Improving CLTS targeting: Evidence from Nigeria

IFS Briefing Note BN183

Co-authored by WaterAid and EDePo at IFS

Laura Abramovsky
Britta Augsburg
Erin Flynn
Francisco Oteiza

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Improving CLTS targeting: Evidence from Nigeria

Laura Abramovsky, Britta Augsburg and Francisco Oteiza
Institute for Fiscal Studies
Erin Flynn
WaterAid

EDePo
Evaluating development policy at IFS

in collaboration with

WaterAid

ISBN: 978-1-911102-14-4

Executive Summary

Many low-income countries face the hefty challenge of increasing sanitation coverage, in both rural and urban areas, which demand different solutions. In response, governments, with support from international agencies, bilateral donors and non-government organisations, are deploying a range of programmes and policies to accelerate progress towards the new global goals. Community-led total sanitation (CLTS) is one popular approach. CLTS works with an entire community to identify the negative effects of poor sanitation, especially the practice of open defecation, and empowers them to collectively find solutions. CLTS is understood to be more suitable for small, rural and homogeneous communities, however it is still considered an appropriate solution for more urbanised areas.

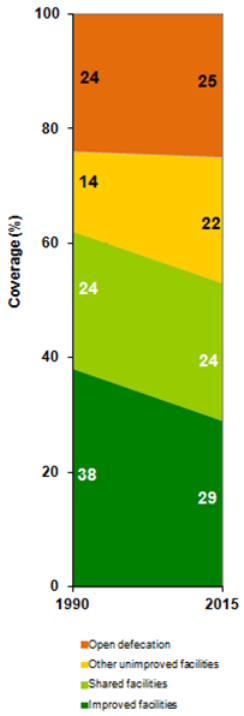
In this brief, we provide quantitative evidence to support this conjecture and bring forward a simple rule of thumb that allows more efficient programme targeting. We suggest that using this information can improve the targeting of CLTS in Nigeria, and possibly other countries, freeing up scarce resources to identify and test complementary sanitation approaches suitable for more urbanised communities.

1 Introduction

Sanitation is fundamental to human development and well-being, alongside the achievement of adequate nutrition, gender equality, education and the eradication of poverty (UNICEF and WHO, 2015). It is estimated that for every 1 USD invested in sanitation, there is a return of 5.50 USD in lower health costs, more productivity and fewer premature deaths (WHO, 2015).

One of the United Nation's Sustainable Development Goals (SDGs) focuses on sanitation for all by 2030, responding to the staggering number of 2.5 billion people living without access to safe sanitation in both rural and urban areas. In response, governments, with support from international agencies, bilateral donors and non-government organisations (NGOs), are deploying a range of programmes and policies to accelerate progress towards the new global goals.

Figure 1: Sanitation trends: Nigeria 1990-2015



Source: UNICEF and WHO (2015).

A commonly chosen strategy is that of community-led total sanitation (CLTS), which was developed in 2004 by Kamal Kar (see Kar et al., 2008). CLTS is designed to operate through changing social norms and raising collective awareness about the private and public costs and benefits of sanitation, aiming to increase the uptake of improved sanitation behaviours.

The CLTS approach has been widely embraced and is now implemented in more than 20 countries (Chambers and Bongartz, 2009), of which at least 15 have made CLTS official national policy. Nigeria is one of the countries that officially adopted CLTS as an approved approach in the national Strategy for Scaling up Sanitation and Hygiene. After three years of intensive piloting in collaboration with WaterAid, UNICEF and local governments, the approach was officially adopted in 2007 as a means to meet the seventh Millennium Development Goal (MDG) of reducing open defecation rates by half by 2015. The UK Department for International Development (DfID) is one of

the major funders supporting Nigeria's attempt to eliminate open defecation. Through Sanitation, Hygiene and Water in Nigeria (SHAWN) 1 and 2, more than GBP 120 million are channelled into the country with the aim of providing more than 7 million beneficiaries with "access to appropriate and safe sanitation facilities, hygiene education activities and a sustainable safe and reliable water supply to reduce exposure to public health risks and disease transmission".

Despite this significant commitment, progress in improving sanitation coverage has been slow and, in fact, declining, as can be seen in Figure 1. Nigeria is the most populous African country, with an estimated population of 180 million in 2015, and faces open defecation rates of 25% - around 45 million people. Such numbers raise the question of whether CLTS is the right approach to address the problem at hand. There are two interrelated questions that need to be answered to contribute to an informed policy debate: whether CLTS can be implemented in all targeted communities and whether, conditional on implementation, CLTS is cost-effective at improving sanitation practices.

The formal research component of the Sustainable Total Sanitation (STS) programme in Nigeria conducts, among other things, a rigorous impact evaluation study of CLTS implemented in two states of Nigeria, Enugu and Ekiti. In this brief, we show initial evidence that the approach can indeed be successful in increasing sanitation uptake.

However, we also show that these impacts are heterogeneous. In particular, we find that CLTS is more successful at triggering households to construct toilets in smaller communities. No significant impacts are found in larger, more urban settlements. This reinforces longstanding anecdotal evidence from CLTS practitioners.

The findings are partly driven by the fact that not all stages of the CLTS approach could be successfully completed in many of the more urban communities. Programme monitoring data reveal that the implementing staff could only complete all stages of the process in 70% of the more urban communities, compared with 95% of smaller ones.

While the success of triggering is likely to be driven by a multitude of factors, only one of which will be the urban nature of the community, we show in this brief that population size is a crucial proxy variable. The significant correlation between settlement size and failed triggering remains even when accounting for a full host of village-level information. Throughout the present brief we will refer to small communities consisting of one or more villages or quarters as a "settlement" and to the smaller units contained within them as villages or communities. Villages within each settlement are small and might share markets with each other, but are defined as units with independent local leaders we call "village chiefs".

Based on these findings, we suggest that population size can be used to improve CLTS targeting in Nigeria, and possibly other countries, freeing up scarce resources to identify and test complementary sanitation approaches, suitable for more urbanised communities.[1]

2 The STS Nigeria project and CLTS impacts

This policy brief benefits from data collected as part of the STS project in Nigeria -a sanitation project funded by the Bill and Melinda Gates Foundation and implemented by WaterAid UK and WaterAid Nigeria in collaboration with local government areas (LGAs) and local NGOs. The STS project encompasses an impact evaluation of two interventions aimed at improving sanitation practices and incentivising higher levels of private investment in toilets, in communities of nine LGAs, in the states of Ekiti and Enugu.[2] The two interventions implemented are CLTS and Sanitation Marketing (SanMark).[3] In the first stage of the project, which started in January 2015, CLTS was implemented in a random subset of communities not previously triggered.[4] The second stage of the project, to be implemented in 2016, will introduce SanMark in a systematic way to these CLTS intervention areas as well as other surrounding communities. A rich data set with information on communities, households and suppliers was collected at baseline before January 2015. We will use these data, especially community-level data, further below in our analysis. In this section, we want to focus on outcome data we collected as part of a rapid assessment survey in November/December 2015.

The primary purpose of this rapid assessment data collection round was to establish the effectiveness of the CLTS intervention one year after programme implementation

[1]These results could also add to the evidence from monitoring exercises and qualitative studies conducted over the past 10 years in Nigeria that have highlighted CLTS's potential as well as its limitations, offering possible solutions and improvements to the approach. These include exploring prestige as a motive (moving away from shame and disgust used more successfully in Asia, see Evans et al., 2009), addressing cultural and religious beliefs, improving facilitation and addressing the challenges of implementing in 'urbanised' communities (Burton, 2007).

[2]The LGAs are Ekiti South West, Ido Osi, Ikole, Irepodun Ifelodun and Moba in Ekiti and Igbo-Eze North, Igbo-Eze South, Nkanu East and Udenu in Enugu.

[3]SanMark aims to improve awareness of the private benefits and costs of better sanitation and hygiene, skills and technical knowledge, and the private supply of suitable (better-quality) products at an affordable price. On the demand side, it uses commercial and social marketing techniques to increase households' private investment by promoting latrine ownership and usage as an aspirational good and reinforcing private benefits of improved sanitation. On the supply side, it uses market development and market facilitation.

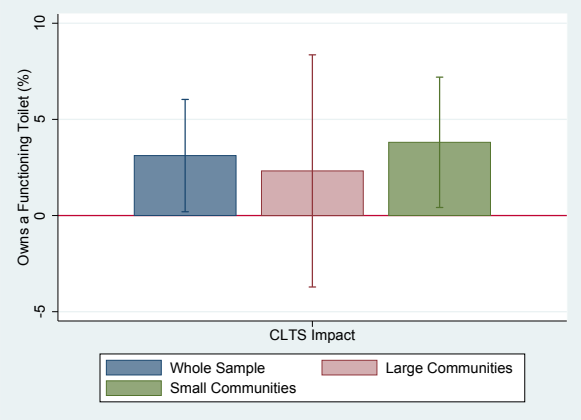
[4]Note that by communities we mean the unit at which a team of CLTS practitioners implement triggering events. In the context of Enugu, communities are stand-alone villages or villages that belong to larger settlements, which are actually administrative units denominated autonomous communities (ACs). In the context of Ekiti, communities could be stand-alone villages but more commonly are quarters (neighbourhoods) within larger settlements, which are usually small towns and more urban than the equivalent AC in Enugu.

started.[5] The main finding was that the CLTS intervention achieved its main objective of triggering sanitation uptake in the targeted communities. We find that, on average, sanitation uptake has increased by 3 percentage points in the two states. This increase due to the intervention is on top of an overall increase in sanitation coverage in the intervention areas. The percentage of households that own a functioning latrine increased from 35% in Enugu and 38% in Ekiti at the end of 2014, to 40% in Enugu and 45% in Ekiti one year later, in November/December 2015.

While 3 percentage points might seem small at first sight, it is worth remembering Figure 1, which showed how little (or rather no) improvement was made over a 20-year period. Viewed in this larger context, the positive impact found, i.e. that sanitation coverage increased by on average 3 percentage points within less than a year, can be considered a considerable achievement.

However, this average of 3 percentage points hides some heterogeneity. Specifically of interest in the context of this brief is the heterogeneity of CLTS impacts by the population of the triggered community. We consider here a threshold of more than 20,000 inhabitants in the settlement, in line with the criterion used by the Demographic and Health Survey (DHS) to distinguish between urban and rural areas.

Figure 2: CLTS impacts according to community size



Note: Large (and small) communities are defined as those that belong to settlements with population above (or below) 20,000. This is isn accordance with, for example, the criterion used by the Demographic and Health Survey (DHS). Brackets illustrate 90% confidence intervals. Impacts estimated by ordinary least squares (OLS) including individual and household controls, as well as LGA fixed effects. Standard errors are clustered at the triggerable unit level.
Source: Household Baseline and Rapid Assessment Surveys.

Figure 2 shows the main findings: the intervention had no statistically significant

[5]Details can be found in Abramovsky et al., 2016.

impact on communities above this population threshold ('large communities', red bar),[6] whereas it was successful in getting 4% of the population in communities with 20,000 inhabitants or less to build toilets ('small communities', green bar).

We will show in the next section that these findings are at least partly driven by unsuccessful implementation of CLTS activities. We will show that the population threshold is a significant predictor of successful triggering, even when accounting for a host of other village-level information. This suggests that this easily obtainable information can, and should, be used to better target limited CLTS resources.

3 CLTS implementation

During CLTS implementation in early 2015, the local implementing partners faced serious obstacles in achieving the necessary level of village mobilisation in 18 out of 84 study villages in Ekiti state. In contrast, all 108 study villages in Enugu were successfully triggered.

CLTS implementation can be broken down into four distinct phases, described briefly as follows:

1. **Planning:** Organising the next two phases (mobilisation and triggering) is a desk-based activity that can take about 4 hours.

2. **Mobilisation:** The CLTS triggering team visits communities to be triggered and talk with community leaders. The aim of this visit is to engage the leaders and agree on a date and time for triggering activities to take place. This date should be chosen so as to be suitable for the majority of community members to attend. For large communities, a single date will be set for the triggering of mutliple clusters concurrently or consecutively. Sometimes it requires two to three visits to set a date for triggering. Each visit takes between one and two hours, excluding travel time.

3. **Triggering**: On the agreed date no fewer than four staff (comprised of LGA water, sanitation and hygiene (WASH) unit staff and sometimes WaterAid Nigeria staff) go to the community at the agreed location. If the team sees that not enough people have turned up at the set time, they try to gather more people, with the support of community leaders, going to people's houses or busy areas. Between 45 minutes and an hour is spent trying to gather more people. If attempts to gather people fail (i.e. the team agrees that an insufficient proportion of the community

[6]The estimated CLTS impact in this case is 2% but, as seen in Figure 2, it is not statistically different from 0.

are present) after an hour, then the triggering is cancelled. The team apologises to the people who have turned up, and asks them to mobilise more people next time. This means that at least four people spend at least 4 hours (2 hours in the community and 2 hours travelling to the community) in this phase.

4. **Follow up:** Regular community monitoring visits take place to assess progress towards open defecation free (ODF) status, movement up the sanitation ladder and use of facilities. The suggestion is that this happens on a weekly basis for each community; each visit is estimated to take around 2 hours.

In the study communities where CLTS triggering failed, the team was always able to talk to and engage the community leader as part of phase 2. However, phase 3, reliant on the mobilisation of a sufficient number of community members, failed in these 18 communities, preventing the delivery of all subsequent activities. There are several reasons that are generally identified as causes of communities being difficult to mobilise for CLTS activities, for example, limited attendance at the triggering due to a busy harvest period, a community leader with little mobilisation power, or seasonal migration. However, in the context of these 18 study communities, the reasons stated by programme staff were all phrased around the community's 'more urban nature'.

From a policy perspective, these failed attempts at community mobilisation for triggering mean a waste of limited resources. Moreover, we know from the above that even if field staff did manage to go through all stages, these efforts did not have any significant impact on toilet construction. It is therefore important to assess whether this waste could be avoided by selecting CLTS intervention communities in a more targeted manner. Improved intervention targeting could be achieved by identifying reliable indicators of where CLTS is and is not feasible.

In what follows, we explore how to best predict CLTS feasibility using settlement or community-level indicators. By CLTS feasibility, we mean the successful move of a community from phase 2 to 3. We start by describing the characteristics of the communities that were targeted for CLTS implementation, split by whether they could be triggered (CLTS feasible) or not (CLTS not feasible) in the next subsection.

3.1 Characteristics of study communities targeted for CLTS implementation

For our analysis in this section, we term our outcome of interest - whether a community could be triggered or not - 'CLTS feasibility'. The variable takes the value 1 if mobilisation and triggering, including all subsequent activities, took place in the community;

the value is 0 otherwise. We are interested in whether this variable is significantly associated with certain community-level characteristics, particularly its size, and whether this association is still significant when accounting for other community characteristics.

We start by looking at simple descriptive statistics of community population from census data and infrastructure data from the STS survey, split by whether CLTS triggering was feasible or not. One caveat to note in our analysis is that the intervention is implemented at the community level[7] whereas the latest Nigerian census data (2006) provide information for enumeration areas, which we then aggregated to the settlement level - comprising one or more communities.[8], This has the obvious problem that conditions for feasibility may vary across communities within the same settlement. In other words, we are relating the success of triggering in a single community with the population of the settlement that this community belongs to. This might be relevant for CLTS feasibility because even small communities might be part of an urbanised settlement. This has to be kept in mind when interpreting our results.[9]

Table 1 shows characteristics for communities where triggering was implemented successfully (first column), and for those where it was not (second column). The Table provides some interesting insight into the type of communities that proved unfeasible for CLTS triggering.

The descriptive statistics presented in the top panel suggest that targeted communities in large settlements, i.e. with a population of more than 20,000, are significantly less likely to be triggerable.[10] Of the 18 communities that could not be triggered two-thirds (12 out of 18) are in large settlements. Looking at the whole sample, 31% of all communities in large settlements could not be triggered, compared with 4% of all communities in small settlements.

Another noteworthy difference between feasible and unfeasible settlements is the higher presence of hospitals in CLTS non-feasible communities as shown in the next panel in Table 1. This indicator can be interpreted as a proxy measure of a more developed, urbanised area. The descriptive statistics suggest that the availability of a

[7]Remember that by communities we mean the unit at which a team of CLTS practitioners implement one triggering event.

[8]This is an autonomous community in Enugu and a small town in Ekiti. This level of disaggregation is available in other developing countries where CLTS has been carried out, such as India and Malawi. In fact in some of these countries there is census information at the community level.

[9]An additional caveat is that the Nigerian 2006 census data have been under heavy scrutiny by national and international organisations due to allegations of inflated figures. These problems seem to be more related to the northern states of Nigeria, however, as discussed in The Economist (2015) and Maja-Pearce and Whitehead (2014).

[10]In a separate exercise, discussed in the appendix, we tested the predictive power of settlement population in various forms and identified this cut-off of 20,000 people as the most relevant. Interestingly, this identified threshold coincides with the criterion used by the Demographic and Health Survey to distinguish between 'urban' and 'rural' areas in Nigeria.

Table 1: Summary statistics by CLTS feasibility - sample of targeted communities

	CLTS Feasible[c]	CLTS Not Feasible[c]
Settlement Population[a]		
Whole sample (%)	90.63	9.38
Enugu (#)	107	0
Ekiti (#)	64	18
In settlements >20,000 (%)	69.23	30.77
Enugu (#)	5	0
Ekiti (#)	22	12
In settlements <20,000 (%)	96.00	4.00
Enugu (#)	102	0
Ekiti (#)	42	6
Community Infrastructure[b]		
Has a hospital (%)	5.30	44.44
Has a primary school (%)	59.20	50.00
Has a secondary school (%)	35.63	38.89
Has graded internal roads (%)	40.79	55.56
Observations	174	18

Note: CLTS feasibility feedback from WaterAid Nigeria.
Source: a) 2006 Nigerian census. b) Village Baseline Survey, from STS Nigeria. c) Monitoring data from STS Nigeria.

hospital in the community is highly indicative of mobilisation for CLTS being likely to fail. The same is true to some extent for the availability of a secondary school and also if the internal roads are graded.

3.2 Using publicly available information on communities to improve CLTS targeting

As a next step, we want to see how these variables correlate with CLTS feasibility, how much predictive power settlement size has and whether combining the settlement size with other community characteristics may change the power to predict CLTS feasibility: does other information reduce or reinforce the predictive power of population size and triggerability? We answer these questions through a multiple regression analysis, which is a statistical method for studying the relationship between a single dependent variable (an indicator variable called 'CLTS feasibility' in our case) and several independent variables (those laid out in Table 1).

Results of this analysis are shown in Table 2. The first two columns look at all communities in both Enugu and Ekiti. The first column shows the statistical relationship between our indicator of large or small settlement and CLTS feasibility. The negative coefficient of 0.25 on our population size variable indicates that communities in settlements that have a population of more than 20,000 are 25 percentage points less likely to be triggered successfully. This relationship is statistically significant at the 1% significance level, as indicated by the three stars. It is worth stressing that we talk here about a statistically significant correlation between triggerability and population size, not causation.

The second column includes additional information about the community's infrastructure: an indicator variable that takes the value 1 if the community has a hospital and similar indicators for whether the community has at least one primary school, at least one secondary school and graded internal roads. As we said in the previous section, we obtain this information from the impact evaluation data, but these variables would usually be available through national surveys. Although we expect these variables to be closely associated with population size, they might also indicate a higher (or lower) pull of resources from the central administration or, more generally, a superior capacity to articulate demands and engage in collective projects. On the other hand, they might simply be more precise indicators of 'urbanity', so the sign of the coefficients is a priori uncertain. Interestingly, we find that, conditional on these variables, population size is still significantly negatively associated with CLTS feasibility, although this association is smaller in absolute terms. We also find that, conditional on settlement size, having

a hospital is negatively associated with CLTS feasibility, consistent with the results in Table 1, but the presence of a secondary school or of graded internal roads is not important conditional on size and all the other infrastructure variables.

The last two columns repeat this analysis, concentrating on Ekiti only given that most non-feasibile CLTS communities were concentrated in this state. Column 4 shows some different results for Ekiti in terms of the infrastructure variables that are relevant, conditional on size, for targeting CLTS. Having a hospital is no longer a relevant variable in Ekiti. Interestingly, we find that, conditional on settlement size, having a primary school and graded internal roads are both positively associated with a targeted community being successfully triggered. This shows the importance of conducting multiple regression analysis: in Table 1, CLTS-feasible communities do not appear to be more likely to have graded internal roads than communities where CLTS is not feasible; but conditional on settlement size, they seem to be an important characteristic associated with CLTS feasibility. This analysis does not shed further light on the mechanisms behind these findings and should be further investigated - for example, it could be the case that, given the size of a community, communities with a primary school and graded internal roads are more cohesive and this facilitates CLTS implementation.

Table 2: Community-level characteristics (probit)

dep. var.: CLTS feasibility	All		Ekiti (exc Ekiti South West)	
	(1)	(2)	(3)	(4)
In settlement >20,000	-0.25***	-0.14**	-0.35***	-0.32**
	(0.07)	(0.07)	(0.11)	(0.13)
Has a hospital		-0.30**		-0.24
		(0.14)		(0.16)
Has a primary school		0.07		0.50***
		(0.05)		(0.18)
Has a secondary school		-0.04		-0.19
		(0.06)		(0.15)
Has graded internal roads		-0.01		0.35**
		(0.04)		(0.16)
N	192	169	73	73
Correctly predicted (%)	90.63	91.12	75.34	84.93

Note: Estimates expressed in terms of marginal effects. Standard errors in parentheses. Regressors are all dummy variables (1 or 0) indicating whether the community is in a settlement with a population above 20,000 people, and whether it has a hospital, a primary school, a secondary school and graded internal roads. Sample includes CLTS communities only (no control communities). Stars indicate statistically significant differences: *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The bottom of the Table provides analysis information for each regression on its

predictive power, i.e. what percentage of targeted communities where CLTS was actually feasible can be correctly predicted to be feasible with each model. Column 1 suggests that, by pooling data from Ekiti and Enugu together, we can predict success with almost 91% accuracy using only the size of the settlement. Adding infrastructure information does not improve the predictive power by much (column 2). When looking at Ekiti only, the predicitive power of using only settlement size (column 3) falls to 75%, and using additional information on infrastructure increases this by 10 percentage points (column 4).

Our main finding from this analysis is that CLTS feasibility drops sharply and significantly in communities that are part of settlements with a population of more than 20,000. This statistical relationship remains when accounting for other information. Furthermore in Ekiti using additional information on community infrastructure helps to improve CLTS targeting.

3.3 Does survey data further improve CLTS targeting?

In the analysis so far, we have constrained ourselves to using information that is typically publicly available. In Table 3, we add more information from specific community data collected as part of the impact evaluation. We analyse data that the literature and sector experts suggest to be supportive factors for successful triggering, but that would not be typically readily available from secondary data.

We construct a community associativity score, using answers to questions about how often social, political and religious meetings take place in each community.[11] High scores are indicative of frequent community gatherings and an active community life, which we intend to use as a proxy for the 'existence of active groups within the community' cited as a favourable trait for CLTS (Kar et al., 2008). We also construct an indicator of the level of asset inequality of each community, constructed as in McKenzie, 2005. This relative index compares the level of asset ownership inequality in a community with that in the whole sample. High values mean that the community has a more unequal distribution of asset wealth than the remaining communities, and vice versa.[12] Finally, we consider whether previous exposure to sanitation-related activities affect CLTS feasibility, over and above other information included in the analysis. Previous exposure to sanitation interventions is typically cited as a potential drawback for CLTS

[11]The community associativity score is the first coordinate resulting from a principal component analysis carried out using the answers to questions about how often religious, political, social or other kind of public meetings/assemblies take place in the community.

[12]The relative asset wealth index is also the first coordinate of a principal component analysis carried out this time on a series of 42 questions asking households whether they own a range of transport vehicles, farm animals, furniture and other durables.

feasibility by sector experts. Column 1 of Table 3 should be compared with column 2 of Table 2; column 2 of Table 3 should be compared with column 4 of Table 2.

Table 3: Additional Community Level Characteristics (probit)

dep. var.: CLTS feasibility	All	Ekiti (exc Ekiti South West)
	(1)	(2)
In settlement >20,000	-0.15**	-0.34**
	(0.07)	(0.14)
Has a hospital	-0.27*	-0.22
	(0.14)	(0.18)
Has a primary school	0.07	0.56***
	(0.05)	(0.19)
Has a secondary school	-0.04	-0.26
	(0.05)	(0.17)
Has graded internal roads	0.01	0.37**
	(0.04)	(0.18)
Community associativity score	0.03**	-0.06
	(0.02)	(0.08)
Asset inequality index	0.09	0.23
	(0.07)	(0.27)
Community had CLTS activities	-0.01	-0.19
	(0.05)	(0.23)
N	166	71
Correctly predicted (%)	90.36	87.32

Note: Estimates expressed in terms of marginal effects. Standard errors in parentheses. Associativity score built by principal component analysis (PCA) using questions on social, political and religious activities. Asset inequality index built by PCA using answers to asset ownership, following McKenzie (2005). Sample includes CLTS communities only (no control communities). Stars indicate statistically significant differences: *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

We find that none of these variables is statistically related to CLTS feasibility, conditional on the settlement's population and having a hospital, primary school, secondary school or graded internal roads. Hence, adding this survey information does not help in improving the predictive power of CLTS feasibility in a significant way. This suggests that the targeting of resources for triggering activities can be significantly improved without additional, often expensive, data collection activities.

4 Implications for Nigeria and beyond

Nigeria is facing a monstrous task to eliminate open defecation by 2030. Given current statistics, 25% of the population are openly defecating and a further 22% use unimproved sanitation according to the JMP definition[13] - together around 85 million people need to be reached in the next 15 years, not taking population growth into account.

The numbers are staggering and call for a significant allocation of resources, which need to be used as efficiently as possible. The current approach adopted by the Nigerian government is known to be most effective in small and homogeneous communities. However a large proportion of these 85 million people live in semi-urban, small towns and newly urbanising areas, likely requiring an alternative approach.

In this policy brief, we present data from a CLTS intervention in two states of Nigeria, Enugu and Ekiti, showing that semi-urban areas, with populations greater than 20,000 people, are challenging environments for mobilising for CLTS activities, and in fact, if mobilised, the intervention is often ineffective. These findings confirm years of anecdotal evidence. Failed attempts imply a loss of resources that could have been better channelled into more promising areas or new complementary approaches.

We demonstrate that publicly available population data could be used to prioritise suitable communities for CLTS programmes. Interestingly, more specific information, such as the degree to which the community interacts with and engages its members, which was collected as part of the impact evaluation study, does not add any further improvement. We further show that the effort of going through all stages of the triggering process, at least in its current form, is not leading to significant changes in the more urbanised communities. Our impact analysis results presented in Section 2 show that triggering in large communities did not lead to significant improvements in the sanitation situation in the study communities. In small communities, on the other hand, significant increases in toilet owership were achieved.

Given the great diversity in Nigeria, it is important to test and adapt this model in other states and begin to build an evidence base that could significantly improve Nigeria's approach to ending open defecation. Our analysis shows that, in the context of Ekiti and Enugu, the government, donors and NGOs could use population data to map CLTS programmes to high and low-priority communities. This mapping would also help in clearly identifying areas that will require alternative approaches to achieve universal access to sanitation.

[13]From UNICEF and WHO (2012). In that report, an improved sanitation facility is defined as 'one that hygienically separates human excreta from human contact' and these include flush toilet, piped sewer system, septic tank, flush/pour flush to pit latrine, ventilated improved pit latrine, pit latrine with slab, and composting toilet.

References

Abramovsky, L., Augsburg, B., and Oteiza, F. (2016). Rapid assessment report: Sustainable total sanitation - nigeria. Technical report, IFS. 5

Burton, S. (2007). Community led total sanitation (clts): An evaluation of wateraid's clts programme in nigeria. Technical report, WaterAid. 1

Chambers, R. and Bongartz, P. (2009). Beyond subsidies: triggering a revolution in rural sanitation. (document)

Evans, B., Colin, J., Jones, H., and Robinson, A. (2009). Sustainability and equity aspects of total sanitation programmes: A study of recent wateraid-supported programmes in three countries. Technical report, WaterAid. 1

Kar, K., Chambers, R., and Plan, U. (2008). *Handbook on community-led total sanitation*. Plan UK London. (document), 3.3

Maja-Pearce, A. and Whitehead, E. (2014). Factsheet nigerias population figures. Technical report, Africa Check. 9

McKenzie, D. J. (2005). Measuring inequality with asset indicators. *Journal of Population Economics*, 18(2):229–260. 3.3

UNICEF and WHO (2012). Improved and unimproved water sources and sanitation facilities. 13

UNICEF and WHO (2015). Progress on sanitation and drinking water 2015 update and mdg assessment. Technical report, UNICEF and World Health Organization. (document), 1

WHO (2015). Sanitation fact sheet n 392. Technical report, WHO. (document)

Appendix - Threshold identification

We carried out a series of regressions testing the predictive power of settlement population in various forms. Specifically, our aim was to test whether there is a 'threshold' population size above which CLTS activities become unfeasible. We built three binary variables for intervals of 10,000 inhabitants (e.g. the first variable takes the value 1 if the settlement has 10,000 or more people, and 0 otherwise). This range was picked because 10,000 is the 25th percentile of observed settlement population size in our sample, 20,000 is close to the 50th and 30,000 to the 75th percentile. Also, 20,000 inhabitants is the threshold used in the Demographic and Health Survey (DHS) to distinguish between rural and urban communities. A first specification was tried using a dummy variable indicating whether the community belonged to a settlement with 10,000 or more people, a second one with a variable indicating settlements larger than 20,000 people, and again with 30,000. All specifications included LGA fixed effects to control for unobserved differences in feasibility at the LGA level. The results for these tests are shown in models 1 to 3 of Table 4. A second possibility is that the effect of population is continuous, so we introduced population as a linear and quadratic term. Results for this can be seen in models 4 and 5 of the same table.[14]

The first row below the coefficients presents the number of observations (i.e. communities) included in the analysis and the second shows the log likelihood coefficient. Higher likelihood coefficients indicate a better model fit. From this row, we see that the 20,000 inhabitants threshold (model 2) performs better than any of the other alternatives.

The signs of the coefficients confirm the evidence from the field: communities that are part of larger settlements are less likely to be CLTS feasible.

Figure 3 plots the conditional probabilities of CLTS feasibility for different settlement population sizes.[15] It suggests a steady drop in the probability of feasibility as settlement population increases. Nonetheless, we should take these results with a grain of salt: our best model for predicting unfeasibility predicted two thirds of the communities correctly. This leaves one third of the variation unexplained. To get a better understanding of this unexplained variation, we incorporated other community-level variables from primary data collected as part of the project evaluation, to see whether we could improve our predictions. We found that more detailed community-level data is not necessarily useful in determining CLTS feasibility. Since this information will

[14] Our unit of observation is communities within settlements, which are usually small towns in Ekiti.

[15] These are the conditional marginal probabilities estimated from a probit regression using linear and quadratic population terms and including LGA fixed effects. The graph reads straightforwardly: the expected probability of CLTS feasibility for the average community of 5,000 members is over 80%, while this figure falls to below 50% for communities in settlements of more than 35,000 people.

Table 4: Population Alternatives - Treatment Communities (probit)

	Threshold Dummies			Continuous	
dep. var.: CLTS feasibility	10,000	20,000	30,000	Linear	Quad
Threshold	-0.79**	-1.18***	-0.04		
	(0.33)	(0.41)	(0.80)		
Population (in thousands)				-0.04*	-0.08
				(0.02)	(0.06)
Population sq.					0.00
					(0.00)
N	192	192	192	189	189
Log likelihood	-55.24	-50.32	-59.73	-53.01	-52.08

Notes: estimates expressed in terms of marginal effects. Standard errors in parentheses. Stars indicate statistically significant differences: *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

generally not be available from administrative data, and therefore not available to policy makers, we omit those results. The quality of our predictions, however, does not improve significantly by adding these additional regressors.

Figure 3: Conditional Probabilities of CLTS Feasibility by Settlement Size