Suvita

Project report: October 2020 - January 2021

Using a remote model to identify and recruit volunteer immunisation ambassadors

For questions or clarifications, please reach out to contact@suvita.org.

Summary

The COVID-19 pandemic risks rolling back years of progress on childhood immunisation. Suvita is a nonprofit working to increase uptake of routine childhood immunisations in India through two evidence-driven programmes:

- Sending **SMS reminders** directly to caregivers when their child is due for a vaccination
- Inviting influencers nominated by their fellow community members to act as volunteer **immunisation ambassadors** within their community, based on the methods and findings of Banerjee et al. (2019)[1].

This project investigated the feasibility and effectiveness of using a remote, phone-based model to identify and recruit immunisation ambassadors.

Research by Banerjee et al. (2019) found that in-person recruitment of immunisation ambassadors increased uptake of childhood immunisation in Haryana. This project adapted that in-person design to one that could be delivered entirely remotely. This accommodated the constraints of the COVID-19 pandemic, whilst also producing a new version of the model which may be more scalable and more cost-effective than the original, if a comparable impact can be achieved.

Within villages where Suvita already has a user base for its SMS reminders programme in Bihar state, a random sample of existing users were called by phone and asked to nominate people in their locality "who share information in a way that many people come to know about that information". These community influencers were then called by phone and invited to become immunisation ambassadors - they would receive SMS messages from Suvita containing information about vaccination and were asked to spread this information within their community, however they chose to do so.

Various iterations on the survey approach were tested to identify the combination of factors which most increased the rate of successful nomination and recruitment of ambassadors by phone. The subsequent spread of information by ambassadors was investigated by asking ambassadors to share a phone number, to which caregivers could make a missed call to self-enrol for Suvita's vaccination reminder programme. Follow-up surveys were also conducted with a small number of ambassadors to learn more about their activities and motivations, and to help understand the mechanism of information spread.

It was found that community influencers could feasibly be identified and recruited to become volunteer immunisation ambassadors using a phone-based survey approach. From attempting to contact 1,197 users, 661 (55%) were reachable and 652 (54%, or 99% of those reached) completed a phone-based nomination survey, nominating a total of 768 influencers. From attempting to contact 152 of these nominated influencers, 78 (51%) were reachable and 75 (49%, or 96% of those reached) agreed to become immunisation ambassadors. Several process adjustments were found to increase successful completion of nomination and recruitment surveys, in particular making up to 4 call attempts over different days during the week and weekend, and attempting to reach participants by phone at different times of the day. Calling mid-afternoon achieved the highest answer rate compared to other time slots. High rates of survey completion were achieved when surveyors took the following steps: gave a clear introduction explaining where they got the participant's number and why they were calling; mentioned their connection to trusted institutions; made a special effort to actively listen to and appreciate survey participants; and asked several 'rapport-building' questions early on.

There was some evidence that ambassadors successfully spread the 'missed call' information to caregivers after it was shared with them in a phone call - 30 previously-uncontacted caregivers made calls to the number within one week of this number being sent to 45 ambassadors. This suggests that ambassadors, nominated and recruited from within their community through

phone-based surveys, do successfully spread information about vaccines to caregivers in their community - and that some caregivers choose to act on this information. However, further investigation is needed to better characterise this information spread, as the method used was designed primarily to determine whether there was non-zero information spread; it was not optimally designed to determine the nature or extent of spread.

In a follow-up survey, ambassadors (n=33) mostly recalled receiving Suvita's SMS messages following recruitment. 27% "definitely" and 55% "vaguely" recalled having received an SMS from Suvita in the previous two weeks. They indicated high levels of perceived self-efficacy, with 82% of ambassadors answering 10/10 when asked on a scale of 1-10 how much they felt that their activities would make a positive difference for increasing vaccination in their village (though we are conscious this question can be subject to experimenter demand effects).

Due to a technical error, some follow-up questions were only asked to eight ambassadors. Findings from this small sample should be considered preliminary and hypothesis-generating, as the sample size is too small to conclude anything with certainty. These eight ambassadors reported primarily passing the information to a small number (1-10 people) of friends and family (89%), and other acquaintances (67%), when they met them in person. One of eight ambassadors also reported forwarding the SMSs themselves to their contacts, and ambassadors did *not* report spreading the information in formal settings such as community meetings. Ambassadors reported being motivated to participate by a desire to improve the health of their community and its children, and did not report other sources of motivation such as social rewards.

Overall, this project found promising results suggesting that a remote, phone-based model can feasibly be used to recruit community-nominated influencers as immunisation ambassadors. It also indicated that ambassadors successfully spread some vaccination-related information to caregivers, who acted on it to some extent by making a missed call to enrol for free SMS vaccination reminders. Future work should seek to more clearly characterise the nature and mechanism of information spread by ambassadors, and should engage with a larger sample of ambassadors to learn more about their motivations and activities. Additionally, future research should investigate the ultimate impact of this programme on successful completion of childhood vaccinations, including when implemented at scale. This model, subject to further iteration and evaluation, presents a potentially promising approach to strengthen uptake of routine immunisations - during the COVID-19 pandemic and beyond.

Contents

Introduction

Vaccines are one of the most cost-effective[2] and evidence-based[3] medical interventions available, saving 2-3 million lives every year[4]. They have caused a huge reduction in the global burden of infectious diseases[5] and are linked with social and economic benefits at an individual and societal level[6,7,8,9,10].

But not everyone enjoys these benefits. In India, one child dies every four minutes as a result of a vaccine-preventable disease.[11] Nationally, approximately 1/3 of children born each year do not receive their full series of recommended vaccinations by their first birthday[12], despite these being freely provided by the government. A survey of nearly 40,000 caregivers of undervaccinated children in India's lowest-vaccine-coverage districts found that the most common reason for missed appointments was an awareness gap.[13] In another nationwide survey, respondents were four times more likely to describe 'demand' side issues than 'supply' side ones when giving reasons for a child being partially or not immunised.[14]

The COVID-19 pandemic has further exacerbated the vaccination gap[15], making the problem even more pressing. This pilot project sought to improve our understanding of how to minimise missed vaccinations in India, in the context of the COVID-19 pandemic, by testing and iterating on an innovative approach that has previously been demonstrated to increase immunisation uptake in India: recruiting community-nominated volunteer immunisation ambassadors.

Existing research

This programme is based on the methods and findings of a large-scale randomised controlled trial in Haryana. That study, and several others which it builds upon, have found evidence in support of the following hypothesis:

- Network-central individuals (those with a high number of social connections) tend to be good at spreading information throughout their network (Banerjee et al., 2013[16]; Banerjee et al., 2014[17]).
- If we ask randomly selected community members to nominate people from their community who spread lots of information to others, they tend to nominate network-central individuals (Banerjee et al., 2014).
- When network-central individuals are asked to spread information about immunisation, it can result in increased immunisation uptake (Banerjee et al., 2019).

Banerjee et al. (2019) used the following method to connect with network-central individuals: they surveyed a random sample of 17 households (in a village up to 500 households total) and asked them to nominate people in their locality "who share information in a way that many people come to know about that information". They asked the six most-nominated individuals in each village if they would be happy to spread information about immunisation in their community, and subsequently shared information with these individuals via SMS messages and automated voice calls.

> Definitions used by Suvita in this report:
>
> **Influencer** - *a network-central individual who has been nominated as such by another member of their community*
>
> **Immunisation ambassador** - *an influencer who has agreed to spread information about immunisation in their community*

Banerjee et al. found that recruiting immunisation ambassadors increased immunisation uptake - more so than sending SMS reminders to parents or giving small mobile credit top-ups alongside each vaccination. They found that ambassadors increased the number of children attending government-run immunisation camps by approximately 25% (roughly 10 percentage points).

Focus of this project

This project investigated the feasibility and effectiveness of delivering this programme with a **remote model** adapted to the COVID-19 pandemic. We used phone-based surveys rather than in-person surveys to collect nominations for and to recruit ambassadors. To our knowledge, this is the first time such a remote model has been piloted. As well as adapting to the practical constraints of the COVID-19 pandemic, we expect a phone-based model may also be more scalable and more cost-effective than the original design, if a comparable impact can be achieved. Thus, if impactful, it may enable the ambassadors programme to be scaled more rapidly to benefit more families and communities.

Suvita's Theory of Change for this remote model can be found in Appendix 1. The Theory of Change includes various assumptions, for example:
- "Phone surveys are effective at soliciting nominations for opinion leaders"
- "Nominators are able to provide contact details for opinion leaders"
- "Opinion leaders are reachable by mobile phone"
- "Phone conversations are effective at persuading nominated opinion leaders to volunteer as ambassadors"

Amongst other research questions, this project sought to determine whether several of these novel assumptions were justified.

The project aimed to investigate the following questions:
1. To what extent can ambassadors be successfully nominated and recruited by phone?
2. What factors increase the successful nomination and recruitment of ambassadors by phone?
3. What factors affect the motivation and action of ambassadors to encourage community members to attend for routine childhood immunisation?
4. To what extent do ambassadors successfully mobilise community members to attend for immunisation?

Method

Context and sampling frame

The pilot was implemented from October-December 2020 in Saran district of Bihar. In Bihar, 29% of children do not receive their full schedule of recommended immunisations by their first birthday.[18] Nominations for influencers were solicited over the phone from a random sample of people in Saran district who were already enrolled to receive Suvita's SMS immunisation reminders. These programme users were parents or caregivers of young children, and had been enrolled to receive SMS vaccination reminders for their child when the child was born at a Primary Healthcare Centre (PHC), under Suvita's collaboration with the State Health Society, Bihar. In Saran district of Bihar, 73.0% of children are born in a healthcare facility, and 57.2% of children are born specifically in a *public* health facility[19], which means that Suvita can enrol them for SMS reminders. This is broadly in line with the same state-wide statistics for Bihar (respectively 76.2% and 56.9%).[18]

Nomination survey

A nomination survey was attempted with up to 10% of the total number of households in the village, selected randomly from those households where someone was enrolled to receive SMS reminders from Suvita. For each household, several attempts were made to call the enrolled number as required. Once the phone was answered, the surveyor conducted the nomination survey. The Belmont Principles[20] (respect for persons, beneficence and justice) were emphasised throughout survey design and delivery. The nomination survey consisted of the following stages:
- Introduction and collecting consent
- Confirming that the participant was the enrolled programme user, resident in the expected village
- Collecting demographic information about the participant:
  - Age
  - Gender
  - Caste
  - Level of completed education
  - Occupation
- Several questions to build rapport between the participant and surveyor:
  - Asking about local routine immunisation services (e.g. whether they were active at the time, when they were being held)
  - Asking about the village (e.g. how many households they estimate it has; whether it has a self-help group (SHG); whether they are a member of the SHG; what portion of the village population they estimate have an institutional vs. home delivery)
- The influencer nomination question
- Collection of demographic and contact information for nominated influencers
  - Name
  - Age
  - Occupation
  - Telephone number
- Closing and thank you

The introduction and collection of consent used the following script (translated into Hindi):

"Hello, My name is [surveyor's name]. I am calling from Suvita. We work with the Bihar government on immunisation. We obtained your contact information from [health centre] hospital. I am calling you now to ask a few questions about your community, for a small survey. This will help us understand how to improve health in your village. We don't expect that there is any risk to participating in this survey, and we also don't expect you to benefit directly. If you have any questions, you can call me on this number: [phone number]. The survey will take 5-10 minutes and your participation is voluntary. I would have loved to be present in person, but unfortunately because of COVID, we cannot come to your village, that is why we are trying to do this on the phone. Would you like to proceed with this survey?"

The influencer nomination question was replicated exactly from Banerjee et al. (2019) for consistency of method, except for the fact that it solicited two rather than four nominations. It consisted of the Hindi translation of the following:

"Now, I am going to ask you about a person in your locality who shares information in a way that many people come to know about that information. For example, if they share information on fair, play, festival, government programmes etc. and people would learn about them. This is because these people have a wide network of friends/contacts in the village and they can use this network to spread information to many villagers. Could you name two such persons who live in your village? They can be male or female, who live in the village (within or outside of your neighbourhood in the village), who when they say something, many people get to know?"

All data collection was carried out using the encrypted software SurveyCTO.

Recruitment survey

Nominated influencers were later contacted to carry out the recruitment survey, inviting them to become voluntary immunisation ambassadors. Again, up to four attempts were made to call each person and the Belmont Principles were emphasised throughout survey design and delivery. The recruitment survey consisted of the following stages:
- Introduction to Suvita and the programme and collecting the respondent's consent to receive immunisation-related SMSs from Suvita
- Confirming the village in which the participant was a resident
- Collecting demographic information about the participant:
    - Phone type (smartphone or button phone)
    - Age
    - Gender
    - Caste
    - Level of completed education
    - Occupation
- Collecting relevant information about the community more broadly, e.g.:
    - Asking about local routine immunisation services (e.g. whether they were active at the time, when they were being held)
    - Asking about the village (e.g. how many households they estimate it has; whether it has a self-help group; whether they are a member of this; what portion of the village population they estimate have an institutional vs. home delivery; asking about their perception of people's attitudes towards immunisation in the village)
- Closing and thank you

The introduction and collection of consent consisted of the Hindi translation of the following:

"Hello, My name is [surveyor's name]. I am calling from Suvita. We work with the Bihar government on immunisation. We obtained your contact information from other people in your village. We are conducting an activity to disseminate information about immunisation for children. We are working in several villages like yours to spread this information. You are one of the people selected from your village to be a part of this programme. Should you choose to participate, you will receive an SMS with information about immunisation for children in the near future. The experiment will not cost you anything. We assure you that your phone number will only be used to send information about immunisation and for no other purpose. I am calling you because you have been selected by people as an important and respected person in your village.

Would you like to participate in this activity? This will help us improve health in your village. We don't expect that there is any risk to participating in this survey, and we also don't expect you to benefit directly. If you have any questions, you can call me on this number: [phone number]. I would have loved to be present in person, but unfortunately because of covid, we cannot come to your village, that is why we are trying to do this on the phone."

Increasing response rates for phone-based surveys

A number of survey process variables were adjusted over the course of the pilot to determine which combination was optimal to achieve maximum completion of the phone-based nomination and recruitment surveys. These factors were tested and iterated upon in a non-systematic manner, guided by the increasing experience of the survey team with this particular survey instrument, as well as by findings from real-time monitoring of survey metrics using a purpose-built dashboard. The survey team conducted daily debriefs to identify barriers, provide feedback and generate new ideas. Weekly meetings were also conducted with senior field staff and programme staff to summarise each week's learnings and to collectively hone in on an increasingly effective approach to conducting nomination and recruitment surveys by phone.

The following factors were varied:
- **Number of call attempts made** - field officers experimented with making up to three to seven call attempts per user, across five days. The average response rate for each additional attempt was monitored using a monitoring dashboard to determine the optimum 'stopping point' beyond which the marginal increase in surveys completed was outweighed by the marginal time cost.
- **Day of call** - The first call attempts were made during weekdays and, if a respondent was unreachable after several attempts, further attempts were made over the weekend.
- **Time of call** - Each day was divided into six different two-hour time slots between 8am-8pm, and the response rates and survey completion rates for the different time slots were monitored real-time using the monitoring dashboard.
- **Phrasing of the survey introduction** - Several components of the introduction to the nomination survey were varied during different survey rounds (the introduction to the recruitment survey remained consistent through all rounds). These iterations were intended partly to maximise the response rate, and partly to improve the focus of the nomination process on 'influencers' and reduce the likelihood that participants were primed to instead think about front-line health workers.
  - The introduction to Suvita focused either on emphasising Suvita's programme ("We… send SMS reminders for vaccination of your child") and/or its government collaboration ("We work with the Bihar government on immunisation" or "We work with the Bihar government").
  - The stated purpose of the survey was varied slightly: "This will help us understand how to improve immunisation in your village" or "...health in your village"
  - The planned length of the survey was varied (2-3, 5 or 10 minutes) to reflect edits to the full survey instrument over time and to improve accuracy based on monitoring of survey duration.
  - The exact consent question was varied slightly: "Would you like to participate in the survey?" or "Would you like to proceed with the survey?")
  - One piece was included only in later rounds of the survey: "I would have loved to be present in person, but unfortunately because of covid, we cannot come to your village, that is why we are trying to do this on the phone."
- **Number of questions prior to the 'nomination question' in the nomination survey** - surveyors included varying numbers of 'rapport-building' questions in the nomination survey, to investigate whether these could increase the successful collection of two influencer nominations per survey. These questions focused on the village and the participant (e.g. how many households they estimate the village has; whether it has a self-help group (SHG); whether they are a member of the SHG; whether routine immunisation services were active at the time; when they were being held if so; what portion of the village population they estimate have an institutional vs. home delivery).

Encouraging information spread by ambassadors

After agreeing to become immunisation ambassadors, ambassadors received a sequence of SMS messages and phone calls, with one contact point every two weeks, encouraging them to advocate for vaccinations in their community.

Example messages are listed below as English translations. All messages were sent in Hindi.

"[Ambassador name], thank you for informing people in [village name] about the importance of vaccination. You are helping to protect children from life threatening diseases. Please continue to spread this message, following corona precautions. Wear a mask, keep distance from others and wash your hands frequently with soap and water.
-Suvita"

"Make sure parents in your community know: vaccination service is free. Without vaccinations, children can die from severe diseases like polio, measles, diarrhoea, pneumonia."

"Doctors recommend that children should attend 5 vaccination appointments before their first birthday. Appointments should be at these ages:
At birth
6 weeks
10 weeks
14 weeks
9 months.
Thank you [ambassador first name] for sharing this message with parents in your community. ASHAs can help parents know when to attend for an appointment. Remember, parents can also make a missed call to [phone number] and we will enrol/register them for free SMS reminders."

"[Ambassador first name], fathers also play an important role by supporting their child to get vaccinated. How can we ensure fathers in [village name] prioritise vaccination for their children?"

Testing the assumption that ambassadors spread relevant information

One of the assumptions of Suvita's Theory of Change for the remote model is that ambassadors choose to act upon messages from Suvita and spread relevant information to caregivers in their community. This project therefore sought to determine whether any information spread took place following Suvita's reminders to ambassadors.

Effectively testing this assumption required the following conditions to be fulfilled:

- Establishing a short, direct, **logistically straightforward** feedback mechanism, whereby Suvita could quickly detect the spread of information.
- The method by which Suvita *detected* information spread should not itself *influence* the spread of that information.
- The method of detection should be **specific**, i.e. not mistakenly conclude that information had been spread by ambassadors if, for example, it had actually originated from another source. If possible, there should be no opportunities for the results to be affected by experimenter demand / social desirability bias (where a participant says that they know something which they do not, because they believe this is what the surveyor wants them to say).
- The information itself should have **similar dynamics of spread** to the broader vaccine-related information intended to be spread by ambassadors; i.e. it needed to be reasonably comparable in form, content, relevance and target audience.
- Any behaviour change required by caregivers before information spread could be detected should be **minimally costly** (in time and money) and should be mentally comparable to attending for an immunisation. This is because the goal was, where possible, to test the assumption 'ambassadors spread information' in isolation from other assumptions like 'parents act on the information'.

An ideation session was conducted which generated 15 potential ideas for how to test the assumption. The ideas were then ranked based on their successful fulfilment of the criteria above.

To test the assumption that ambassadors would spread the information they received from Suvita, **a self-enrollment system was set up using missed calls**. Caregivers could enrol their child for Suvita's SMS immunisation reminders by making a missed call to a specific phone number. The phone number was provided only to the first cohort of 45 ambassadors, both during a phone call and in an SMS. The number was not shared elsewhere. Thus, it could be assumed that any missed calls received to the number in the period after it was shared were a result of information spread by ambassadors. So if any missed calls were received, this would provide some evidence of successful information spread by ambassadors.

The missed-call-based enrollment service was selected because it is a low-cost behaviour (making a missed call does not use any mobile credit and the reminder service is free of charge) and may be acted upon by families that wish to be reminded of their child's immunisation appointments. Thus it was expected that this information would spread in a relatively similar way to the other childhood-vaccination-related information included in messages to ambassadors.

There are, however, several reasons why it is an imperfect proxy:

- Suvita already enrols for its SMS reminders programme the 57.2%[19] of children in Saran district who are born in public health facilities, so the SMS reminders function is only of added value to the 42.8% of families who were not already registered for SMS reminders. Also, it is likely that only literate people (65.2% of people in Bihar[18]) may have found SMS reminders of interest. So a feedback loop via this mechanism is limited to only a subset of the wider population who might find other, more universal messaging about immunisation to be helpful.
- Missed calls were returned to complete the enrollment process several days later, so it is likely that caregivers who made a missed call in this 'first wave' did not pass the information on to other caregivers, as they did not get immediate confirmation that the process worked in full. Similarly, ambassadors may have stopped passing it on if they weren't sure whether the service worked at first. This friction may have reduced both first- and second-degree information spread.
- Caregivers may be less familiar with the process of self-enrolling for a service via phone than going to a provider in their community for services (like childhood vaccination). This may have affected information spread and/or follow-up actions.
- Because the information is specific and seeded only by ambassadors, it is not likely to be reinforced by other community members such as ASHA workers and healthcare workers. This means that it may differ from other messages which an ambassador might spread to encourage families to vaccinate their children, such as that vaccination is important and prevents serious diseases, or exactly when and where a vaccination clinic is held.

So it should be noted that this mechanism *can* be used to demonstrate some (non-zero) spread of information by ambassadors, but should *not* be assumed to perfectly reflect the full mechanism by which ambassadors may have an impact on attendance for childhood vaccines.

Follow-up surveys

As part of process monitoring and evaluation, follow-up surveys were conducted with 33 ambassadors one month after recruiting the ambassadors, to confirm if the ambassadors had received SMS messages from Suvita and to learn more about their experience participating in the programme. Ambassadors were asked whether they remembered receiving SMSs from Suvita. If they did remember Suvita's SMSs, they were asked who (if anyone) they passed the information to. Ambassadors were also asked what they perceived to be the key barriers to vaccination in their community - this gives a sense of the particular challenges most salient to ambassadors, which they may be more likely to focus on addressing.

Ambassadors were also asked how impactful they felt their role was as an immunisation ambassador within the community (on a scale of 1 to 10) - this question was intended to help reveal the strength of 'perceived self-efficacy' amongst ambassadors, which is expected to be higher-than-average amongst 'trendsetters' compared to average members of a population.[21]

Additionally, eight of the 33 ambassadors (unfortunately this was not carried out in all surveys due to technical issues with the survey instrument) were asked: how they had spread the information within their community; approximately how many people they had passed the information to; and what originally motivated them to become an immunisation ambassador.

Findings from these surveys should be considered preliminary and hypothesis-generating. This is partly because the sample size is small, so may not be representative of all ambassadors, but also due to limitations of specific survey questions (which could be subject to surveyor demand effects) and of the survey design (as opposed to e.g. in-person focus groups or in-depth interviews).

Effect on uptake of vaccination

Due to time and logistical constraints, this project did not directly measure the final (critical) outcome: the effect of the ambassadors programme on uptake of vaccination.

In future, Suvita hopes to use either the administrative data from the State Health Society's Health Management Information System, or, if necessary, primary data collection at vaccination clinics, to determine whether an increase in immunisation uptake can be detected in the villages where the ambassador programme has been conducted.

Results

Completion of ambassador nomination and recruitment

In total, surveyors attempted to call 1197 programme users to complete a nomination survey, of whom 661 were successfully reached (55% response rate) and 652 completed the nomination survey (54% completion rate of total attempted; or 99% of those reached).

768 nominations of influencers were received in total (on average 1.18 per user surveyed), of which 724 (94%) included a phone number (which is necessary to contact the influencer to ask if they would be interested in becoming an immunisation ambassador).

Figure 1 illustrates the number of nomination survey attempts with different outcomes.
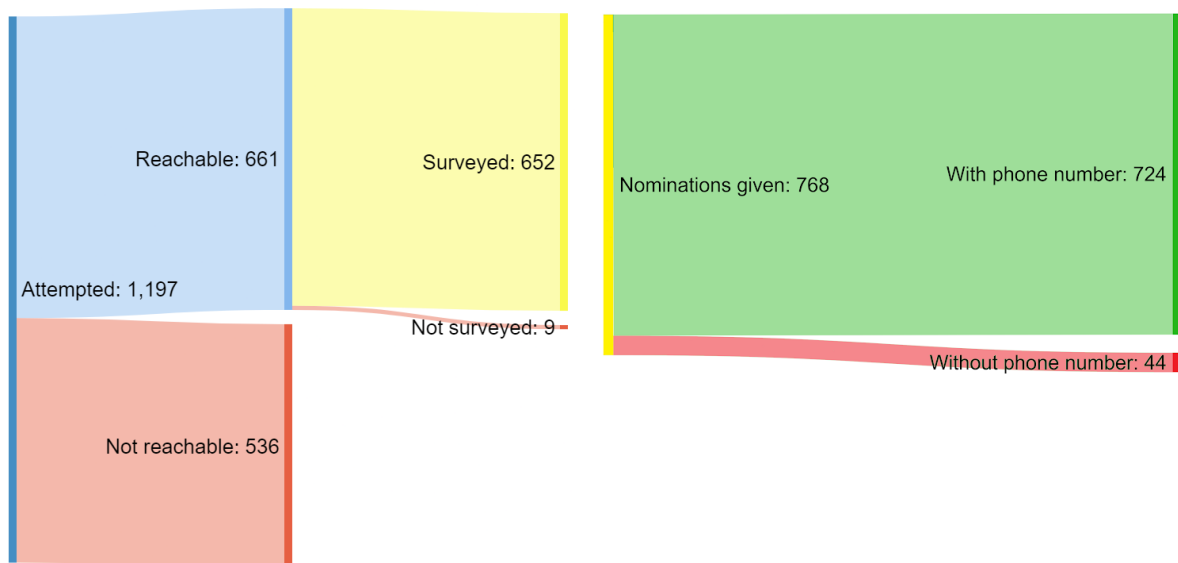
Figure 1 - the total number of nomination surveys attempted, reachable or not reachable, surveyed or not surveyed; followed by the total number of nominations given from those surveyed, with or without a phone number.

For the recruitment surveys, attempts were made to call a total of 152 nominated influencers, of whom 78 (51%) were reached, 76 (50%; or 97% of those reachable) agreed to complete the survey, and 75 (49%; or 99% of those surveyed) were enrolled as ambassadors.

Figure 2 illustrates the number of recruitment survey attempts with different outcomes.
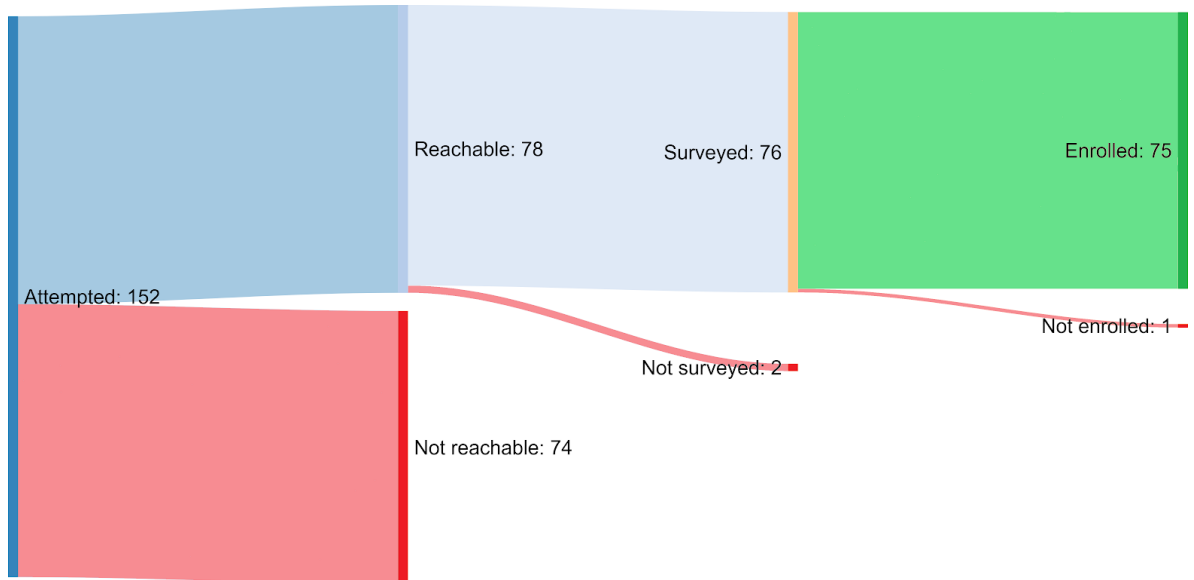
Figure 2 - the total number of recruitment surveys attempted, reachable or not reachable, surveyed or not surveyed; enrolled or not enrolled.

Interestingly, while Banerjee et al. (2019) reported that 16.5% of nominated influencers refused to become ambassadors, this project found that only 1.3% of nominated influencers refused. Further expansion of Suvita's programme will indicate whether this holds for a larger sample of influencers.

Increasing phone-based survey completion

Call attempts

Figure 3 shows the call attempt on which the participant picked up, for a random sample of 488 potential participants in the nomination survey (of whom 264 participants, or 54%, were reached successfully).

Figure 3 - the cumulative percentage of participants who were reached for a nomination survey from a starting sample of 488, according to the call attempt on which they answered.

As expected, there were diminishing marginal returns to each additional call attempt. Of the total number of participants eventually reached in this sample (54% of the total), over 90% (49% of the total) were reached within 4 call attempts, so this was considered to be a practical 'stopping point' for future surveys, to ensure efficient use of surveyors' time.

Time of call

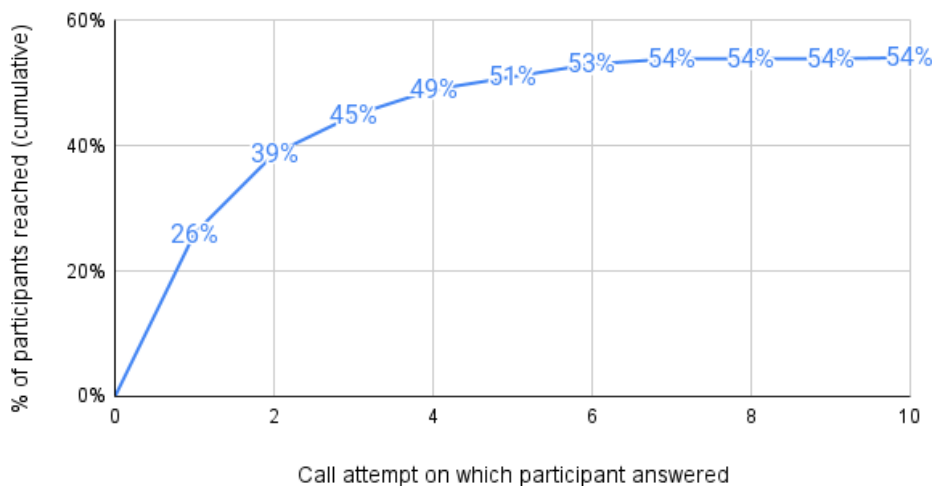It was found that certain time slots tended to have higher call answer rates than others.

Table 1 illustrates the answer rates of 3,003 calls made to enrolled caregivers to conduct **nomination** surveys during different time slots. Anwer rates ranged from 17.35%-24.90%, with peak answer rates during mid afternoon (2pm-4pm), and answer rates declining as the time moved earlier or later from this peak (with a more rapid decline after 4pm than before 2pm).

Table 2 illustrates the answer rates of 483 calls made to nominated influencers to conduct **recruitment** surveys during different time slots. This ranged from 13.40%-25.37%, with a clear peak answer rate in the 12pm-2pm slot, followed by a smaller peak in the 6pm-8pm slot.

	Call attempts	Total answered	% answered
Time slot			
8am-10am	486	86	**17.70%**
10am-12pm	627	127	**20.26%**
12pm-2pm	492	102	**20.73%**
2pm-4pm	494	123	**24.90%**
4pm-6pm	587	110	**18.74%**
6pm-8pm	317	55	**17.35%**
Total	**3003**	**603**	

Table 1 - call answer rates by time slot during the nomination survey

Time slot	Call attempts	Total answered	% answered
8am-10am	87	12	**13.79%**
10am-12pm	97	13	**13.40%**
12pm-2pm	67	17	**25.37%**
2pm-4pm	86	12	**13.95%**
4pm-6pm	80	12	**15.00%**
6pm-8pm	66	12	**18.18%**
Total	**483**	**78**	

Table 2 - call answer rates by time slot during the recruitment survey

Other factors

It was found that taking the following measures increased the rate of successful completion of nomination and recruitment surveys:

- Where possible, making some call attempts on weekdays and others at weekends (including on Sunday), and making each call attempt during a different time slot throughout the day. We expect that this helped to reach participants who were consistently unavailable for particular day/time slots, e.g. because they were working from 8am-4pm Monday-Saturday.
- In the call introduction, the surveyor explaining why they were calling and mentioning their connection to a trusted institution.
- Adding roughly 5 minutes' worth of 'rapport-building' questions in the nomination survey, before asking participants to nominate an influencer
- Adding a phrase to the introduction which explained to participants why the survey was being conducted on the phone rather than in-person
- Making an effort to actively engage with the participant's responses and to openly appreciate their contribution
- Being adaptable and happy to speak to another member of the household if the person who answers the phone would prefer them to take the call (or alternatively, to switch the surveyor - Field Officers found that participants commonly preferred to speak to someone of their own gender)
- Where a respondent answered but was unavailable to speak at the time, asking when would be a better time to call and ringing them back.

Ambassador characteristics

Table 3 illustrates the characteristics of enrolled ambassadors compared to the nomination sample, both in this project and in Banerjee et al. (2019). While Banerjee et al. collected nominations from random members of the population in Haryana, this pilot collected nominations from caregivers of young children in Bihar (as this is the population enrolled for Suvita's SMS reminders). Comparing nominators to ambassadors across both studies reveals some patterns in the characteristics of ambassadors relative to nominators, across contexts:

- In both studies, the mean age of ambassadors was close to the mean age of nominators.
- Despite Suvita having a higher % of female *nominators* than Banerjee et al. (34% vs. 6.7%), both studies had a similarly low % of female *ambassadors* (13%).
- In both studies, ambassadors had on average completed more education than nominators.
- In both studies, the percentage of ambassadors from a Scheduled Caste/Tribe or from an Other Backward Caste was similar to the percentage of nominators from these groups. Where Suvita's nominator sample had a higher percentage of OBC members than that of Banerjee et al., it correspondingly had a higher number of OBC ambassadors as well.
- In Banerjee et al., ambassadors were more likely than nominators to be a member of a village committee, whereas they were not in Suvita's project. It is possible that some part of this distinction is dependent on the differing definitions of "village committee" between the two projects.
- In both projects, ambassadors awareness' of routine immunisation services was close to, but higher than, that of the nomination sample.

Ambassador characteristic	Suvita ambassadors *(n=329)*	Suvita nomination sample *(n=652)*	Banerjee et al. ambassadors *(n=648)*	Banerjee et al. nomination sample *(n=570)*
Age (mean)	32.3	29.1	48.6	49.2
Female	13%	34%	13%	6.7%
Education completed	6% none; 8% primary; 29% secondary; 56% college	12% none; 12% primary; 36% secondary; 40% college; 1% no answer;	Mean 8.5 years	Mean 7.0 years
From Scheduled Caste/Tribe	22%	24%	20%	23%
From Other Backwards Caste	65%	61%	25%	24%
Member of a village committee*	8%	7%	32%	10%
Owns a smartphone	67%			
Aware of routine immunisation services taking place in the village	97%	90%	76%	69%

Table 3 - characteristics of enrolled ambassadors in Suvita's study, compared to Banerjee et al. (2019). "Suvita ambassadors" data are from 329 ambassadors recruited by February 2021 (75 within the project period until January 2021 and 254 shortly afterwards) as this larger sample size was available at the time of writing. Data from Banerjee et al. (2019) are taken from Table 2 in their paper: ambassadors data from column 2 ("Gossip Seed") and nomination sample data from column 1 ("Random Seed") - random seeds were a random sample of the study population, as were nominators, and are thus assumed to be representative of the nomination sample.
* For J-PAL, this was "Panchayat member".

Information spread by ambassadors

In the week after the first 45 recruited ambassadors were given the missed call number and asked to pass it to interested caregivers in their community, 30 unique caregivers made a missed call to the number. This is indicative both of some successful information spread by ambassadors, and of some caregivers choosing to act upon the information.

Ambassador follow-up survey

Barriers to vaccination

Table 4 shows the key barriers which ambassadors felt prevented people in their community from getting their children fully vaccinated. The most commonly cited reasons were the fact that children get a fever after receiving their vaccination (91%), the belief that parents don't know *when* to go to get their child vaccinated (30%), and a belief that people do not have a strong sense of the benefits of vaccination (24%). Barriers such as not knowing where to go; believing that vaccines are harmful; or not having time were cited by few ambassadors.

In your opinion, what is the reason why people in your village don't get their children vaccinated?	Freq.	Percent
because children get fever/get sick after vaccination	30	91%
people don't remember when to go for the next vaccination	10	30%
people don't know about benefits of vaccination	8	24%
people don't know where to go for getting their children vaccinated	2	7%
people think vaccination is harmful	2	7%
people are busy, they don't have time	0	0%

Table 4 - reported main barriers to vaccination in the community as perceived by ambassadors (n=33 ambassadors surveyed)

Ambassador recall of Suvita's SMSs

Table 5 illustrates the number of ambassadors who remembered receiving SMS messages from Suvita.

Did you receive any SMS in the last 2 weeks regarding the improvement of vaccination coverage in your area?	Freq.	Percent
No, I did not receive an SMS	6	18%
Yes, I vaguely remember receiving an SMS	18	55%
Yes, I am sure I received an SMS	9	27%
Total	**33**	**100%**

Table 5 - number of ambassadors (n=33) who remembered receiving SMS messages from Suvita

Activities carried out by ambassadors

Of the 27 ambassadors who remembered receiving an SMS from Suvita, 24 (89%) said they spoke about vaccination with their family members, relatives and friends; 18 (67%) said that they had informed other acquaintances in the village and 2 (7%) reported that they had not done anything to spread the message. This is presented in Table 6.

We are interested to learn about your experience so far when talking to others in the community about vaccination, to see if we can provide useful support. Can you tell me who have you spoken to so far about vaccination? If you haven't spoken to any of these groups, it is absolutely fine and you can say nobody (n=27)	Freq.	Percent
I told my friends and family members	24	88.9%
I told other people in the village	18	66.7%
I did not do anything	2	7.4%
Other	0	0%

Table 6 - who ambassadors (n=27) reported having spoken to about vaccination after being recruited by and receiving SMSs from Suvita.

Due to a technical issue, some questions were only asked to 8 ambassadors, so the results below should be interpreted with some caution:

Table 7 illustrates the specific methods ambassadors reported using to spread the information. All eight ambassadors reported doing so by word of mouth when they met people, while one also reported forwarding the SMS to their contacts. Nobody reported spreading information via WhatsApp, phone calls, community meetings, or by informing community health workers.

Could you tell me about the methods you used to spread information about vaccination to people in your village? This will help us understand how to improve our programme (n=8)	Freq.	Percent
I told people when I met them	8	100%
I forwarded the SMS to my phone contacts	1	12.5%
I forwarded the message using WhatsApp	0	0%
I called people on their phone to share the information in the message	0	0%
I informed people in a community meeting	0	0%
I informed ASHAS/ANMs or other community health workers	0	0%
Other	0	0%
None of the above	0	0%

Table 7 - methods used by ambassadors (n=8) to spread information

Figure 4 shows that ambassadors were equally likely (4 of 8 for both) to report having discussed vaccinations with 0-5 people or 5-10 people. Nobody reported having spread the information to more than 10 people.
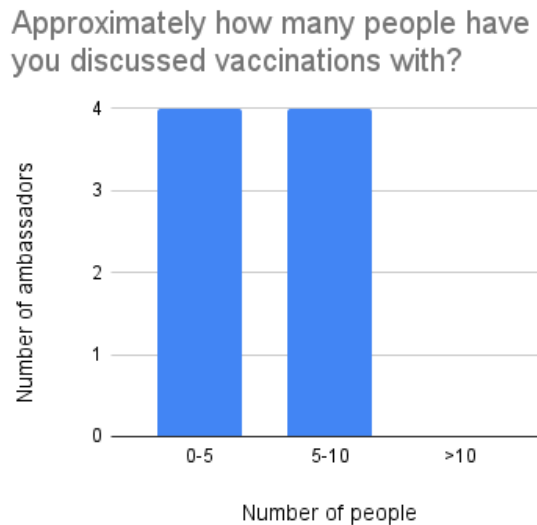
Approximately how many people have you discussed vaccinations with?

Figure 4 - the number of people ambassadors (n=8) reported having spoken to about vaccination

Ambassador motivations and perceived self-efficacy

When asked why they became part of the programme, all eight respondents highlighted their motivation as being to **improve the health of the community in general and/or children specifically**. No other motivations were highlighted (such as building their reputation in the community, building experience, being something to do).

Ambassadors consistently reported high perceived self-efficacy across two indicators:

Firstly, Figure 5 (see next page) illustrates that 27 of 33 ambassadors surveyed (82%) felt that their activities would make a 10/10 positive difference for increasing vaccination in their village. No ambassador stated a value below 5/10.

Secondly, for the ambassadors for whom the full follow-up survey was completed, when asked whether they had faced any challenges in the month since beginning their role as an ambassador, eight of eight answered "No".

Both of these findings are suggestive of high perceived self-efficacy amongst ambassadors, but they should be interpreted with caution due to the small sample size and the potential for experimenter demand effects.

On a scale of 1-10, how much do you feel that your activities will make a positive difference for increasing vaccination in your village? (n=33)
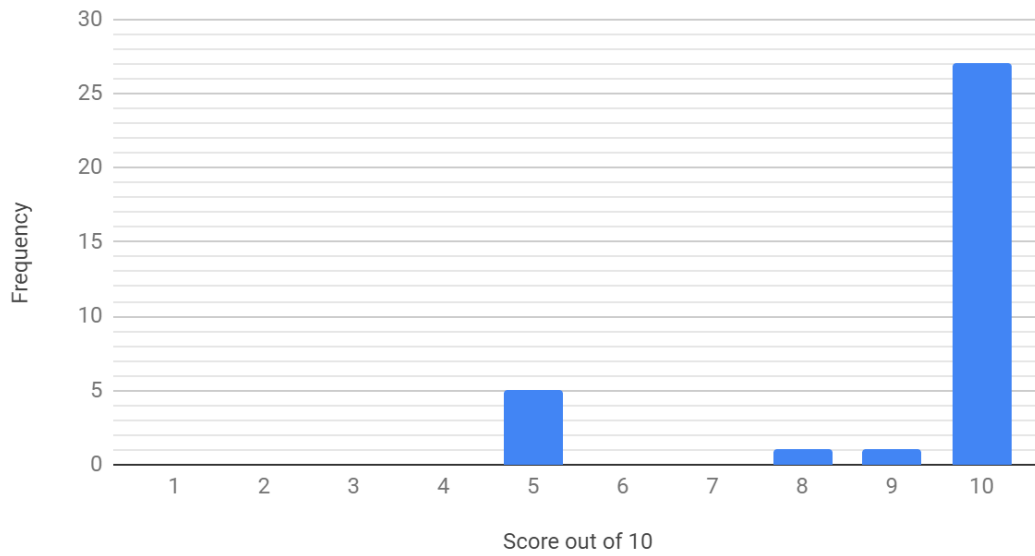

Figure 5 - ambassador perceived self-efficacy

Discussion, key learnings and outstanding questions

The research project investigated the following questions:
1. To what extent can ambassadors be successfully nominated and recruited by phone?
2. What factors increase the successful nomination and recruitment of ambassadors by phone?
3. What factors affect the motivation and action of ambassadors to encourage community members to attend for routine childhood immunisation under COVID-19 circumstances?
4. To what extent do ambassadors successfully mobilise community members to attend for immunisation?

Below, for each area, we discuss the implications of the project's results and highlight key learnings and outstanding questions.

1. To what extent can ambassadors be successfully nominated and recruited by phone?
2. What factors increase the successful nomination and recruitment of ambassadors by phone?

Successfully nominating and recruiting ambassadors by phone

The project results demonstrate that the nomination and recruitment process can be successfully conducted remotely using phone-based surveys. Surveyors were able to conduct nomination surveys of randomly sampled programme users, and recruitment surveys of influencers, with approximately 0.3 ambassadors being finally recruited for every programme user who surveyors attempted to contact to collect a nomination.

The key bottleneck during this process was **reaching** people by phone - once participants were reached, successful completion of nomination and recruitment were respectively 99% and 96%. This indicates that measures taken to achieve successful completion of surveys (for example the surveyor building trust by mentioning their connection to a trusted institution during the introduction; asking a few initial questions to build rapport with the participant; actively listening and appreciating the survey participant) were effective.

Suvita's future iterative work should therefore focus on increasing call answer rates. A number of improvements led to progress here during the project: for the first 49 attempted contacts, 31% were reachable after four attempts - whereas for the full 1,217 attempted contacts, 54% were reachable after four attempts. This increase primarily stemmed from deliberate variation in the timings of calls: calling on weekdays for some attempts followed by weekends for others, as well as making each call attempt at a different time slot where possible.

Future programme iterations could therefore focus on further optimising the call attempt schedule to maximise the number of participants reached. Results showed slightly different optimum call times for the nominations survey (calling Suvita's existing programme users: caregivers of young children) compared to the recruitment survey (calling ambassadors, who had been nominated for their tendency to spread information with the community, and did not necessarily have young children). These peak times could also be prioritised for making survey attempts in future. There is also scope to further investigate the importance of the day when the call is made - in future, Suvita could experiment with different variations on the weekday-weekend call attempt schedule.

It is perhaps also worth noting that, amongst nominated influencers called for the recruitment survey, a slightly lower 51% were reachable with four attempts, compared to 55 % for the nomination survey. It is somewhat surprising that nominated influencers were harder to reach than random programme users - it would seem reasonable to expect that nominated influencers might be *more* responsive via mobile phone given their network centrality. One explanation for

the lower answer rate for recruitment surveys may be that some portion of phone numbers given at the nomination stage were incorrect - either accidentally or deliberately. Suvita plans to continue monitoring these metrics and to conduct further investigation / process improvement if needed.

A much higher 85% of already-recruited ambassadors were reached within three attempts to later conduct the follow-up survey. It is unsurprising that recruited ambassadors are relatively easier to reach by phone, given that they have previously been reached by phone earlier on at the recruitment stage (leading to selection effects).

Overall, it is clear that ambassadors can successfully be nominated and recruited over the phone, without requiring in-person interaction. This is a promising development building upon the work of Banerjee et al. (2019), as it suggests that the programme may potentially be implemented with lower cost and greater scalability.

Key learnings:
- Ambassadors can be successfully nominated and recruited by phone
- Adjusting various factors can help to increase call answer rates and survey completion rates

Key outstanding questions:
- Can Suvita further increase the proportion of people reached for nomination and recruitment surveys?

Ambassador characteristics

Ambassadors nominated and recruited during the project shared a number of characteristics with those recruited in Banerjee et al. (2019), for example a low proportion were female (13%) and they had on average completed more years of schooling. Suvita's ambassador population also differed from that of Banerjee et al. in some ways, for example they were nearly two decades younger (as was the nominating population) and were more likely to be a member of a Scheduled Caste/Tribe or Other Backward Caste' (again, reflective of the nominating population). This suggests that those nominated as influencers may reflect some of the characteristics of the nominating community (e.g. age and caste distribution), whilst deviating on others (e.g. gender, level of education). This provides interesting corroboration of the findings of Banerjee et al. (2019) that certain demographic characteristics may be associated with being nominated as a community influencer, irrespective of background community demographics.

One remaining research question related to this is whether ambassadors nominated by a non-random sample of the population (in this case, caregivers whose child was born in a public health facility in the last year) show any difference in effectiveness at increasing immunisation uptake, compared to ambassadors nominated by a random sample of the population. It is possible that they could be more effective (because they are inherently known to caregivers of young children, having been nominated by them) or that they could be less effective (because this population may only be representative of a portion of the community network which, for some reason, does not include the best-placed influencers). At this stage, either hypothesis is plausible, so this will be an interesting research question to investigate in future.

Key learnings:
- Ambassadors seem to broadly reflect the nominating population in terms of age and caste demographics, but are more likely to be male, and are likely to have completed more education, than the nominating population. This corroborates the findings in Banerjee et al. (2019).

Key outstanding questions:
- Is there any difference in impact between ambassadors nominated by a random sample of their community vs. a caregiver sample?

3. What factors affect the motivation and action of ambassadors to encourage community members to attend for routine childhood immunisation under COVID-19 circumstances?

At this stage, evidence around the motivation and activities of ambassadors is drawn from a small sample size consisting of short phone surveys, and should thus be interpreted with caution. Future research plans include larger surveys and longer in-person conversations, which will allow greater depth of discussion and may therefore be more revealing.

From preliminary findings, ambassadors report entirely intrinsic sources of motivation, highlighting only their desire to improve the health of their community and the children in it when asked why they participated in the programme. This suggests that Suvita may be able to more successfully maintain and strengthen ambassador motivation over time by sharing with ambassadors the positive effects they are having within their community. In the future, Suvita could look into sharing data with ambassadors describing immunisation trends in their local area as a potential motivation-booster.

This project did not specifically attempt to assess the degree of motivation felt by ambassadors, though several factors could indicate high motivation, including the low 1.3% refusal rate compared to 16.5% found in Banerjee et al. (2019), as well as the fact that 92.6% of ambassadors reported having done something to spread information in the month since they joined the programme. These results should, however, be interpreted with caution due to their indirectness and the potential role of social-desirability bias.

Key learnings:
- From a small sample, it seems that the intrinsic motivation to improve health in their community is a key salient driver for ambassadors.

4. To what extent do ambassadors successfully mobilise community members to attend for immunisation?

Information spread and caregiver action

This study provided some evidence that ambassadors recruited through the remote model did spread immunisation-related information which was acted upon in some way by caregivers.

The fact that 30 unique caregivers made a missed call to enrol for SMS reminders after the relevant phone number was shared with 45 ambassadors is indicative of both some successful information spread by ambassadors, and some caregivers choosing to act upon the information. However, as mentioned previously, this mechanism is only a rough proxy for identifying some first-degree information spread by ambassadors.

The ambassador survey results also provided some supporting evidence:
- **Ambassadors generally recalled receiving Suvita's SMS messages** (only 18% didn't recall a message from within the last two weeks; 55% vaguely recalled one and 27% confidently recalled one).
- **Ambassadors reported spreading the information** to their family, friends and acquaintances, typically discussing vaccination with 1-10 other people over the first month.

Findings from the ambassador follow-up survey can generate some hypotheses around the potential mechanism by which information may be spread. Ambassador survey responses were consistent with a model in which ambassadors pass information ad-hoc to a relatively small number of friends and family (89%) and other acquaintances (67%), mostly by in-person word of

mouth, but occasionally by other means such as forwarding the SMS messages. It is possible that these individuals then pass the information on to others in a similar manner, though this project did not collect evidence on this. Ambassadors did not report spreading the information in organised settings such as community meetings. All of these findings should be used only for hypothesis generation, and not conclusion, due to the small sample size.

Future work involving follow-up discussions both with a larger number of ambassadors and in greater depth with each ambassador would be informative, to further investigate the possible mechanism of ambassadors' potential impact. It would also be interesting to compare the main barriers to immunisation highlighted by ambassadors in this project to those highlighted by parents - this could indicate the degree to which ambassadors are well-placed to understand and address the challenges faced by caregivers in their community.

The follow-up surveys in this pilot were conducted one month after ambassador recruitment. Banerjee et al. measured the impact of ambassadors over around 12 months. Future work should therefore investigate the effect of the passage of time on ambassador engagement and activities. Do ambassadors engage differently depending on the time since they were first recruited? Should we always recruit a new cohort of ambassadors after some interval?

Another interesting conclusion emerges from the fact that, with the missed call mechanism, ambassadors successfully reached some caregivers who were not existing users of Suvita's SMS reminders programme, and had not given birth in a public health facility. This is an early indication that the ambassador model may be a promising way to engage with families who are otherwise at higher risk of being missed by existing systems. Vaccination completion is lower both amongst families with fewer previous interactions with front-line health workers (such as antenatal care appointments), and amongst families who give birth to their child at home rather than in a hospital.[22] Both of these groups are less likely to already be enrolled for Suvita's SMS reminders, but immunisation ambassadors may be able to help reach this cohort. Doing so may also have outsized benefits beyond vaccination, as successful attendance for vaccination creates a valuable touchpoint at which families may also access other health services such as postnatal care and family planning.

Key learnings:
- Ambassadors do spread some information to caregivers which prompts caregivers to act (by making a missed call to enrol their child for SMS vaccine reminders).
- From the responses of a small sample of ambassadors, a plausible mechanism for information spread is that ambassadors primarily pass information ad-hoc to a relatively small number (<10) of friends, family and other acquaintances, mostly by in-person word of mouth.
- Ambassadors can reach some families who did not give birth in a public health facility and were therefore not already enrolled for Suvita's SMS reminders.

Key outstanding questions:
- How do ambassadors engage with the role in general? We should hear from more ambassadors, and from some ambassadors in greater depth.
- Is there much variation in how individual ambassadors engage?
- How important are the SMS messages themselves, relative to the initial recruitment phone call, in prompting ambassadors to advocate for immunisation on an ongoing basis?
- What is the effect of time since recruitment on ambassador engagement? Do ambassadors engage differently depending on the time since they were first recruited? Should we always recruit a new cohort of ambassadors after some interval?
- How do people tend to respond when ambassadors bring up the topic of immunisation in conversation?

Attendance for vaccination

This project was not able to collect evidence regarding the ultimate effects of the ambassador programme on attendance for immunisation. This is because the investigation focused primarily on - first - evaluating the operational feasibility of the remote model and - second - generating actionable iterations and insights to further optimise the model for effectiveness and scalability. Determining the model's efficacy is a key future research question, made more relevant by this demonstration of its operational feasibility.

In the longer term, Suvita hopes to conduct a quantitative impact evaluation, potentially using administrative data from the State Health Society's Health Management Information System on vaccination attendance. Producing a statistically valid quantitative result will require the ambassadors programme to scale to a larger number of villages. In the shorter term, we plan to conduct various activities to begin to investigate this question - including a larger scale ambassador survey, a number of in-depth ambassador interviews, and discussions with caregivers, ambassadors and front-line health workers to investigate whether anecdotal examples emerge of caregivers being mobilised to attend for vaccination appointments as a direct result of ambassador activity.

Key outstanding questions:
- Do ambassadors cause a measurable / attributable increase in immunisation uptake?

Final conclusion

This project has demonstrated that community influencers can successfully be identified through phone-based surveys and recruited to become volunteer immunisation ambassadors. It has generated early evidence that ambassadors do disseminate vaccination-related information within their immediate networks, and that caregivers sometimes receive and act on this information (by making a missed call to enrol for free SMS reminders for their child's vaccination schedule). This provides various pieces of supporting evidence for different stages of Suvita's Theory of Change.
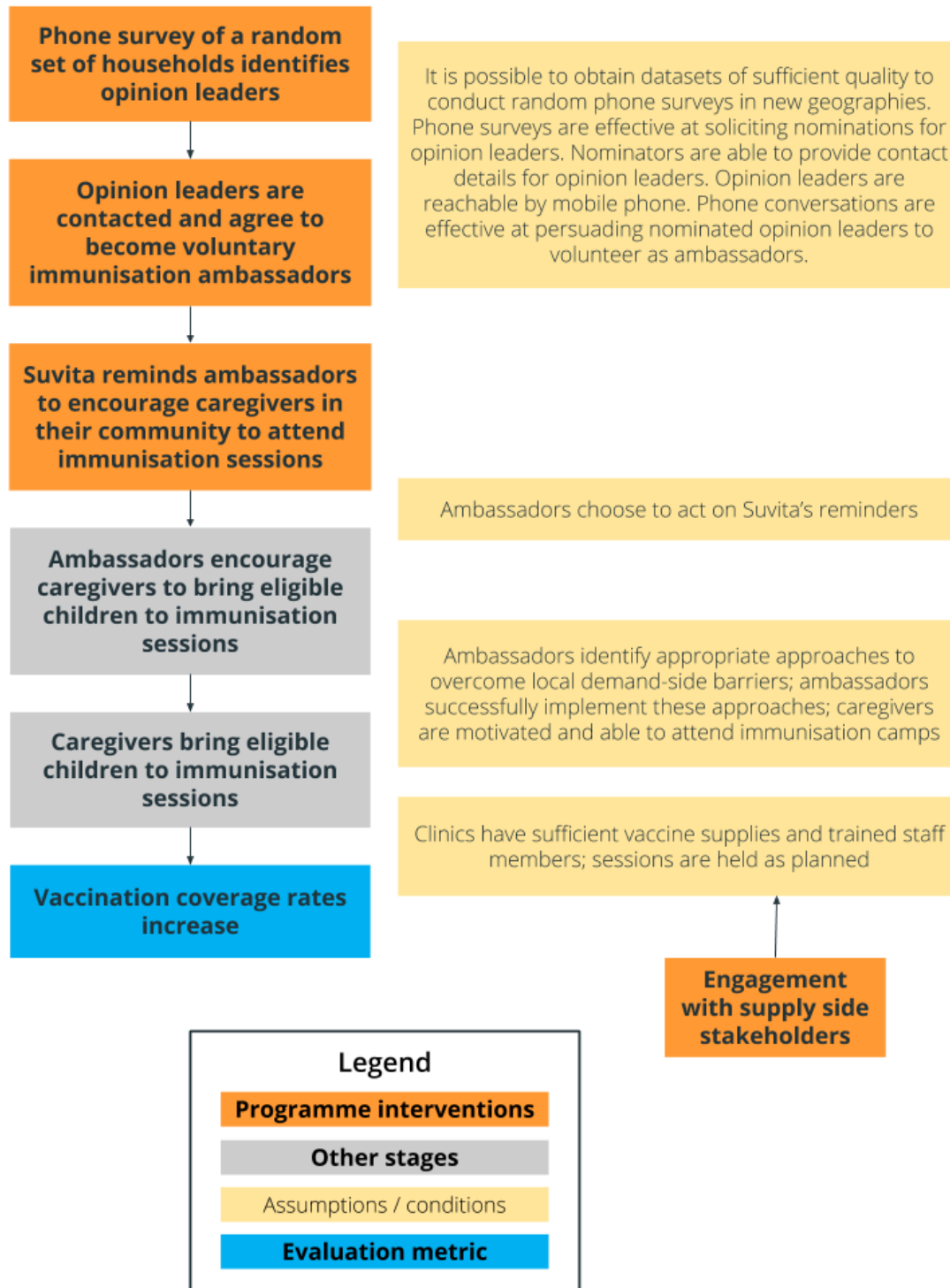
By relying only on phone-based communication between Suvita and nominators/ambassadors, this model is both potentially more scalable than an in-person approach and also adapted to the COVID-19 context. It also directly addresses a critical challenge posed by the effects of COVID-19 and lockdowns, namely reduced uptake of childhood immunisations. This pilot has demonstrated that such a phone-based model is operationally feasible, and has provided early signals that it may be impactful. If so, the programme may help to preserve and build upon important gains in immunisation coverage achieved over recent years.

Further work should focus on three main areas.
- **Better understanding the mechanism** by which ambassadors may have an impact - how do they engage with the role? How much does this vary at an individual level and over time? How do people respond when ambassadors bring up the topic of immunisation?
- **Generating additional evidence** around the final pieces of the Theory of Change, to investigate whether ambassadors do indeed ultimately mobilise more parents to bring their children for immunisation.
- **Continued testing and iteration** on Suvita's operational model to further optimise the programme's scalability and impactfulness. Can call answer rates and nomination rates be further increased? Is there any difference in impact between ambassadors nominated by a random sample of their community vs. a caregiver sample?

Appendix 1

Theory of Change
Immunisation ambassadors (fully remote)

Phone survey of a random set of households identifies opinion leaders

It is possible to obtain datasets of sufficient quality to conduct random phone surveys in new geographies. Phone surveys are effective at soliciting nominations for opinion leaders. Nominators are able to provide contact details for opinion leaders. Opinion leaders are reachable by mobile phone. Phone conversations are effective at persuading nominated opinion leaders to volunteer as ambassadors.

Opinion leaders are contacted and agree to become voluntary immunisation ambassadors

Suvita reminds ambassadors to encourage caregivers in their community to attend immunisation sessions

Ambassadors choose to act on Suvita's reminders

Ambassadors encourage caregivers to bring eligible children to immunisation sessions

Ambassadors identify appropriate approaches to overcome local demand-side barriers; ambassadors successfully implement these approaches; caregivers are motivated and able to attend immunisation camps

Caregivers bring eligible children to immunisation sessions

Clinics have sufficient vaccine supplies and trained staff members; sessions are held as planned

Vaccination coverage rates increase

Engagement with supply side stakeholders

Legend
Programme interventions
Other stages
Assumptions / conditions
Evaluation metric

Endnotes

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