

# CRS Food For Education Baseline Study

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# Baseline Evaluation for FY 2014 McGovern-Dole Food for Education Project in Benin

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## Contents

Tables.....	4
List of Abbreviations.....	6
Executive Summary .....	7
Strategic Objective 1: Improved Literacy of School-Aged Children .....	8
Recommendation:.....	9
Strategic Objective 2: Increased Use of Health and Dietary Practices.....	9
Recommendation:.....	9
Students' Literacy: EGRA .....	10
Recommendation:.....	10
1. Introduction.....	11
2. Methodology .....	13
2.1 Sampling Design for Principals, Teachers, and Parents.....	13
2.2 Sampling Design for EGRA Implementation.....	16
2.3 Sampling Design for Qualitative Component .....	18
2.4 Sampling Weights .....	18
Adjustment Factors .....	18
3. Results of Questionnaires and Observation.....	20
3.1 Strategic Objective 1: Improved Literacy of School-Aged Children .....	20
3.1.1 Improved Quality of Literacy Instruction .....	20
3.1.2 Improved Attentiveness .....	24
3.1.3 Improved Student Attendance .....	26
3.1.4 Foundational Results .....	29
3.2 Strategic Objective 2: Increased Use of Health and Dietary Practices.....	30
3.2.1 Improved Knowledge of Health and Hygiene Practices .....	31
3.2.5 Increased Access to Preventative Health Interventions.....	35
4. Results of EGRA .....	35
4.1 Vocabulary.....	35
4.2 Oral comprehension .....	36
4.3 Knowledge of letter names .....	36
4.4 Identification of letter sounds .....	37

4.5 Simple words reading .....	37
4.6 Invented words reading.....	38
4.7 Text reading and comprehension.....	38
4.8 Oral comprehension .....	39
4.9 Dictation .....	39
5. Conclusions and Recommendations .....	40
Strategic Objective 1: Improved Literacy of School-Aged Children .....	40
Strategic Objective 2: Increased Use of Health and Dietary Practices .....	41
Students' Literacy: EGRA .....	41
6. Appendices .....	44
6.1 Baseline Study Key Questions .....	44
6.2 Instruments .....	46
Principal Questionnaire .....	46
Teacher Questionnaire .....	49
Parent Questionnaire .....	51
Classroom Observation Rubric .....	55
Focus Group Guide .....	56
Interview Rubric for CCS.....	58
6.3 Power Calculations .....	59
6.4 Summary Statistics .....	61
6.5 Calculation of Indicators.....	63
6.6 Supplementary Tables .....	65

## Tables

Table 1: Summary of SO1 Indicators .....	8
Table 2: Summary of SO2 Indicators .....	9
Table 3: School Summary Statistics .....	14
Table 4: Principals Summary Statistics .....	15
Table 5: Teachers: Summary Statistics .....	15
Table 6: Parents Summary Statistics .....	16
Table 7: Number of Classrooms Observed .....	16
Table 8: EGRA Student Summary Statistics, 2015 .....	17
Table 9: Literacy Instruction .....	21
Table 10: Teacher Attendance Rate .....	22
Table 11: Teacher Attendance Rate by Commune (Intervention Schools Only) .....	22
Table 12: National Curriculum .....	23
Table 13: Student Attentiveness .....	24
Table 14: Eating and Hunger .....	26
Table 15: Attendance Counts and Rates .....	28
Table 16: Health Related Absences, Counts and Percentages .....	28
Table 17: Importance of Education .....	29
Table 18: Parents' and Women's Associations .....	29
Table 19: Minimum Acceptable Diet .....	31
Table 20: Diet Content and Frequency .....	31
Table 21: Knowledge of Good Health and Hygiene .....	32
Table 22: Place in which youngest child's feces were disposed .....	32
Table 23: Water products named .....	33
Table 24: Reasons to wash hands named .....	33
Table 25: Times to wash hands named .....	33
Table 26: Ways to make water better for drinking named .....	34
Table 27: Student Knowledge of when to wash hands .....	34
Table 28: Student Knowledge of hygiene practices .....	34
Table 29: Number of Students Dewormed .....	35
Table 30: Percentage of vocabulary known by grade and type of school: 2015 .....	36
Table 31: Percentage of actions correctly performed by grade and type of school: 2015 .....	36
Table 32: Average number of letters correctly read per minute by grade and type of school: 2015 .....	37
Table 33: Average percentage of sounds correctly identified by grade and type of school: 2015 .....	37
Table 34: Average number of words correctly read per minute by grade and type of school: 2015 .....	37
Table 35: Average number of invented words correctly read per minute by grade and type of school: 2015 .....	38

Table 36: Average number of words read per minute and questions responded correctly by grade and type of school: 2015 .....	38
Table 37: Average percentage of questions correctly answered by grade and type of school: 2015 .....	39
Table 38: Percentage of words correctly written by grade and type of school: 2015. ....	39
Table 39: EGRA Students' Previous Education .....	61
Table 40: EGRA Students' Languages spoken at home .....	61
Table 41: EGRA Students' Reading materials .....	61
Table 42: EGRA Students' Literacy help at home .....	62
Table 43: Who helps with homework at home .....	62
Table 44: After school activities .....	62
Table 45: Eating at school.....	62
Table 46: Teacher Attendance in Treatment Schools .....	65
Table 47: Status of Kitchen and Water System in Intervention Schools .....	67
Table 48: Supplies Available in Treatment Schools.....	70
Table 49: Supplies Available in Treatment Schools, cont.....	72

## List of Abbreviations

CCS	Head of School Districts (Chef de Circonscriptions Scolaires)
CI	Cours d’Initiation (first grade)
CP	Conseillers Pédagogiques (Pedagogical Advisors)
CP	Course Préparatoire (second grade)
CRS	Catholic Relief Services
FAO	Food and Agriculture Organization
HIP	USAID Hygiene Improvement Project
EGRA	Early Grade Reading Assessment
IFPRI	International Food Policy Research Institute
INFRE	Institute National Pour la Formation et la Recherche en Education
LOA	Life of Activity
ND	University of Notre Dame
USDA	US Department of Agriculture
WFP	World Food Programme
WEI	World Education, Inc.

## Executive Summary

Catholic Relief Services, Benin (CRS Benin) is implementing a four-year project to improve literacy and alleviate hunger. The project is aimed at strengthening the learning environment and improving the quality of instruction, with an explicit focus on community engagement. The project will improve literacy through provision of school lunches which will increase student attentiveness and reduce student absences. Trainings for teachers and school administrators, improved instructional materials, school facilities and infrastructure will also increase the quality of education. The project will also improve health and dietary practices by implementation of awareness campaigns for parents, trainings for teachers and food preparers on hygienic practices, improved infrastructure and sanitation facilities, and distribution of deworming pills.

Overall, the project will benefit approximately 38,000 primary school-age children attending 141 primary schools in four communes in the Alibori and Borgou Departments of Northeast Benin.

This baseline study utilized both quantitative and qualitative tools to provide information necessary to understand the starting point of students, parents, teachers and principals in the intervention areas. The quantitative portion has two main components. The first component consists of surveys of principals, teachers and parents, as well as a classroom observation. The second component consists of an Early Grade Reading Assessment (EGRA). The qualitative component consists of interviews with key stakeholders such as the head of the school districts (Chef de Circonscription Scolaires, CCS) in Malanville, Gogounou, and Kandi communes. Additionally focus groups were conducted with both parents' and mothers' associations identified as being particularly active, as well as with parents who have decided not to enroll their children in school.

Data were collected in schools which will receive the intervention, and in schools which, like intervention schools, do not have canteens but were identified by CRS as having mothers' associations. The majority of these schools are located in communes neighboring the intervention areas, but nine schools are located in the same commune as intervention schools (Kalale Commune). These comparison schools are hoped to serve as a control group during midline and end line evaluation. Throughout this report, balance tests are performed to demonstrate the adequacy of the control group as a comparison. Statistically significant differences are noted when detected. The comparison schools are found to be useful as a control group. A few issues that should be dealt with using econometric models are listed in the conclusions section.

Data has been weighted to represent the entire population of students, teachers, principals, or parents, within school clusters and strata of urban or rural schools. Results of the baseline study were mixed. It was observed that some indicators for the project have been surpassed prior to program implementation, while in other categories a clear need for improvement is needed. Results are discussed below by strategic objective.

## Strategic Objective 1: Improved Literacy of School-Aged Children

Table 1: Summary of SO1 Indicators

Indicator	Baseline	Target	Surpassed at Baseline?	Recommendation for M&E
% of teachers who spend at least 45 minutes on literacy instruction	90	70	Yes	<i>Adjust indicator to quality of instruction as defined by WEI</i>
Teacher attendance rate	92	75	Yes	<i>Verify through unannounced visits</i>
# of teachers using the national curriculum	587	141	Yes	<i>Adjust indicator to “% of schools using national curriculum”</i>
% of students who are attentive in class	74	75	No	<i>Increase goal: 80% or 85%</i>
% of parents whose children report being hungry during the school day	55	20	No	-
% of Students who have eaten during the school day	98	95	Yes	<i>No adjustment: rely on minimum acceptable diet</i>
# of Students who regularly attend school			No	-
Male	18,893	19,607		
Female	18,579	19,069		
% of students who experience health-related absence	5	(10% reduction)	No	-
% of parents who can name 3 reasons that education is important	39	60	No	-
# of schools with active parents’ associations	127	141	No	-
# of schools with active mothers’ associations	74	141	No	-

It was found that a large proportion of teachers devote sufficient time to literacy instruction, teacher attendance rates are high and most use the national curriculum already. However, key informant interviews reveal that there is a significant lack of experienced teachers and materials, implying that quality of instruction, as opposed to time of instruction, may be the issue.

On average, 74% of the students in an intervention classroom were attentive. 48% of students enrolled in the elementary schools report being hungry during the school day to their parents, despite the fact that 98% of them had eaten during the school day. 98% of students in the treatment area are defined as regularly attending, and only 5% of them experience health-related absences. While it appears that a lack of nutrition has not lead to absences from school, providing proper nutrition could cause fewer students to complain of hunger, and more students to be attentive during the school day. This would lead to improved learning.

Only 39% of parents who enrolled their children in school can name three reasons that education is important. It can be presumed that parents who did not enroll their children in school could name fewer reasons for the importance of education, meaning that this estimate is positively biased. Efforts to improve awareness of the importance of education could improve student enrollment and performance.

With regards to parental involvement, 92% of schools in the treatment area have active parents' associations; however, only 54% of schools have active mothers' associations. Improving the capacity of mothers' associations could help improve student enrollment and diet, as well as community knowledge of health and hygiene.

#### Recommendation:

- Focus on increasing teaching staff and providing necessary resources for quality instruction instead of on increasing teacher attendance rates.
- Monitor quality of literacy instruction instead of only time spent on literacy instruction.
- Build capacity of mothers' associations in intervention areas.

## Strategic Objective 2: Increased Use of Health and Dietary Practices

Table 2: Summary of SO2 Indicators

Indicator	Baseline	Target	Surpassed at Baseline?	Recommendation for M&E
% of students receiving a minimum acceptable diet	67	95	No	-
% of students with a passing score on a test of good health and hygiene	TBD	60	TBD	<i>Develop cut-off for passing score</i>
% of parents with a passing score on a test of good health and hygiene	TBD	75	TBD	<i>Develop cut-off for passing score</i>
# of students receiving de-worming pills	5876	43,804	No	-

Only 67% of students in the intervention area are receiving a minimum acceptable diet as defined by the USDA. Approximately 40% of parents in the treatment areas indicated that their households usually practice open defecation. In the intervention area, 8% of parents demonstrated knowledge of washing hands before preparing food, and approximately 1% of students demonstrated knowledge of the need to wash hands after defecation. These and other indicators related to health and hygiene can be improved. Approximately 5,876 students (26%) in the intervention area have benefitted from de-worming campaigns. Improvement is needed in the number of students receiving a minimum acceptable diet, students receiving de-worming pills, and student and parent knowledge of healthy and sanitary practices.

#### Recommendation:

- Provide food to increase students receiving minimum acceptable diet.

- Provide education to students and parents on health and hygienic practices.
- Provide de-worming pills in intervention area.

### **Students' Literacy: EGRA**

Because the cut-off point of “reading and understanding the meaning of grade level text” has not yet been developed at the time of writing this baseline report, individual elements of the EGRA test are presented in this report. Compared to other sections, students demonstrated some proficiency in vocabulary identification and oral comprehension of commands. In other sections such as knowledge of letter names, identification of letter sounds, reading and comprehension of texts, and dictation, students performed at very low levels.

Because EGRA was conducted in the middle of the school year, students cannot be proficient at their grade level, particularly among first grade (CI) students. Performing the EGRA at the end of the school year will provide richer information on students' literacy levels, particularly for second grade (CP) students.

### **Recommendation:**

- Develop national cut-off for reading at grade level
- Conduct EGRA assessment at intervention schools annually.

## 1. Introduction

Catholic Relief Services, Benin (CRS Benin) is implementing a four-year project to improve literacy and alleviate hunger. The project is aimed at strengthening the learning environment and improving the quality of instruction, with an explicit focus on community engagement. CRS Benin, in partnership with World Education, Inc (WEI) will ensure sustainability by leveraging community-based activities to engage parent-teacher associations (Associations des parents d'élèves) and school mothers' associations (Associations des mères d'élèves) in the management of school canteens and other activities. The project also aims to increase government capacity and ownership by working with the Ministry of Education's National Institute for Training and Research in Education (Institute National pour la Formation et la Recherche en Education – INFRE) in designing improved teacher training. The project will train pedagogical advisors known as "CPs" (conseillers pédagogiques), who will in turn directly train and monitor an estimated 212 teachers and 141 officials to assess literacy levels and share new and effective teaching methods.

The project will improve literacy through provision of school lunches which will increase student attentiveness and reduce student absences. Trainings for teachers and school administrators, improved instructional materials, school facilities and infrastructure will also increase the quality of education. The project will also improve health and dietary practices by implementation of awareness campaigns for parents, trainings for teachers and food preparers on hygienic practices, improved infrastructure and sanitation facilities, and distribution of deworming pills.

Overall, the project will benefit approximately 38,000 primary school-age children attending 141 primary schools in four communes in the Alibori and Borgou Departments of Northeast Benin.

This report presents the baseline information necessary to understand the starting point of students, parents, teachers and principals in the intervention areas. The methodology which was used to gather this information included both quantitative and qualitative tools. Data collected for this baseline study was gathered in January 2015.

Additionally this report provides similar information on students, parents, teachers and principals in two neighboring communes. These populations serve as a comparison group in order to determine the impact of the program.

The results of this baseline study demonstrate high levels of teacher and student attendance, and low rates of health-related absences for students. However, it demonstrates moderate levels of attention in classrooms and student-reported hunger. Finally, it demonstrates low levels of student literacy, and very few students who are receiving a minimum acceptable diet. Additionally, most parents do not have complete knowledge and correct behavior related to health and hygiene. Finally, schools lack physical resources such as buildings and books, and

personnel resources such as sufficient numbers of teachers to deliver quality education to the community.

This report is divided into 6 sections. The first is this introduction. The second section presents the methodology used to gather data. The third section presents the baseline statistics for the indicators of the project. The fourth section presents the baseline statistics for the EGRA test. The fifth section presents conclusions and recommendations.

## 2. Methodology

This baseline study utilized both quantitative and qualitative tools. The quantitative portion has two main components. The first component consists of surveys of principals, teachers and parents, as well as a classroom observation. The second component consists of an Early Grade Reading Assessment (EGRA). The qualitative component consists of interviews with key stakeholders such as the head of the school districts (Chef de Circonscription Scolaires, CCS) in each intervention commune, and parents' and mothers' associations which were identified by the quantitative component as particularly active. This section explains the sampling strategy for each component of the study, and how the analysis for this report has been completed.

### 2.1 Sampling Design for Principals, Teachers, and Parents

Sampling was determined based on expected impact to be detected at midterm or end line. The goal was to achieve sufficient statistical power to detect the impact we expect to find. School sampling was stratified by urban and rural schools, and was calculated proportional to the number of students in each school. In this way each student had an equal probability of selection into the sample, despite the different size in schools. Stratification was completed by classifying the schools as rural or urban, and selecting equal numbers from each category in both intervention and comparison groups. Data was stratified by urban and rural schools because it was assumed that urban and rural populations will differ on relevant indicators. Schools were then selected randomly within these strata. Treatment and control groups each consisted of seven urban schools, and 43 rural schools. Resulting data is stratified by the same categories, but individual indicators are not disaggregated by strata because none of the indicators in the PMP require this. The complete list of schools which were sampled included 142 intervention schools and 98 comparison schools.

The sampling strategy focused on outcome indicators for parents. The two main outcomes of interest for parents are the percentage of parents who can name at least three benefits of primary education, and the percentage of parents who receive a passing score on a test of good health and hygiene. For both indicators, the goal is 60%. Using a significance of 5%, a statistical power of 80%, it was determined that with 50 treatment and 50 control schools, and 10 parents surveyed per school, the study would have power to detect a minimum change from 46% to 60%. Since this effect is fairly modest (a .2 effect size), we could reasonably expect for a change of this size to be observed.

For selection of the schools based on these calculations, the `gsample`<sup>1</sup> command in STATA was used. Within each stratum, schools were randomly selected with a probability proportional to the size of the school. Since for some schools the probability was greater than the available selection probability, these probabilities were limited to 1/50.

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<sup>1</sup> Jann, B. (2006). `gsample`: Stata module to draw a random sample. Available from <http://ideas.repec.org/c/boc/bocode/s456716.html>.

For selection of respondents, different methods were used per school. The universe of teachers and principals were planned to be surveyed at each school so no selection methodology was implemented. For parents, 10 parents were randomly selected using the school rosters. This ensured that the sample of parents interviewed in each school were representative of the parents of enrolled students in each community. This is consistent with CRS's indicators, but it should be noted that it is not representative of parents in the community in general.

Classrooms for observation were also selected randomly. At each school, two classrooms were randomly selected for observation. Within the classroom, ten students were again randomly selected to be observed and classified as attentive or inattentive at the time of observation. For this component of the study, only classrooms from 3<sup>rd</sup> to 6<sup>th</sup> grade were selected, as the students in 1<sup>st</sup> and 2<sup>nd</sup> grade were being pulled out for EGRA testing. Thus it was assumed that those classrooms would have sufficient disturbance to negatively bias the results, since students would be paying attention to the movement of their peers instead of the teacher.

Open Data Kit was used on smart phones to collect information from the surveys. Open Data Kit allows data to be collected offline and downloaded to a server once the phone is again connected to the internet. More information on Open Data Kit can be found here: <http://opendatakit.org/>. In addition, a Random Number Generator (RNG) free app was used to randomly select classrooms and students. The App Smart Lock, a free application, was used to prevent the use of other applications in the cellphones and tablet that could potentially drain the battery. All phones and tablets used Android 4.1.

Schools sampled in the treatment area were significantly larger than those in the control area. According to data from last academic year, which was used for sampling, selected schools in the treatment area have 282 students, while schools in the control area have 183 students. This difference is observed because there is a similarly statistically significant difference within the universe of treatment and comparison schools. Average number of teachers in treatment and control areas is the same.

**Table 3: School Summary Statistics**

	Control	Treatment	Difference
Mean student population (#)	183	282	-99***
Mean number of teachers	3	3	-0.48

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

A total of 95 principals were interviewed—48 in the comparison area and 47 in the intervention area. The sample is balanced on percent female principals, and levels of experience. Principals are, on average, six years older in the treatment group than the control group, but the size of this difference is negligible, particularly because this difference is not reflected in amount of experience.

**Table 4: Principals Summary Statistics**

	Control	Treatment	Difference
Percent Female	2.21	4.99	-2.79
Mean Age	40.50	46.56	-6.06***
Experience (yrs)	3.64	4.01	-0.38
Education Level:			
Some High School	42.99	26.47	16.51
High School Graduate	24.36	44.06	-19.69
Some college	7.39	11.30	-3.91
College Graduate	9.17	1.51	7.66
Post-graduate or professional	16.08	16.66	-0.58

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

A total of 399 teachers were interviewed—221 in the intervention group and 178 in the comparison group. Again, this difference is due to the larger size of schools in the intervention area. On average, a higher proportion of female teachers were interviewed in the treatment area, and this difference is statistically significant. Conversely, teachers in the comparison group have less education (secondary cycle in “normal” track high school, or junior high school in the education track). More teachers have completed “education track” high school in the treatment areas, but this difference is only statistically significant to the 10% level.

**Table 5: Teachers: Summary Statistics**

	Control	Treatment	Difference
Percent Female	12.76	28.99	-16.23***
Mean Age	30.57	31.77	-1.20
Experience (yrs)	5.38	5.65	-0.27
Education Level:			
High School (Secondary Cycle) (%)	27.19	15.52	11.68*
BPC: Junior High in Education Track (%)	18.62	6.81	11.81**
CEAP: High School in Education Track (%)	21.14	32.39	-11.24*
Baccalauréat: High School Graduate (%)	14.54	23.15	-8.61
CAP: Teaching Certificate (%)	14.84	15.39	-0.54
Some University or higher (%)	3.66	5.31	-1.65

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

A total of 556 parents participated in the questionnaire, 284 in the area of comparison and 272 in the area of intervention. No statistically significant difference was observed between treatment and control groups in age, number of children, and household size. There was a sizable difference in the proportion of female respondents in the treatment area; however, this difference is only significant to the 10% level.

**Table 6: Parents Summary Statistics**

	Control	Treatment	Difference
Percent Female	23.04	37.88	-14.84*
Mean Age of Parent	39.42	37.51	1.91
Mean Number of Children	7.71	6.34	1.37*
Mean Household Size	16.54	16.79	-0.25

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

A total of 1,420 students were observed, in 142 classrooms. An equal proportion of 3<sup>rd</sup> grade classes were observed in both treatment and control areas, but significantly more 4<sup>th</sup> and 6<sup>th</sup> grade classrooms were observed in the treatment area. In some cases, classrooms were combined because of a lack of sufficient teaching staff. In this case, enumerators were instructed to observe students in only the randomly selected grade if the two grades could be distinguished from each other. For instance, teachers of combined classrooms assign one grade to sit on the right side of the room, and the other grade to sit on the left. In three instances this was not the case, meaning the class selected for observation was in a room where the students were mixed with students of another grade. This is listed as a 3<sup>rd</sup> and 4<sup>th</sup> grade or 5<sup>th</sup> and 6<sup>th</sup> classroom below. On average, the proportion of male and female students observed in the treatment and control area was equal (not reported).

**Table 7: Number of Classrooms Observed**

	Control	Treatment	Difference
3rd grade	24	24	0
4th grade	13	26	-13**
5th grade	17	15	2
6th grade	5	16	-11**
3rd and 4th grade	0	2	-2
5th and 6th grade	1	0	1

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

## 2.2 Sampling Design for EGRA Implementation

The sample size for the selection of students to complete EGRA was determined based on the indicator goal of students reading at grade level. This goal is 65%, meaning that there is a .65 probability of success for each student at baseline. Again a clustered sampling strategy was employed, with students constituting the level of analysis but considering that students are nested within schools. Similar constraints of significance (5%), statistical power (80%), and number of clusters (50 treatment and 50 control) were utilized. Within these constraints, if 16 students are tested per grade, the study has power to detect a change of at least 12 percentage points (from 53% to 65% of students reading at grade level). Again, this effect size is below .2 and therefore considered to be a modest effect, meaning it can be reasonably expected that the intervention will result in an impact of this size.

Among the schools which were selected using the above strategy, students were again selected randomly using school rosters. This ensures that the students selected to complete EGRA were representative of the first and second grade student population within the schools visited. Since these schools were also selected randomly, it can be inferred that the EGRA scores are representative of the first and second grade populations in all the intervention and comparison schools.

Tangerine® was the program that was used to test EGRA. Tangerine® was developed by RTI International and is available under a General Public License (GNU). For more information on this program, please visit [tangerinecentral.org](http://tangerinecentral.org).

For more information on the sampling strategy, please see Appendix 7.3: Power Calculations. Power calculations were conducted assuming a cluster size of 48 intervention and 48 comparison schools. These power calculations are relevant to our final sample size of 50 intervention and 50 comparison schools.

A total of 2,677 students were tested with EGRA in 99 schools visited. The total number of students tested by grade was 1,346 for CI and 1,331 for CP. The distribution of students between treatment and control schools was similar: 1,254 students in control schools and 1,423 students in treatment schools. The sample had an equal proportion of girls and boys. The average age of students was about 6 years old for CI and 7 years old for CP. However, the response rate for age was extremely low. Enumerators were instructed to ask the student or copy the age from the class roster, but both sources of information did not provide more than 32% of information on average. Students understood the question, since it was asked in the local language and not French. This is a common occurrence in rural communities where time and age have different cultural significance and people may not be aware of their age.

The test took on average 10 minutes to complete with CI students and 16 minutes with CP students. More background information on the sample can be found in Appendix 6.4: Summary Statistics.

**Table 8: EGRA Student Summary Statistics, 2015**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Girls (%)	49.0	52.2	-3.2	49.9	49.5	0.3
Mean age	6.1	6.0	0.1	7.0	7.2	-0.2
Age percent response	29.4	25.5	3.9	33.2	42.3	-9.1

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

## 2.3 Sampling Design for Qualitative Component

The qualitative component focused on key stakeholders and key informants on project outcomes of interest. First, interviews were conducted with the head of school districts (Chef de circonscription scolaire, or CCS), in each intervention commune. Second, focus groups were conducted among parents' and women's associations (PME's and AME's) that were identified by the principals or CCS's as most active, by their own interpretation. These associations were in turn asked to identify parents who have not enrolled their children in school. Interviews were conducted with those parents as well. In this way, the qualitative interview employed a snowball method, in which key informants identify other key informants.

## 2.4 Sampling Weights

In the schools, the goal was to interview all principals and all teachers in the 100 selected schools. However, because some teachers and principals were absent, a response rate for each sample was calculated. Similarly, the study aimed to interview ten parents at each school but often less than ten selected parents were present. Each sample was weighted by the inverse probability of selecting the school from the universe of schools provided, and by the inverse probability of selecting the respondent from the total respondents available within that school. In this way, sample weighting accounts for the selection of the school, but also for the selection within the school or classroom. Schools were randomly selected with probability proportional to size. The measure of size was the number of students enrolled in each school. Therefore the school weight is as follows:

$$W_j^i = \frac{M}{jm_i}$$

Where j is the number of schools sampled in each strata,  $m_i$  is the number of students in each school and

$$M = \sum_{i=1}^N m_i$$

where N is the number of schools in the explicit stratum. The school weight was adjusted in specific cases. There were 7 schools in the intervention area classified as urban; these schools received a weight of 1. In order to avoid some weight being less than unity, the size of large schools (schools with sizes larger than the sampling interval given by  $M / n$ ), was set equal to 50. As a result, these large schools were sampled with equal probability without having to use an explicit stratification approach. Finally, the sampling weight was adjusted for the rural control stratum since one of the schools was closed.

## Adjustment Factors

Weights for principals and teachers were adjusted based on response rate. The adjustment factors are listed as follows:

$$A_{jt} = \frac{n_j}{t_j}$$

Is the adjustment rate for teachers, where  $n_j$  is the number of teachers within school  $j$  and  $t_j$  is the number of teachers who completed the survey in school  $j$ . Thus the final weight for the teachers is as follows:

$$FW_{jt} = W_j * A_{jt}$$

Similarly, the parents subsample was adjusted based on the probability of selecting the parents from the total available parents at school  $j$ .

$$A_{jp} = \frac{n_j}{p_j}$$

$A_{jp}$  is the adjustment factor for parents, where  $n_j$  is the total number of parents at school  $j$ , and  $p_j$  is the number of parents from school  $j$  who participated in the survey. Thus the final weight for the parents is as follows:

$$FW_{jp} = W_j * A_{jp}$$

Classrooms were similarly adjusted for the probability of selection. The adjustment factor for classrooms is as follows:

$$A_{jc} = \frac{n_j}{c_j}$$

Where  $n_j$  is the total number of classrooms eligible for observation in school  $j$  (note that only grades 3-6 were eligible for selection), and  $c_j$  is the number of classrooms that were observed in school  $j$ . Additionally, this sample is adjusted based on the probability of selecting a student within the classroom. This adjustment factor is as follows:

$$A_{jcs} = \frac{n_{jc}}{s_{jc}}$$

Where  $n_{jc}$  is the number of students in classroom  $c$  in school  $j$ , and  $s_{jc}$  is the number of students observed in classroom  $c$  in school  $j$ . Thus the final weight for classroom observation is as follows:

$$FW_{jcs} = W_j * A_{jc} * A_{jcs}$$

Finally, the principal sample was adjusted by the response rate of principals within the strata.

$$A_r = \frac{n}{r}$$

Where  $n$  is the total number of principals within the strata, and  $r$  is the number of principals who completed the survey in that stratum. Thus the full weight calculation for principals is:

$$FW_{jr} = W_j * A_r$$

For EGRA, the goal was to test 16 students in CI and CP grades from each school. The standard errors to test hypotheses were corrected because students were grouped or nested within classes and then nested with schools, as oppose to a random selection of students among all eligible students in the districts where the survey took place. In addition, because students have a different probability of selection depending on the total number of students in each class, a weight was calculated as follows:

$$FW_{ji} = \frac{W_j * k^{ji}}{s^{ji}}$$

Where  $W_j$  is the school weight for school  $j$ ,  $k^{ji}$  is the total number of students in grade  $i$  from school  $j$ , and  $s^{ji}$  is the number of students sampled from grade  $i$  in school  $j$ . When the number of students is less or equal to 16 the sample weight was equal to the school weight.

The following section reports the results observed. It is organized by indicators for each result stream and strategic objective of the project. When necessary, data are disaggregated by grade, gender, commune or level of experience.

### 3. Results of Questionnaires and Observation

The analysis below considers the strategic objectives as laid out in CRS's Project Monitoring Plan (PMP). Indicators which are not zero at baseline are focused on here.

#### 3.1 Strategic Objective 1: Improved Literacy of School-Aged Children

##### 3.1.1 Improved Quality of Literacy Instruction

###### *Percent of teachers who devote at least 45 minutes per day to literacy instruction*

Teachers of all grades were asked how many minutes they spent each day on literacy instruction. Literacy was defined as "teaching how to read and write." Each teacher was then classified as meeting the indicator or not. Weights were applied to extrapolate the count of teachers to the population of teachers. Using this data, 600 (90.46%) teachers spend at least 45 minutes a day on literacy instruction. On average, teachers spend 100 minutes per day teaching literacy. The LOA target of 70% has been surpassed.

Table 9: Literacy Instruction

	Control	Treatment	Difference
Spend at least 45 minutes per day teaching literacy (#)	283.83	599.89	-316.06***
Spend at least 45 minutes/day teaching literacy (%)	90.35	90.46	-0.11
Minutes spent teaching literacy	92.97	100.78	-7.82

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

While it appears that the time spent teaching literacy is sufficient, the quality of that time is insufficient, as evidenced by both students' literacy scores and reports from CCS's. They report a lack of resources for teachers, and a lack of teachers. For example, the [REDACTED] of Kandi, a larger town in the area of intervention, stated that

*"In Kandi, the school district is comprised of 100 schools today, exactly 100. And it has 471 classrooms but actually 246 teachers. You can already see the deficiency of teaching staff."*<sup>2</sup>

Furthermore, the teachers who are working in the region do not have sufficient training. Over half the teachers surveyed have only completed some high school education or less. See Table 2 for a break-down of teachers' education levels.

#### *Average Teacher Attendance Rates for each school and aggregated by district*

Data on teacher attendance rates were acquired from principals. Principals were asked the following question about each of their teachers: "How many days has [Teacher  $t$ ] been absent last trimester?" The principal then referred to his or her register to report the number of days teacher  $t$  was absent. The reported number of days was subtracted from the total number of days last trimester (47) and divided by the total number of days to achieve the rate by teacher. Teacher attendance rates were then averaged by school. See Appendix 6.5 for a definition of this formula.

Using this calculation, it was found that teachers are present at their schools 92% of the time, surpassing the LOA target of 75%. No statistical difference between teachers in control and treatment areas was observed on this indicator. This rate was verified by the teacher response rate in this data collection, which was 91.7% (not reported). Caution should be used in relying solely on this observational data, because of potential bias due to advance warning of enumerator visits, but it is provided here to supplement principal-reported data. See Tables 7 and 8 for a breakdown of this indicator among schools by grade taught, teacher experience, and commune. Table 8 reports rates for teachers in treatment schools only by commune.

Data for this indicator was only available from principals' registers. However, this source is potentially biased for several reasons—a desire to please potential program implementers, a

<sup>2</sup> Key Respondent Interview, [REDACTED], Kandi. [REDACTED].

fear of retribution if data is reported to the Ministry of Education, and finally, a lack of adequate records. The first two risks of bias were mitigated by the consent form, which specifically states that data will only be reported at aggregate levels, and that participation in the survey has no impact on selection for program participation. The enumerators explained this to each principal before beginning the interview. However, little can be done about a school with inaccurate records. It is recommended that program partners verify information through unannounced visits during the planning and initial implementation of the program.

Schools in Benin have two types of teachers—"permanent" teachers (those employed by the state), and "community" teachers (employed by the community). Because community teachers are paid by the hour, it could be possible that these teachers have a higher rate of attendance than community teachers. Therefore, it is recommended that data on teacher type is gathered at mid-line and end-line so data can be disaggregated by type of teacher.

**Table 10: Teacher Attendance Rate**

	Control	Treatment	Difference
Teacher Attendance Rate	93.33	93.29	0.05
Grade 1	93.26	97.29	-4.03
Grade 2	96.53	85.03	11.50
Grade 3	89.53	94.25	-4.72
Grade 4	91.57	96.10	-4.52
Grade 5	90.70	95.21	-4.50
Grade 6	89.75	89.06	0.70
Some High School	92.71	96.08	-3.37
High School Graduate	91.95	91.97	-0.03
Some college	97.62	94.24	3.39
College Graduate	94.86	95.74	-0.89

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 11: Teacher Attendance Rate by Commune (Intervention Schools Only)**

	Rate
Kalale	99.10
Gogounou	94.54
Kandi	86.44
Malanville	97.62

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

A full list of teacher attendance rates by school can be found in Appendix 7.5: Supplemental Tables. The interpretation of this indicator is consistent with that of the time spent on literacy instruction. While teachers are present at their schools for a sufficient amount of time, they do not have sufficient resources or training to lead quality instruction during that time.

### *Percent of Teachers Using the National Curriculum*

In 88.3% of the schools, principals report that their schools are using the national curriculum. Extrapolating this rate to the universe of teachers in the intervention area implies that 587 teachers use the national curriculum (see Table 12). Again, this already surpasses the LOA target of 141 teachers using the national curriculum. This could be because the program goal is 1 teacher per school using the national curriculum. However, national curriculum is typically implemented by a school entirely, in which case many teachers use the curriculum; or not at all, in which case no teachers use the curriculum. A change in the definition of the target can help capture information more clearly. For example, if the goal is 100% of *schools* using the national curriculum, this target has not yet been met.

For a deeper understanding of the national curriculum, we can note the response from the [REDACTED] in Kandi. He states, regarding the curricula

*“The program is well designed, the elements are well-designed, but the actors who need to direct these programs, to develop them, are they sufficiently equipped? This is the problem. It’s one thing is to have well-designed programs, but the other thing is the knowledge that those who are in charge of driving the programs forward have the hoped-for profile. Do they have the necessary capacity and competence for developing these programs?”*

In general, most school officials interviewed agreed that not only is the number of teachers in the intervention areas insufficient, but the teachers who were hired by the school district or the local community lacked necessary levels of education or certification. Parents also noted that schools suffer from a lack of resources. When asked what could be done to help them facilitate their children’s learning, the parents in Kalale asked for resources such as notebooks and math or French activity books “that the state does not provide.”<sup>3</sup> Without these resources and without sufficient training, it can be presumed that teachers would face difficulty in providing quality instruction. Further classroom observation by program implementers can verify quality of instruction, presence of resources, or teacher capacity when instructing using the national curriculum.

**Table 12: National Curriculum**

	Control	Treatment	Difference
Schools Using the National Curriculum (%)	86.03	88.30	-2.27
Number of Teachers Using National Curriculum	295.58	587.19	-291.61***

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

<sup>3</sup> Focus group with Kalale PTA. 22 January 2015.

### 3.1.2 Improved Attentiveness

#### *Percent of Students who are identified as Attentive during Classroom Instruction*

Attentiveness was identified through classroom observation. A classroom observation template was created based on validated instruments from Carnegie Mellon's Eberly Center for Teaching Excellence, the London School of Education and Massachusetts Department of Education (see Appendix 6.2: Instruments). As described in Section 2.2, classrooms for observation were randomly selected from grades 3-6, because students from grades 1-2 were participating in the EGRA exam, and thus would not provide valid data on attentiveness. Enumerators were instructed to observe each of the ten randomly-selected students individually until that student could be classified, according to the rubric, as attentive or inattentive. An average of attentiveness was then determined for each classroom. See Appendix 6.5 for equation.

To disaggregate average classroom attentiveness by gender, the gender ratio of the classroom was used. Gender ratio was calculated using the number of boys and girls in the observed classroom, as reported in the teacher survey. The proportion of girls in each classroom was determined from this data. However, it was assumed that the gender ratio of students observed was not always exactly proportional to the gender ratio of the classroom. So using this data a gender was assigned to each observed student in a classroom by generating a normally distributed set of binomial variants, centered on the gender ratio of the observed classroom. Using this method, each student was assigned a gender and mean values of attentiveness were calculated in the same manner described above, among male students and female students separately.

Using this procedure, 74 % of students in intervention schools were classified as attentive. This is quite close to the LOA target of 75%. Again, there was no statistical difference between treatment and control schools on this indicator, demonstrating that the sample is balanced. Also the differences between male and female students within either treatment or control group are not statistically significant (not reported). This data could be confirmed through unannounced visits to the schools by program implementers if desired.

**Table 13: Student Attentiveness**

	Control	Treatment	Difference
Average Attentiveness	70.77	73.99	-3.22
Female	73.78	79.87	-6.09
Male	68.29	65.78	2.52

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

#### *Percent of parents whose children report being hungry during the school day*

Data on student hunger was gathered from parents. The World Food Programme (WFP), Food and Agriculture Organization (FAO), the US Department of Agriculture (USDA) and the International Food Policy Research Institute (IFPRI) all use parent-reported information on child

hunger.<sup>4</sup> Furthermore, research which includes both child-reported and parent-reported child hunger demonstrates a correlation between the two.<sup>5</sup> In addition, pilot tests of the survey instrument resulted in the removal of the question of child hunger from the teacher questionnaire, because teachers indicated that they did not know if their students were hungry during the day. They believed that their students would not report this to them out of fear. For these reasons, it was decided that parents were the best sources for data on student hunger.

Parents were asked about each of their children who were enrolled in the intervention school, “Has (name) reported being hungry during the school day last week?” The school day was defined as the time period from the beginning of the school day until the end. It should be noted that the school day in Benin is quite long (8:00-17:00), with a lengthy lunch break (12:00-15:00). This entire time was included in the definition of school day to be consistent with USDA definition of school day. Parents were asked about each of their children individually. The indicator of interest was a binomial, with a parent being classified as “1” if they reported at least one hungry child. This means parents were classified as a “0” only if they responded that none of their children reported hunger. See Appendix 6.5 for a breakdown of this formula.

Using this definition, 55% of parents stated that at least one of their children had reported being hungry during the school day (see table 11). Again, this is statistically indistinguishable from students in the comparison area. Improvement will be needed to reach the final target of only 20% of parents with children who report hunger during the school day.

#### *Percent of students who consume daily meals during the school day*

Similarly, parents were asked about students’ consumption of daily meals during the school day. Again parents were asked about each of their children enrolled in the school “Did [name] eat during the school day yesterday?” Enumerators were prompted that if the prior day was not a school day, to ask specifically about the last school day. Again, a similar definition of school day was used, which included the long lunch break. In this case data calculated by student, and then averaged by parent. See Appendix 6.5 for a breakdown of the formula.

According to these calculations, 98% of students in the schools of intervention ate something during the school day (see Table 14). Again no statistically significant difference was detected between the intervention and comparison schools on this indicator.

This rate surpasses the LOA target of 95%. Because the Beninese school day is long, it is logical that most students might eat something during that time. But as can be seen in the indicator on minimum acceptable diet below, the content and frequency of students’ diets is insufficient according to USDA standards.

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<sup>4</sup> For an adaptation of one of the most commonly cited tools for assessing child hunger, the Community Child Hunger Identification Project, see the following:

<http://www.sahealthinfo.org/nutrition/food8hungerscale.pdf>

<sup>5</sup> Murphy, J M et al. “Relationship between hunger and psychosocial functioning in low-income American children.” *Journal of the American Academy of Child Adolescent Psychiatry*. 1998 Feb;37(2):163-70.

Parents were not asked where their children were acquiring food during the day—whether they were going home or purchasing something near the school. Additionally, information on breakfast habits in the region was not gathered. This information can be gathered from AME’s before program implementation. However, regardless of where students are eating, the content of the food is clearly insufficient as evidenced both by the hunger reported and by the proportion of students who do not receive a minimum acceptable diet.

**Table 14: Eating and Hunger**

	Control	Treatment	Difference
Percent of parents whose children report being hungry during the school day	58.06	54.74	3.32
Male	57.17	62.58	-5.40
Female	58.81	49.51	9.31
Percent of students who have eaten during the school day	96.99	98.22	-1.24
Male	97.16	98.26	-1.10
Female	96.83	98.20	-1.36

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

### 3.1.3 Improved Student Attendance

#### *Number of Students regularly (80% or more) attending USDA-supported classrooms*

Student attendance data were gathered from teacher registers. Teachers were asked to report, using their registers, the number of boys and girls in each of their classrooms who were missing more than 10 days last trimester. According to the Benin Department of Education, the first trimester in the 2014-2015 school year began on Thursday October 16<sup>th</sup>, and ended on Friday December 19<sup>th</sup>. This is a total of 47 school days. If a student is absent for 10 of these 47 days, their rate of attendance falls below 80% and they are considered to have irregular attendance. Students with absences of 9 days or less (more than 80% of the total school days in the trimester) are considered to be regularly attending. This number of students who were not regularly attending was subtracted from the total number of students in each grade. See Appendix 6.5 for a calculation of this indicator.

Using this calculation and the weights described above to extrapolate these counts to the entire population, the number of students regularly attending intervention schools is 18,893 males and 18,589 females. This does not meet the goals of 19,607 and 19,069 for male and female students respectively. Because this is a count, not a proportion, a statistically significant difference is detected from the comparison area. Percentages are included in this baseline report to provide context for these totals. On average, 95% of students are regularly attending intervention schools, and this proportion is not statistically distinguishable from the comparison area.

It should be noted that the 80% cut-off is a low threshold for regular attendance—students could be absent for up to two weeks of instruction and still be considered to be attending school regularly. It is unlikely that sickness due to malnutrition would cause students to be absent this much. Instead, it is likely that they are regularly attending school, but without proper nutrition or in poor health (as evidenced by the indicators on hunger and minimum acceptable diet).

### *Enrollment*

This baseline study did not gather community-level data on enrollment rates; these will be gathered through partnership with AME's. However, focus groups were conducted in each of the four communes of intervention with parents who have not enrolled their children in school. They were asked why they have not enrolled their children in school, what they thought the cause was for this problem, and what could be done to solve it. Consistently parents answered that the cause was economic. Some focus groups cited cultural reasons for the lack of enrollment. For example, the mothers' group in Kandi mentioned that in the past, parents sent the children to watch the cattle, and that they needed to do the same. But although this reason was interpreted as cultural by respondents, it could also be considered economic. More frequently, parents' and mothers' groups cited a lack of financial means as the reason for choosing to not enroll their children. They referenced the costs of registration, school clothes, books, and other supplies. The combination of these costs is prohibitive for the families. Additional research could investigate the cut-off point of household income where the cost of school enrollment becomes prohibitive, or differences between families with equal incomes that send their children to school and those that do not. As no household level data was collected from families of unenrolled students, this report cannot provide additional information on these behaviors.

### *Percent of students who report a decrease in health-related absences*

Data on student health-related absences were gathered in the same manner as data on student regular attendance. It was confirmed by local education partners that teachers record not only absences but the reason for absences in their registers. Teachers were asked how many boys and girls in each of their classes were absent for health-related reasons in the last full month of classes. During the time of data collection, the last full month of classes was November. Teachers referred to their registers and reported the number of boys and girls. Those students were totaled and divided by the total students in each grade. See Appendix 6.5 for the calculation of health-related absences at the school level.

This indicator is defined as “percent of students who report a decrease in health-related absences.” The number reported here is the total number of students who were absent for health-related reasons. Percentage out of total students is also provided for context. At mid-line, the difference between total students absent for health-related reasons can be calculated to determine the percent change in this indicator.

Using this calculation, 5% of students in the area of intervention experienced health-related absences. Again no statistical difference was observed between the intervention and

comparison areas on this indicator. It should be noted that the percentage is quite low so the target of a 10% decrease in this indicator will be hard to detect.

This rate and the high rate of regular attendance demonstrate that students may be attending school while still lacking proper nutrition. This hypothesis is consistent with students' low scores in literacy (presuming that if a student attends school while not receiving adequate nutrition, s/he will not be learning well).

**Table 15: Attendance Counts and Rates**

	Control	Treatment	Difference
Students Regularly Attending School(#)	13,793	37,481	-23,688***
Percentage of total students	92.12	94.76	-2.64
Male (#)	7,038	18,893	-11,855***
Percent of total male students	92.49	95.31	-2.82
Female (#)	6,755	18,589	-11,833***
Percent of total female students	91.75	94.21	-2.46

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 16: Health Related Absences, Counts and Percentages**

	Control	Treatment	Difference
Students with Health-Related Absences (#)	855.66	1,664.46	-808.80*
Percentage of total students	6.44	4.97	1.47
Male (#)	440.22	890.74	-450.52**
Percent of total male students	6.40	5.35	1.05
Female (#)	415.44	773.72	-358.28*
Percent of total female students	6.56	4.60	1.96

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

### ***Percent of parents in target communities who can name at least 3 benefits of primary education***

Data on this indicator was gathered by asking parents two questions—first “Do you consider your children’s education important?” If parents answered yes, they were asked why. Enumerators could classify parents’ answers to categories listed or write in other answers that could not clearly fit into one of the categories. Written-in answers were later checked and re-classified if possible. Each parent was classified as having met the goal (by naming three or more reasons), or not (by naming less than three reasons or by saying that his or her child’s education is not important).

Based on these calculations, 39% of parents can name at least 3 benefits of education in the intervention areas. Improvement will be needed to meet the LOA target of 60%. Again, no statistically significant difference was detected between intervention and comparison groups on this indicator. In the intervention area, 47% of male respondents are able to name 3 reasons for the importance of education, while only 26% of female respondents are able to do so. This difference between men and women in the treatment group is significant to the 5% level (not

reported). However, despite the magnitude of difference between the responses of females in treatment and control group, this difference is statistically indistinguishable from zero. No difference can be detected between the treatment and control groups, on the percent of women who named 3 reasons that education is important.

**Table 17: Importance of Education**

	Control	Treatment	Difference
Can name 3 reasons that education is important (%)	46.72	38.81	7.91
Male	48.32	46.61	1.71
Female	41.42	26.03	15.39

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

### 3.1.4 Foundational Results

#### *Percent of schools in target communities with active PTA's or other school government structures*

Data on parents' and mothers' associations were gathered from principals. Principals were asked if their schools had parents' and women's associations. If they answered yes, they were asked how active the association is. The enumerator classified the principal's answer as "very active," "moderately active," or "not at all active." Principals were able to answer based on their opinions of what defined these categories. If the principal's answer was one of the first two options, that school's parents' or mothers' association was classified as "active." Counts of active PTA's and AME's were applied to the entire population of schools according to the weights described previously, and the results can be seen below in Table 12. 122 schools in the intervention area have active PTA's, which is approximately 92% of the schools. Improvement will be needed to meet the LOA target of 100%. There is no statistically significant difference between number of active PTA's in the treatment and control schools.

Only 54% percent of the treatment schools have an active AME, as compared with 15% of the control schools. The difference observed between the treatment and control groups in this variable is statistically significant to the 99<sup>th</sup> percentile. Among intervention schools without active AMEs, the AME was either inactive (17.11%), or non-existent (26.93%).

**Table 18: Parents' and Women's Associations**

	Control	Treatment	Difference
Schools with Active PTAs (#)	91	122	-31**
Percent	89.57	92.39	-2.82
Schools with Active AMEs (#)	15	72	-58***
Percent	14.90	54.06	-39.16***

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

Among female parent respondents, the presence of an active AME in a community is positively and significantly correlated with knowledge of times to wash hands, and with children receiving a minimum acceptable diet (not reported). Of the 556 parents interviewed, only 21 stated that

they were members of their AME. Therefore this correlation could be considered a spillover effect of the presence of an active AME in the community. However, this data is not experimental so endogenous factors probably exist that contribute to these correlations. No such correlations were found between active AME's and attendance rates, sick rates, or ability to name benefits of education.

### **3.2 Strategic Objective 2: Increased Use of Health and Dietary Practices**

#### ***Percent of Students Receiving a Minimum Acceptable Diet***

Data on students' diets were gathered from parents. The parent was asked to report all the items that his or her child ate yesterday. Parents were asked about each of their children enrolled in the target school individually, and it was specified that the parent should consider food eaten during the day or the evening, and at school, at home or outside the home. The parent was asked about food in groups of food items (see Appendix 7.2 Instruments for these food groups). The specific foods listed were discussed in the training and pilot study, and edited to include local fruits, vegetables and dishes as appropriate. Foods were classified into the seven food groups as specified by USDA:

- Grains, roots and tubers
- Legumes and nuts
- Dairy products (milk, yogurt, cheese)
- Flesh foods (meat, fish, poultry and liver/organ meats)
- Eggs
- Vitamin-A enriched foods, including vegetable oil, fruits and vegetables
- Other fruits and vegetables

Parents were also asked how often their children ate the day before. Any answer over 7 was classified as 7 times. A minimum acceptable diet is defined as eating 4 or more of these food groups, and a minimum frequency of 3 times a day. Each child was classified as receiving a minimum acceptable diet if the parent reported consumption of food items that fit into at least 4 of the categories listed above, and if the parent reported that the child ate at least three times yesterday.

According to this definition, 67% of the students in the area of intervention are receiving a minimum acceptable diet. Again the comparison area does not exhibit a statistically significant difference from the intervention area. Again, improvement is needed in order to reach the LOA target of 95%.

Diet content and frequency are included in Table 17 for additional information. The most commonly consumed food groups are #1 (Grains, roots and tubers) and #7 (other fruits and vegetables). Sauce is classified into this category because many typical Beninese sauces contain tomatoes and onions. Eggs and dairy products are the categories of foods consumed by the least number of respondents.

In focus groups, parents were asked about what foods they would feed their children if they had the means. Most parents mentioned pasta (“macaroni”), rice, couscous and sorghum. Some parents mentioned beans, fresh tomatoes, okra, meat or fish, and milk to put in the tea. One parent also mentioned a lack of oil for cooking. In all communes, parents cited a lack of means as the reason that they were not able to provide these foods to their children. Instead they cited the need to feed their children *pâte* and stretch meals to last for more than 1 day. From these focus groups, it can be concluded that parents lacked both complete knowledge of a balanced diet and the financial means to provide that diet.<sup>6</sup>

**Table 19: Minimum Acceptable Diet**

	Control	Treatment	Difference
Students Receiving a Min. Acceptable Diet (%)	64.24	67.14	-2.89
Male	63.33	68.04	-4.71
Female	65.00	66.53	-1.53

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 20: Diet Content and Frequency**

	Control	Treatment	Difference
1. Grains, roots and tubers (%)	92.48	98.31	-5.83**
2. Legumes and nuts (%)	46.53	51.97	-5.43
3. Dairy products (%)	25.51	36.73	-11.21
4. Flesh foods (%)	55.93	77.28	-21.34***
5. Eggs (%)	4.83	11.97	-7.13
6. Vitamin A Rich foods (%)	96.82	95.41	1.41
7. Other fruits and vegetables (%)	100.00	99.79	0.21
Eats three or more times a Day (%)	77.59	78.08	-0.48

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

### 3.2.1 Improved Knowledge of Health and Hygiene Practices

#### *Percent of Parents in target communities who achieve a passing score on a test of good health and hygiene practices*

Data on parent knowledge of health and hygiene practices was gathered from parents. Parents were asked questions related to USAID’s Hygiene Improvement Project (HIP). Specifically, questions from this section were taken from a verified instrument used to determine baseline indicators for a USAID HIP in Madagascar.<sup>7</sup>

As a “passing score” threshold was not yet determined by CRS at the time of writing this report, summary statistics are reported instead. Some indicators reflect parents’ knowledge, such as the ability to name practices or products that can make water safe to drink, and reasons or

<sup>6</sup> Focus groups with PTA’s and AME’s in Kandi, Malanville, Kalale, Gogounou. Jan 20-23 2015.

<sup>7</sup> To see this report and the full instrument as developed by FHI360, please visit:

<http://www.hip.fhi360.org/file/16498/HIP%20Madagascar%20Baseline%20Report%20%20Dec.%2008.pdf>

times to wash hands. Other indicators reflect parents' practices, such as the toilet that the family uses, or the place in which they disposed of their youngest child's feces. These indicators can be combined and weighted according to the planned awareness campaigns, to develop a health and hygiene score. From that score, a cut-off for passing can be determined.

In most indicators, intervention and comparison areas are balanced, meaning that there is no detectable difference between the two groups. However, 42% of respondents in treatment areas reported open defecation (defined as defecation in the field, nature, or otherwise outside the home but not in a latrine of any kind), while 77% of respondents in the comparison area reported this. The difference of 36% is statistically significant at the 1% level. In the case of toilet use, the control group does not provide an adequate comparison for the treatment group.

During focus groups, parents were asked how the health and hygiene situation can be improved in the home. Some parents answered that education was necessary about healthy food preparation, latrine use, water purification and hand-washing.<sup>8</sup> In most focus group discussions, the lack of both potable water and clean water for washing was mentioned. The focus group in Kandi also mentioned the possibility of a community garden for the women to grow fruit.<sup>9</sup> In Malanville, parents reported that people with means are digging wells and selling water suitable for washing. These new water sources reduced their trips to the river for water.<sup>10</sup>

**Table 21: Knowledge of Good Health and Hygiene**

	Control	Treatment	Difference
Can name 1 water sanitization product (%)	43.82	73.19	-29.37***
Can name 2 water sanitization products (%)	10.25	25.96	-15.71*
Can name 3 water sanitization products (%)	0.53	0.00	0.53
Can name 1 reason for hand washing (%)	99.65	100.00	-0.35
Can name 2 reasons for hand washing (%)	40.49	49.15	-8.66
Can name 3 reasons for hand washing (%)	16.53	13.66	2.86
Can name 1 time to wash hands (%)	98.49	99.62	-1.14
Can name 2 times to wash hands (%)	73.99	75.81	-1.81
Can name 3 times to wash hands (%)	27.51	48.27	-20.76**
Open Defecation (%)	77.42	41.53	35.89***

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 22: Place in which youngest child's feces were disposed**

	Control	Treatment	Difference
In the latrine (%)	17.84	52.75	-34.92***
Pit or garbage (%)	15.96	16.13	-0.17
In the road (%)	0.30	0.54	-0.24
Outside (%)	60.67	25.03	35.63***
In a public latrine (%)	0.41	1.44	-1.03

<sup>8</sup> Focus Group Discussion, Kalale and Malanville PTA. 23 January 2015.

<sup>9</sup> Focus Group Discussion, Kandi PTA. 23 January 2015.

<sup>10</sup> Focus Group Discussion, Malanville PTA. 23 January 2015.

In the sink or the tub (%)	0.35	0.00	0.35
Down a drain (%)	2.93	0.42	2.51
Don't Know (%)	1.54	3.69	-2.15

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 23: Water products named**

	Control	Treatment	Difference
Liquid chlorine (Sur 'Eau) (%)	6.81	21.81	-15.00*
Chlorine tablets (Aqua tabs) (%)	27.05	42.84	-15.80*
Chlorine flocculants (%)	0.30	5.09	-4.80
Filter (PuR, Watermaker) (%)	1.33	5.13	-3.80
Other chlorine products (%)	18.41	20.90	-2.49
Iodine (tablets or liquids) (%)	0.00	2.62	-2.62
Permanganate (%)	0.70	0.74	-0.05
Nothing (%)	16.92	3.92	12.99***

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 24: Reasons to wash hands named**

	Control	Treatment	Difference
Prevention of diarrhea (%)	23.40	33.37	-9.97
Prevention of other illnesses (%)	82.99	86.65	-3.67
Removing germs (%)	33.75	29.55	4.21
To prevent dirt from entering the mouth (%)	12.22	8.98	3.23
To prevent dirt from entering food (%)	7.39	6.18	1.21
Good health (%)	0.68	0.33	0.35

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 25: Times to wash hands named**

	Control	Treatment	Difference
After Defecation (%)	51.89	65.82	-13.93
Before Eating (%)	93.70	90.56	3.14
After washing children or diapers (%)	1.84	10.91	-9.07***
After washing latrines (%)	1.89	10.32	-8.43*
After washing pots (%)	1.57	1.97	-0.41
Before preparing food (%)	2.24	7.65	-5.42
Before feeding children (%)	3.79	5.83	-2.03
After eating (%)	48.32	48.24	0.08

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 26: Ways to make water better for drinking named**

	Control	Treatment	Difference
Boiling (%)	22.38	27.06	-4.68
Add Javel (%)	6.40	14.09	-7.70
Add chlorine solutions (Sur' Eau) (%)	2.22	7.16	-4.94
Add chlorine tablets (Aqua tabs) (%)	10.74	12.52	-1.78
Pass it through a fabric (%)	10.74	10.57	0.17
Let it sit (%)	3.13	4.05	-0.92
Use a ceramic filter (%)	0.30	0.00	0.30
Use a bio-Sable filter (%)	0.00	0.00	0.00
Solar disinfection (%)	0.00	0.00	0.00
Keep it in a covered container (%)	23.53	12.20	11.33*

\*  $p<0.1$ ; \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

***Percent of Children in target communities who achieve a passing score on a test of good health and hygiene practices***

**Table 27: Student Knowledge of when to wash hands**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
After defecate (%)	1.6	0.4	1.3	0.8	1.6	-0.8
Before eating (%)	32.4	34.8	-2.4	45.7	49.4	-3.7
After taking care of baby (%)	0.0	0.0	0.0	0.0	0.0	0.0
After cleaning latrines (%)	0.0	0.0	0.0	0.0	0.8	-0.8
After cleaning the toilet (%)	0.0	0.0	0.0	0.0	0.0	0.0
Before preparing food (%)	0.7	0.1	0.5	0.7	0.1	0.7
Before giving food to children (%)	0.8	0.0	0.8	0.5	0.0	0.5
After eating (%)	12.7	15.2	-2.5	18.2	25.3	-7.1
None (%)	67.0	64.7	2.3	53.1	49.5	3.6

\*  $p<0.1$ ; \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

**Table 28: Student Knowledge of hygiene practices**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Personal hygiene (%)	0.0	0.0	0.0	0.8	1.0	-0.1
Wash hands (%)	0.0	0.0	0.0	6.9	9.8	-2.9
Bathing every day (%)	0.0	0.0	0.0	11.1	18.6	-7.4
Clean environment (%)	0.0	0.0	0.0	0.7	0.0	0.7
Clean School (%)	0.0	0.0	0.0	0.9	1.3	-0.5
Cleaning classroom (%)	0.0	0.0	0.0	0.8	1.5	-0.8
Brush teeth/ mouth hygiene (%)	0.0	0.0	0.0	0.1	0.3	-0.2
Healthy nutrition (%)	0.0	0.0	0.0	0.0	0.1	-0.1
None (%)	100.0	100.0	0.0	81.9	76.8	5.0

\*  $p<0.1$ ; \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

### 3.2.5 Increased Access to Preventative Health Interventions

#### *Number of students receiving de-worming medication*

Data on number of students receiving de-worming medication were gathered from principals. Principals were asked if any students from their schools received de-worming pills from any campaigns this year. If they answered yes, the principals were asked how many students benefitted from the campaign. Twelve principals in the intervention area noted that deworming campaigns had benefitted some of the students in their schools. The reported numbers below reflect the weighting of the schools sampled within the intervention and comparison areas. Thus, among all the intervention schools, it is estimated that 5,876 students have benefitted from de-worming campaigns this year. Program activities such as provision of deworming pills should help to meet the LOA target of 43,804 students within the program.

**Table 29: Number of Students Dewormed**

	Control	Treatment	Difference
Number of Students Dewormed	3,504.43	5,876.05	-2,371.62
Percent	20.54	26.00	-5.46

## 4. Results of EGRA

Apart from an initial section that collected student environment information, the test used in this study had 9 sections: 1) vocabulary 2) oral comprehension 3) knowledge of letter names 4) identification of letter sounds 5) simple words reading 6) invented words reading 7) reading and comprehension 8) Oral comprehension and 9) Dictation. The results of each section are shown here. The test was based on a model prepared by World Education Benin. We adapted the test in consideration of the purpose of the test and the place in the curriculum where students should be in the academic year: 1. Question on households assets were eliminated 2. An open ended question requesting examples on what reading material is available at home was eliminated. 3. Two questions about hygiene knowledge and practices were added, these were reported above. 4. The section on producing letter sounds was not used, and 5. Only one of the sentences was used for dictation. These changes were done in consideration to the level of knowledge of the students in the grades that were taking the EGRA. Specifically, because all students had completed one trimester of classes, they were not expected to have the reading and comprehension that at student at the end of the school year might have. This was particularly true for students in the first grade, or Cours d'Initiation (CI) level. Also, the introduction of the letter sounds is a new development in the national curriculum that is beginning to be implemented.

### 4.1 Vocabulary

During the vocabulary section, the enumerator asked the students to point at different items, in total there were 17 items. Each item was asked once to the student and it was marked as correct or incorrect according to the student's response. The items were body parts (head, knee,

ears, foot, stomach), school items (eraser, blackboard, notebook, chalk), things from nature (the sun, a stone, a bowl and a tree), and spatial terms (a door, the top of the table, a rag, the corner of the table). The following table presents the average percentage of objects correctly identified by each student.

**Table 30: Percentage of vocabulary known by grade and type of school: 2015**

Indicator	Control	CI Treatment	Diff	Control	CP Treatment	Diff
Mean	39.0	41.8	-2.8	60.4	61.2	-0.8

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

Students in first grade, or CI were able to identify about 40 % of the items that were requested, while students in second grade, or Course Préparatoire (CP) were able to identify 60% of all the items that the enumerators ask for. There is no statistically significant difference between students from control and treatment schools.

## 4.2 Oral comprehension

The oral comprehension section is an extension to the vocabulary section. The enumerator asked students to perform some actions using a pencil or a rag. In total the students were asked four groups of actions. In Group A, the enumerator asked students to pick a pencil and put it on top of a sheet of paper, behind them, on the soil, under the paper, by their right side, and in a box. In Group B the enumerator ask students to take the pencil with their hand and put it on the table on their right side. In Group C, the enumerator asks students to take a chalk with their right hand and put it under the table. Finally, in Group D, the enumerator asks students to take an eraser with their right hand and put it under the chair. The total number of actions of all these requests added to 19. The following table shows the average percent of actions correctly done by students.

**Table 31: Percentage of actions correctly performed by grade and type of school: 2015**

Indicator	Control	CI Treatment	Diff	Control	CP Treatment	Diff
Mean	44.6	52.1	-7.5**	67.2	67.0	0.2

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

About half of the students in CI were able to complete their tasks correctly, and more than two thirds of students in CP were able to complete their tasks correctly. There is no statistically significant difference between students in treatment and control groups.

## 4.3 Knowledge of letter names

In the section on knowledge of letters, the students were asked to read as many letters as they could in a minute. The enumerator presented a grid containing 100 letters organized in table of 10 rows by 10 columns. Letters were capital or lower case and some had accents. If students

could not read any of the letters in the first row correctly they were asked to stop this section of the test and move to the next one. The following table presents the number of letters correctly read per minute.

**Table 32: Average number of letters correctly read per minute by grade and type of school: 2015**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Mean	1.8	0.8	1.1***	11.8	9.0	2.7

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

The number of letters per minute by CI students is very low, about 1 letter per minute, while for CP students the average was about 10 letters per minute. There is a statistically significant difference in CI level but the difference is not large in magnitude. There is no statistically significant difference at the CP level.

#### 4.4 Identification of letter sounds

In the identification of letter sounds section, the enumerator read ten words twice. The student was asked to identify the initial sound—not letter name—of each word which was read. The enumerator stopped the section if the student couldn't identify the first five words. The following table presents the average percent of sounds correctly identified by the students.

**Table 33: Average percentage of sounds correctly identified by grade and type of school: 2015**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Mean	0.8	0.7	0.0	8.2	7.5	0.6

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

The percentage of sounds identified by CI students is less than one, while for CP students were able to identify about 8 percent of the words. There is no statistically significant difference between treatment and control schools at either level.

#### 4.5 Simple words reading

In this section, the enumerator presented a grid with 50 words and asked student to read as many words as possible in one minute. The majority of the words have one or two syllables. The section is stopped if the student cannot read the first five words correctly. The following table presents the average number of words correctly read per minute.

**Table 34: Average number of words correctly read per minute by grade and type of school: 2015**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Mean	1.0	1.1	-0.0	1.6	1.9	-0.4

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

The results of this section show that there is little difference between CI and CP in terms of words read. CI students are able to read a word per minute, while CP students can read close to 2. There is no statistically significant difference between treatment and control.

#### 4.6 Invented words reading

Similar to the previous section, the enumerator presented a grid with invented words to the student who should read as many as possible in a minute. Most words have one or two syllables and have no meaning in the French language. The section is stopped if the student cannot read the first five words correctly. The following table presents the number of words correctly read per minute.

**Table 35: Average number of invented words correctly read per minute by grade and type of school: 2015**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Mean	0.9	0.1	0.8	1.3	0.7	0.6

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

The number of words read per minute is low for both CI and CP. CI students are able to read less than a word per minute, while CP students are able to read about a word per minute. There is no statistically significant difference between treatment and control schools.

#### 4.7 Text reading and comprehension

This section had two parts. In the first part, students were asked to read a short text, or as many words as possible in a minute. In the second part, a series of questions are asked to the student on what they were able to read. There are a total of 5 questions, but students are asked the questions in proportion to how much they were able to read. The following table presents the number of words read per minute and questions correctly answered.

**Table 36: Average number of words read per minute and questions responded correctly by grade and type of school: 2015**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Number of words read per minute	3.4	3.4	0.1	6.4	4.2	2.1
Number of questions answered correctly	0.0	0.0	0.0	0.0	0.0	0.0**

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

The number of words read per minute is low—CI students were able to read 3.4 words per minute, while CP students were able to read about 5 words per minute. The minimum number of words that student needs to read for the enumerator to ask the first question is 13, so given the low number of words read, it is not surprising that on average the number of questions answered is close to zero. There is a statistically significant difference between treatment and

control at the CP level, but given that the number is so small it has been rounded to zero, the magnitude of this difference is negligible.

#### 4.8 Oral comprehension

In the section of oral comprehension, the enumerator read a story twice in French and then asked 5 questions about the story. The following table presents the average percentage of questions correctly answered by students.

**Table 37: Average percentage of questions correctly answered by grade and type of school: 2015**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Mean	0.0	0.0	0.0	0.1	0.1	-0.0

\*  $p<0.1$ ; \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

There is not much difference between CI and CP students, the percentage of answers correctly answered by the students is close to zero, and there is not a statistically significant difference between treatment and control schools.

#### 4.9 Dictation

In this section, the enumerator read a sentence three times. The first time students listened; the second time the enumerator read slowly and students wrote as best as they can; the third time, the enumerator read the text so students could correct what they wrote. The enumerator then graded the text by classifying each word as correct, partially incorrect or incorrect. A correctly written word is worth twice as a partially correct one. The students did not get any credit if they wrote the word incorrectly or nothing at all. Punctuation and spacing were also measured separately. The following table shows the results in percentages according to each category.

**Table 38: Percentage of words correctly written by grade and type of school: 2015.**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Students that do not write (%)	80.0	85.2	-5.2	39.6	52.5	-12.9*
Percentage of words correctly written	0.7	0.2	0.6	8.4	5.6	2.8*
Percentage of words partially correctly written	0.9	0.5	0.4	5.7	3.2	2.5*
Percentage of words incorrectly written	91.8	95.6	-3.8*	76.8	81.8	-5.0

\*  $p<0.1$ ; \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

The percentage of students that cannot write is high in CI close to 82%, while in CP the percentage is close to 46 percent. Among the CI students that were able to write, more than 90 percent wrote the words incorrectly. Among CP students, this percentage was in the upper 70

percent. There were statistically significant differences between treatment and control schools. At the CI level, the percentage of words incorrectly written is higher in treatment schools. However, the difference is negligible. At the CP level, there is a difference of almost 13 percentage points between students that cannot write—treatment schools have a higher percentage of those students than control schools. In addition, the percentage of words correctly written and partially correctly written is higher in control schools. These differences are negligible. However, within the sample of schools selected, there is no known reason why control schools would be better at writing than treatment schools.

## 5. Conclusions and Recommendations

### Strategic Objective 1: Improved Literacy of School-Aged Children

Approximately 90% of teachers in the intervention schools dedicate at least 45 minutes per day on literacy instruction. Teachers' attendance rates are 92%, and 88% of the schools are using the national curriculum. However, key informant interviews reveal that there is a significant lack of educated teachers and materials. Thus, while teachers are present and have been told to use the national curriculum, they likely do not have sufficient training or resources to provide quality instruction. In addition, some are called upon to teach two classes simultaneously, further reducing quality of instruction.

On average, a classroom in the intervention area had 74% attentive students. 48% of students report being hungry during the school day to their parents, despite the fact that 98% of them had eaten during the school day. Some parents indicated needing to stretch meals over multiple days and being limited to serving 'pate'. 95% of students in the treatment area are defined as regularly attending school, and only 5% of them experience health-related absences. While it appears that a lack of nutrition has not lead to absences, providing proper nutrition could cause fewer students to complain of hunger, and more students to be attentive during the school day.

Only 40% of parents of enrolled students can name three reasons that education is important. It can be presumed that parents who did not enroll their children in school could name even fewer reasons for the importance of education, meaning that this estimate is positively biased. Efforts to improve awareness of the importance of education could improve student enrollment and performance.

93% of the schools in the treatment area had active parents' associations; however, only 54% had active mothers' associations. The rest are non-existent (17%) or inactive (27%). Providing trainings could potentially increase the number of active women's associations, which may lead to improved student enrollment and diet, as well as community knowledge of health and hygiene. Analysis demonstrates a correlation between active AME's and proportion of children who receive a minimum acceptable diet, as well as knowledge of health and hygiene practices. Further research is necessary to understand current effectiveness of these associations, as well

as needs for trainings and capacity-building. Local partners, upon working with these associations, can gather this information from association members.

### **Recommendation:**

Theories of change about the impact of FFE programs demonstrate that the effect of an FFE program can be ambiguous if it increases enrollment and reduces farming labor in the community.<sup>11</sup> In the case of Benin, schools lack an adequate supply of well-trained teachers prior to program implementation so increased enrollment could reduce effectiveness of the program on indicators such as literacy scores or quality of instruction. To address this, the program may choose to focus on increasing teaching staff and providing necessary resources for quality instruction. Indicators related to this activity could include student-to-teacher ratio or resources available to teachers. In addition, monitoring quality of literacy instruction could provide richer information. If quality of instruction is to be monitored, implementing partners would need to develop a rubric for assessing quality of literacy education.

Because many schools do not have an active AME, the program should focus on supporting AME's that require revitalization or initiation. Community level trainings on health, hygiene, and the importance of education can be implemented with the help of the AME. By working with the AME's, program implementers can also gather information about local enrollment rates and percent of parents of unenrolled students who can name the benefits of education.

### **Strategic Objective 2: Increased Use of Health and Dietary Practices**

67% of students in the intervention area are receiving a minimum acceptable diet as defined by the USDA. Approximately 40% of parents in the treatment areas indicated that their households usually practice open defecation. 8% of parents in treatment areas demonstrated knowledge of washing hands before preparing food, and approximately 1% of students demonstrated knowledge of the need to wash hands after defecation. These and other indicators related to health and hygiene can be improved. Approximately 5,876 students (26%) in the intervention area have benefitted from de-worming campaigns. Improvement is needed in the number of students receiving a minimum acceptable diet, students receiving de-worming pills, and student and parent knowledge of health, nutrition, and hygiene/sanitation practices.

### **Recommendation:**

More students need to receive minimum acceptable diet. Provision of meals and take-home rations will improve this indicator, but education and outreach to parents can help as well. Education is needed on health and hygiene practices for both students and parents.

### **Students' Literacy: EGRA**

Because the threshold which will define "reading and comprehension at grade level" has not yet been developed at the time of writing this baseline report, individual element of the EGRA is

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<sup>11</sup> Braun, J. (2009). Ch. 23: How Effective Are Food-for-Education Programs? A Critical Reassessment. In *The poorest and hungry: Assessment, analyses, and actions*. Washington, D.C.: International Food Policy Research Institute. < <http://www.ifpri.org/sites/default/files/publications/oc63ch23.pdf>>.

addressed here. Compared to other sections, students demonstrated some proficiency in vocabulary identification and oral comprehension of commands. In other sections such as knowledge of letter names, identification of letter sounds, reading and comprehension of texts, and dictation, students performed at very low levels.

### ***Recommendation on Timing of Future EGRA Implementation***

Because EGRA was conducted in the middle of the school year, the tool was not sufficient for detecting students' literacy levels, particularly among first grade (CI) students. Performing the EGRA at the end of the school year will provide richer information on students' literacy levels, particularly for second grade (CP) students. Furthermore, the indicator of interest specifically refers to "the *end* of two grades of primary schooling." For this reason, we recommend repeating the EGRA at the end of this school year. After less than half a year of program implementation, data gathered at the end of the first year could still be considered a baseline indicator for academic outcomes.

The EGRA should be implemented at treatment schools at the end of each academic year of the program for monitoring purposes. However, the EGRA results reported here can serve as baseline data in terms of impact evaluation. The difference-in-difference model allows for the calculation of impact even if the assessment is implemented at a different time of the year, because with a comparison group, that difference can be subtracted, or "differenced out." Because of this flexibility, we recommend implementing the EGRA at the end of the academic year for any impact evaluation.

### ***Recommendation: On the Adequacy of the Comparison Group***

Statistically significant differences between treatment and control group were noted when observed throughout this report. In order for a group to provide an adequate comparison, it should not differ from the intervention group on both observable characteristics and characteristics that the program will not impact—such as gender, age, experience and education level. First, schools in the control area were significantly smaller than those in the treatment area. This causes concern because larger schools may be fundamentally different from smaller ones and thus not comparable.

Several differences were observed in regards to gender. The intervention area has significantly more female teachers (a difference of 16 percentage points). More female parents were interviewed in the treatment area (15 percentage points), and principals reported a larger number of active mothers' associations in the treatment areas (39 percentage points). This is especially of concern given that the presence of an active mothers' association appears to be correlated with outcome indicators such as receiving a minimum acceptable diet and knowledge of health and hygiene practices.

In most outcome-level indicators, we observed very few differences between treatment and control areas that were both statistically significant and large enough in magnitude to be of concern. One such difference was open defecation; however, it is unlikely that this program will

impact this behavior greatly, since it is not providing new infrastructure at the community level such as latrines.

Contamination could be an issue among the schools that exist within the intervention area. While most program activities will be occurring within the school, some components of the program could affect the entire community. Because Kalale commune is large, distance from the control schools and implementation schools can be calculated to determine if this is a concern. If the schools are sufficiently close to each other, outreach activities and enrollment campaigns could affect members of both the treatment and control group if they are implemented on a large scale. If these components are implemented within the context of the intervention school (for example, if education on health and hygiene is provided to parents' association members only), contamination will be minimized. In this way, program implementation will affect concerns of contamination.

We recommend addressing the above concerns in econometric models, which can account for differences in school size, gender proportions, and potential contamination. Mid-line evaluations should use the same comparison group but pay careful attention to indicators that need to be disaggregated by gender, making attempts to gather responses from equal portions of males and females at each level of data collection. Finally, respondents in the comparison area should be asked if any similar intervention that has been implemented during the program implementation. Any school which has experienced a similar intervention can no longer provide an adequate counterfactual.

## 6. Appendices

### 6.1 Baseline Study Key Questions

Project Objectives	Key Questions	Source of Data	Level of Analysis
<b>SO 1: Improved Literacy of School Age Children</b>	What percent of students (male and female) can read and understand the meaning of grade level text?	EGRA	Student
<b>1.1 Improved Quality of Literacy Instruction</b>	What is the teacher attendance rate?	Principal Questionnaire	School
	What percentage of teachers devote at least an average of 45 minutes a day to literacy instruction?	Teacher Questionnaire	School
<b>1.2 Improved Attentiveness</b>	What percentage of students indicate that they are not hungry during the school day?	Parent Questionnaire	Student
	What percentage of students regularly eat meals during the school day?	Parent Questionnaire	Student
	What percentage of the students are attentive during class instruction?	Class room Observation	School
<b>1.3 Improved Attendance</b>	How many students are regularly (80% or more) attending the schools?	Teacher Questionnaire	School
	What is the current rate of student-reported health-related absences?	Teacher Questionnaire	School
	What is the current number of students (male/female) enrolled in USDA schools?	(known) <sup>12</sup>	
	What percentage of parents can name 3 benefits of primary education?	Parent Questionnaire	School
<b>1.4 Foundational Results</b>	How many schools in target communities currently have PTAs or similar governance structures?	Principal Questionnaire	School
<b>SO 2: Increased Use of Health and Dietary Practices</b>	What percentage of students in target schools are receiving a minimum acceptable diet?	Parent Questionnaire	School
<b>2.1 Improved Knowledge of Health and hygienic practices</b>	What percentage of students achieve a passing score on a test of good health and hygiene?	Student Questionnaire	Student
	What percentage of parents achieve a passing score on a test of good health and hygiene?	Parent	School

<sup>12</sup> Enrollment Rate, however, is not known. This will be calculated as the number of current students enrolled divided by the school aged population in the administrative unit in which the school is located. The data on population should come from the Benin Bureau of Statistics.

		Questionnaire
<i>2.5 Increased Access to preventative health interventions</i>	How many students currently receive de-worming medication?	Principal Questionnaire

Key Questions by Source:

Students:

- EGRA Literacy tests
- test of good health and hygiene

Parents:

- Children's health-related absences
- Benefits of primary education
- Minimum Acceptable Diet of child
- Test of good health and hygiene
- Priorities for improving school infrastructure
- Percent of students who report being hungry during the day

Teachers:

- Amount of time (daily) spent on literacy lessons
- Students who regularly attend school
- Percent of students who experience health related absences

Principals:

- Teacher attendance rate
- Existence an active levels of a PTA
- Current de-worming campaigns in the schools

Classroom Observation:

- Percent of students that are attentive

### 6.3 Power Calculations

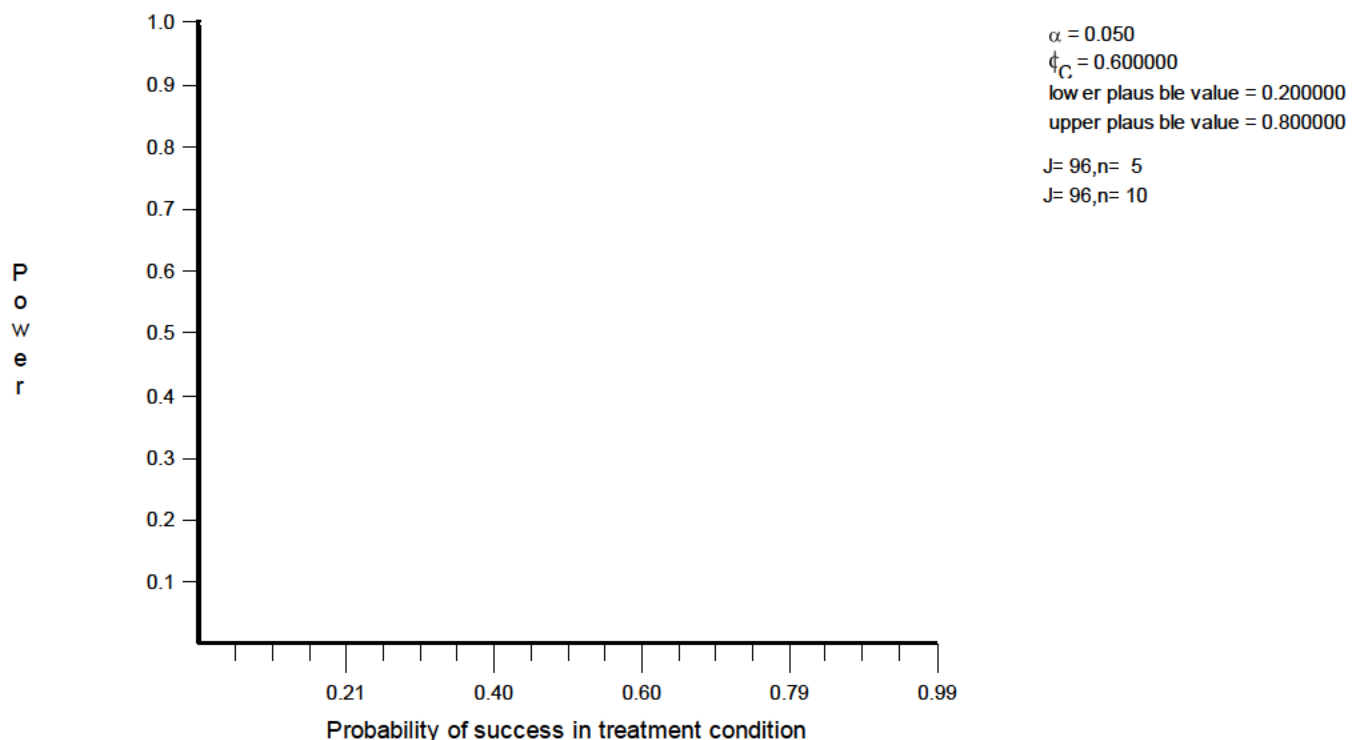
Sample sizes were determined based on a power analysis using a clustered design based on projected student performance on the EGRA test.

In the design of this study, students constitute the unit of analysis (the level at which the main outcome is measured), but the treatment will be implemented at the level of the school. The power analyses have taken into account this nested treatment model of students within schools. The outcome of interest is the “percentage of students who can read and understand grade-level text by the end of 2<sup>nd</sup> grade.” The goal of this indicator is 65%, meaning that there is a .65 probability of success for each student at the implementation schools.

Instead of assuming a baseline, we assume this end-line of .65, and observe minimal detectable change from that end-line. We also assume a level of significance at .05, and that probabilities for 95% of the students will be between .2 and .8.

These power calculations are based on 48 treatment and 48 control schools, or clusters. So using a total of 96 clusters, we have .8 statistical power to detect a change from .53 to .65 when 16 students are tested per school, or .51 to .65 when 10 are tested. This is a 12-14 percentage point increase from the baseline. This effect size is below .2 and is considered to be a modest effect, meaning that we can realistically assume that an effect of this size will be observed.

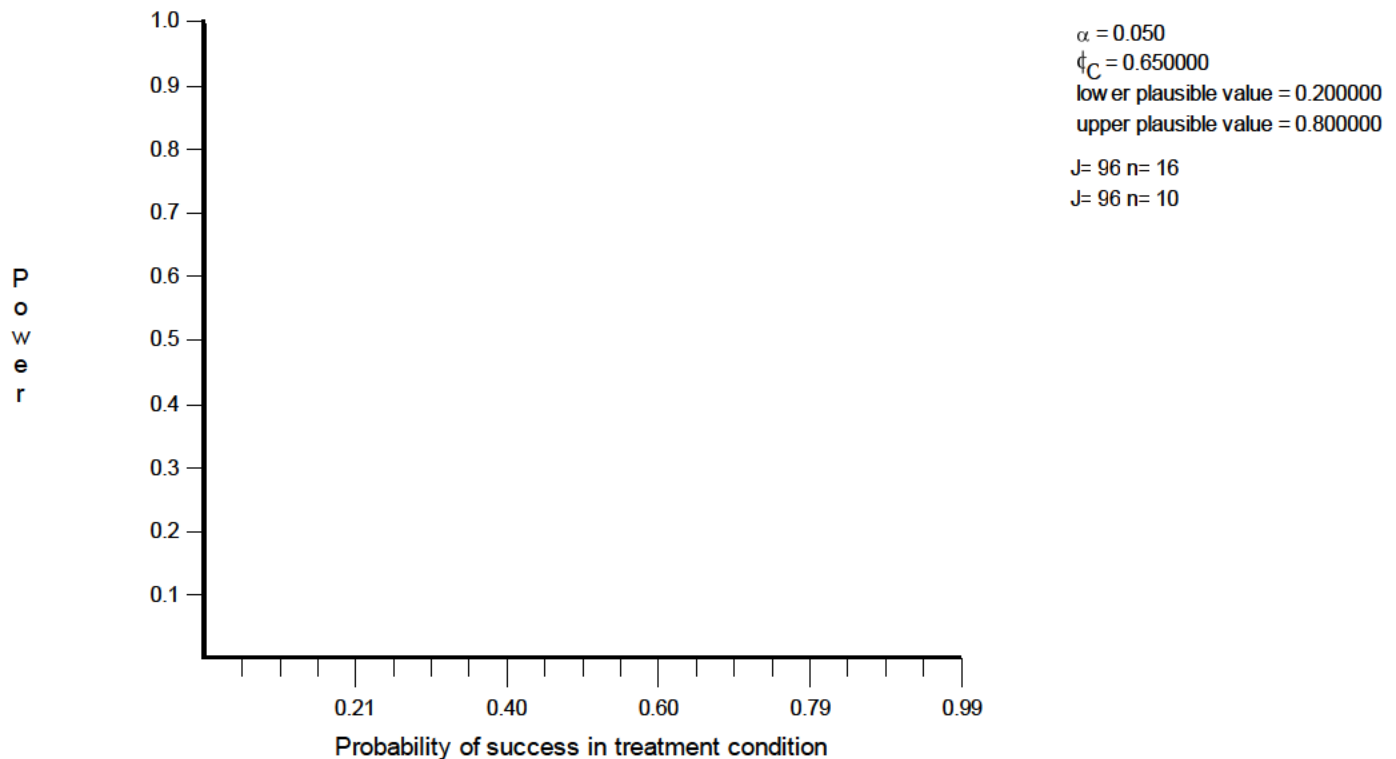
Figure 1: Power Calculations for Parent Outcomes



Because in most schools the number of first and second grade teachers is small, similar power calculations were not run this portion of the sample. Instead, we plan to survey the universe of these teachers and principals in both treatment and control schools.

For parents, the outcomes of interest are the percentage of parents who can name at least three benefits of primary education, and the percentage of parents who receive a passing score on a test of good health and hygiene. For both indicators, the goal is 60%. A similar power calculation was performed for parents. Again the cluster size is 96. Probability of success for 95% of the students will fall between .2 and .8, and level of significance is again set at .05. Using these constraints, we will have 80% power to detect a change from .43 to .6 if we survey 5 parents per school and .46 to .6 if we survey 10 parents per school. If greater than 46% of the parents succeed at the indicators at baseline, we will not be able to detect an impact of the intervention. Again, this change is relatively modest (.20 or .24 effect size, respectively), and it is realistic that the intervention will detect an effect of this magnitude.

Figure 2: Power Calculations for Students' EGRA Scores



In summary, we propose testing of the EGRA on **10-16 students per grade** in all treatment and control schools. The decision on the exact number will depend on the length of the EGRA in Benin. We further propose a questionnaire for **all first and second grade teachers**, and **all principals** in all schools. Finally, we propose a questionnaire for **5-10 parents** who have children attending each treatment and control school.

## 6.4 Summary Statistics

**Table 39: EGRA Students' Previous Education**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Attended CI (%)	12.1	10.4	1.7	79.5	82.1	-2.6
Attended CP (%)	0.6	2.5	-1.9	20.1	17.6	2.5
Not at school (%)	87.3	87.1	0.2	0.4	0.2	0.1
Attended kindergarten (%)	22.2	33.6	-11.4	27.3	30.9	-3.6

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 40: EGRA Students' Languages spoken at home**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Baatonou (%)	5.9	0.4	5.4	4.3	2.4	1.9
Bariba (%)	67.9	39.3	28.6**	74.8	41.4	33.4**
Dendi (%)	0.4	24.3	-23.9**	0.4	26.7	-26.3***
Mokole (%)	0.1	5.4	-5.3**	0.0	4.5	-4.5*
Peulh (%)	14.4	5.7	8.7*	9.7	4.0	5.7
Boo (%)	5.3	8.3	-3.0	7.1	5.7	1.4
Zarma (%)	0.4	1.5	-1.1	0.0	1.4	-1.4*
Djerma (%)	0.9	8.7	-7.8	0.4	6.9	-6.5*
Don't know (%)	0.7	0.2	0.4	1.0	0.0	0.9
Other (%)	4.5	6.6	-2.2	3.1	7.4	-4.3

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 41: EGRA Students' Reading materials**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Reading book or manual (%)	32.0	33.4	-1.3	47.1	44.1	3.0
Don't know (%)	13.4	13.0	0.4	5.7	4.7	1.0
Read books, journals, periodicals at home (%)	16.1	18.8	-2.7	22.6	27.3	-4.7
Don't know (%)	20.2	20.4	-0.2	10.7	4.5	6.2**

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 42: EGRA Students' Literacy help at home**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Father (%)	22.7	32.2	-9.5*	33.8	48.7	-14.9**
Mother (%)	13.0	18.3	-5.3	13.8	21.5	-7.8**
Brother (%)	23.0	30.6	-7.6	34.4	49.8	-15.4***
Sister (%)	13.1	22.3	-9.3*	23.0	29.6	-6.6
Other (%)	3.2	5.5	-2.3	4.3	3.6	0.7
Someone reads at home (%)	40.4	47.8	-7.4	55.9	71.4	-15.4**
Don't know (%)	23.6	23.8	-0.2	11.3	10.0	1.3

\*  $p<0.1$ ; \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

**Table 43: Who helps with homework at home**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Father(%)	7.8	15.1	-7.3*	11.9	12.9	-1.0
Mother(%)	3.8	9.0	-5.2***	5.0	9.6	-4.6
Brother(%)	14.9	13.1	1.8	19.8	28.1	-8.2
Sister(%)	7.1	7.5	-0.5	9.1	10.6	-1.4
Other(%)	2.8	7.3	-4.5	5.7	12.7	-7.1

\*  $p<0.1$ ; \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

**Table 44: After school activities**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Go to the fields (%)	21.5	16.4	5.1	23.9	22.7	1.2
Household chores (%)	22.9	33.3	-10.4	33.2	33.2	-0.1
Sell things with parents (%)	1.8	2.3	-0.5	1.4	7.1	-5.7

\*  $p<0.1$ ; \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

**Table 45: Eating at school**

Indicator	CI			CP		
	Control	Treatment	Diff	Control	Treatment	Diff
Eat during recess (%)	7.7	10.3	-2.6	3.7	3.6	0.0
Eat at school kitchen (%)	16.7	22.7	-6.0	10.9	8.4	2.6
Times per week eat at school kitchen (mean)	1.0	2.0	-1.0*	1.3	2.5	-1.2

\*  $p<0.1$ ; \*\*  $p<0.05$ ; \*\*\*  $p<0.01$

## 6.5 Calculation of Indicators

Below are the equations for all indicators in this study.

Formulas below describe the calculation of the indicator to the level of school  $j$ . Means of all indicators within the specified strata were then calculated, and weights were applied as described in the section on weighting. The notation follows a similar pattern:  $j$  refers to school,  $p$  refers to parents,  $c$  refers to classrooms,  $s$  refers to students, and  $t$  refers to teachers.

Indicator	Source	Description	Calculation
Average Teacher Attendance Rate	Principal Survey	The principal reported the number of days ( $a_{jt}$ ) teacher $t$ was absent. The reported number of days was subtracted from the total number of days last trimester (47) and divided by the total number of days to achieve the rate reported $r_{jt}$ (see the following equation). Teacher attendance rates were then averaged by school by summing all the rates and dividing by the number of teachers surveyed in school ( $n_{jt}$ ).	$r_{jt} = \frac{47 - a_{jt}}{47}$ $r_j = \frac{\sum_{t=1}^{n_{jt}} r_{jt}}{n_{jt}}$
Improved Attentiveness	Classroom Observation	$a_{jci_1}$ is the attention for student $i$ in classroom $c_1$ , and $s_{c_1}$ is the number of students observed in classroom $c_1$ . Likewise $a_{jci_2}$ is the attention for student $i$ in classroom $c_2$ and $s_{c_2}$ is the number of students observed in classroom $c_2$ . $a_j$ is the average of the two average attentiveness rates in the two classrooms observed.	$a_j = \frac{\frac{\sum_{i=1}^{n_{c_1}} a_{jci_1}}{s_{c_1}} + \frac{\sum_{i=1}^{n_{c_2}} a_{jci_2}}{s_{c_2}}}{2}$
Students who Indicate Hunger	Parent Survey	Percent of parents who indicate that their child was hungry ( $h_j$ ) at school $j$ was calculated where $h_{jp}$ is a binomial indicator of	$h_j = \sum_{i=1}^{p_j} \frac{h_{jp}}{p_j}$

		whether or not parent $p$ responded that any of his or her children were hungry during the school day last week, and $p_j$ is the number of parents on which parent $p$ provided data.	
Students who consume daily meals during the school day	Parent Survey	Percent of students who consumed a meal during the day ( $e_{jp}$ ) was calculated as a mean of means. $e_{jpi}$ is a binomial indicator of whether or not student $i$ reported hunger during the school day last week, and $s_{jp}$ is the number of children on which parent $p$ provided data.	$e_{jp} = \sum_{i=1}^{s_{jp}} \frac{e_{jpi}}{s_{jp}}$
Number of Students Regularly Attending School	Teacher Survey	The number of students regularly attending, $g_j$ was calculated by subtracting $i_{jc}$ , the number of students irregularly attending from $s_{jc}$ the total number of students in class $c$ . This number was summed across all classrooms $c$ in school $j$ .	$g_j = \sum_{jc=1}^6 (s_{jc} - i_{jc})$
Percent of Students who report a decrease in health-related absences	Teacher Survey	$h_{jc}$ is the number of students in class $c$ of school $j$ who had health-related absences. $s_{jc}$ is the total number of students in class $c$ of school $j$ . This rate was summed for all classes in school $j$ , and divided by $c_j$ , the number of classes in school $j$ to create a school-level rate of health-related absences.	$d_j = \frac{\sum_{jc=1}^6 (\frac{h_{jc}}{s_{jc}})}{c_j}$