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Memo

Date:	December 14, 2017
To:	Saurav Dev Bhatta, Uttam Sharma and Alaka Holla, World Bank
From:	Elizabeth Spier, Principal Investigator
Re:	Sampling Frame for the Early Years Preschool Program Evaluation

This memo serves to describe the sampling frame that we propose for the Early Years Preschool Program (EYPP) evaluation that American Institutes for Research (AIR) is carrying out for the World Bank under the Strategic Impact Evaluation Fund (SIEF). In this document, "community" refers to the catchment area of a school identified for this study. We also provide up-to-date information regarding program uptake rates in the EYPP communities in 2017 (among children one year older than our study cohort) because low program uptake can compromise our ability to detect program effects on children who do participate.

School-Level Sampling

One hundred schools in the Meherpur district of Bangladesh are participating in this study. These schools were already selected and randomly assigned according to the Documentation of Randomization report that AIR provided to the World Bank in December of 2015. We randomly assigned 50 schools to the EYPP group and 50 schools to a business-as-usual control group. In the 50 EYPP schools, the program was first introduced in the beginning of 2017, so the first group of children has just completed the program (these children will not be included in the study). In six of the 50 treatment schools, the program was not offered in 2017, but will be starting in 2018.[1]

Student-Level Sampling

In this section, we describe (a) how children are typically selected for enrollment in the EYPP in the ordinary course of business (when no evaluation is taking place), (b) how we identified children in the sampled school communities for potential inclusion in the sample, and (c) the sampling frame that we propose to apply to select individual children for this study.

[1] Save the Children did not serve these six schools because they were either in very small communities with few children, or in urban areas where it can be difficult to define the community in terms of programming. Save asked AIR for authorization to serve other schools, but there seems to have been a miscommunication with the previous AIR project lead perhaps assuming that the Save the Children team was asking if they could serve extra schools (beyond the study sample, which should not be a problem). The Save the Children staff interpreted this permission as approval to replace the six schools. This issue was identified during the October 2017 field visit to Meherpur, and Save the Children is willing to start serving the six schools in 2018.

Who typically uses the EYPP program if it is available?

During an October 2017 visit to Meherpur, we learned that EYPP schools typically accept approximately 18-20 children, and no more than 25 children. The EYPP staff expressed a preference for enrolling children within close proximity to the school, and give priority to children who live closer to the school or center. This preference is guided by the experience that children who live further away are less likely to regularly attend and their parents are less likely to be involved in the program. All schools visited stated that they did not expect any children to participate who lived further than a 15-minute walk from the EYPP class.

How did we identify children for potential inclusion in this study?

AIR's in-country partner, Data International, conducted a census of every household within a 15-minute walk of the primary school (the location where the EYPP would be held if offered). The resulting census included a total of 36,806 households across the 100 study communities. For each household, if there were any children ages 3-6 years old, enumerators recorded the child's name and date of birth, father's name, whether the child was currently in an education program (and if yes, what type), and what the family's plan was for the child in 2018 (stay home, or participate in the educational program). Enumerators also recorded the exact household location using GPS coordinates, and asked how many minutes it will take the child to walk from the home to the primary school. In most cases (exact figure unknown but in a substantial majority), children's dates of birth were verified with the Extended Program of Immunization (EPI) card or a birth certificate. If these documents were unavailable (even after parents were encouraged to search), enumerators recorded what the parent reported as the child's date of birth. Note that in one treatment community, the primary school (where EYPP would typically be held) and the actual program site were 1km apart. The census was carried out for all households within a 15-minute walk of either of these two buildings.

The target sample for our study includes all children in the census areas born from January 1, 2013 – December 31, 2013 (because on-time enrollment in government pre-primary school for these children would be in January 2019). We identified a total of 1,986 children born in 2013. We did ***not*** exclude any age-eligible children based on any other criteria (for example, children with disabilities will be included in our sample pool). See Table 1 for summary information regarding eligible children in the treatment and control communities.

Table 1. Characteristics of the Treatment and Control Groups

Characteristic	Treatment	Control
Number of communities	50	50
Total number of children born 2013	1,082	904
Average number of children born 2013 per community (SD)	21.5 (6.6)	18.1 (6.0)
Number of communities with < 20 children born in 2013	21	30
Number of communities with > 25 children born in 2013	14	6
Average walking distance household to school (minutes)	12.5	10.7

How do we propose to select children for the study sample?

AIR agreed with the World Bank that we would sample an average of 20 children in each of the 100 study communities. As shown above in Table 1, many communities have fewer than 20 eligible children. Because EYPP centers will typically enroll up to 25 children, for both treatment and control communities with 25 or fewer children, we prose to include all eligible children in the study (with parental consent).

For children in communities that include more than 25 children born in 2013, we need to determine how best to select the 25 study children. To inform this decision, we examined the characteristics of children born in 2012 and their households in the study communities with more than 25 children where the EYPP was offered in 2017. These 1,045 children – one year older than our study sample – would have had access to the EYPP in the treatment communities.[2] For these 347 children in this subset of schools, Table 2 shows their 2017 enrolment status, and the average distance from their homes to the school sampled for the study (regardless of whether they participated in any programming at that school).

Table 2. 2017 Enrollment for Children Born 2012 in Treatment Communities with > 25 Children and 2017 EYPP Program Available

Enrollment	% (n)	Average Household Distance from Study School (Minutes' Walk)
No program	20.7 (72)	12.5
EYPP	35.9 (125)	9.3
Islamic Foundation	19.8 (69)	14.8
Government[3]	10.1 (35)	11.7
BRAC	4.9 (17)	14.1
Private	6.6 (23)	12.2
Other	2.0 (7)	10.1

We looked specifically at the schools that offered EYPP in 2017, and had over 25 age-eligible children in the community (so there were too many for the EYPP class to take all). In these communities, we found no statistically significant relationship between proximity to the school and whether or not the child attended the EYPP (versus some other program or no program). Therefore, in the 20 communities (14 treatment and 6 control) with over 25 children in the target age range, we recommend taking a random subsample of 25 for inclusion in this sample.

[2] This group excludes children from the six treatment communities where the EYPP was not offered in 2015.
[3] It is possible that children enrolled in EYPP were described by their parents as being in government pre-primary, because in most communities, the EYPP program is taught in the same classroom by the same teacher as government pre-primary, but at a different time of day. However, it is also possible that these children were indeed already enrolled in government pre-primary a year early.

What was the EYPP uptake rate in 2017?

We examined the program uptake rate in 2017 for the older children (born in 2012). These more recent uptake figures from the treatment communities specifically can guide our assumptions about program uptake in 2018 with the study cohort. See Table 3 for 2017 enrollment information on children in all 44 of the study communities that offered the EYPP in 2017.

Table 2. 2017 Enrollment for Children Born 2012 in Treatment Communities with 2017 EYPP Program Available

Enrollment	% (n)
No program	18.7 (195)
EYPP	45.6 (477)
Islamic Foundation	16.6 (173)
Government[4]	11.5 (120)
BRAC	2.9 (30)
Private	3.4 (36)
Other	1.3 (14)

The findings suggest that the true enrollment rate for the EYPP in 2017 was somewhere between 45.6 percent and 57.1 percent of all children born in 2012. It is possible that children identified as attending government pre-primary were actually participating in the EYPP, because the EYPP is held in the same room as government pre-primary and taught by the same teacher (just at a different time of day). But it is also possible that some children started government pre-primary a year early.

The findings show that program uptake should still be considered a concern with the study cohort starting in 2018. Our analyses will likely need to include estimates of treatment on the treated (TOT) effects (based on instrumental variable regression analysis) as well as intent-to-treat (ITT) effects. Importantly, however, we anticipate that the take-up rate of our study could increase significantly when we restrict the sample to a sample of children that live in close proximity to the schools.

It will be crucial to increase the take-up rate to maintain sufficient statistical power. As highlighted by McKenzie (2011) the sample size needs to increase by 1/(take-up rate^2) to be able to detect the same effect size as in a situation with a perfect take-up rate. Power calculations suggest that we will be able to detect an effect size of 0.249 standardized mean differences with 80% statistical power when we assume 100% take-up (see Table 3 below). The expected ITT effect size will, however, shrink dramatically when we assume that only 50% takes up the program. In that case we will only be able to detect a TOT effect size of 0.498 (0.249*2) standardized mean differences for those children who take up the program. We would require a sample size that is $1/0.5^2 = 4$ times as large to still be able to detect an effect size of 0.249 SMDs. However, when we assume that we will be able to increase the

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take-up rate to 80% when we focus on children who live close by the schools, we will be able to detect an effect size of 0.31 SMDs (0.249/0.8) for those children who take up the program.

Table 3: Power Calculations with Perfect Take-Up

MDES Calculator for Two-Level Cluster Random Assignment Design (CRA2_2)— Treatment at Level 2		
Assumptions		**Comments**
Alpha Level (α)	0.05	Probability of a Type I error
Two-tailed or One-tailed Test?	2	
Power (1-β)	0.80	Statistical power (1-probability of a Type II error)
Rho (ICC)	0.25	Proportion of variance in outcome that is between clusters
P	0.50	Proportion of Level 2 units randomized to treatment: $J_T / (J_T + J_C)$
R_1^2	0.50	Proportion of variance in Level 1 outcomes explained by Level 1 covariates
R_2^2	0.30	Proportion of variance in Level 2 outcome explained by Level 2 covariates
g*	3	Number of Level 2 covariates
n (Average Cluster Size)	20	Mean number of Level 1 units per Level 2 cluster (harmonic mean recommended)
J (Sample Size [# of Clusters])	100	Number of Level 2 units
M (Multiplier)	2.83	Computed from T_1 and T_2
T_1 (Precision)	1.99	Determined from alpha level, given two-tailed or one-tailed test
T_2 (Power)	0.85	Determined from given power level
MDES	**0.249**	Minimum Detectable Effect Size