



Literacy Boost: CERDAS Project

Endline Report

TTU (North Central Timor) & Malaka Districts

Indonesia Country Office

July 2017

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With special thanks to the team of enumerators: Abel, Ade, Antonia, Bernadus, David James, Ervilinda, Evelyando, Filipus, Fitriana, Gradiana, Janri, Lusia, Marsel, Maximus, Medelson, Meri, Oktofianus, Ronny, Victor, Yakob, Yohana, Yublinance, Yuliana, Yenny, Yunita, Beatus, Hendrikus, Almerio, Alidio, Lusi, Melkianus, Selvia, Flora, Maria, Melania, Elisabeth, Christina, Rikhardus, Bernadetha, Damianus, Yohanes, Nurhariati, Apryanus, Emiliana, Yanti, and Norbert

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Introduction

Save the Children began its Literacy Boost program in 15 schools in Malaka District and Timor Tengah Utara (North Central Timor; abv TTU) district on Timor Island (Figure 1). This program is CERDAS (Creating Early Readers for Academic Success), funded by the Ministry of Foreign Affairs and Trade (MFAT), New Zealand. CERDAS has four expected outputs: 1) improve learning environments, 2) improve capacity of teachers through training and mentoring, 3) increase community engagement through community action activities such as reading camps and parenting session, and 4) establish a strong relationship with the government at different levels to mainstream the concept of the project into local policy.

Figure 1. Administrative districts in Timor Island, Indonesia. Source: Wikipedia.



In TTU, a baseline assessment was conducted in August 2016 to examine children's literacy skills. A follow up data collection was conducted in May 2017 which assessed 467 grade 2 students, with 250 students from CERDAS intervention schools and 217 students from comparison schools. The comparison schools was chosen by looking at the similarities between characteristics of school (geographical area), and socioeconomic status of the control schools and intervention schools. Comparison schools does not receive the CERDAS program components.

To examine children's literacy skills in Malaka, a baseline assessment was conducted in August 2016. In May 2017, follow up data on 182 of the same children from CERDAS schools were collected to investigate changes in Malaka students' reading skills. The endline survey just covered the intervention schools because the baseline study had shown that CERDAS students had better socioeconomic traits compared to the comparison schools, and therefore the groups were not very comparable. Therefore, the comparison group was not surveyed again at endline, and only the literacy gains for CERDAS students were analyzed.

The endline assessment in both districts took place in the month of May 2017, Appendix A details the activities and the dates of the intervention components that had been implemented by Save the Children in the time between the baseline and endline assessments.

Research objectives

The key research questions to be explored in this report include:

1. At endline, how comparable are learners in CERDAS schools versus comparison schools in terms of reading skills, background characteristics, and home literacy environment?
2. What can the endline data tell us about learners' emergent reading skills? What does this mean for Literacy Boost programming?
3. What was the impact of the CERDAS program during the 9 months of program implementation from baseline to endline?
4. How do learners' endline reading skills vary according to their backgrounds, home literacy environment, and other dimensions of equity? What does this mean for targeting the CERDAS program?

Methodology

Sampling

In TTU, the 2017 CERDAS sample included 467 students including 250 CERDAS students (132 boys, 118 girls) and 217 comparison school students (124 boys, 93 girls) who were enrolled in grade 2 in 15 CERDAS intervention schools and 13 comparison schools. In all schools where data was collected, 20 children in grade 2 were sampled. If there was more than one classroom of grade 2 at a given school, one classroom was randomly selected. Ten boys and ten girls were randomly selected where there were more than 20 learners in the classroom. All of sampling on this study were the same students as in the baseline student. Therefore, this study will report on average scores and learning gains for student present at both the baseline and endline assessment.

In Malaka, the 2017 CERDAS sample included 182 students (90 boys, 92 girls) who were enrolled in grade 2 in 15 CERDAS intervention schools. In all schools where data was collected, 20 children in grade 2 were sampled. If there was more than one classroom of grade 2 at a given school, one classroom was randomly selected. Ten boys and ten girls were randomly selected where there were more than 20 learners in the classroom. All of sampling on this study were the same students as in the baseline student. Therefore, this study will report on average scores and learning gains for student present at both the baseline and endline assessment.

Data collection tool

The assessment tool used for 2017 data collection was the same as was used for the baseline data collection in 2016, with the exception of a different reading passage and students' participation in community reading activities such as Reading Camp and Book Bank. Table 1 gives an example of background indicators as well as a detailed description of reading indicators.

Table 1. CERDAS assessment instruments.

Student background	Examples
General	Sex, age, language spoken at home
School-related	Previous ECD attendance, repetition history
Socioeconomic status	Type of home, household size, household amenities/possessions
Participation in community reading activities	Reading practice, Participation in reading camp, book creation and book bank activities
Home Literacy Environment	
Access to print	Materials present in home, types of materials
Reading activities at home	Study and reading practice at home, Presence and percentage of family members who children see read, and who engage in literacy activities with children
Reading Outcome	Description
Alphabet knowledge	Number of letters/sounds known of 26
Single word reading	Number of single words read correctly of 20
Decoding skills	Number of invented words read correctly of 20
Fluency	Number of words in a short story read correctly in a minute
Accuracy	Percentage of words in a short story read correctly
Comprehension	Questions related to short story read aloud by student
Teacher's LB strategies	
LB strategies	Labelling, story telling, education material usage,

The instructions for this study were given in Bahasa Indonesia and some in Bahasa Dawan, Bahasa Tetun, or any local dialect that children most speak of.

Data analysis

This analysis has two purposes. First, we will investigate the literacy skills of Literacy Boost learners and comparison learners in 2017. The second purpose is to assess what skills the students currently have, and what areas and skills Literacy Boost should focus on for the remainder of the program.

This report will use comparison of means through two-tailed t-test to assess the comparability of the CERDAS and Comparison groups at baseline and endline. Multilevel mixed models will be used to explore relationships between literacy skills and students' background characteristics, including the home literacy environment. Finally, this report also investigates the impact of Literacy Boost on CERDAS students.

Results

Endline sample characteristics

TTU district

The average age of CERDAS students are 7.74 years old while for comparison school students are 7.81 years old. In both CERDAS and comparison school, mostly students speak Bahasa Indonesia and Dawan as their native mother tongue. More than half of both students in CERDAS and comparison schools attended early-childhood development (ECD) programs. Students who repeated grade 1 in CERDAS schools were lesser than in comparison school. However, more students who repeated grade 2 in CERDAS schools than in comparison schools. There is significance different between student who repeated grade 1 in CERDAS and comparison schools.

Table 2. Student characteristic and language usage by students in home, by group (baseline vs endline)

Students Background	Baseline 2016			Endline 2017		
	Literacy Boost	Comparison	Significant Difference	Literacy Boost	Comparison	Significant Difference
Number of sample size	273	236		250	217	
Average age	7.31	7.20		7.74	7.81	
% of students who are female	45%	43%		47%	43%	
% who attended ECD	79%	80%		83%	77%	
% who attended TPA	0%	0%		n/a	n/a	
% who attended TK	37%	57%	*	n/a	n/a	
% who attended PAUD	54%	35%	*	n/a	n/a	
% who repeated Grade 1	24%	32%	*	22%	33%	*
% who repeated Grade 2	8%	6%		12%	9%	
% of students doing chores at home	98%	95%		n/a	n/a	
% who speak Bahasa Indonesia at home	63%	63%		88%	85%	
% who speak Tetun Terik at home	3%	7%		0%	0%	
% who speak Tetun Portu at home	0%	0%		0%	0%	
% who speak Bahasa Dawan at home	52%	53%		70%	63%	
% who speak Tetun Fehan at home	1%	2%		0%	0%	

Significance levels: * $p < 0.05$

On average, students have four of nine common amenities in the region (electricity, latrine, television, refrigerator, bicycle, motorcycle, computer, AC, and radio). The socioeconomic status of CERDAS schools and control schools tend to be the same. More than eighty percent of CERDAS and comparison school students revealed they have electricity at home and most all of them have latrine.

The possession of motorcycle was increase from baseline 2016 in both group with 54% of students in CERDAS and comparison schools revealed they have motorcycle at the endline 2017.

Table 3. TTU students' socioeconomic status, by group (Intervention School vs comparison school)

Socioeconomic Status	Baseline 2016			Endline 2017		
	Literacy Boost	Comparison	Significant Difference	Literacy Boost	Comparison	Significant Difference
Number of sample size	273	236		250	217	
% who have zinc roof	91%	89%		n/a	n/a	
% who have electricity	88%	86%		89%	89%	
% who have latrine	96%	97%		94%	95%	
% who have TV	56%	56%		61%	61%	
% who have refrigerator	21%	24%		22%	22%	
% who have bicycle	20%	21%		20%	26%	
% who have motorcycle	47%	49%		54%	54%	
% who have computer	13%	12%		13%	10%	
% who have AC	3%	1%		2%	2%	
% who have radio	17%	15%		17%	13%	

Significance levels: * $p < 0.05$

Malaka district

In Malaka, the average age of CERDAS students is 8.23 years old. Students mostly speak Bahasa Tetun Fehan and Bahasa Indonesia as their native mother tongue. More than half of both students in CERDAS attended early-childhood development (ECD) programs.

On average, students have three of nine common amenities in the region (electricity, lantrine, television, refrigerator, bicycle, motorcycle, computer, AC, and radio). The socioeconomic status tend to be better in some aspects in CERDAS schools. Eighty percent of students revealed they have electricity at home and 65% of them have lantrine and more than half of students have TV and motorcycle.

Table 4. Malaka district: Student characteristic and language usage by students in home, by group (baseline vs endline)

Students Background	Baseline 2016			Endline 2017	
	Literacy Boost	Comparison	Significance Difference	Literacy Boost	Significant Difference
Number of sample size	273	236		250	
Average age	7.42	7.67	*	8.23	

% of students who are female	51%	44%		51%	
% who attended ECD	69%	56%	*	66%	
% who attended TPA	0%	0%		N/a	
% who attended TK	45%	42%		N/a	
% who attended PAUD	32%	30%		N/a	
% who repeated Grade 1	43%	45%		35%	
% who repeated Grade 2	6%	11%		12%	
% of students doing chores at home	93%	91%		N/a	
% who speak Bahasa Indonesia at home	42%	26%	*	42%	
% who speak Tetun Terik at home	0%	0%		0%	
% who speak Tetun Portu at home	0%	0%		0%	
% who speak Bahasa Dawan at home	21%	18%		20%	
% who speak Tetun Fehan at home	63%	68%		65%	

Significance levels: * $p < 0.05$

Table 5. Malaka district: Student socioeconomic status, by group (Intervention School vs Comparison School)

Socioeconomic Status	Baseline 2016			Endline 2017	
	Literacy Boost	Comparison	Significance Difference	Literacy Boost	Significant Difference
% who have zinc roof	82%	79%		n/a	
% who have electricity	70%	50%	*	80%	
% who have latrine	64%	48%	*	65%	
% who have TV	47%	31%	*	54%	
% who have refrigerator	15%	6%	*	8%	
% who have bicycle	22%	10%	*	23%	
% who have motorcycle	40%	29%	*	52%	
% who have computer	8%	5%		3%	
% who have AC	4%	0%	*	0%	
% who have radio	14%	7%		8%	

Significance levels: * $p < 0.05$

Home literacy environment

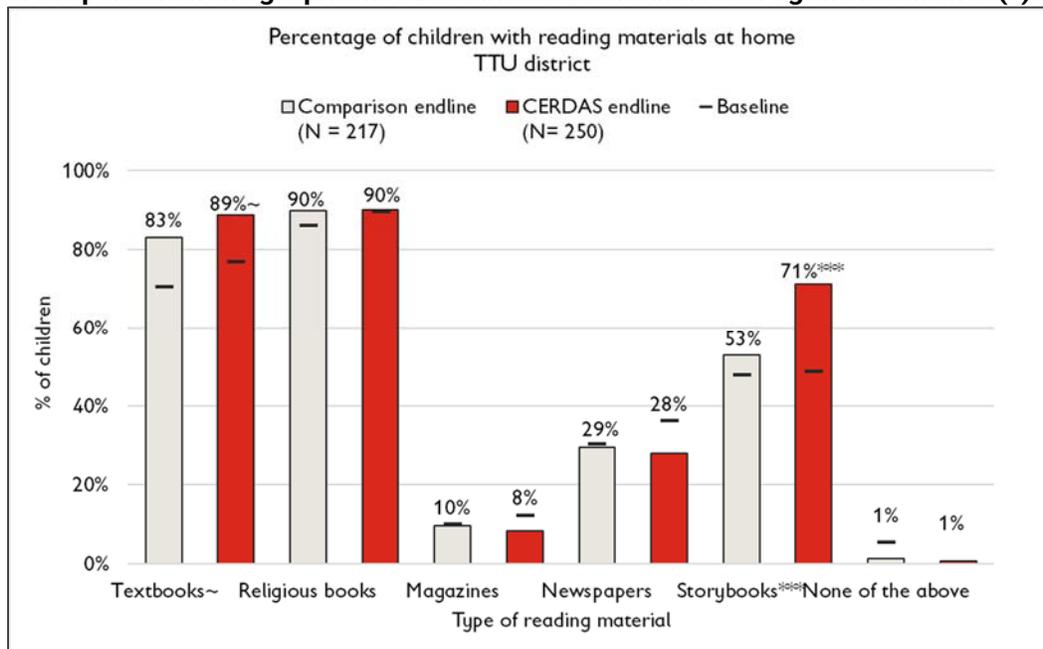
An important aspect of reading development concerns the home literacy environment (HLE). How are children exposed to the printed word in the home? How much access do they have to books and print to practice their nascent reading skills? Many Literacy Boost activities are centered on helping parents and communities to enhance the HLE. As such, it is important to measure where learners' HLEs begin, and how they change over the course of time. This section describes the different types of printed materials that students had at home at baseline and endline and the different types of literacy-supporting activities they are involved in with their household members.

TTU district

In TTU district, 99% of both CERDAS and comparison students reported having at least one kind of reading material at home at endline, compared to 98% at baseline for the CERDAS students and 94% at baseline for the comparison group (

Figure 2). At endline, a significantly higher proportion of CERDAS students report having textbooks and storybooks at home compared to comparison students—almost three-quarters (71%) of CERDAS students have storybooks at home. Most students (90% overall) also report having religious books at home while fewer have newspapers (29% of students overall) or magazines (9% of students overall).

Figure 2. Reading materials at home at baseline and endline, TTU district. Endline percentages are reported on the graph while baseline value are indicated by the black lines (—) on each bar.



Significant endline differences between CERDAS and Comparison: ~ $p < 0.1$, *** $p < 0.001$

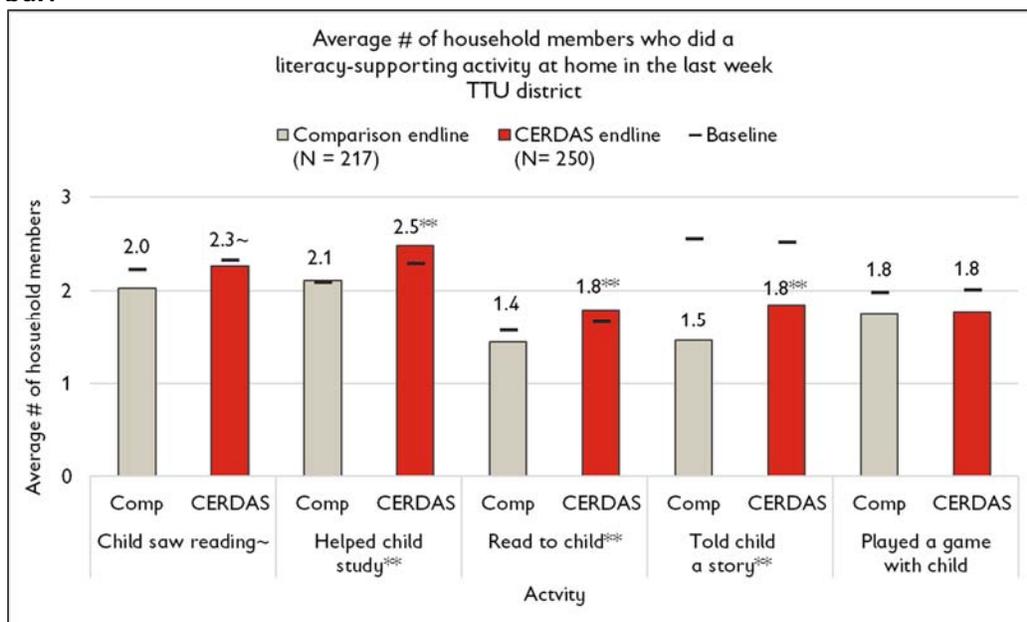
The HLE is not only about materials in the home, but how those materials are used to engage the child in reading and learning. Hess and Holloway (1984) identified five dimensions of the home literacy environment that are theoretically related to reading achievement in children. The first is value placed on literacy, which we operationalize by asking the learners whether they see anyone reading at home. The second is press for achievement, which we operationalize as individuals telling or helping the

student to study. The third is the availability of reading and print materials, which we operationalize as the amount of printed materials at home (see Figure 2 above). The fourth dimension is reading with children, which we operationalize by asking the learners whether anyone reads to them at home. The last is opportunities for verbal interaction, which we operationalize as family members telling stories to learners. Finally, we also ask about household members playing games with children which can stimulate their learning and development.

Figure 3 shows how the CERDAS and comparison groups measure up in terms of engagement in these five home literacy environment activities. At endline, CERDAS students reported having seen more household members reading in the last week, on average, and they also reported a significantly higher number of household members who had helped them study, read to them, or told them a story in the past week, compared to students in the comparison group.

One interesting trend in this figure is that the number of family members who told a story and played a game with the child in the last week decreased from baseline to endline. Consultation with the program team revealed that this may have been due to the timing of the endline assessment—it took place during the harvesting month, and it is possible that parents and family members were less engaged with children at home during this time because of their work obligations.

Figure 3. Number and types of activities at home at baseline and endline, TTU district. Endline values are reported on the graph while baseline value are indicated by the black lines (–) on each bar.



Significant endline differences between CERDAS and Comparison: ~ p < 0.1, ** p < 0.01.

Malaka district

In Malaka district, 96% of CERDAS students interviewed at endline have at least one type of reading material at home, compared to 92% at baseline (Figure 4, note the different sample sizes at endline compared to baseline, due to attrition). About the same proportion of CERDAS student have storybooks at home at endline (49%) compared to baseline

(50%). This could be because of a lower availability of storybooks for purchase in Malaka district—according to the CERDAS program team, it is difficult to buy storybooks in Malaka and children would borrow the books from the reading camp instead of having their own storybooks at home.

In terms of literacy-supporting activities in the home, the average number of household members who had told a story or played a game with the student decreased from baseline to endline (Figure 5) while household members' involvement in the other activities stayed about the same. This decrease could be due to the increased workload that occurs during harvesting time, as explained above with the TTU results.

Figure 4. Reading materials at home at baseline and endline, Malaka district (CERDAS students only).

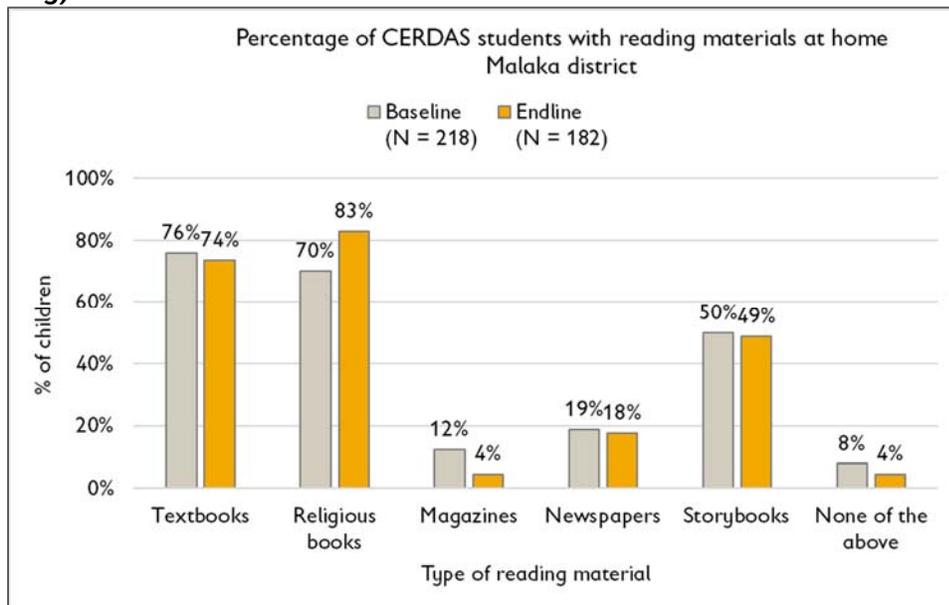
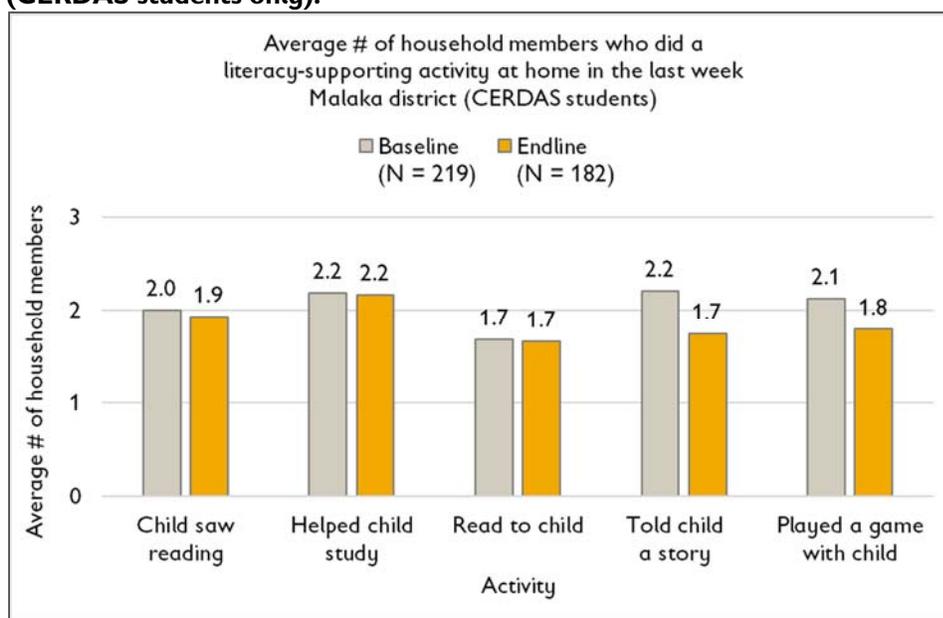


Figure 5. Number and types of activities at home at baseline and endline, Malaka district (CERDAS students only).



Participation in community reading activities

TTU district

In TTU district, more than sixty percent of students who were assessed had borrowed a book either from book bank, reading camp or reading corner in the class (Table 6). On a average they borrowed books 2.4 times in the past week. Almost sixty percent of students who were assessed participated in a reading camp an average of 2.2 times in the past a week. Fifty percent of them did make and take activities in the reading camp. More than half of students revealed their parents attended a parents meeting that was conducted by Save the Children in schools. More than sixty percent students have participated in a child event like a reading competition at their school.

As noted in Table 6, some students from the comparison group also report participation in program activities. The CERDAS program team feels that these responses were given by children who did not understand that the activities in question were specific to the Literacy Boost program—they were instead interpreting them to refer to general activities organized by their school, such as libraries and parent meetings. In the case of reading camps, there were about 7 CERDAS schools located in the same village as a school from the Comparison group, and it is possible that there was some cross-contamination of Comparison students who attended a reading camp.

Table 6. Participation in community reading activities.

Participation in Community Reading Activities	Baseline 2016		Endline 2017	
	Literacy Boost	Comparison	Literacy Boost	Comparison
% who borrow from book bank	n/a	n/a	66%	27%

Freq borrowing books	n/a	n/a	2.4	1.9
% who participated in reading camp	n/a	n/a	59%	17%
Freq participated in reading camp	n/a	n/a	2.2	2.2
% who doing make and take	n/a	n/a	50%	29%
% parents who participated in parents meeting	n/a	n/a	54%	19%
% who participated in child event	n/a	n/a	67%	26%

Malaka district

In Malaka district, more than half of assessed student borrowed books either a book bank, reading camp, or reading corner in the class (Table 7). On a average they borrowed books 2.1 times in the past week. Sixty percent of assessed students participated in reading camp and average of 2.1 times in the past week. More than thirty percent of them reported doing make and take activities on reading camp. More than sixty percent of students students revealed their parents attend the parents meeting that was conducted by Save the Children in schools. More than fifty percent students have participated in a child event like a reading competition at their school.

Table 7. Participation in community reading activities, only Literacy Boost Schools

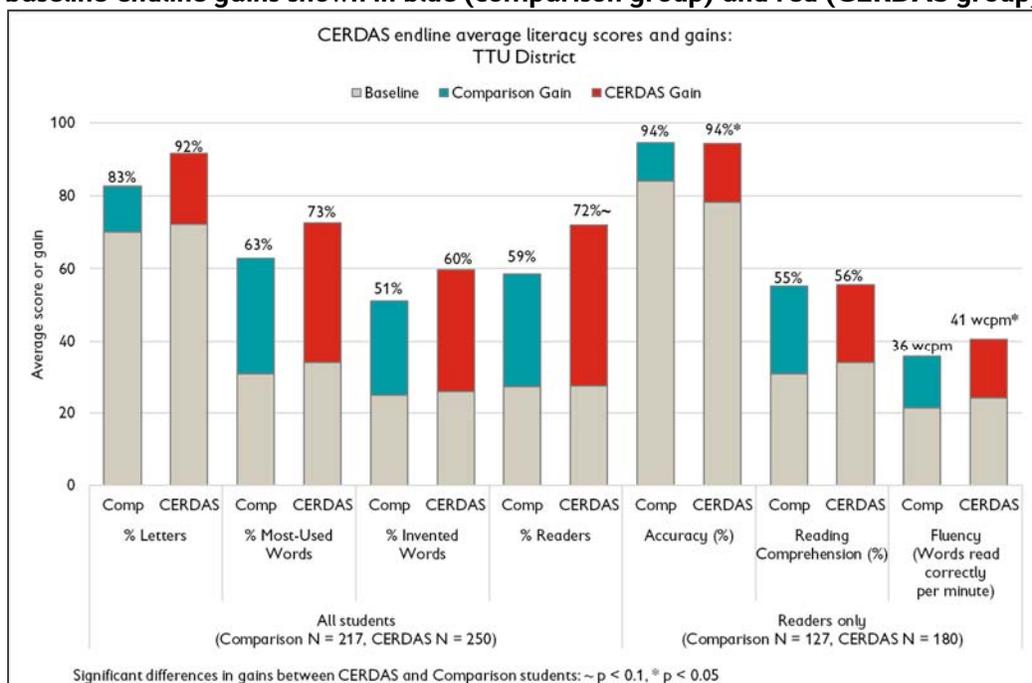
Participation in Community Reading Activities	Baseline 2016		Endline 2017
	Literacy Boost	Comparison	Literacy Boost
% who borrow from book bank	n/a	n/a	55%
Freq borrowing books	n/a	n/a	2.1
% who participated in reading camp	n/a	n/a	60%
Freq participated in reading camp	n/a	n/a	2.1
% who doing make and take	n/a	n/a	32%
% parents who participated in parents meeting	n/a	n/a	63%
% who participated in child event	n/a	n/a	56%

Endline reading skills

TTU district: Endline skills and clustered t-test results

Since students from the comparison group in Malaka were not assessed at endline, gains in reading skills can only be statistically compared for TTU students. For the first stage of analysis here, clustered t-tests were used to compare the reading gains of students in the CERDAS group to those of the students in the comparison group in TTU, with standard errors clustered at the school level. TTU students’ average endline skills and gains are shown below in Figure 6. From baseline to endline, CERDAS students made significantly greater gains than comparison students in the advanced reading skills of fluency and accuracy, and a greater proportion of CERDAS students became readers.

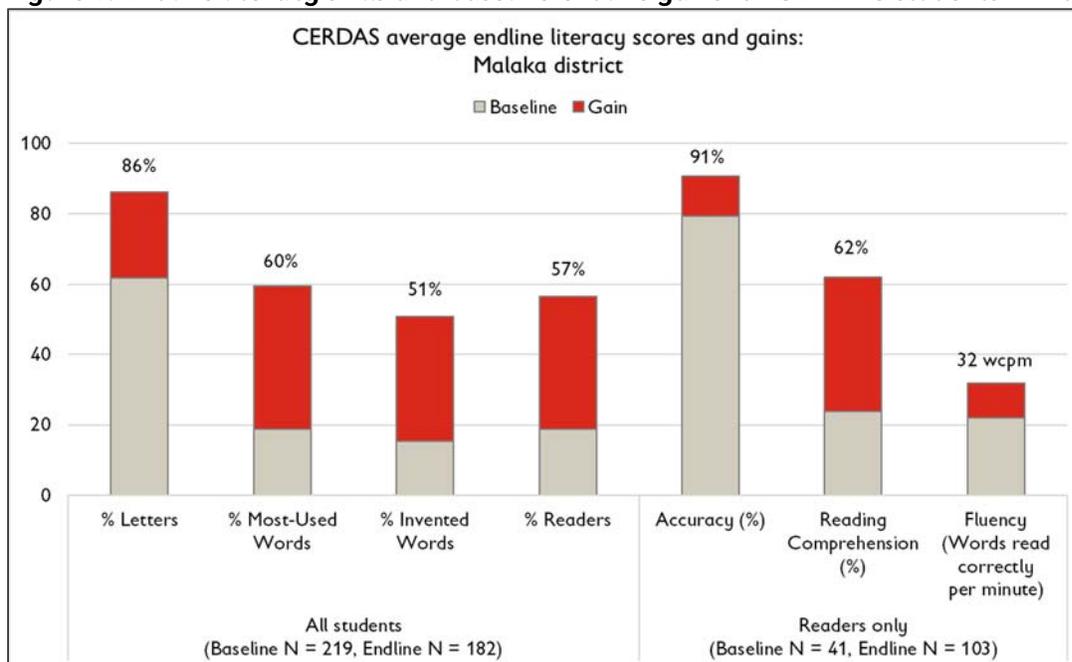
Figure 6. Average endline literacy skills of CERDAS and comparison students in TTU, with baseline-endline gains shown in blue (comparison group) and red (CERDAS group).



Malaka district: Endline literacy skills and gains

In Malaka district, we cannot statistically compare the gains in the CERDAS group to those in a comparison group, but we can still examine the gains for CERDAS students over time. CERDAS students' average endline literacy skills and their baseline-endline gains are shown below in Figure 7. By endline, 57% of the grade 2 CERDAS students in Malaka district were readers, compared to only 19% of the students at baseline.

Figure 7. Endline literacy skills and baseline-endline gains for CERDAS students in Malaka district.



Program indicators

Table 8 below displays the baseline and endline values for two key CERDAS program indicators, the percentage of Grade 2 CERDAS students that can read at least 35 words correctly per minute (34% in TTU and 19% in Malaka) and the percentage of Grade 2 CERDAS students that can answer at least 6 of 10 comprehension questions (39% in TTU and 34% in Malaka).

Table 8. Literacy indicators for TTU and Malaka samples.

Indicator	TTU		Malaka	
	Baseline	Endline	Baseline	Endline
% of Grade 2 students able to read a minimum of 35 words per minute	5%	34%	4%	19%
% of Grade 2 students who can answer at least 6 of 10 comprehension questions	7%	39%	4%	34%
N	250	250	219	182

Impact analysis (TTU district)

The last three sections of this analysis focus only on students in TTU district, since in this district we were able to track both groups of CERDAS and comparison students from baseline to endline. First, we look at the average impacts of the CERDAS program on different literacy skills using multilevel mixed effects regression models. In the equity analysis section, we consider three factors that are also significantly correlated with literacy skills—students’ sex, socioeconomic status, and home language. Finally, in the “struggling students” analysis we use mixed effects logistic regression models to explore the factors that make students more likely to be non-readers.

Regression analysis results

In a previous section we explored differences in literacy skill gains for the CERDAS and comparison students in TTU district. To take this analysis further, multilevel mixed effects regression models were fit to estimate the average impact of the CERDAS program while controlling for students’ sex, age, and other relevant demographic factors. The full regression output is available in Appendix B, and program impacts are summarized below in Table 9. This analysis reveals statistically significant impacts of the CERDAS program on students’ letter knowledge, reading fluency, and reading accuracy. In terms of effect sizes, exposure to the CERDAS program was equivalent to an additional 2.3 months of learning for CERDAS students in terms of their fluency and accuracy skills and an additional 3.2 months of learning for CERDAS students in terms of letter knowledge. To put this a different way, it means that it would take students in the comparison group 2.3-3.2 additional months of learning to catch up to CERDAS students’ current skill levels in these domains.

Table 9. CERDAS impacts by literacy skill TTU district. The fourth column explains the effect size of the CERDAS program in terms of additional months of learning; for example, it will take

students in the comparison group 3.2 additional months of learning to catch up to the CERDAS students' current skill level on the Letters test.

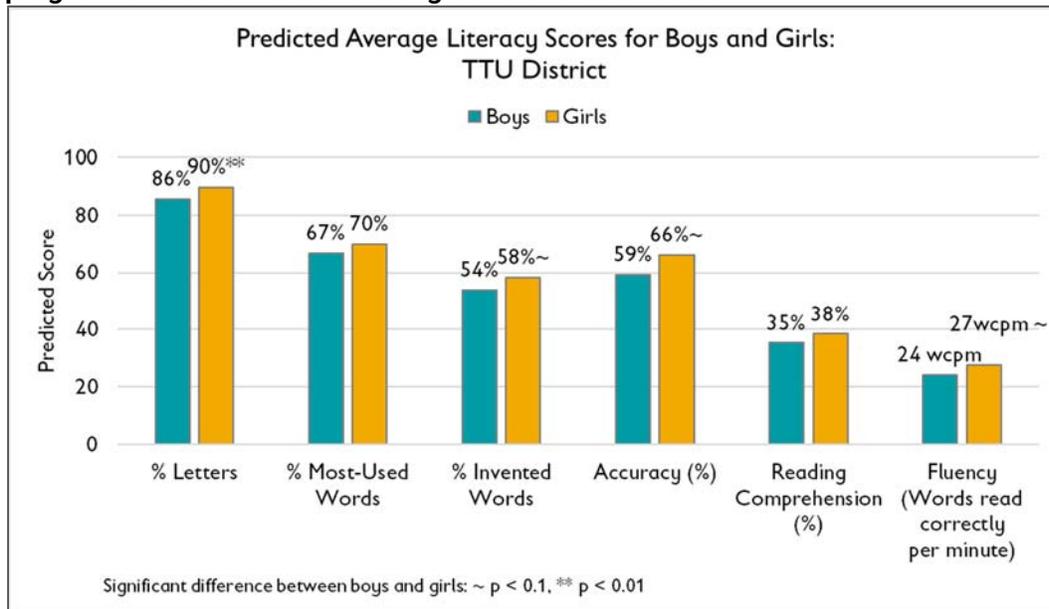
Skill	CERDAS effect size	Significance	Equivalent additional months of learning for CERDAS students
% Letters	0.35	**	+3.2
% Most-Used Words	0.18	None	+1.7
% Invented Words	0.17	None	+1.5
Fluency (All)	0.26	*	+2.3
Accuracy (All)	0.25	~	+2.3
Reading comprehension (Readers only)	0.18	None	+1.7
Significance: ~ p < 0.1, * p < 0.05, ** p < 0.01, assumes 9 months of program implementation			

Equity analysis (TTU district)

Gender

The same regression models fit above also reveal certain background characteristics that are statistically significantly correlated with students' performance. The first is sex: controlling for exposure to the CERDAS program and other relevant background factors, girls score statistically higher than boys on the letter knowledge and invented words sub-tests, and they also read with greater fluency and accuracy (Figure 8). From a practical standpoint, the gap between boys' and girls' literacy skills is not very large (for example, there is only a 4 percentage-point difference on the letters and invented-words sub-tests), but it is still interesting to note that girls seem to be outpacing boys in the acquisition of several key reading skills.

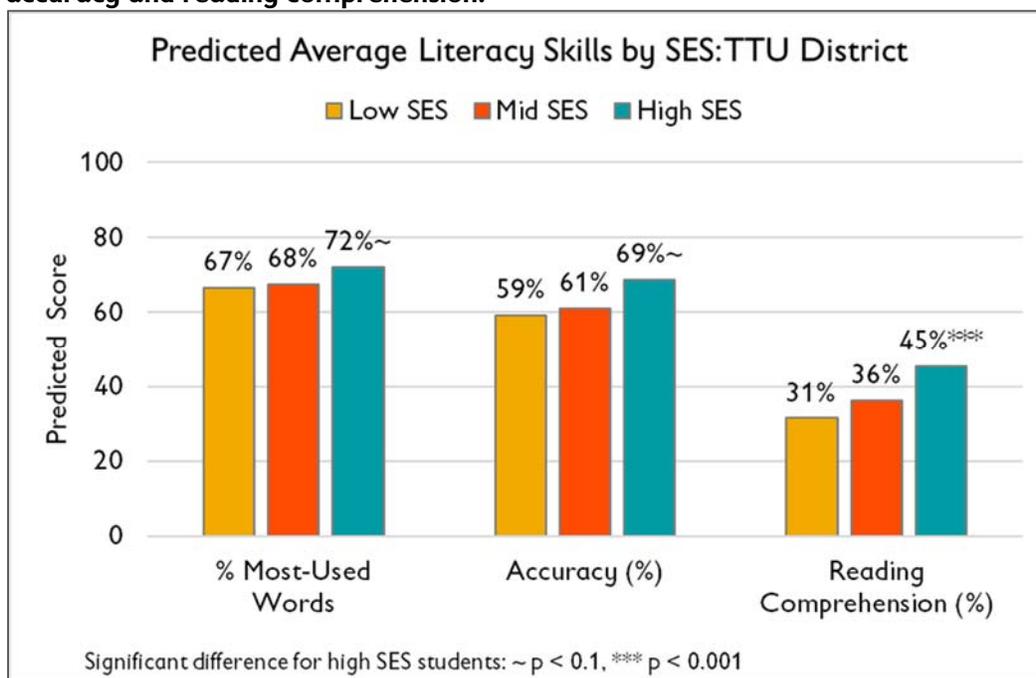
Figure 8. Predicted average literacy skills by sex, controlling for exposure to the CERDAS program and other relevant background characteristics.



Socioeconomic status

Figure 9 reveals how socioeconomic status (SES) is statistically correlated with three of the reading skills that were tested in the TTU sample: word recognition, accuracy, and reading comprehension. Students from the top socioeconomic group (as measured by the different types of possessions they have at home) scored statistically higher on the most-used words sub-test and had statistically higher reading accuracy and comprehension compared to students in the bottom two-thirds of SES.

Figure 9. Predicted average literacy skills by socioeconomic status, controlling for exposure to the CERDAS program and other relevant background factors. Students from the top third socioeconomic group score statistically higher on most-used words sub-test and on reading accuracy and reading comprehension.



There are likely a variety of reasons why high-SES students have higher reading skills. Upon learning these results the CERDAS program team decided to investigate whether high-SES students also have more reading materials at home and more learning interactions with household members. And, in fact, this hypothesis is true: analysis-of-variance tests reveal that students from high SES background also have a higher number of reading materials at home and participate in more learning activities with their household members. This signals that there may be critical differences in these students' environments that give them an education advantage over students from lower socioeconomic groups.

Table 10. Analysis-of-variance results comparing reading materials and interactions at home for students in the low-, mid- and high-SES groups.

Group	Average # of Types of Reading Materials at home Nreadmats	Average # of learning interactions at home in the last week
Low SES	2.2	9.8
Mid SES	2.4	10.2
High SES	3.2***	12.4**
N	466	466

Significant difference for high-SES students vs. others: ** p < 0.01, *** p < 0.001.

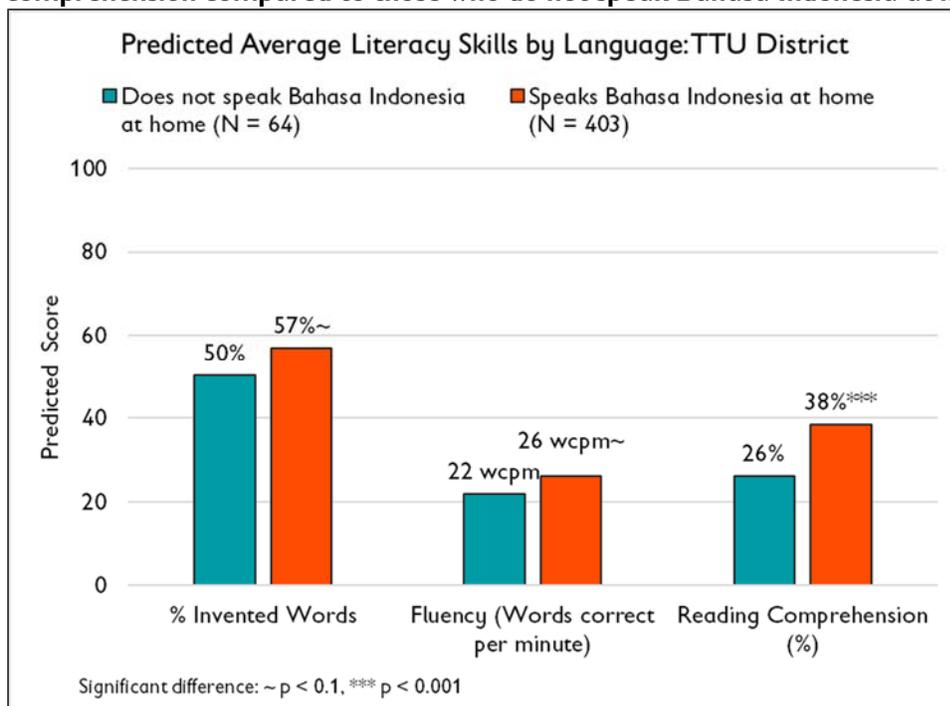
Language

Finally, whether or not a student speaks the language of instruction (Bahasa Indonesia) at home is also predictive of several of his or her literacy skills, regardless of age, sex, gender, participation in the CERDAS program, and other background factors. As shown below in Figure 10, children who speak Bahasa Indonesia at home score statistically higher, on average, on the invented words sub-test and

on reading fluency and comprehension compared to students who do not speak Bahasa Indonesia at home.

Save the Children in Indonesia encourages teachers to use mother tongue languages where appropriate in the classroom to help students learn. Even though we see from Figure 10 that there is a gap in some reading skills for students who only speak mother tongue languages at home, this is possibly a smaller gap than it would be if mother tongue were not used at all in the classroom.

Figure 10. Predicted average literacy skills by home language, controlling for exposure to the CERDAS program and other relevant background factors. Students who speak Bahasa Indonesia at home score statistically higher on the invented words sub-test and on reading fluency and comprehension compared to those who do not speak Bahasa Indonesia at home.



Typology of struggling students

For the final analysis in this report, we fit a multilevel mixed effects logistic regression model to investigate the factors that are significantly correlated with being a “struggling student” at endline—for the purpose of this analysis, being a “struggling student” means being classified as a “nonreader.” We used the longitudinal sample from TTU district for this analysis. The full regression output is available in Appendix B.

Factors that are predictive of a student being a nonreader at endline include sex, grade repetition, the number of literacy activities done with household members at baseline, the number of days of school the student had missed in the past week at baseline, and whether or not the student speaks Bahasa Indonesia as one of his or her home languages (see Appendix B). The relationships between reading status and three of these characteristics are displayed below in Figure 11. For example, not speaking Bahasa Indonesia at home increases the probability of a student being a non-reader by 17 percentage points (from 30% to 47%), when all other predictive factors are held constant. Being a boy instead of a

girl increases a student's probability of being a nonreader from 27% to 38%, and having repeated a grade increases a student's probability of being a nonreader from 29% to 40%.

It is also informative to consider how having more than one of these characteristics could signal that a student is at a disadvantage compared to his peers (i.e., has a higher likelihood of being a nonreader). This is illustrated in Figure 12. Students who are male, have repeated a grade, and do not speak the language of instruction as their home language are **almost three times as likely** as their peers to be a nonreader. These typologies could be informative for the CERDAS program going forward, because they can give the implementation team a way to identify students who may need more in-depth support to become efficient and effective readers. The effects of missing school and engaging in fewer literacy activities at home are not part of the illustrative examples in Figures 10 and 11 below, but our analysis suggests that these characteristics may also signal a students' vulnerability to being a struggling reader.

Figure 11. Illustrative examples of demographic characteristics that statistically predict whether a student is a reader or a nonreader at endline.

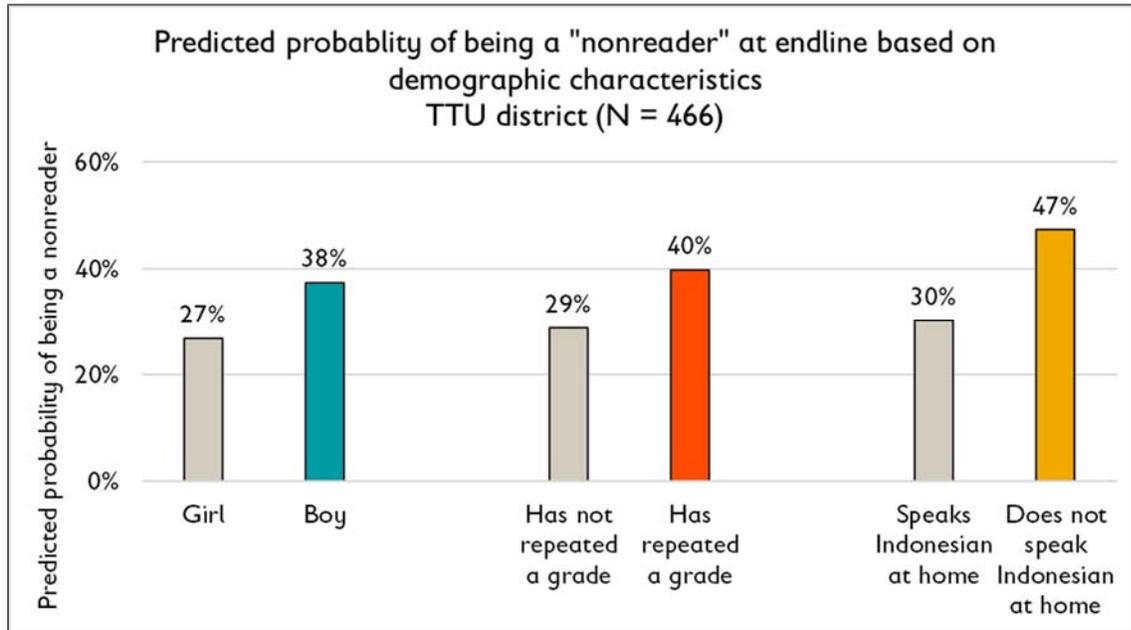
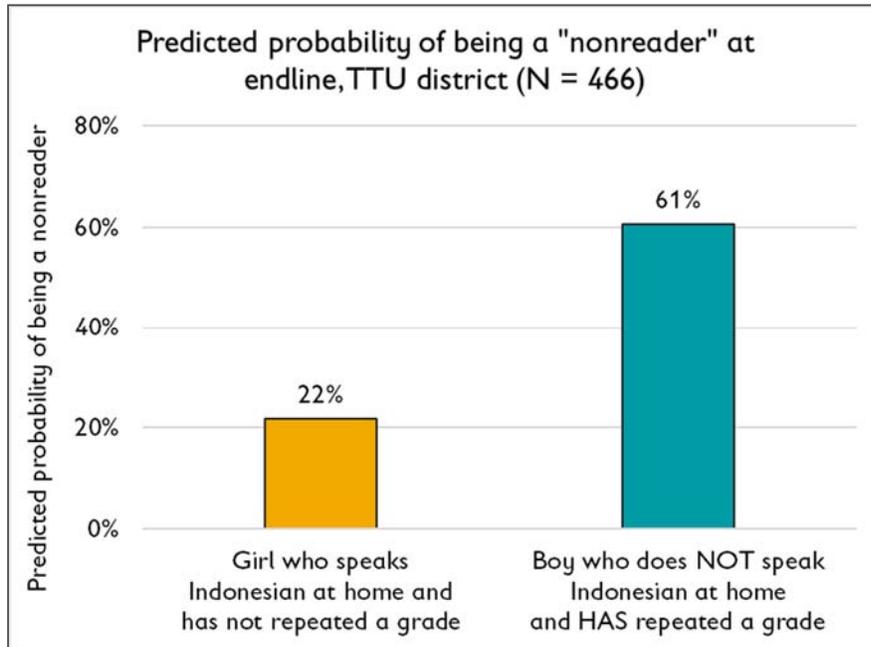


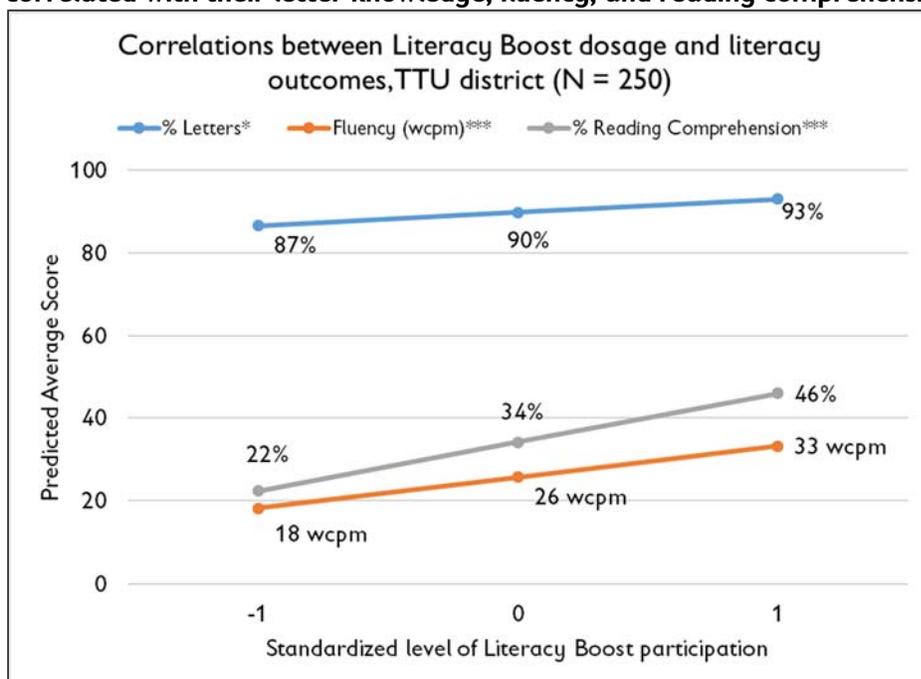
Figure 12. Students who are male, have repeated a grade, and do not speak the language of instruction as their home language are almost three times as likely as their peers to be a nonreader at endline.



Correlation between community activities and learning

Finally, after seeing the impact results in TTU, the CERDAS program team was interested to know if students' level of engagement in Literacy Boost activities is significantly correlated with their learning. To answer this question, multilevel mixed models were used to investigate the correlation between the level of "dosage" of Literacy Boost and three literacy outcomes: Letter Knowledge, Fluency, and Reading Comprehension. Literacy Boost "dosage" was calculated as the standardized number of activities a CERDAS students had reported participating in, out of 3 (book banks, reading camps, and a child event at the school). Figure 13 below displays the results of this investigation. Controlling for other background factors, CERDAS students' level of exposure to Literacy Boost community activities is significantly positively correlated with their learning outcomes in all three skills. This is not necessarily a causal relationship (we cannot prove that participation in Literacy Boost community activities causes these literacy outcomes) but it still provides a good advocacy point for continuing the community activities of the CERDAS program.

Figure 13. CERDAS students' level of participation in community activities is significantly correlated with their letter knowledge, fluency, and reading comprehension.



Significant correlation between participation and literacy outcome: * $p < 0.05$, *** $p < 0.001$.

Key Findings and Program Recommendations

Key findings

The key findings of all of the analyses in this report are summarized below:

Home Literacy Environment

- In TTU, there was an increase in the proportion of children with storybooks in the home from baseline to endline, and it is a statistically significant difference between the CERDAS group (71%) and Comparison group (53%), which suggests that the CERDAS program has increased storybooks in the home for students in TTU.
- In Malaka, the proportion of children with storybooks in the home stayed about the same between baseline and endline for CERDAS students. This is possibly due to lower accessibility of storybooks in Malaka district. Children may borrow storybooks from reading camp but do not have storybooks of their own at home.
- In both districts, there were gains in some types of learning interactions at home and decreases in others. This could be due to the busy harvest season that was occurring during endline data collection.

Participation in community activities

- In both districts, CERDAS' students reported participation in LB activities is good, but there is room for improvement (For example, in TTU, 66% have borrowed from the book bank in the past week, 59% did reading camp, 54% of parents have participated in a parents' meeting, etc.)
- In TTU district, children's level of participation in community activities is significantly correlated with reading gains.

Literacy Boost impact:

- In TTU district, the CERDAS program significantly increased students' letter knowledge, reading fluency, and reading accuracy, with the biggest effect being on letter knowledge (effect size: 0.35 SD). The effect sizes are only small-to-medium, but since there was only 9 months of implementation before endline, this is still notable progress for the CERDAS program.
- 34% of CERDAS students in TTU and 19% of students in Malaka have met the target for fluency (reading at least 35 words correct per minute), and 39% of CERDAS students in TTU and 34% of students in Malaka have met the target for reading comprehension (at least 6 out of 10 questions correct).

Equity:

- Girls are slightly ahead of boys in some skills: letter knowledge, invented words, fluency, and accuracy.
- Children from high SES backgrounds have higher scores in word recognition, accuracy, and reading comprehension.
- Children who do not speak Bahasa Indonesia at home area at a slight disadvantage in reading Bahasa Indonesia compared to children who speak Bahasa Indonesia as their mother tongue.
- Three characteristics are highly predictive of a child being a “non-reader”—if the child is male, has ever repeated a grade (grade 1 or grade 2), and does not speak Bahasa Indonesia as a mother tongue language. Doing fewer literacy activities with household members also increases the likelihood of a student being a nonreader. CERDAS staff could potentially use this finding as a way to identify the children who are at risk of not learning how to read at the same pace as their peers.

Recommendations

After reviewing the key findings described above, the CERDAS program team came up with the following recommendations:

- 1) **Increase accessibility of books for children in Malaka:** Advocate with the local government to develop reading camps or reading corners in the village and do procurement of children books, including storybooks through village budget funds.
- 2) **Focus on increasing students' word recognition and reading comprehension skills:** Provide training on teaching practice followed by intensive training on the 5 main reading skills for primary school teachers. Refresh training about word recognition and reading comprehension should also be given to teachers.
- 3) **Strengthen monitoring activities to primary schools** by a making regular schedule for school visits, to ensure that CERDAS activities are being implemented as planned.
- 4) **Increase participation in reading camps:** Increase the coverage of participants of reading camp to all of early grade students, especially male students, by giving more socialization about it. In terms of the content of reading camp, the capacity of reading camp facilitators should be strengthened through trainings or workshops. At least every six months, monitoring of reading camps should be conducted to get the picture of participation and quality of reading camp.
- 5) **Improve the understanding of Indonesian language in reading skills:** Strengthen the capacity of teachers in terms of reading technique with local story context. Provide teacher

training about 'Reading training' so teachers can motivate their student to love reading books especially in Bahasa Indonesia and improve their skills in reading Indonesian text.

- 6) **Strengthen the reading buddy program** to help students who cannot understand or speak Bahasa Indonesia to more easily understand reading books in Bahasa Indonesia. Give more focus on male students.
- 7) **Target students who are at risk of being "nonreaders:"** advocate with local governments to develop early childhood development center in the village and require children to enter ECCE center before entering primary schools so that children have basic knowledge and ready to learn in the next level of education.

Conclusion

This report summarized the literacy assessment results from TTU and Malaka districts in eastern Indonesia after approximately 9 months of CERDAS program implementation. Students in both districts made gains in key reading skills during the time between the baseline and endline data collections, and thanks to the longitudinal research design in TTU district, we were able to detect significant impact of the CERDAS program on students' letter knowledge, reading fluency, and reading comprehension. The CERDAS program also significantly increased the proportion of students who have storybooks at home in TTU district and the number of learning interactions taking place at home.

The data were also used to investigate which groups of students are disadvantaged in literacy compared to their peers. The equity analysis found that boys are slightly behind girls in reading skills, students from low- and middle-SES backgrounds are performing slightly worse than those from high SES backgrounds, and students who do not speak Bahasa Indonesia at home are disadvantaged compared to their peers who do speak Bahasa Indonesia as a mother tongue. Finally, additional analysis of the non-readers shows that boys, students who have repeated a grade, and students who do not speak Bahasa Indonesia at home are all especially at risk of being non-readers. The CERDAS team has used these findings to develop specific program recommendations for the next phase, in the hope that even more students in Indonesia will become proficient readers because of the CERDAS program.

Appendix A: CERDAS Program Timeline

Table 11. Timeline of Literacy Boost activities in TTU district.

No	Date of intervention	Intervention	Time to assessment (May 2016)
1	08-Jun-16	Training of Reading Camp Facilitators	11 month
2	27-Jun-16	Training of trainer Literacy Boost in Kupang	11 month
3	25-Jul-16	Literacy Aseessment	10 month
4	01-Agu-16	Parents Meeting	9 month
5	16-Agu-16	Cascade Literacy Boost in Wewiku and Rinhat	9 month
6	19-Agu-16	Teacher Training on Literacy Boost	9 month
7	14-Sep-16	Parents Meeting	8 month
8	13-Okt-16	Implementation of Reading Camp Facilitator Refresh in TTU	7 month
9	25-Okt-16	Refresh Training Reading Camp Facilitators	7 month
10	26-Okt-16	Parents Meeting	7 month
11	14-Nov-16	Training for parents meeting facilitator Malaka	6 month
12	16-Nov-16	Parents Meeting Facilitator Training in TTU	6 month
13	02-Des-16	Parents Meeting Socialization	5 month
14	08-Des-16	Reading Camp Session at field	5 month
15	17-Jan-17	Support teacher training LB phase 2	4 month
16	30-Jan-17	Regular Parents Meeting	4 month
17	30-Jan-17	Reading camp facilitator training phase 2	4 month
18	06-Feb-17	Workshop Literacy Boost	3 month
19	28-Feb-17	School based workshop on Literacy Boost	3 month
20	28-Feb-17	Reading Camp Session	3 month
21	28-Feb-17	Regular Parents Meeting	3 month
22	01-Mar-17	Parents Meeting Refresh Training	2 month
23	25-Apr-17	Reading buddy training	1 month
24	27-Apr-17	Reading competition	1 month

Table 12. Timeline of Literacy Boost activities in Malaka district.

No	Date of intervention	Intervention	Time to assessment (May 2016)
1	08-Jun-16	Training of Reading Camp Facilitators	11 month
2	27-Jun-16	Training of trainer Literacy Boost in Kupang	11 month
3	25-Jul-16	Literacy Aseessment	10 month
4	01-Agu-16	Parents Meeting	9 month
5	16-Agu-16	Cascade Literacy Boost in Wewiku and Rinhat	9 month
6	19-Agu-16	Teacher Training on Literacy Boost	9 month
7	14-Sep-16	Parents Meeting	8 month
8	13-Okt-16	Implementation of Reading Camp Facilitator Refresh in TTU	7 month
9	25-Okt-16	Refresh Training Reading Camp Facilitators	7 month
10	26-Okt-16	Parents Meeting	7 month
11	14-Nov-16	Training for parents meeting facilitator Malaka	6 month
12	16-Nov-16	Parents Meeting Facilitator Training in TTU	6 month
13	02-Des-16	Parents Meeting Socialization	5 month
14	08-Des-16	Reading Camp Session at field	5 month
15	17-Jan-17	Support teacher training LB phase 2	4 month
16	30-Jan-17	Regular Parents Meeting	4 month
17	30-Jan-17	Reading camp facilitator training phase 2	4 month
18	06-Feb-17	Workshop Literacy Boost	3 month
19	28-Feb-17	School based workshop on Literacy Boost	3 month
20	28-Feb-17	Reading Camp Session	3 month
21	28-Feb-17	Regular Parents Meeting	3 month
22	01-Mar-17	Parents Meeting Refresh Training	2 month
23	25-Apr-17	Reading buddy training	1 month
24	27-Apr-17	Reading competition	1 month

Appendix B: Regression Output

Table 13. CERDAS impact analysis in TTU district—multilevel mixed effects regression output. Coefficients are denoted with ‘b’ and corresponding effect sizes are denoted with ‘bStdY.’

Characteristic	% Letters		% MUW		% Invented Words		Fluency (wcpm)		Accuracy (%)		Reading Comprehension (%)	
	b	bStdY	b	bStdY	b	bStdY	b	bStdY	b	bStdY	b	bStdY
CERDAS (1 = treatment, 0 = comparison)	0.074***	0.351	0.065	0.189	0.061	0.171	6.568*	0.258	0.113~	0.250	0.062	0.184
Student is female	0.043*	0.203	0.032	0.093	0.044~	0.123	3.396~	0.133	0.069~	0.153	0.031	0.092
Age	-0.101~	-0.474	-0.523**	-1.508	-0.467**	-1.309	-15.702~	-0.616	-0.363	-0.805	-0.277	-0.821
Age (squared value)	0.006~	0.027	0.030**	0.086	0.027**	0.075	0.868~	0.034	0.021	0.047	0.017	0.051
Student has repeated a grade	-0.029	-0.136	0.290*	0.037	-0.017	-0.049	-3.610~	-0.142	-0.067	-0.148	-0.050	-0.147
Number of family members							1.146~	0.045				
Baseline reading materials at home (standardized value)	-0.015*	-0.070										
Baseline literacy activities at home (standardized value)	-0.012~	-0.058							0.032~	0.070		
SES- bottom third			-0.010	-0.028					-0.017	-0.038	-0.046	-0.137
SES- top third			0.045~	0.130					0.078~	0.172	0.093***	0.275
Student speaks Bahasa Indonesia at home					0.059*	0.035	4.212~	0.165			0.123***	0.365
Baseline score	0.491***	2.314	0.482***	1.389	0.604***	1.691	1.325***	0.052	0.414***	0.919	0.567***	1.681
R-squared: Level 1	0.411		0.266		0.290		0.471		0.151		0.217	
R-squared: Level 2	0.817		0.671		0.766		0.768		0.559		0.560	
N	467		467		467		467		467		466	

Statistical significance: ~ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 14. Factors that predict the likelihood of being a nonreader at endline—mixed effects logistic regression results (N = 466).

Predictive Factor	Coefficient	Standard Error	Odds Ratio
CERDAS (1 = treatment, 0 = comparison)	-0.458	0.518	0.633
Student is female	-0.624*	0.247	0.536
Age (years)	0.249	0.162	1.283
Student has repeated a grade	0.621*	0.267	1.860
Baseline reading activities (standardized value)	-0.328*	0.134	0.721
Number of days student missed school last week	0.275*	0.118	1.316
Student speaks Bahasa Indonesia at home	-0.926**	0.359	0.396

Statistical significance: ~ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001