

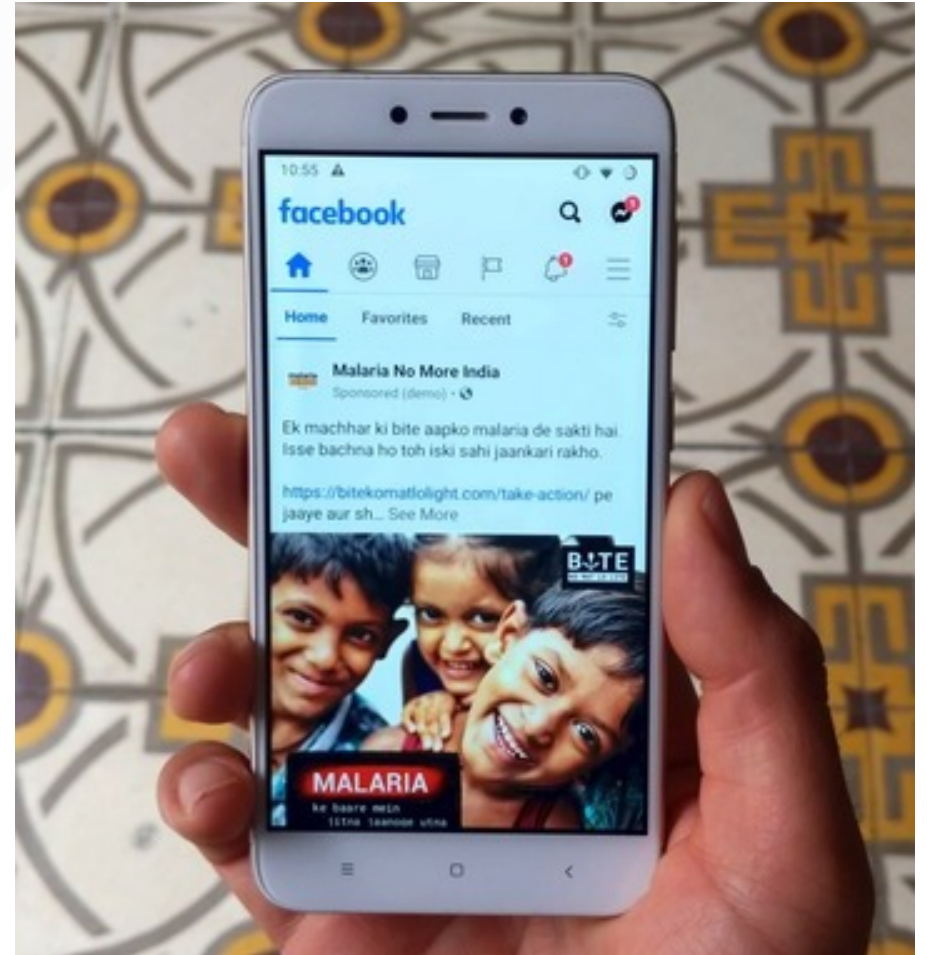
# **Facebook Ads vs. Malaria: A Cluster-Randomized Trial in India**

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# The Context: A

You have an intervention. It's digital. It can be:

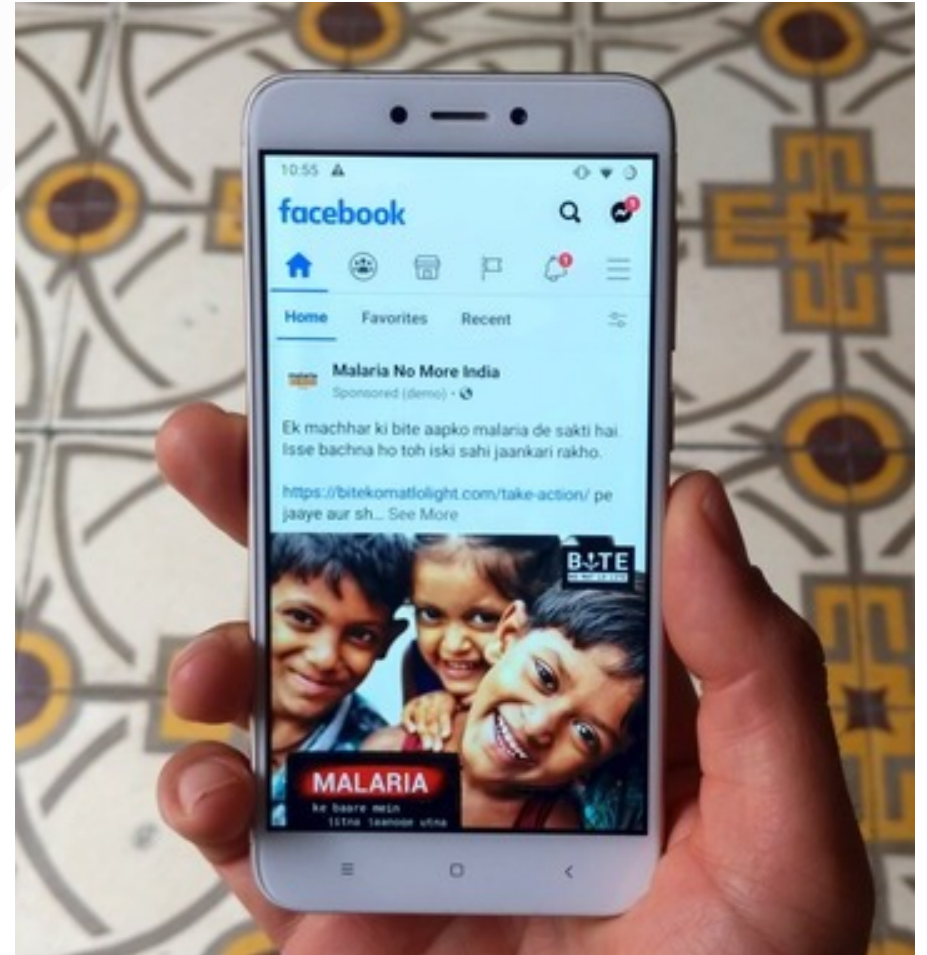
1. An advertising campaign.
2. Something that uses an ad campaign as a distribution channel.



# The Context: B

You want it to impact something other than online behavior. This can be:

1. Knowledge
2. Attitudes
3. Behavior



# The Context: C

Your outcomes of interest can be self-reported in a survey.



## **Example: A Parenting App**

You have an app that helps educate parents with new-born children. The app promotes breast feeding, among other things.

You can ask people if they are breast feeding their baby (behavior, measurable via self report)

You can advertise your app online.

## **Example: An Anti-Malaria Campaign**

You want to prevent malaria by encouraging safe behavior, such as using mosquito nets.

You can ask people if they slept under a mosquito net.

You can create an online ad campaign to encourage people to sleep under mosquito nets.

# Malaria No More Campaign Evaluation

A collaboration between Facebook's Campaigns for a Healthier World, Upswell, Malaria No More, and the World Bank.

Campaign goals: malaria awareness, protective behavior, and treatment seeking.



# Malaria No More Campaign

**malaria NO MORE India** Sponsored · 🌐

Malaria ka sahi ilaaj karvakar, apne vansh ko aage badhaate raho.

...See More



**BITE**  
KO MAT LO LITE

**AAP KAR SAKTE HO APNE NAATI-POTON KI SURAKSHA IN 3 STEPS MEIN**

**01**  
Hamesha machhardani ka istamaal kare

**02**  
Malaria ki testing 24 ghante ke andar kare

**03**  
Samay par apne family doctor ke paas jaa kar ilaaj karvaiye

27K 320 Comments 577 Shares

Like Comment Share

**malaria NO MORE India** Sponsored · 🌐

अपने बच्चे को मच्छरदानी के अंदर सुरक्षित रखें और मच्छरों से होने वाली खतरनाक बीमारियों को दूर रखें। और जानने के लिए क्लिक करें

...See More



**MalariaNoMore** मलेरिया और डेंगू के खिलाफ आपके बच्चे की सुरक्षा कवच #StaySafe #monsoon #UseBednet #StopMalaria

**BITE** MalariaNoMore


2.5K 61 Comments 181 Shares

Like Comment Share

**malaria NO MORE India** Sponsored · 🌐

Don't let Malaria take your family away from you. In case of prolonged fever, get tested immediately within 24 hours.

...See More



**BITE**  
KO MAT LO LITE

**24 HOURS**  
That's all you have to save your family from **Malaria!**

41K 152 Comments 27 Shares

Like Comment Share



**Do the ads work?**

# An Ideal design

Randomize a population into treatment/control conditions.

Show the treated people ads (for a couple weeks)

Know if treated people are more likely to sleep under mosquito nets.

# An Ideal (commercial) design

Randomize a population into treatment/control conditions.

Show the treated people ads (for a couple weeks).

Know if treated people are more likely to **buy your shoes**.

# An (almost) Ideal design

Recruit some study participants online.

Tell them you're doing a survey. Ask them some questions, then tell them you'll ask them more questions in a couple of weeks.

Sneakily advertise to them.

Ask them if they slept under a bednet last night.

See if the treatment group is more likely to **report** sleeping under mosquito nets.

# An (almost) Ideal design

Recruit some study participants online **via Facebook**.

Tell them you're doing a survey. Ask them some questions, then tell them you'll ask them more questions in a couple of weeks.

Sneakily advertise to them **via Facebook**.

Ask them if they slept under a bednet last night.

See if the treatment group is more likely to **report** sleeping under mosquito nets.

# Remarketing

Offered by all major ad platforms.

Run campaign micro-targeted to group of individuals who have previously interacted in some way with the advertiser.

"Advertiser" is based on ownership, not visible advertisement entity.

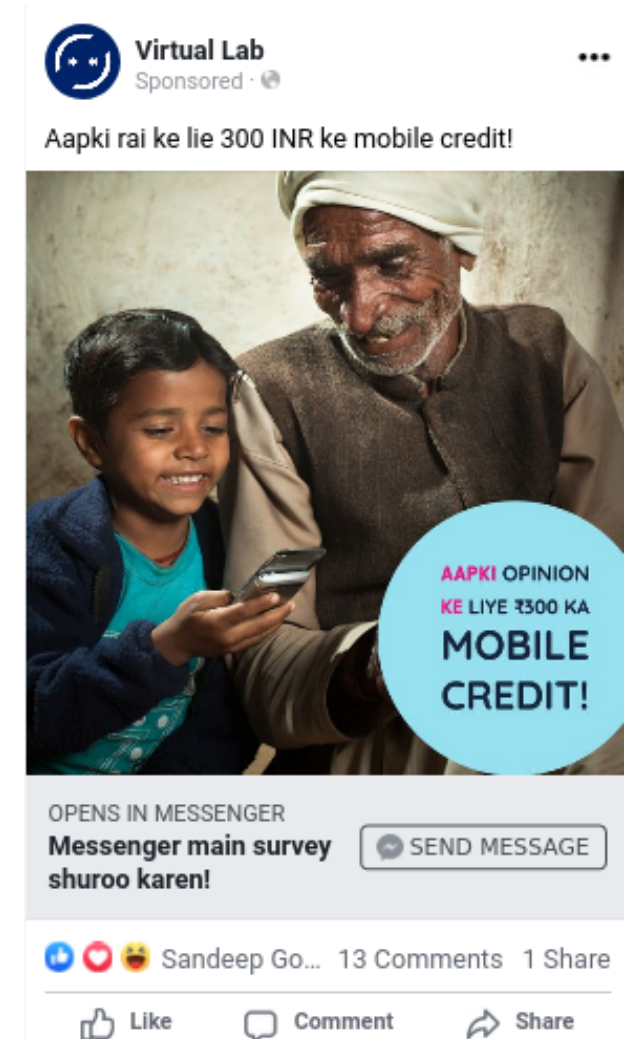
Interaction means interacting with a previous ad or connecting their account (i.e. sign in with FB/Google).

# Recruiting

Use Facebook ads to recruit respondents directly from Facebook.

Offer mobile credit as an incentive to finish the survey.

Use Virtual Lab to create ad sets for each stratum and optimize spend across ad sets.



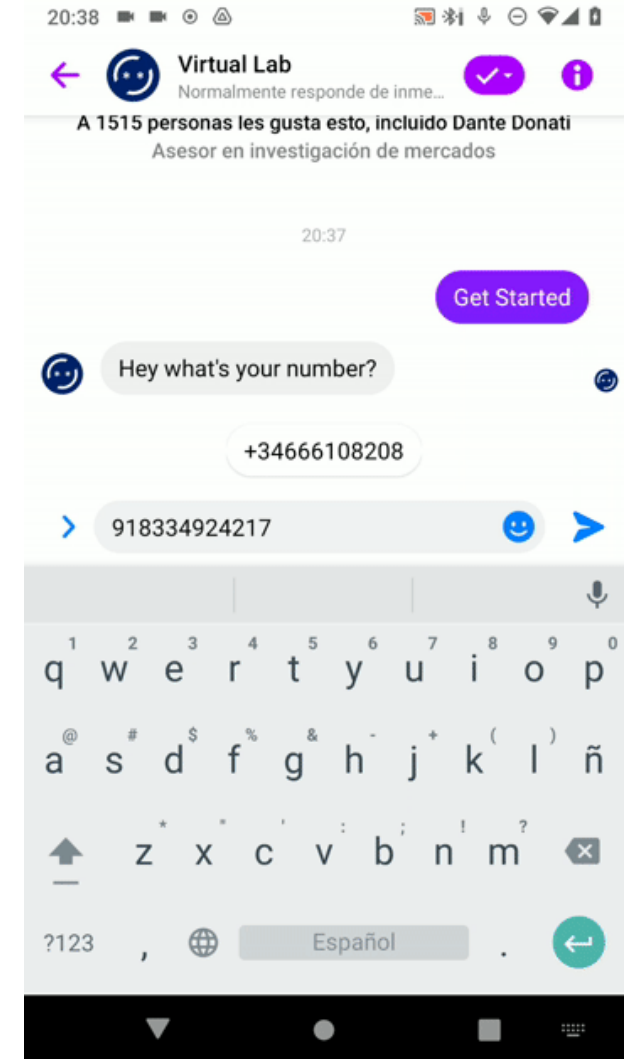


# Surveying

All surveying was done via chatbot on Facebook Messenger (Virtual Lab).

Mobile credit payment was integrated into the chatbot.

Chatbot allows for seamless follow ups / experience sampling.



# Real ads. Real timelines.



**So do the ads work?**

# Individual Level Results

Table 1:

Sleeping Under Bednet (Individual Level) - OLS (Subset)				
Slept Under Net				
	(1)	(2)	(3)	(4)
ind_treatment	0.06** (0.03)	0.06** (0.03)	0.06* (0.04)	0.06** (0.03)
pucca			-0.12*** (0.05)	
treatment		0.02 (0.03)	0.02 (0.03)	0.02 (0.03)
admalaria				0.12*** (0.03)
ind_treatment:pucca			0.02 (0.05)	
Controls	No	Yes	Yes	Yes
Observations	1,226	1,225	1,225	1,225

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Marginal effect

69% > 75%

No heterogeneity.

# Individual Level Results

Table 1:

Long Sleeve Clothing (Individual Level) - OLS				
Wore Long Sleeves				
	(1)	(2)	(3)	(4)
ind_treatment	−0.03 (0.02)	−0.04 (0.02)	0.03 (0.03)	−0.04* (0.02)
pucca			−0.01 (0.04)	
treatment		−0.01 (0.02)	−0.01 (0.02)	−0.003 (0.02)
admalaria				0.16*** (0.03)
ind_treatment:pucca			−0.12*** (0.04)	
Controls	No	Yes	Yes	Yes
Observations	1,791	1,789	1,789	1,789

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

We also asked:

*"Thinking about yesterday, did you/your family use long-sleeve clothing to prevent mosquito bites?"*

There were no ads specifically mentioning long sleeves.

**So who do the ads work on?**

# Stratification

Are Facebook ads effective in the fight against malaria?

(concern) Aren't those most affected by Facebook ads least affected by malaria?

(solution) Stratify:

1. Let's determine who malaria affects the most and the least.
2. Let's measure effects of the campaign on both groups.



# Baseline insights

Table 1: Marginal Correlations at Baseline

	Malaria - 2 weeks	Malaria - 5 years
Distance to Medical Center	.037	.055
Backward Caste	.022	.049
Family Size	.028	.032
Air Conditioning	.010	-.021
Education	-.026	.032
Dwelling	-.041	-.059

# What is Dwelling???

Respondents were asked which kind of house they live in:

1. Kutcha (made of mud, tin, straw)
2. Pucca (have cement/brick wall and floor)
3. Semi-pucca

**Ok, how do you stratify on kutcha?**

# Ad Optimization

Major ad platforms offer a variety of "optimization" tools.

The goal of these tools is to ensure that your ads go to those who are most likely to \_\_\_\_\_ (*conversion event*).

One of these tools, on Facebook, is known as "Lookalike Audience".

# Lookalike Audiences

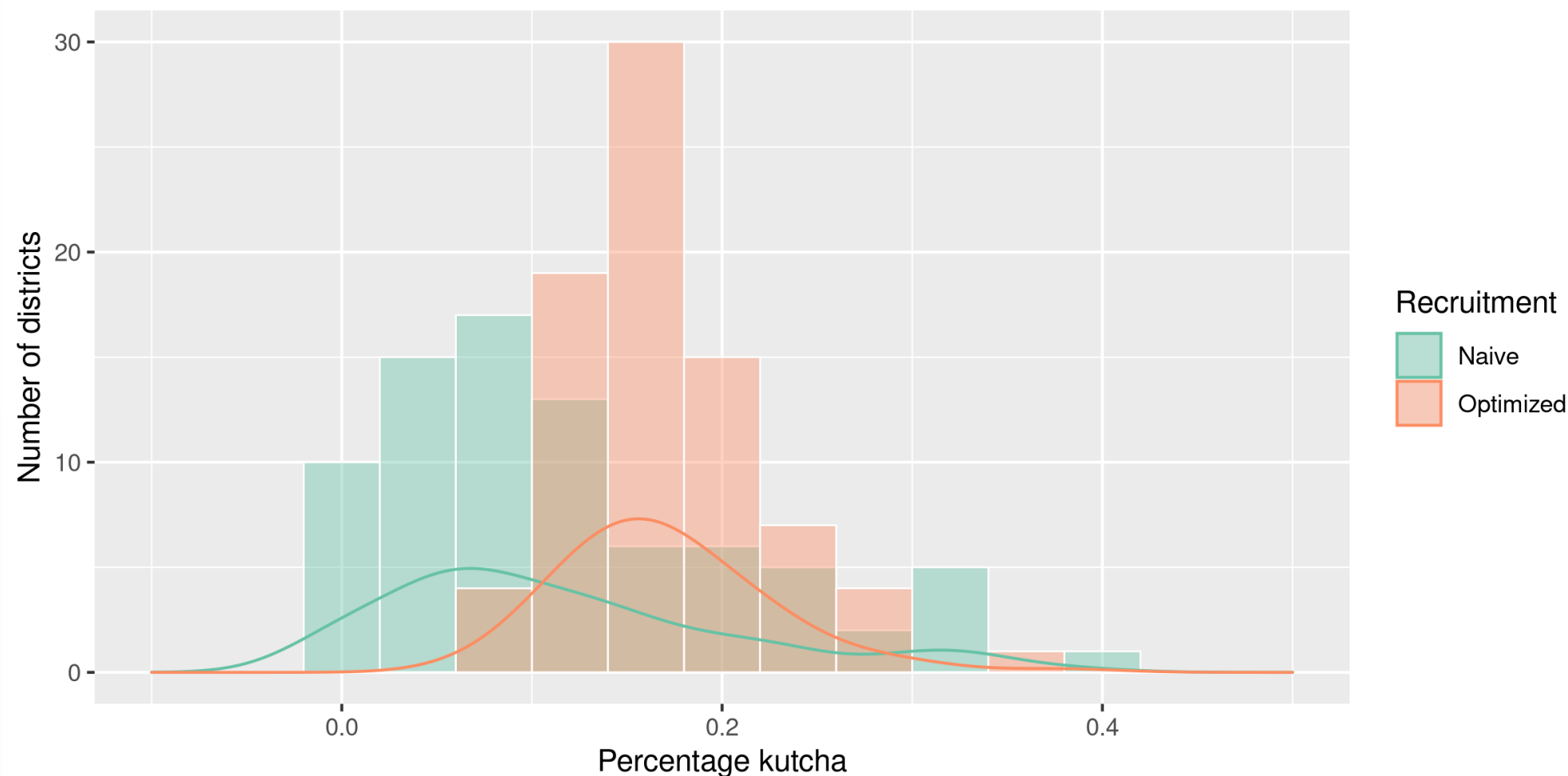
One-class classification problem.

You give them a set of people and pick a percentage between 1%-20%.

They give you an audience that is 1-20% of the population that is "most like" the set of people you gave them.

Kutcha lookalike!

# Optimizing recruitment for dwelling



# Virtual Lab

Virtual Lab is an open-source platform for performing surveys and experiments within digital ad platforms.

<https://vlab.digital>

- Uses advertiser APIs to optimize recruitment.
- Chatbot survey platform (+ web survey integration coming).
- Payment/incentive integration with mobile recharges.
- Allows retargeting for ad experiments.



**So does an ad campaign work at scale?**

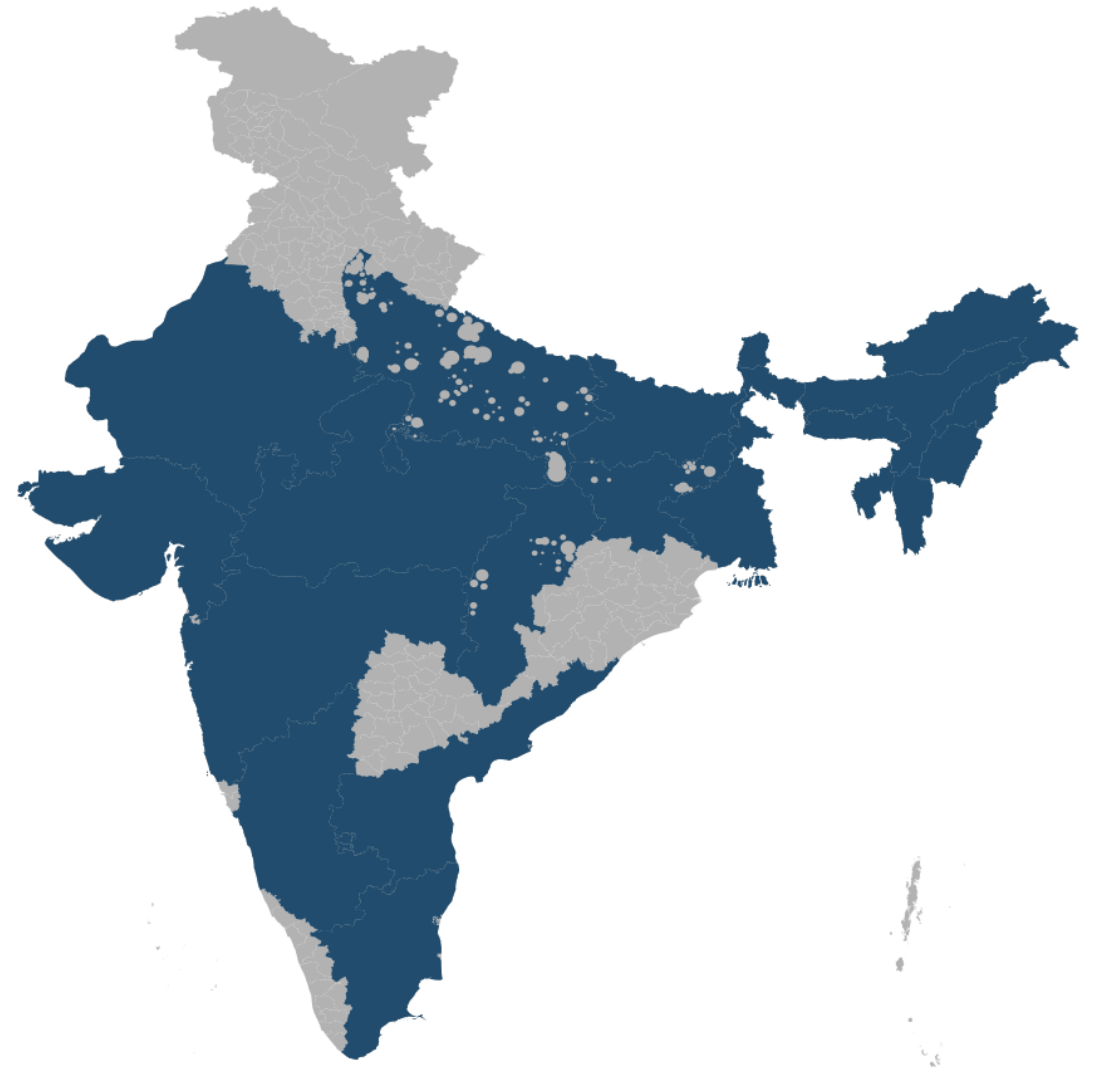
# Malaria No More Campaign

Ran across 22 states.

133M people reached.

Stratified by age, gender, or  
capital/else.

September - November 2020.

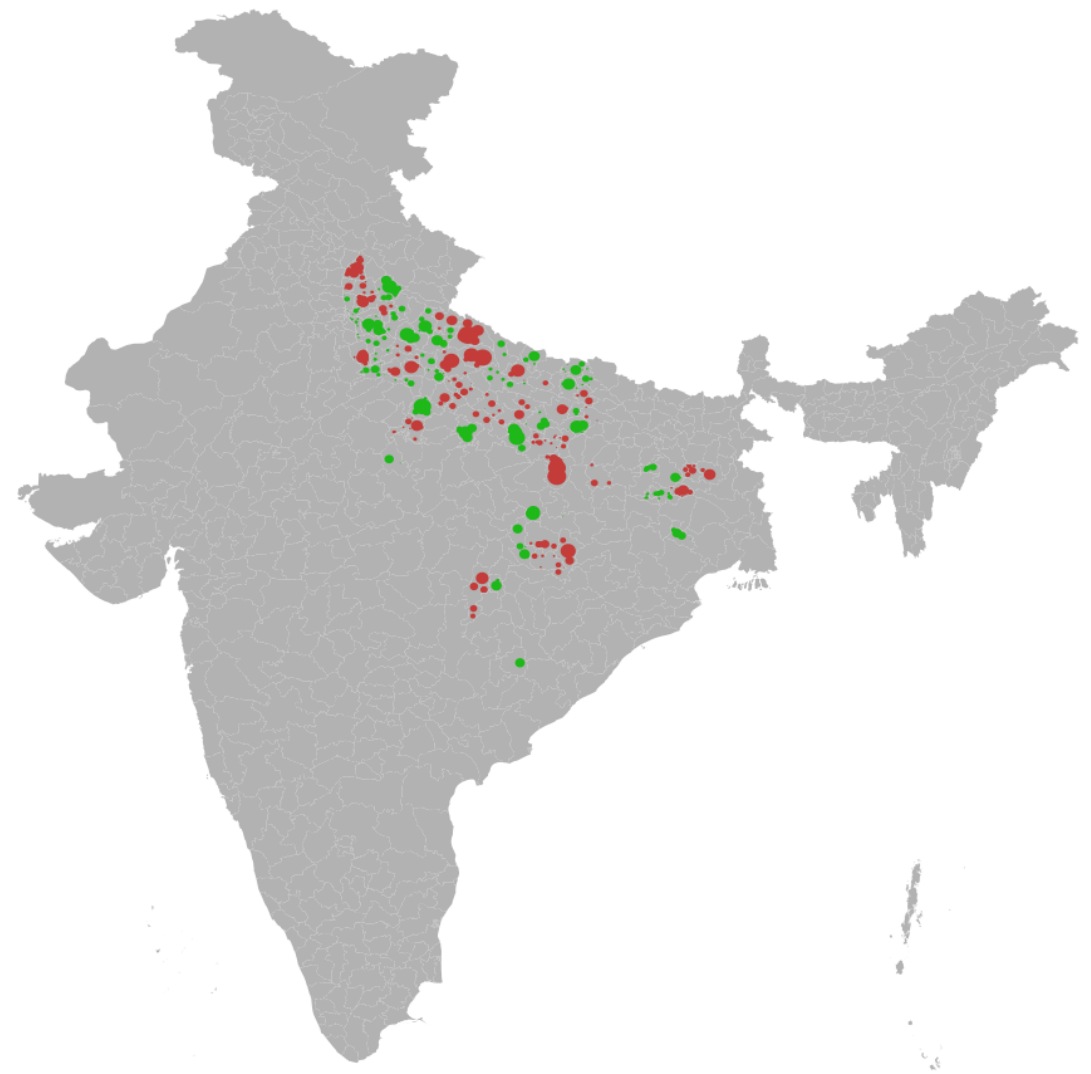


# Survey Recruitment Campaign

Stratified across 80 districts and 2 dwelling types.

July - December 2020.

January - March 2020.



# Stratify, stratify, stratify

160 strata!

Use Virtual Lab to optimize spend dynamically.

160 adsets!

Most expensive districts > 50x that of cheap districts

# Timeline

- **July 2020:** Launch baseline of "round 1" panel survey.
- **September 2020:** Launch country-wide Malaria No More ad campaign
- **November 2020:** Finish country-wide Malaria No More ad campaign
- **December 2020:** Finish "round 1" panel survey
- **January 2020:** Launch "round 2" cross-section survey.
- **March 2020:** Finish "round 2" cross-section survey.

# **Data and Results**

# Data - Round 1 Panel

We create a panel dataset with respondents asked questions every 17 days regarding:

1. Incidence (malaria/fever)
2. Treatment seeking (in case of malaria/fever)
3. Behavior (did you sleep under a mosquito net?).

This lasted for up to 9 waves, ending December 18th with an endline survey.



# Data - Round 2 Cross Section

Single cross sectional survey. Respondents asked about:

1. Incidence (malaria/fever)
2. Treatment seeking (in case of malaria/fever)

With a subset of this group becoming part of the "individual level study" and were later asked about behaviors.

# Model

Basic random effects model binomial specification for analysis:

$$\text{logit}(\pi_{ih}) = \alpha + \sum_j \beta_j x_{jih} + u_h$$
$$u_h \sim \mathcal{N}(0, \sigma_B^2)$$

(we also run OLS with clustered standard errors as robustness check.)

## Question: Behavior

**Self:** *Did you sleep under a mosquito net last night?*

**Household:** *How many family members that live in your house (including yourself) slept under a mosquito net last night?*

# Results: Behavior

Table 1: Sleeping Under Bednet - Panel

	Self		Household			
	(1)	(2)	(3)	(4)	(5)	(6)
treatment	0.07 (0.09)	−0.03 (0.10)	0.17 (0.14)	0.08 (0.09)	−0.12 (0.11)	0.30** (0.12)
pucca		−0.21*** (0.06)			−0.38*** (0.06)	
treatment:pucca		0.20** (0.08)			0.38*** (0.09)	
Controls	No	Yes	No	No	Yes	No
Subgroup	All	All	Pucca	All	All	Pucca
Observations	2,972	2,972	1,415	2,697	2,697	1,311

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Marginal effects

**R1 (pucca)**

**Self:** 61.1% > 65%

**HH:** 61.2% > 67.6%

## Question: Incidence

**Panel:** *Have you/someone in your family had Malaria in the last two weeks?*

**Cross Section:** *Have you/someone in your family had Malaria since last August?*

# Results

Table 1: Malaria Incidence

	Round 1 Panel			Round 2 Cross Section		
	(1)	(2)	(3)	(4)	(5)	(6)
treatment	−0.15 (0.16)	−0.30 (0.19)	0.12 (0.23)	0.11 (0.17)	0.27 (0.19)	−0.22 (0.24)
pucca		−0.67*** (0.21)			−0.07 (0.18)	
treatment:pucca		0.41 (0.29)			−0.50* (0.26)	
Controls	No	Yes	No	No	Yes	No
Subgroup	All	All	Pucca	All	All	Pucca
Observations	3,490	3,490	1,733	4,898	4,895	2,191

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Marginal effects (not sig.)

**R2 (pucca)**

4.6% > 3.7% (0.81 OR)

# Question: Treatment Seeking

**Question:** *Did you seek medical help?*

If they answered yes to either:

**Panel:** *Have you/someone in your family had a fever (100.4F / 38C or above) in the last two weeks?*

**Cross Section:** *Have you/someone in your family had a fever (100.4F / 38C or above) since last August?*

# Results

Table 1: Treatment Seeking

	Round 1 Panel			Round 2 Cross Section		
	(1)	(2)	(3)	(4)	(5)	(6)
treatment	0.23 (0.22)	0.43 (0.29)	−0.13 (0.30)	0.42 (0.32)	0.49 (0.39)	0.34 (0.52)
pucca		0.08 (0.30)			0.27 (0.35)	
treatment:pucca		−0.51 (0.41)			−0.14 (0.54)	
Controls	No	Yes	No	No	Yes	No
Subgroup	All	All	Pucca	All	All	Pucca
Observations	632	631	277	1,335	1,335	602

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Marginal effects (not sig.)

**R1 (non-pucca)**

86% > 91%

**R2 (non-pucca)**

95% > 97%



# Conclusions

The ad material itself had a direct impact on preventative behavior.

The ad campaign seemed to have population-level impact on one subgroup (pucca)

**Hypothesis:** The campaign material could have had an impact on behavior (mosquito nets) for those in kutcha dwellings, but it did not reach them.

# Conclusions

Policies and interventions affect subpopulations differently.

Measuring effects on different populations can be hard.

Digital advertising can be used for recruitment and help via microtargeting.

If we stratified by dwelling to recruit, can we do the same in the campaign itself?

# References