Pre-Analysis Plan for Assessment of Learning Outcomes and Social Effects of Community-Based Education in Afghanistan

Dana Burde, Joel A. Middleton and Cyrus Samii

June 2016

Contents

1 Introduction

Experimental evidence suggests that community-based schools are effective in closing the gender gap in school attendance and improving language and math scores among girls and boys in villages in Afghanistan where access to education is otherwise limited (Burde and Linden 2013). While donor countries and NGOs alike have invested heavily in these schools in Afghanistan with the intention of handing over their administration to Afghanistan's Ministry of Education (MoE), the long-term provision of these schools is in question.

The Assessment of Learning Outcomes and Social Effects (ALSE) is a mixed-method, randomized controlled trial that aims to expand and deepen understanding of the best ways to provision community-based education that is both effective *and* sustainable. The program being studied is Community-Based Education Enhancement Program (CBEEP), an activity funded by Canada's Department of Foreign Affairs, Trade, and Development (CDFATD). The program establishes community-based schools (CBS) in villages lacking in educational access (>2km from closest primary school). Evidence produced by this comprehensive impact evaluation will offer critical insights into the institutionalization of access to schooling.

2 Methods

2.1 Communities studied

Our initial sample of eligible villages included 195 villages arranged in 156 community clusters in the Provinces of Kapisa, Parwan, Bamiyan, Daykundi, Ghor and Herat.

Villages were selected on the basis of needs from within the geographic regions that the NGOs, CARE and CRS, worked. The NGOs identified candidate villages in conjunction with the District Education Directors and Provincial Education Directors. Villages were considered eligible for inclusion if the nearest elementary school was more than 2 km away.

Villages were clustered into communities on the basis of judgement by the NGOs to ensure equity between villages near one another in order to avoid stoking local rivalries or creating the perception of partiality of the NGOs.

The distribution of communities across the districts and provinces is given in Table 1.

Table 1: Provinces of Operation

NGO	Province	Number of communities
CARE	Kapisa	52
	Parwan	37
CRS	Bamian	13
	Dykundi	29
	Ghur	18
	Herat	7
Total		156

2.2 Treatment Assignments

The research design is depicted in Table 2. The main intervention being studied is the provision of community-based schools. 44 communities constituted the control group and the remaining 112 were divided equally into one of the 8 additional of treatment arms.

The eight treatment arms differed in terms of three components: 1) whether the community received additional enhancements; 2) whether teacher recruitment emphasized the importance of obtaining a qualified teacher or a teacher from within the community; and 3) whether the handover from NGO administration would be early (after 2 years of NGO administration) or late (after 3 years of NGO administration).

Numbers of communities included in each treatment arm are given in Table 2 below. Each of the program components is described in the sections that follow.

Table 2: Number of communities per treatment arm

School	Enhancements	Recruitment	Early Handover	Number of communities
No	N/A	N/A	N/A	44
Yes	Yes	Within	Early	14
Yes	Yes	Qualified	Early	14
Yes	Yes	Within	Late	14
Yes	Yes	Qualified	Late	14
Yes	No	Within	Early	14
Yes	No	Qualified	Early	14
Yes	No	Within	Late	14
Yes	No	Qualified	Late	14

2.2.1 Community Enhancements

Community enhancement activities were designed to boost community awareness and buy-in for educating children, especially girls. In 56 communities, CARE and CRS are implementing their standard activities to engage community members in children's education. This includes establishing school management committees (SMCs), facilitating links between the SMCs, other MoE outreach classes, MoE hub schools, village shuras, Community Development Committees, and other relevant stakeholders; support for social audits and other public accountability measures; and making grants for school improvement. In a different 56 communities, CARE and CRS are implementing activities to bolster community buy-in to education. These will include the dissemination of Qur'anic messages to support education and the establishment of community libraries and parent reading groups.

2.2.2 Teacher Recruitment

Where possible, the NGOs recruited teachers from within each target village who met the current MoE qualifications of grade 12 graduation. In villages where there were no accredited teachers, ALSE is studying one of two processes for recruiting teachers: (A) Teachers were recruited from within the village based on the level of their skills and personal capabilities. These teachers were provided with training on MoE curriculum as well as pedagogy. Fifty-six communities received the "recruit within" assignment. (B) Teachers were recruited from outside the community, either from a nearby village, the district center, or the provincial center. Teachers who possess credentials satisfying MoE standards (at least a grade 12 education but ideally graduate of a Teacher Training Center–which is equivalent of grade 14) were hired. Teachers were provided financial incentives (40% increase over the civil servant salary scale) to encourage teachers with MoE mandated credentials to live and work in remote communities. Fifty-six communities will receive the "recruit qualified" treatment.

2.2.3   Handover Schedule

To evaluate the sustainability of these different variations of CBE, schools in 56 communities will be handed over to MoE after two years of NGO administration provided they are handover elidgible. The MoE will either upgrade these to a primary school or continue to support them as an outreach class of the hub school, continuing to serve future school-age children. The MoE and CARE and CRS will follow the handover process outlined in the Government of Islamic Republic of Afghanistan's Policy Guidelines for CBE. The remaining schools opened in 2014 will be handed over to the MoE in 2018.[1]

2.2 Household selection

A team of two enumerators enumerated 70 households each village. In speaking to the village head, enumerators asked the village head to describe the boundaries of the village and to identify the location of the biggest/main mosque in the village. This main mosque will be used as the starting point for enumeration. If there is no mosque, enumerators should ask where the villagers gather to pray, and that building should be used as the enumeration starting point.

Enumerators should take a GPS-tagged photo of the mosque or building that served as the enumeration starting point, standing directly in front of the door of the mosque. Enumerators should begin enumerating by walking away from the mosque on a road/path in a pre-assigned random direction written in the sampling plan (north, south, east, and west). If there is no road in the assigned direction, enumerators should go in the next direction clockwise from the direction assigned. Enumerators walked down the assigned road, counting all houses on the **right** side of the road by writing the number on or near the door of the dwelling. If it is unclear if a structure contains a house or has some other use (school, shop, etc.), the enumerator must knock on the door and talk to someone to determine if there is a household living in the structure.

If the enumerators arrive at the end of one road/path, they should turn right onto the next road and continue enumerating all houses on the right. If there is no right turn, they should turn left instead and continue enumerating all houses on the right side of the road. If the road/path ends and there is nowhere else to turn, they should turn around and continue enumerating the other side of the road/path, which will now be the right-hand side.

Once the enumerators enumerated the first 20 households, the enumerators paused and give the first two pages of the enumeration list to the supervisor so that he can start assigning households for the interviewers to contact. After that, the enumerators should pick up where they left off and continue enumerating 50 more households until they have enumerated 70 total households. If there are fewer than 70 households in the village, enumerators should continue until they have enumerated every household in the village.

The first contacted house will be randomly pre-assigned in the sampling plan as either the first or the second house on the Household Enumeration List. Interviewing teams began at the assigned

---

[1] Note that lack of cooperation from the MoE raises questions about whether we will be able to implement this manipulation. A revised research design may be required.

first contacted house and then survey every other house on the Household Enumeration List (if starting with the first house, this would be the odd houses; if starting with the second house, this would be the even numbered houses).

The interviewing team should take a GPS-tagged photo of every contacted house standing directly in front of the house's door. The enumeration ID, which was written on the house door by the enumeration team, should be visible in the photo. GPS coordinates embedded in the photo will also be written on the contact sheet for the house.

If a house refuses to participate or there is a noncontact, it should be replaced with the next unsampled house in the enumeration list the enumeration ID for the replacement house will equal 1 + the enumeration ID of the house that was not interviewed. For example, if an interviewing team is assigned to houses 7, 9, and 11 but house 9 is not interviewed, it would be replaced with house 10. If house 11 is not interviewed, it would be replaced with house 12.

If the interviewing team is sampling even numbered houses and house 70 refuses or is not contacted, this house should be replaced with house #1 on the enumeration list, since only 70 houses were enumerated.

If surveyors knock on the door of a dwelling and find that multiple households live in the building, they will randomly select which household to request for an interview.
   i.   First, assign all households within the dwelling a number, beginning with 1.
   ii.   Each interviewing team will be given a bag with pieces of paper numbered 1-5. The interviewers should reach into the bag and randomly draw out a number. They should request to interview the household that they have assigned that number.
   iii. If the number pulled from the bag is greater than the number of households sharing that dwelling, continue to draw from the bag until they pull out a number assigned to a household.
   iv.   If the selected household refuses the interview, the surveyors should move on to the next enumerated dwelling. They should <u>not</u> replace it with another household in the same dwelling.

If there are more than 35 but fewer than 70 households in a village, surveyors should interview every other household as described above. After this first draw of houses is completed, they should begin at the end of the list and interview every other household of the opposite number category until a total of 35 households are interviewed. For example, if there are 50 households in a village, and even households are assigned to be interviewed, surveyors should interview House 2, 4, 6 … up to 50. At that point, they will have conducted 25 interviews. To complete the remaining 10 interviews, surveyors should begin at House 49 and go down the list to House 47, 45, 43, etc.

If there are fewer than 35 houses in a village, surveyors should interview all houses in the village.

5

2.3 Statistical Power

The minimal detectable effect will depend on the ICC of the particular outcome variables in question. We present an analysis for a range of possible values of the ICC below. The analysis assumes 35 interviews from each of the 156 communities broken into treatments in the above-given counts. Power is 0.8, and alpha is 0.95, 2-tailed. To be conservative computations are done assuming no covariate adjustment.

Table 3: Gives the MDE in terms of standard deviations of the outcome measure for different ICC values. Assumptions: Power is 0.8, alpha =0.05, 2-tailed, control and treatment potential outcomes have equal variance. Estimates are in terms of standard deviations of the control potential outcomes.

Table 3: Power Analysis

MDE	ICC			
	0.0	**0.1**	**0.3**	**0.7**
Treatment vs. control	0.084	0.177	0.282	0.419
Variation vs. variation	0.089	0.188	0.299	0.445

3 Empirical Analysis

3.1 Outcomes, Indexes and Omnibus Tests

Outcomes of interest are listed in Table 4 below. Survey items are grouped at the level of the indicator. Survey items within an indicator will be combined to form indexes by first rescaling each item to range from 0-1. For example, a 4-point likert satisfaction scale would be rescaled such that Highly satisfied =1, Satisfied=.667, Dissatisfied = 0.333 and Highly dissatisfied=0. Once all items are rescaled they will be summed and standardized such that within the control group the mean of the index is 0 and standard deviation is 1. Scales will usually be constructed such that the hypothesized effect of school provision is positive. The treatments that we hypothesize will effect each indicator are marked in the left-hand columns of Table 4.

Indicators (indexes) are grouped into 11 Outcome Themes. Within each outcome theme the Benjamini–Hochberg procedure will be used to adjust for multiple comparisons and constrain the false discovery rate at 0.05. Each of the three treatments (school provision, community enhancements and teacher recruitment) will be dealt with separately.

Omnibus tests of significance within Outcome Themes will average the t-statistics from each indicator-level test. P-value will be computed by looking at the proportion of t-statistics in the rerandomization distribution that are larger than the observed t-statistic. An effect on an indicator will be considered significant if both the omnibus test and the (Benjamin-Hochberg adjusted) test for the indicator are significant.

For student-level outcomes, in addition to an overall treatment effect estimates, a model will be estimated interacting student gender with the treatment indicators. The interaction between treatment and gender will be tested.

3.2 Statistical Models

Statistical models will be fit using weighted least squares, where the weight is the inverse probability of being included in the treatment condition. The weights for each case will be computed:

$$\text{final weight in village } i = \text{number of households in village } i$$
$$/ (\text{village } i \text{ assignment probability}$$
$$* \text{ number households surveyed in village } i)$$

The probabilities of village assignment to treatment was computed by generating 100,000 possible designs using the original rerandomization method and computing the proportion of times each unit was assigned to each treatment arm. In spite of using a rerandomization design to balance covariate values, the assignment probabilities varied little across the communities. For example, the probability of being assigned to the control group estimated from the 100,000 rerandomizations varied from about .1788 to .1810 for CARE communities and .1770 to .1808 for CRS communities.

Since the handover variation will not yet been implemented in first-wave analysis, the eight (non-control) treatment arms will be collapsed down into four, collapsing over the early/late handover distinction. For the regression specification outcomes of interest will be regressed on four indicators for treatment arms 1-4 (listed in Table 5). The estimated effects in the treatment arms will be combined in various ways to estimate quantities of interest. The quantities of interest are:

- School effect: the average marginal causal effect (AMCE) of having a school, marginalizing over the enhancement variation and the teacher qualification variation (0.25*arm1+0.25*arm2+0.25*arm3+0.25*arm4). One-sided tests.
- Teacher qualification effect: the AMCE of emphasizing teacher qualifications, marginalizing over community enhancement status (0.5*arm2+0.5*arm4-0. 5*arm1-0. 5*arm3). Two sided tests.
- Community enhancement effect: the AMCE of the community enhancements, marginalizing over the teacher recruitment conditions (0.5*arm1+0.5*arm2-0.5*arm3-0.5*arm4). One sided tests.

Models will be run without covariates and also with two sets of covariates. Covariates are listed in Table 6. The first set of covariates (cov1) was chosen to mirror the covariates used in Burde and Linden (2014). The second set (cov2) includes the cov1 covariates and an extended set of additional items that were found to correlate with educational outcomes in the baseline survey. Our cov2 specification is the specification from which we will derive our tests of significance.

P-values will be based on randomization inference, using 5,000 randomizations generated based on the original randomization method. The test statistic will be the t-statistic, the estimate divided by the estimated standard error, where the estimated standard error is the robust-clustered standard error from the WLS regression. The reference distribution for the t-statistic will then be generated by computing it for each of the 5,000 randomizations. The p-value will be generated for upper and lower tails of the distribution as follows:

$$p_u = \frac{\sum_{i=1}^{5,000} I(|t| \geq t_i)}{5,000}$$

and

$$p_l = \frac{\sum_{i=1}^{5,000} I(-|t| \leq t_i)}{5,000}$$

where t_i is the t-statistic from the ith randomization and t is the value of the t-statistic from the actual randomization.

Confidence intervals will likewise be generated using the randomization distribution. Define $t^{\alpha/2}$ to be the $\left| \frac{5,000\alpha}{2} \right|^{th}$ ordered t-value in the randomization distribution of t. Similarly $t^{1-\alpha/2}$ is the $\left[5,000 \left(1 - \frac{\alpha}{2} \right) + 1 \right]^{th}$ order statistic. Then a 95% confidence interval will be constructed as

$$\{ \hat{\beta} + t^{\alpha/2} \widehat{SE}, \hat{\beta} + t^{1-\alpha/2} \widehat{SE} \}. \, [2]$$

---

[2] In the case of 5,000 rerandomizations and alpha = 0.05 we'll use the 125th and 4876th order statistic for the lower and upper t-values.

Table 4: Outcome Themes, Indicators and Associated Items

General	Enhancements	Recruitment	New Outcome Theme	Indicator	Data source	Midline Q#
X	X	X	Adults' trust in service-providing institutions	Legitimacy and trust in service providers: government	Adult survey	q41 (ac3); q55a, q55b, q56a, q56b; q57b; q59a-e (not
X	X	X	Adults' trust in service-providing institutions	Legitimacy and trust in service providers: NGOs	Adult survey	q55d; q56d; q57e; q59k; (q57e? Also in cell h20)
X	X	X	Adults' trust in service-providing institutions	Legitimacy and trust in service providers: schools/teachers	Adult survey	q57d
	X	X	Barriers to access to education	Acceptance of teacher (authority/legitimacy), and comfort with leaving children alone with teacher	Adult survey (parents 6-11 only) and CL survey	q70b/e / CL11b/e / CL23b/e (CL23 is about the second
	X	X	Barriers to access to education	Acceptance of teacher (authority/legitimacy), and comfort with leaving children alone with teacher	Community leader survey	CL12b CL24b (similar to q70 but asked to speculate on
X	X	X	Barriers to access to education	Safety concerns	Adult survey (parents 6-11 only)	q36a-h, q22c, q29c
X	X	X	Access to education	Children's attendance	Adult survey (roster 6-11)	q24d/q31d , q25a/q32a, q25d/q32d
	X	X	Access to education	Children's attendance	Teacher survey	q28, q29
X	X	X	Learning	test scores	learning assessments	reading index; math index
	X	X	Parent/community advocacy	Picking the teacher	Adult survey (parents 6-11 only)	q64
	X	X	Parent/community advocacy	Shura support	Teacher survey	q21a-l
	X		Parent/community advocacy	Frequency of parent meetings	Teacher survey	q18aa-bf
X			Parent/community advocacy	Participation in School Shura	Adult survey (parents 6-11 only)	q46; q47
	X	X	Parent/community advocacy	Participation in School Shura	Adult survey (parents 6-11 only) and CL survey	q60/CL1; q62/CL3 (and q46; q47)
X	X	X	Parent/community advocacy	Participation in School Shura	Community leader survey	CL29; CL30
	X	X	Parent/community advocacy	Community involvement in interacting with the classroom	Adult survey (parents 6-11 only) and CL survey	q65a-l and CL6a-l (same as q65a-i) also CL18a-l (about second classroom)
	X		Parent/community advocacy	Community involvement in takling to community leader	Community leader survey	CL13/CL25, CL14/CL26, CL15/CL27
	X	X	Parent/community advocacy	Frequency of parents' visits to school	Adult survey (parents 6-11 only)	q66; q67
	X	X	Parental assistance in learning	Frequency of parents' visits to school	Teacher survey	q19
	X		Parent/community capacity	understanding how CBS and MOE primary education system works (who pays?, resources, structure, authority)	Adult survey (parents 6-11 only)	q58aa (ac 99/98)
X	X	X	Parent/community capacity	Parents' confidence in decisions pertaining to children's education	Adult survey (parents 6-11 only)	q39; q40; q41 (ac2)
X	X	X	Parental assistance in learning	Parents engagement with kids' education by helping with homework, reading stories, and other activities in the home	Adult survey (parents 6-11 only)	q42; q43; q44 (count?)
X	X		Parental demand	Belief that modern education for girls/boys is good	Adult survey (parents 6-11 only)	q22a/b/d/e; q23; q29a/b/d/e; q30; q37b
X	X	X	Parental demand	Community willingness to provide material support to school and teacher	Adult survey (parents 6-11 only)	q45a-h (number of items?); q46; q47
	X	X	Parental demand	Community members providing material support to school and teacher, and in other ways to enhacing	Teacher survey	q16a-g
	X	X	Parental demand	Community members providing material support to school and teacher, and in other ways to enhacing	Community leader survey	CL28a-h (similar to q45a-h, but about the village)
X	X	X	Parent satisfaction	Satisfaction with education available for children	Adult survey (parents 6-11 only)	q38a-d
	X	X	Teacher capacity	Satisfaction with teacher's qualifications, ability	Adult survey (parents 6-11 only) and CL survey	q70a/c / CL23a/c (same as q70a/c above)
		X	Teacher capacity	Trainings that the teacher has received to lead CBE	Teacher survey	q17aa-ae (count?)
		X	Teacher capacity	Teacher education	Teacher survey	q5, q6
		X	Teacher capacity	Teacher experience	Teacher survey	q9c/d/e/f (total num years taught)
	X	X	Teacher motivation	Teacher effort	Adult survey (parents 6-11 only)	q68, q69, q70f
	X	X	Teacher motivation	Teacher absenteeism	Teacher survey	q27
	X	X	Teacher motivation	teacher turnover	Teacher survey	q10, q25
	X	X	Teacher motivation	job satisfaction	Teacher survey	q24a-k
	X	X	Teacher motivation	Timeliness of payment and adequacy of salary	Teacher survey	q14, q15

Table 5: Treatment Arms for Wave 2 Midline.

ARM	Enhancements	Recruitment	Number of communities
0	N/A	N/A	44
1	Yes	Within	28
2	Yes	Qualified	28
3	No	Within	28
4	No	Qualified	28

Table 6: Covariates

Variable name	Description	Notes	cov1	cov2
school_km	Distance to nearest formal school	top code (15)	x	x
ros_hhheadchild	Head of household's child (indicator)		x	x
ros_girl	Child is female (indicator)		x	x
ros_age	Child age		x	x
int_lang_pashto	Farsi/Pashto (indicator)		x	x
hh_eth_hazara	Ethnicity Hazara (indicator)		x	x
hh_eth_pashtun	Ethnicity Pashtun (indicator)		x	x
hh_eth_tajik	Ethnicity Tajik (indicator)		x	x
hhhead_age	Household head age	top code (80)	x	x
hhhead_schoolyears	Household head schooling (years)		x	x
hh_num	Number in household	top code (20)	x	x
hh_jeribs	Jeribs of land worked by household	top code (10)	x	x
hh_animal_sheep	Number of sheep	top code (15)	x	x
hhhead_job_farmer	Household head is farmer (indicator)		x	x
hhhead_job_laborer	Household head is laborer (indicator)			x
hhhead_job_military	Household head is in military (indicator)			x
hhhead_write	Household head can write (indicator)			x
hhhead_read	Household head can read (indicator)			x
hhhead_edu_mosque	Household head went to mosque school (indicator)		x	x
hhhead_edu_madrassa	Household head went to madrassa (indicator)			x
hhhead_edu_community	Household head went to CBS (indicator)			x
hhhead_edu_government	Household head went to gov. school (indicator)			x
hhhead_edu_university	Household head went to university (indicator)			x
hhhead_female	Household head is female (indicator)			x
hh_totalincome_2000less	Total household income is 2000 AF or less	contrast is "missing"		x
hh_totalincome_2001to5000	Total household income is 2001 to 5000 AF	contrast is "missing"		x
hh_totalincome_5001to10000	Total household income is 5001 to 10000 AF	contrast is "missing"		x
hh_totalincome_10001to15000	Total household income is 10001 to 15000 AF	contrast is "missing"		x
hh_totalincome_15001plus	Total household income is 15001 AF or more	contrast is "missing"		x
hhhead_shia	Household head is Shia			x
hhhead_sunni	Household head is Suni			x
hh_own_tvs	Household has TV (indicator)			x
hh_own_mobiles	Household has mobile phone (indicator)			x
hh_own_cars	Household has car (indicator)			x
hh_own_radios	Household has radio (indicator)			x
factorwealth	A factor score measuring wealth	top code (2)		x
hh_landown	Household owns land (indicator)			x
hh_children	Number of children in household	top code (10)		x