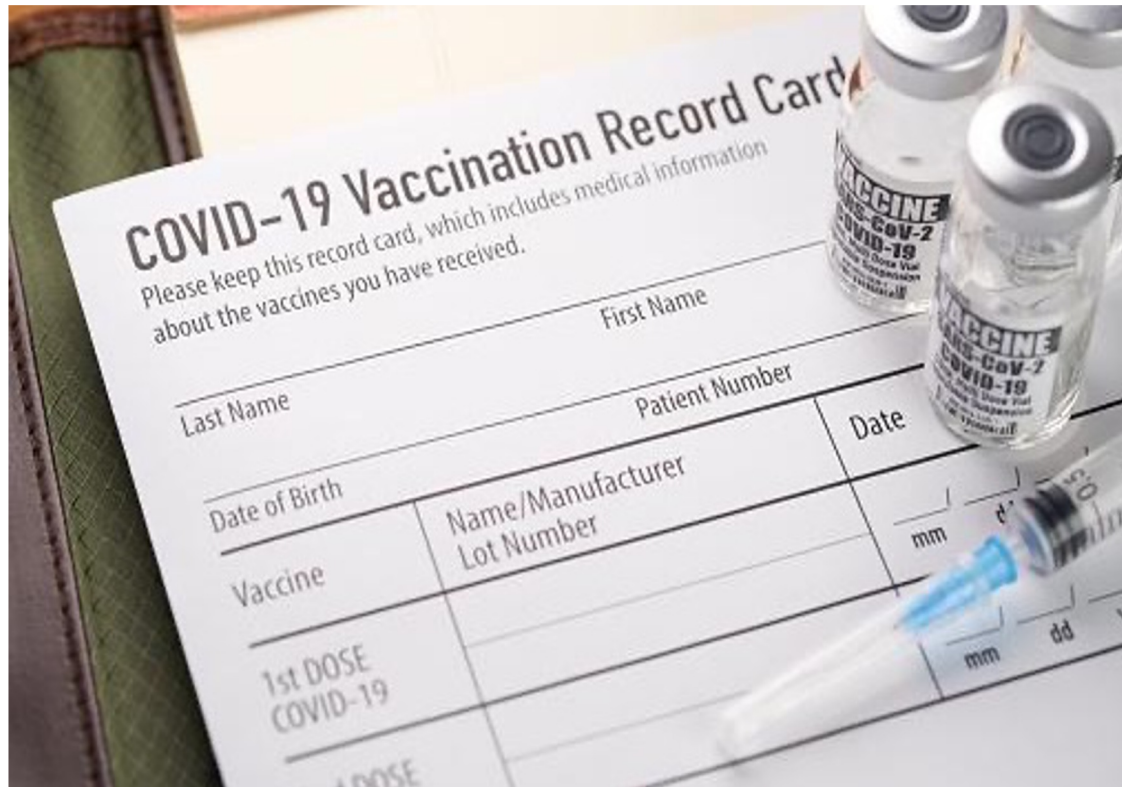
April 27, 2022

**Why are vaccination rates lagging?**



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# INTERNATIONAL SUPPLY CHAIN FAILURES



*The high global demand for vaccines and limited supply benefited **countries with payment capacity** and geopolitical importance*

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# nature medicine

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## COVID-19 vaccine acceptance and hesitancy in low- and middle-income countries

Julio S. Solís Arce, Shana S. Warren, Niccolò F. Meriggi, Alexandra Scacco, Nina McMurry, Maarten Voors, Georgiy Syunyaev, Aryn Abdul Malik, Samya Aboutajdine, Opeyemi Adejo, Deborah Anigo, Alex Armand, Saher Asad, Martin Atyera, Britta Augsburg, Manisha Awasthi, Gloria Eden Ayesiga, Antonella Bancalari, Martina Björkman Nyqvist, Ekaterina Borisova, Constantin Manuel Bosancianu, Magarita Rosa Cabra García, Ali Cheema, Elliott Collins, Filippo Cuccaro, Ahsan Zia Farooqi, Tatheer Fatima, Mattia Fracchia, Mery Len Galindo Soria, Andrea Guariso, Ali Hasanain, Sofía Jaramillo, Sellu Kallon, Anthony Kamwesigye, Arjun Kharel, Sarah Kreps, Madison Levine, Rebecca Littman, Mohammad Malik, Gisele Manirabaruta, Jean Léodomir Habarimana Mfura, Fatoma Momoh, Alberto Mucauque, Imamo Mussa, Jean Aime Nsabimana, Isaac Obara, María Juliana Otálora, Béchir Wendemi Ouédraogo, Toubá Bakary Pare, Melina R. Platas, Laura Polanco, Javaeria Ashraf Qureshi, Mariam Raheem, Vasudha Ramakrishna, Ismail Rendrá, Taimur Shah, Sarene Eyla Shaked, Jacob N. Shapiro, Jakob Svensson, Ahsan Tariq, Achille Mignondo Tchibozo, Hamid Ali Tiwana, Bhartendu Trivedi, Corey Vernot, Pedro C. Vicente, Laurin B. Weissinger, Basit Zafar, Baobao Zhang, Dean Karlan, Michael Callen, Matthieu Teachout, Macartan Humphreys, Ahmed Mushfiq Mobarak & Saad B. Omer [✉](#) -Show fewer authors

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Covid-19 vaccine acceptance is higher in every LMIC studied (average 80%), compared to USA or Russia



Childhood vaccine acceptance is very high in most low and middle income countries



Healthcare workers are the most trusted source of guidance on vaccine uptake in most LMICs.

## LAST-MILE DELIVERY CHALLENGES

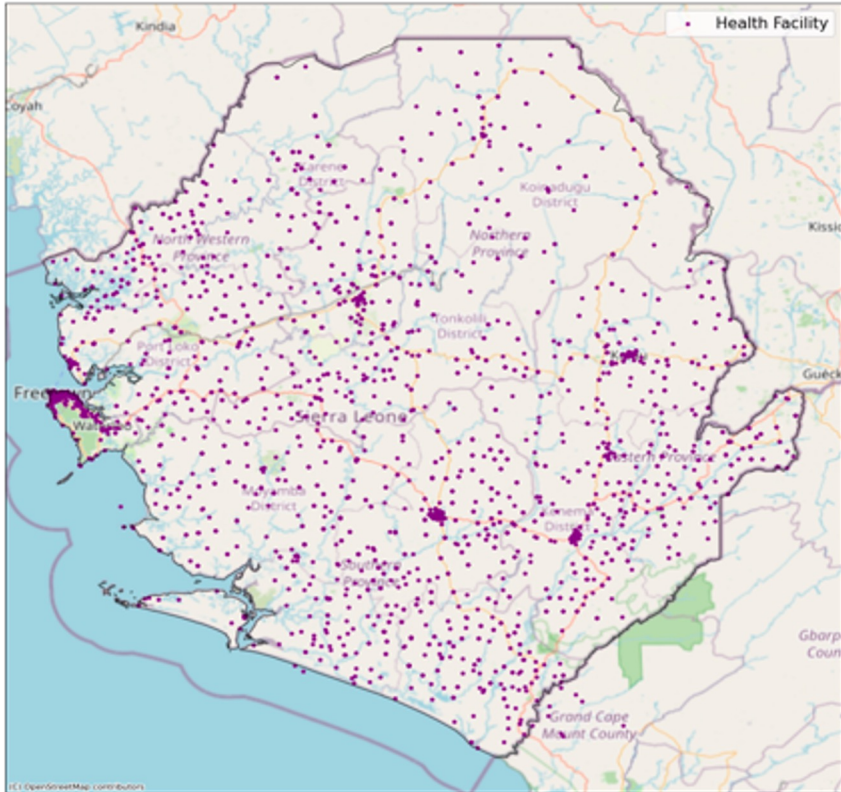
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In Sierra Leone, it takes (on average) **3 hours** to get to a vaccination center each way, and it costs **6.5 USD** each trip

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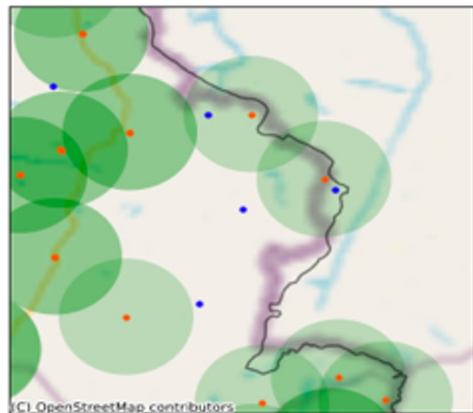
# Research Design: cluster randomized trial



150 Study Sites

Control

Last Mile Delivery of Vaccines



Meriggi et al (2023) Last-Mile Delivery Increases Vaccine Uptake in Sierra Leone, *Nature* (forthcoming)

## Step 1

**Meet with  
community  
leaders**





## Step 2

**Socialize the  
idea of  
vaccines in  
front of all  
community  
residents**



## Step 3

Bring  
vaccines and  
nurses to  
these  
remote  
communities



## Step 4

Set up  
temporary  
vaccine  
clinic for  
next 48-72  
hours



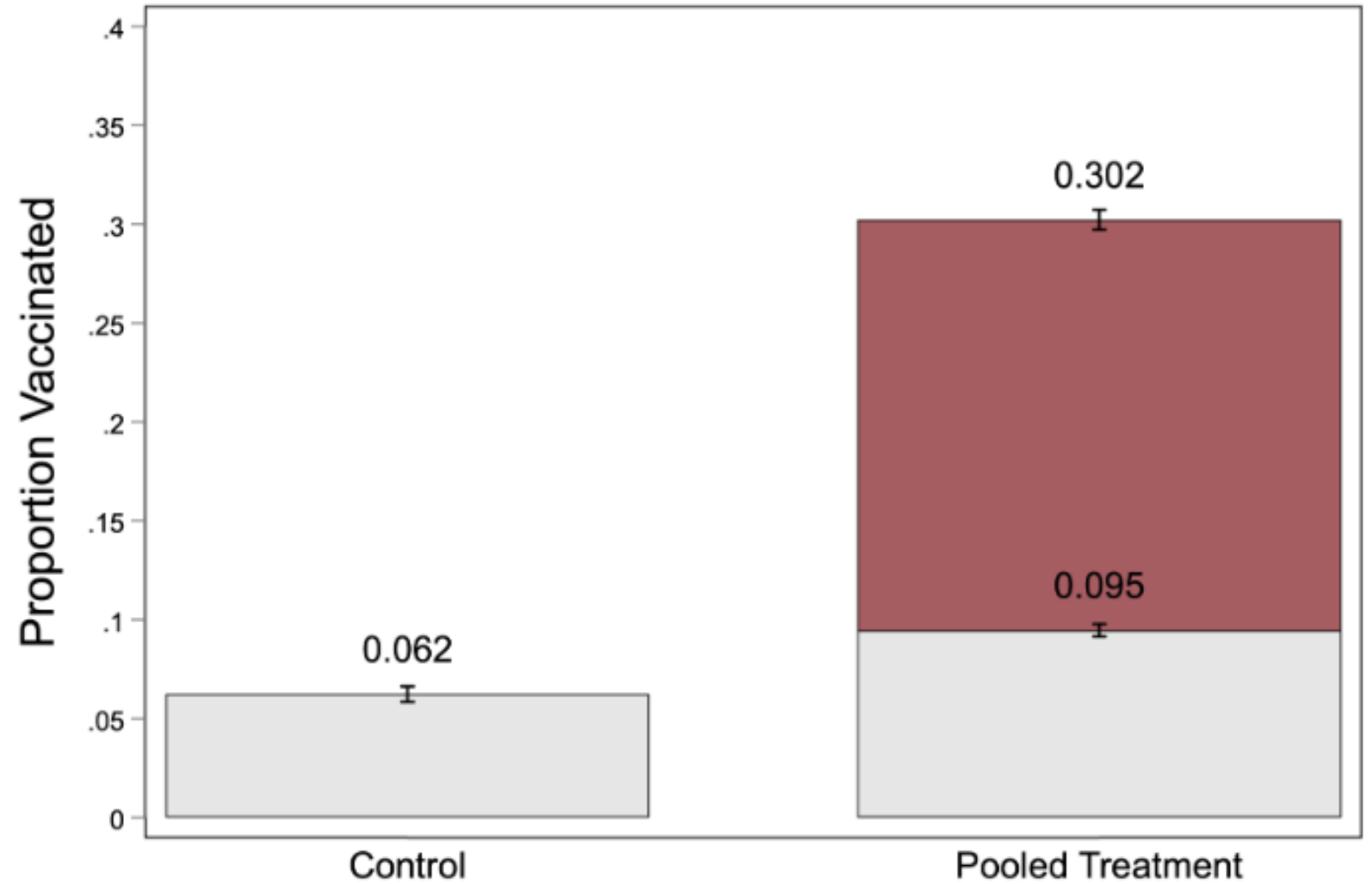
## Step 4

Requires both  
vaccine  
administration  
and  
registration  
infrastructure



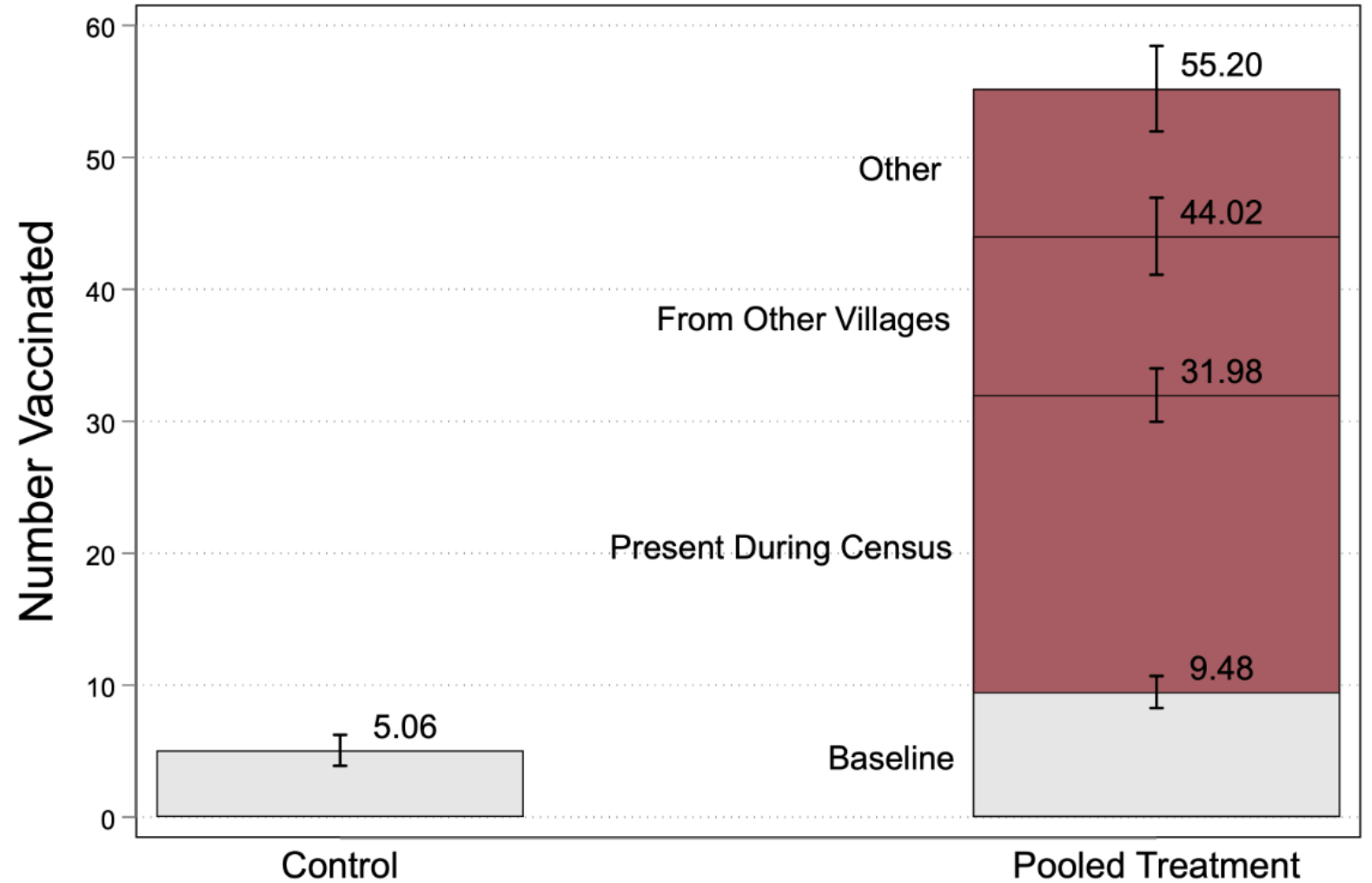
Increases in  
village  
vaccination  
rate

Figure 2: Vaccination *Rate* Amongst Adults Enumerated During Census Before and After Mobile Vaccination Program

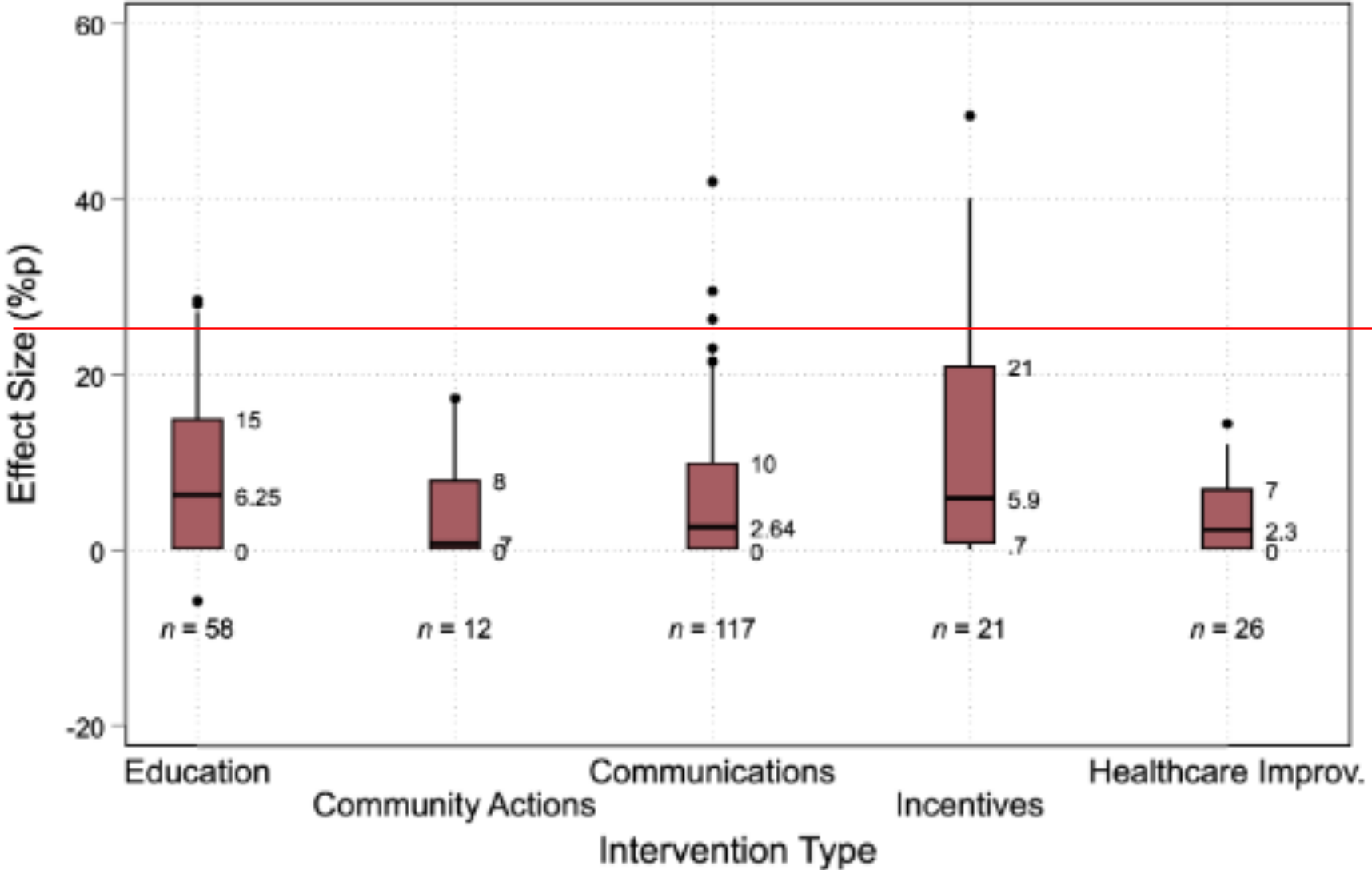


Increases  
in the  
number of  
people  
vaccinated  
per village

Figure 3: Count of People Vaccinated per Site Before and After Mobile Vaccination Program



# Benchmarking Effect Sizes



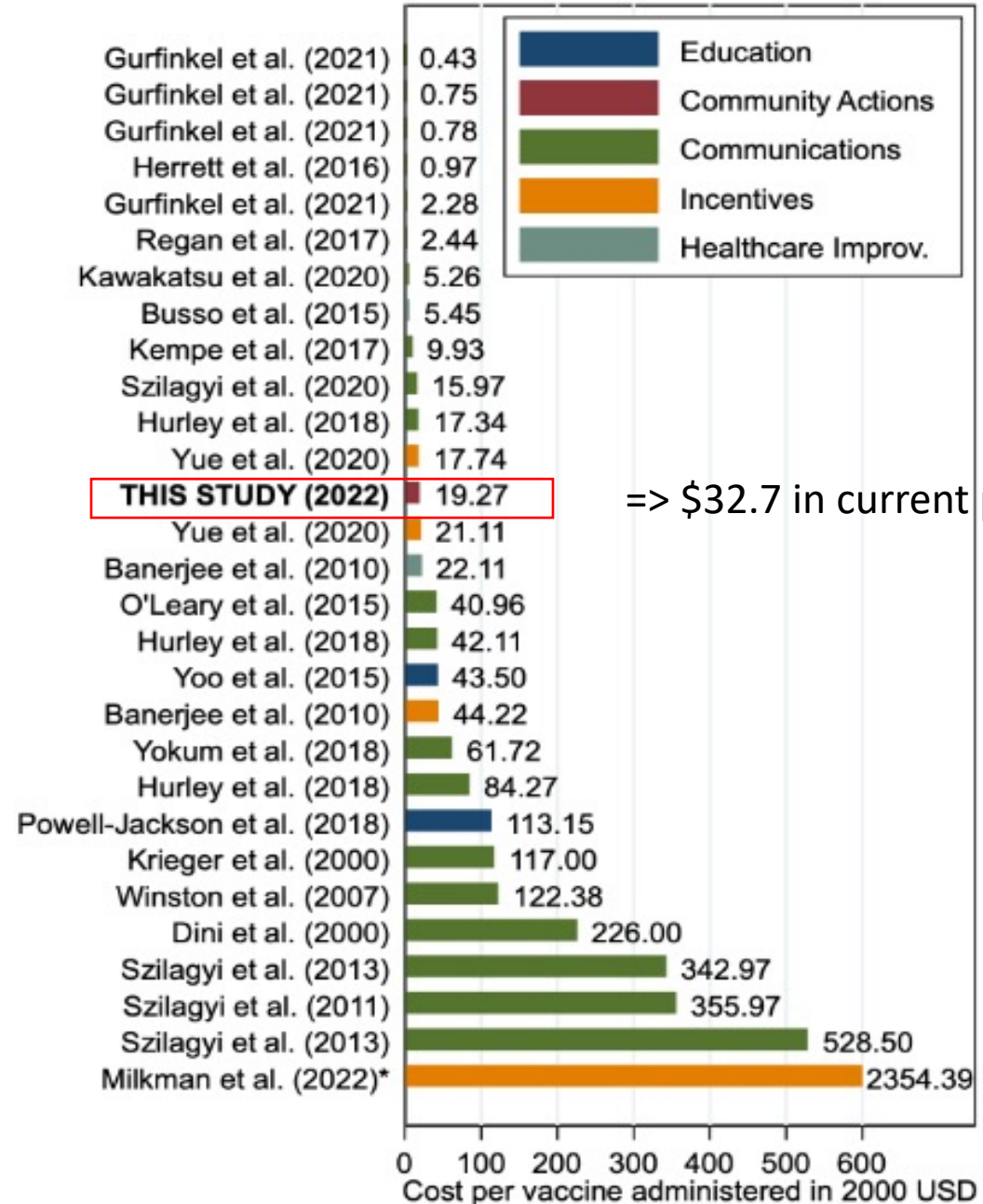
# Cost-effectiveness comparison

Costs per shot: \$32.7

Fixed costs of training (25%)

Variable costs (75%)

- **Transportation**
- Materials
- Salaries



=> \$32.7 in current prices



# Next Steps

- Proof-of-concept that we can get large numbers vaccinated - *even in the most remote, rural areas* - quickly and cost-effectively
- The biggest component was transportation cost of reaching remote villages
- If you are going to pay that cost, then it makes sense to take a bundle of maternal and child health interventions.



***i.e.: what gives us the highest DALY's per dollar spent?***

# Scaling and Bundling

- New project: *Marklate Don Cam: Scaling Bundled Health Interventions in Rural Sierra Leone* (funded by SSRC)
  - Coalition of Ministry of Health Sierra Leone, Concern Worldwide, Academics
- Cost-effective delivery of routine childhood immunizations
  - BCG, Oral Polio, DTP-HepB-Hib (penta), Pneumococcal conj., Rotavirus, Inactivated Polio
- Potentially adding:
  - Malaria vaccine
  - Antenatal care (blood pressure)
  - Supplements: Vitamin A; Deworming; Water quality (chlorine)



# Multiple Treatment Arms to Answer New Questions

- Main questions:
  - What is the **cost-effectiveness** of the bundle in terms of DALYs per dollar?
  - Are there any **spillovers** in surrounding villages?
  - Do **complementary behavior change campaigns** (social mobilizers, salient endorsement of traditional authorities) improve cost-effectiveness?
  - Can we reach more beneficiaries by **targeting** different sub-populations (e.g. infants and adolescents) on the same trip?
- Longer term:
  - **Do malaria vaccines improve human capital accumulation and economic productivity?**
- Behavioral questions:
  - Moral hazard and competing risks