



# Impact Evaluation of New Incentives in North West States of Zamfara and Katsina

## Report on June Field Activities

Prepared for GiveWell, Good Ventures, and New Incentives

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## Executive Summary

IDinsight conducted a data collection exercise from June 20 – 28, 2017 in Zamfara and Katsina States in North West Nigeria in preparation of a cluster randomized control trial (RCT) of New Incentives' conditional cash transfer program ("Pre-RCT"). The pre-RCT data collection activities enhanced IDinsight's confidence that the proposed RCT design will be feasible to implement on the ground. However, certain modifications will be required to ensure a successful baseline:

- The baseline should include approximately 20% more households than expected to ensure a sufficient number of eligible children will be surveyed to achieve efficient stratification.
- Baseline sampling should include modifications to the compact segment sampling strategy in small, rural communities. In particular, we will use systematic random sampling as a back-up strategy for communities that are simply too small or too scattered to effectively divide into segments. However, we anticipate only a small percentage of the sample will be selected using this strategy.

The Pre-RCT findings provided indicative evidence that estimated baseline coverage rates were very low as other coverage surveys predict. Additionally, findings showed that mothers are not currently traveling from outside clinic catchment areas to access immunization at New Incentives' clinics with 96% traveling from within an approximately 5-kilometer radius<sup>1</sup>. However, this result does not guarantee that the situation will not change over time.

## Pre-RCT objective

The overall goal of the Pre-RCT fieldwork was to gather information to finalize the evaluation design and field protocol of a cluster randomized control trial (RCT) of New Incentive's conditional cash transfer program for childhood immunizations. Specific objectives of the pre-RCT activity were to:

- Pilot a compact segment sampling technique to understand its operational feasibility.
- Pre-test methods of measuring and verifying vaccination status.
- Understand mothers' willingness and ability to travel to clinics for vaccinations.
- Further understand the availability and quality of administrative and programmatic data.
- Test capabilities of Hanovia Ltd, a Nigerian survey firm, as a potential survey partner for the full RCT.
- Explore requirements for research approvals in Zamfara and Katsina States.

## Field Activities

IDinsight conducted four field activities to achieve the above objectives:

- 1. Household listing** – The compact segment sampling technique was piloted in four catchment areas, two in Zango Local Government Area of Katsina state and two in Bakura Local Government Area of Zamfara state. The catchment area of each clinic was divided into different segments, and eight segments were randomly selected to census 250 households per clinic catchment area. Town segment boundaries followed roads, and rural segment boundaries followed roads and other apparent natural features in satellite maps such as streams.

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<sup>1</sup> The radius is defined as the mother coming from a settlement less than a 250 naira motorbike ride away as reported by the clinic staff during an analysis of the child immunization register.

**2. Routine immunization survey** – Twenty eligible children<sup>2</sup> in each of the four clinics were randomly selected for the routine immunization survey based on the information collected during the household listing. The routine immunization survey included questions on verifying the child’s vaccination status with a card check as well as standard self-report by primary care-giver, usually the mother<sup>3</sup>.

**3. Exit interviews at clinics** – Exit interviews focused on understanding the effort mothers are willing to travel to get their infants immunized. These were conducted on an immunization day at a New Incentives clinic. The questions included: home settlement, distance traveled, and time and money spent on traveling. This information will be helpful in spacing the treatment and control clinics. Twenty mothers were interviewed per clinic, across six clinics.

**4. Clinic record verification** – Since some mothers would not have the vaccination card at the time of the routine immunization survey, we would need to rely on self-report of vaccination status – the primary outcome. For such self-reports where a vaccination card was not produced, verification was carried out using the child health register from the local clinic.

## Results

### 1. Coverage rates were low as expected.

Of the total mothers surveyed, 33% only reported that their children had received any injectable vaccinations. This result was consistent across both states with 33% of children in Katsina and 34% in Zamfara having received any injectable vaccines. The coverage rate for the oral polio vaccination were consistent with DHS<sup>4</sup> with 76% of mothers in Katsina and 85% of mothers in Zamfara reporting their children received a polio vaccination. Polio campaigns are very active in these state, and some mothers reported receiving OPV at their homes as frequently as monthly. The survey may provide some useful feedback for planners of these campaigns; five mothers reported that polio vaccinators marked their infant’s finger but did not vaccinate them. The reason for this is unclear.

In general, coverage rates derived from interviews with only 80 infants should be interpreted with caution. However, the general hypothesis that coverage rates are low seems to hold. The measles coverage rate was 8% in Katsina and 20% in Zamfara<sup>5</sup>. In both states about 26% of infants received at least one penta dose. BCG coverage was 20% in Katsina and 18% in Zamfara.

### 2. Card retention about 50%

In the pre-RCT phase, 10 out of 22 mothers (45%) that reported ever receiving a vaccination card had it available. There was likely some confusion between child health cards and campaign cards since two of the mothers that reported once receiving a card, but didn’t have it available reported never vaccinating at a clinic. Thus, the child health card retention rate is likely 50%, but retention of child health card like cards such as card from an immunization campaign could be important for the study. Not all cards are useful, however. During pre-testing, mothers produced a wide variety of cards ranging

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<sup>2</sup> Children were eligible if they were between 12 and 16 months of age on the day of the survey, based on care-giver report.

<sup>3</sup> We will refer to care-givers as mothers throughout the rest of the report

<sup>4</sup> According to DHS 2013 77% of children in the North West had received the Polio 1 vaccine.

<sup>5</sup> Beyond the random noise inherent in the small sample, another reason for the difference in coverage rates between Katsina and Zamfara is that in Zamfara every mother reported their child either did or did not receive an injection to prevent them from getting measles while in Katsina there were three definite yes and three don’t knows. If the “don’t know” cases are included the coverage rate is a more comparable 16%.

from birth registration cards to cards associated with malnutrition programs when enumerators asked for child health cards.

The Pre-RCT found better card availability than the 2013 Nigeria Demographic and Health Survey<sup>6</sup>. For 12-16 month-olds who received at least one immunization, only about 40% of mothers produced child health cards for DHS enumerators, 10% lower than what we experienced. However, the Pre-RCT was conducted in a small area of two states in Nigeria, while the DHS is a national survey.

### 3. Based on Limited Cases, Clinic Record Verification is Feasible.

**Procedure followed** – IDinsight provided the enumeration team with the list of all children surveyed for whom mothers self-reported vaccinating their child but could not produce the vaccination card. The details of the children included: full name of child, settlement name, date of birth, parent’s name. Enumerators used both child name and settlement name to search for matches in the child health register<sup>7</sup>.

**Matches found** – Across the four clinics where clinic verification was conducted, only three matches were found (2 at Model Primary Health Care Center Zango and 1 Primary Health Care Center Yarkafoji) out of 25 children (12%) whose caregivers had reported that they were vaccinated. However, given the low coverage rates and frequency of infants receiving vaccinations at other clinics, this low number of matches was expected.

Considering only cases where mothers reported vaccinating at the clinic used for cross-referencing, there were only 2 non-cross-referenced cases out of 5. However, one of these mothers never received a child health card and only reported receiving one dose of PCV and the other is from a settlement whose mothers commonly visited a different clinic than the one used for cross-referencing.

#### **Matches to other Infants with Similar Names**

Enumerators were given 25 names to cross reference. Most of these mothers likely never took their children for vaccination at the clinic. However, since they answered don’t know for questions such as whether or not their infant received measles, they were included anyways. The fact that none of these additional infants were matched suggest the risk of false matches due to similar names is low.

### 4. Very limited number of households with phone numbers in Zamfara

For the clinics visited in Zamfara, the percentage of households with phone numbers was very low at 10%, as compared to Katsina at 44%. There could be multiple reasons for the low coverage of mobile phones in Zamfara including – worse network, higher relative poverty, or more insular community.

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<sup>6</sup> National Population Commission (NPC) [Nigeria] and ICF International. 2014. *Nigeria Demographic and Health Survey 2013*. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.

<sup>7</sup> The child health register is organized by month, with the list of infants who were given their first vaccination (BCG) that month. Each row is for a different child and includes columns to indicate the date when a vaccination was given according to the nine-month vaccination schedule

## Key recommendations

Based on the Pre-RCT findings, IDinsight has several recommendations on both field operations as well as evaluation design.

### Recommendations to Improve Field Operations:

#### 1. Modify compact segment sampling strategy for small rural settlements

IDinsight found that compact segment sampling worked well in the field for urban settlements and larger rural settlements. Overlaying the GPS coordinates on the sampling maps showed that enumerators who correctly identified their settlement largely stayed within the identified boundaries. There were some issues with enumerators continuing across intersections and out of their segment for a few households, but this can be corrected during training. Additionally, labels on the map did not always align with settlement names, causing confusion about where they should enumerate. IDinsight believes improved training and removing labels on sampling maps will ensure close adherence to the compact sampling protocol in larger settlements.

However, IDinsight found that compact segment sampling was more challenging to conduct in smaller rural settlements. First, determining the exact location of these settlements can be difficult. In a few cases, the maps misplaced settlements and neighborhoods due to duplicate or similar settlement names. Secondly, there are few landmarks in these small rural settlements which make them difficult to divide, resulting in enumerators oversampling them. For most areas, we will continue to use compact segment sampling. However, for small rural settlements IDinsight plans to conduct systemic random sampling<sup>8</sup>. We learned during the pre-RCT that residents of small rural settlements have a good sense how many households are in their community. Enumerators can use this number to randomly select the few houses that must be sampled from a small settlement. IDinsight is working on finalizing details and plans to pilot this technique during training.

#### 2. Improve flow of questionnaires

The intensive pre-testing revealed aspects of the questionnaires that could be improved for question flow. Good flow is particularly important for the self-reported data section which can be confusing for mothers. In particular, it is important to make sure the form flows smoothly for common response patterns. For example, since many infants have only received an oral polio vaccine and no other immunizations, the form has been revised to probe about oral and injectable vaccines separately. We are continuing to refine the questionnaire flow and will finalize any additional changes during the next round of piloting.

#### 3. Require knowledgeable respondents

The pre-RCT showed that limited revisits will be necessary reach household members and caregivers. The majority of households were reached on the first attempt for both listing and routine immunization visits. Only 4% of the 1,012 listings conducted required a neighbor to provide information. Only two of the targeted 80 (2.5%) routine immunization interviews could not be completed because the mother was unavailable when the enumerator visited the household. In interviews with neighbors and non-mothers as respondents, there were issues accurately determining birth dates or an infant's immunization history. Since the number of cases is small, the surveyors will attempt re-visits when a mother or household member is not available on the first visit for the household listing and routine immunization surveys respectively.

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<sup>8</sup> Broadly systematic random sampling is a sampling technique where all the households in an enumeration area are counted and then the required number are randomly selected. This differs only slightly from true random sampling where every house would be censused and the eligible children are randomly selected. The core assumption behind systematic random sampling is that eligible are approximately evenly distributed across households.



4. Improve procedure for gathering catchment area settlement names.

Inconsistent naming of settlements contributed to challenges in identifying a given location. IDinsight is planning to work with New Incentives to ensure that the name list collected during the clinic screening process that New Incentives is undertaking this month is the most comprehensive that it can be. The key change will be to ensure New Incentives expansion officers probe for alternate names rather than simply recording whatever is said first. As noted above, we will not label the compact segments in towns with neighborhood names since these neighborhood names seem to change often and have poorly defined boundaries.

5. Provide better training and more options for household marking

Households included in the listing questionnaire were numbered using chalk / charcoal to facilitate relocation for the routine immunization survey. IDinsight is adding markers to enumerators' toolkits for cases where mud-bricks make writing on the wall a challenge (figure 1). To ensure that children or other inhabitants do not rub off the chalk written codes, enumerators will now be instructed to label higher on buildings out of children's reach (figure 2). Further, we will also gather any household nicknames and phone numbers to serve as an additional means to identify houses for re-visits when the markings have washed away.

*Figure 1: Creatively addressing chalk's limitations*



*Figure 2: Marking out of children's reach*



## Recommended changes to study design

1. Increase the number of households censused from 250 to 300 households, and expand survey eligibility from 12-16 month old infants to 12-24 month old infants

A key learning from the Pre-RCT phase determined that average household size is 6.5 which is lower than what IDinsight had expected in North West Nigeria (9 based on DHS expected household sizes<sup>9</sup>). Consequently, only about 10% of households have an eligible child. Based on this learning, the plan is to census on average of 300 households per clinic catchment area for the baseline. This finding would also makes the full census alternative considerably more challenging since we now estimate catchment areas have approximately 1,000 rather than 500 households which means a full census would require interviews with 150,000 households.

IDinsight will expand the eligibility criteria from 12-16 months to 12-24 months for the baseline.<sup>10</sup> Based on the pre-RCT and a re-analysis of data from a recent World Bank study in Katsina and Zamfara, we expect about 10% of households surveyed to have eligible babies. After including all 12-16 month babies, we will randomly select additional 17-24 month old babies to ensure sufficient information on other variables such as vaccination attitudes and other health behaviors we may want to use for a heterogeneous treatment effect analysis<sup>11</sup>. The coverage data to be used when stratifying clinics during random selection will be taken only from infants 12-16 months to ensure comparability with the endline sample and reduce the risk of measurement error. IDinsight conducted a simulation which determined 20 or 25 infants per clinic would be sufficient for stratification (details in Annex 2).

2. Increase the target number of routine immunization surveys from 40 to 45

For the baseline, the power calculations yielded a sample size of 40 households for routine immunization survey. In the field during pre-testing, capturing date of birth accurately was a challenge at times. For listing, only 73% of mothers were able to provide their child's birthdate using the Julian calendar. For the remaining mothers, enumerators used the Islamic calendar<sup>12</sup> (13%) and major events (5%). For a final 5% of mothers, enumerators were not able to confidently establish a birth date despite extensive probing. Built in back-checks yielded some discrepancies detailed in the table below. Due to the uncertainties around birth-date, we now plan to sample 45 eligible infants per catchment area to ensure 40 are eligible.

**Table 2: Discrepancies between household listing and routine immunization surveys**

Month of Birth (listing minus survey)	Frequency	Percent	Age in months (listing minus survey)	Frequency	Percent
-4	4	5.71%	-4	1	1.28%
-2	1	1.43%	-3	1	1.28%
-1	2	2.86%	-1	6	7.69%
0	51	72.86%	0	64	82.05%
1	8	11.43%	1	4	5.13%
3	1	1.43%	2	1	1.28%
4	1	1.43%	4	1	1.28%
6	2	2.86%			

<sup>9</sup> A re-analysis of the DHS data on actual household sizes confirms that 6.5 is the correct estimate for the North West.

<sup>10</sup> The current thinking is still to target 12-16 month olds at endline.

<sup>11</sup> If there are more 12-16 month olds identified in the household listing than are required for the routine immunization survey, we will randomly select from 12-16 month olds only.

<sup>12</sup> Without a date, a given Islamic month could be one of two Julian calendar months.

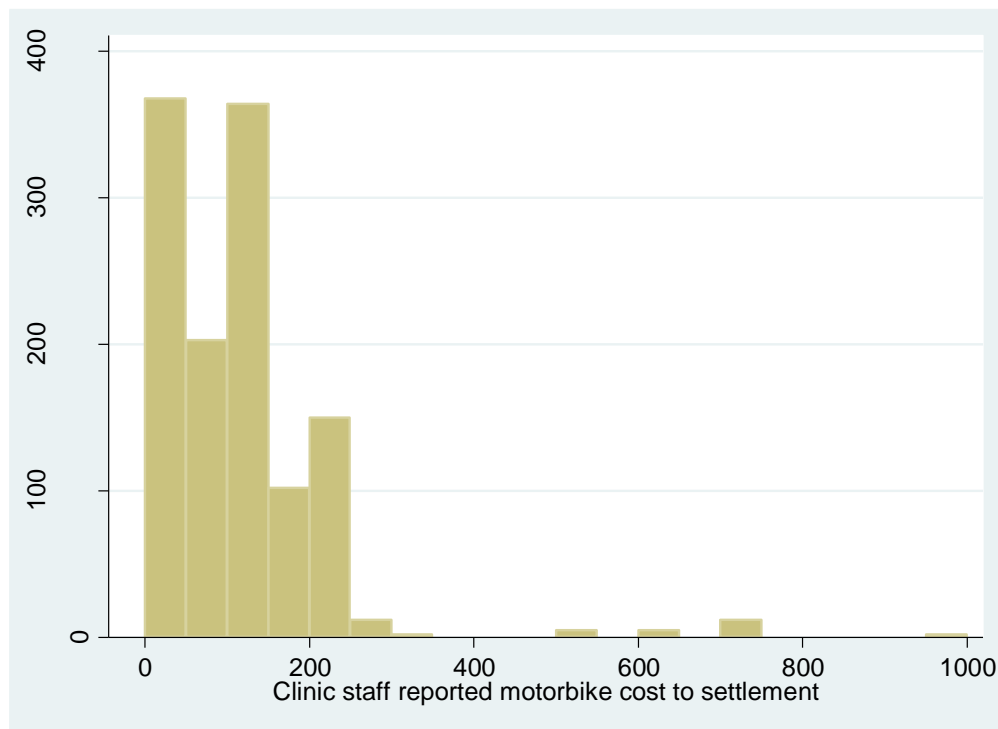
3. A 9 kilometer buffer may provide adequate spacing.

Based on the data, 9 kilometers seems to be a reasonable buffer size. A 9km buffer implies about a 12km from the closest settlement in a control clinic to a treatment clinic since catchment settlements are largely within 5km of a clinic. It seems unlikely a 500 Naira incentive would justify a 400-500 Naira one-way motorbike or a 6 hour one way walk<sup>13</sup>. Travel costs would be less if the clinics were directly down a main road from each other, but IDinsight has selected clinics to avoid that situation.

Despite this guidance, some outlier mothers currently travel long distances to reach certain clinics. The motivations behind these women’s journeys is unclear, and it is possible the presence of an incentive would induce more such journeys although the effects of such a change are not yet apparent in the data. Discussions with one woman who traveled to Zango from Bulugudu, 10 km as the crow flies but 18km by road, said she likes using her routine immunization appointments as an excuse to visit her relatives in Zango. We will never be able to completely prevent cases such as this one during the baseline, but the question for baseline is whether the incentive affects this behavior or whether traveling long distance for immunizations is a decision made independent of incentives.

The 97% of clinic records are from settlements less than 250 naira by motorbike from the clinic. Visits from the outlier settlements do not seem to be associated with New Incentive’s program. All settlements with reported travel cost over 250 Naira were from PHC Damri. The two visits from Kwatsama and the 4 visits from Banda a 1000 and 700 Naira motorbike ride away respectively took place in early April. The remaining records from far settlements referred to visits in January and February. Figure 3 below illustrates in detail the distribution of distance as measured by clinic staff reported travel cost to the settlement listed in the baby’s record in the child immunization register.

**Figure 3: Clinic Records Travel Analysis**



<sup>13</sup> Only one mother reported using a taxi or truck which is the only kind of transport that can be shared.



Based on the subset of settlement names we could geo-code, a conservative assessment would be that a 200 Naira motorbike ride corresponds with a 5-kilometer distance from the clinic as the mean distance with 200 Naira is 4.33km and the maximum is 5.03km. The 1000 Naira one-way motorbike ride was for a settlement located 15 kilometers from the clinic.

Based on the exit interviews, the amount of time mothers spent to travel to the clinic was relatively short. The table below illustrates broad categories of transport time across the kind of transport used. Mothers predominantly walked or took a motorbike for less than 30 minutes.

Time Category	Walked	Own Motorbike	Commercial Motorbike	Taxi/ Truck	Bicycle
Less than 30mins	69	6	32	1	1
	85%	100%	89%	100%	100%
30mins - 1 hour	10	0	4	0	0
	12%	0%	11%	0%	0%
1.5-2hrs	2	0	0	0	0
	2%	0%	0%	0%	0%

Actual incurred travel costs from the exit interviews were relatively low. The average out of pocket spending on transport for the 36% that paid anything for transport was only 100 Naira. The maximum reported travel cost was 300 Naira for two women from PHC Damri who each took a motorcycle from a settlement about 8 kilometers away based on an approximate match of the settlement name they reported to a settlement in the eHealth Africa database.

## Limitations

The primary purpose of the activities in June was to gain a stronger understanding of operations and to pilot the proposed survey techniques rather than to generate representative data. Consequently, there are important limitations to the results contained in this report. The data is from a small area near the borders of both Katsina and Zamfara states. For this reason, the data collected is unlikely to represent the states at large and thus should be compared to representative coverage surveys with caution. Information on travel time and travel cost gathered during exit interviews is self-reported and thus may be biased for a number of reasons. For example, due to conflation of New Incentives staff with survey enumerators and/or a general lack of comprehension, some mothers may have inflated travel costs in hopes of receiving a further reimbursement. Other mothers may have understated travel costs due to concerns over program eligibility. Finally, the clinic records and exit interview data collection activities took place relatively early in New Incentives' tenure at their learning clinics. Travel patterns may change as the program matures. Despite these limitations, this June data collection does provide indicative information that key evaluation design assumptions continue to seem reasonable when tested in the field.

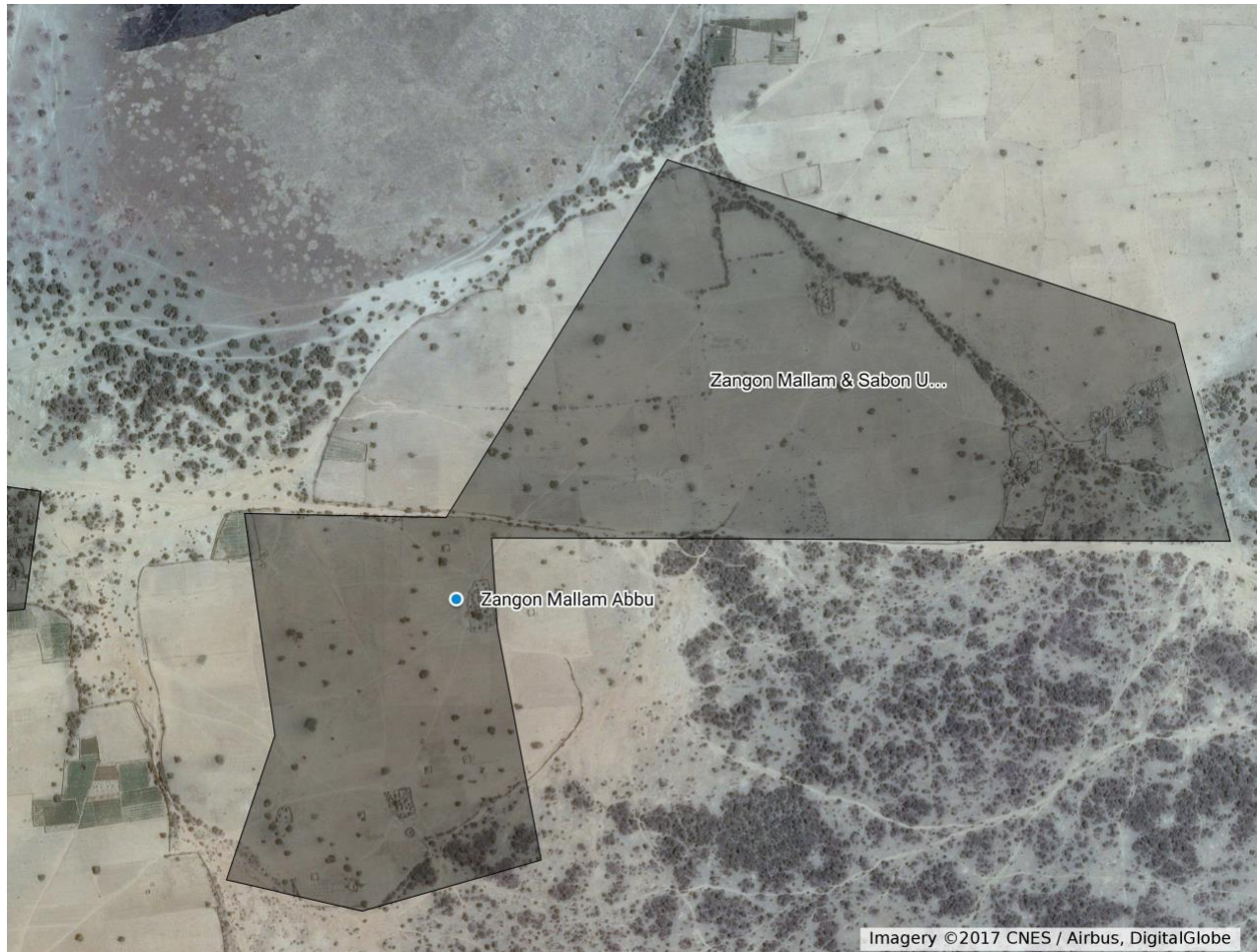
## Conclusion

June field activities provided IDinsight with valuable operational insights into conducting coverage surveys in the North West Nigerian context. Additionally, this work provided an initial test of our evaluation design assumptions. Based on this work, we have adjusted the household size assumption we use for survey planning.

We also have adjusted our sampling strategy for small, rural segments where we found compact segment sampling to be operationally challenging. IDinsight feels confident moving forward with the baseline based on our learnings from June field activities.

## Annex 1

Example of small rural settlements. No clear landmarks to draw sampling boundaries.





Example of a larger settlement. Note: there are many possible roads to divide the area beyond the tarred road.



## Annex 2

To better inform the sample size for baseline measurement. IDinsight created a simulated dataset using the mean and distribution of enumeration area coverage rates in DHS as a proxy for clinic coverage rates. The based on these simulated clinic coverage rates IDinsight randomly generated 40 infants vaccination status. Samples of 20-40 of these infants were used to create estimated clinic coverage rates for stratification. After randomizing the clinics, stratifying on these estimated rates, balance with respect to the initial “true” clinic coverage rate was assessed.

We asses balance using two statistics, average absolute difference and the number of cases with statistically significant differences. The average absolute difference in coverage percentage points between treatment and control is reported in (column 1). Note the differences are in terms of percentage points so based on the simulation an average case without stratification would be the control group has a mean coverage rate of 14.75% and the treatment group has a mean coverage rate of 17.25% (note the mean coverage used for the simulation was 16%). Column 2 reports the number of simulations out of 1,600 where a t-test comparing coverage rates in the treatment and control clinics finds a difference significant with a p-value<10%. This would be equivalent to the variable having a star next to it in a standard balance table included in many randomized controlled trials in development economics.

<b>Randomization Strategy. The stratified randomization strategy uses 7 coverage strata and 2 state strata.</b>	<b>Average difference in coverage percentage points between treatment and control</b>	<b>Number of cases where difference in coverage percentage points between treatment and control is significant with p&lt;10%</b>
No Stratification	2.49%	150
Stratification using 20 eligible	1.16%	1
Stratification using 25 eligible	1.06%	0
Stratification using 30 eligible	1.06%	0
Stratification using 35 eligible	1.03%	0
Stratification using 40 eligible	1.03%	0