



RAPIDLY IMPROVING
STANDARDS IN ELEMENTARY

LITERACY AND NUMERACY BOOST ASSESSMENT BASELINE REPORT PAPUA NEW GUINEA

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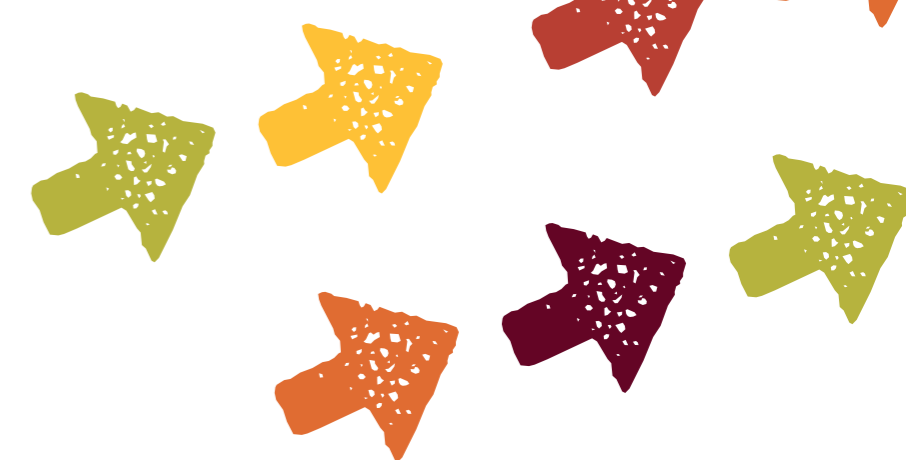
We are particularly grateful to the children who participated in our study and gave their valuable time and patience. We want to acknowledge and appreciate all of our colleagues from RISE PNG partner organisations and Save the Children who contributed their time, effort and expertise in successful completion of this baseline study.

ACRONYMS

ARoB	Autonomous Region of Bougainville	LB	Literacy Boost
BOM	Board of Management	LLG	Local Level Government
E1	Elementary One	LoI	Language of Instruction
E2	Elementary Two	MEP	Monitoring and Evaluation Plan
ECCE	Early Childhood Care and Education	NB	Numeracy Boost
EGRA	Early Grade Reading Assessment	NDoE	National Department of Education
EHP	Eastern Highlands Province	PDoE	Provincial Department of Education
EMIS	Education Monitoring Information System	PILNA	Pacific Islands Literacy and Numeracy Assessment
EOPO	End of Program Outcome	PNG	Papua New Guinea
EP	Elementary Primary	RCT	Randomised Control Trial
ESP	East Sepik Province	RISE	Rapidly Improving Standards in Elementary
IDELA	International Development Early Learning Assessment	SBC	Standards Based Curriculum
IE	Inclusive Education	SIL	Summer Institute of Linguistics
IELTS	International English Language Testing System	SMS	Short Message Service
IERC	Inclusive Education Resource Centre	TFF	Tuition Free Fee
KOBO	in reference to KOBO toolbox which is a free online software package for surveys. KOBO is a software hardware IT company based in Canada	VSO	Voluntary Services Overseas



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EXECUTIVE SUMMARY

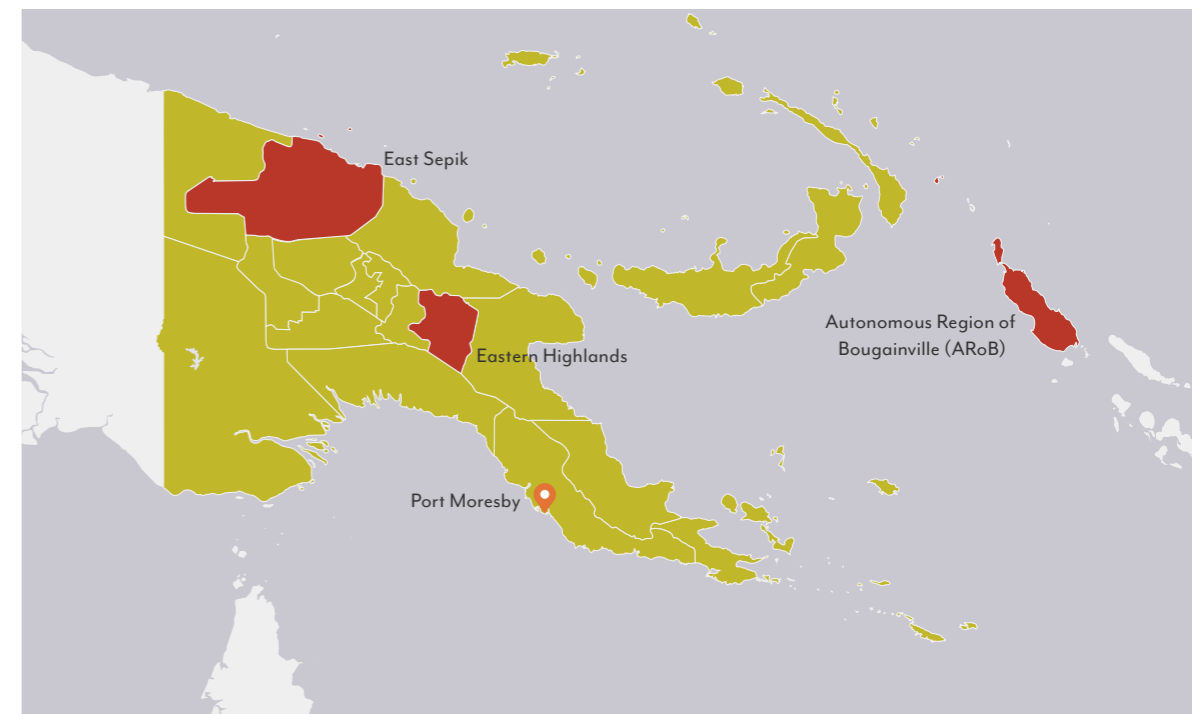


BACKGROUND AND RATIONALE

According to international and national research, elementary learning outcomes in literacy and numeracy are below national standards and the expectations of the National Department of Education (NDOE)¹. Reforms - including a new curriculum - have attempted to address root causes². However, challenges remain in terms of literacy and numeracy teaching, elementary teachers' English competency³ and managing teacher professional development programs⁴. Elementary schools struggle to meet the needs of learners, with limited access to relevant story books and levelled readers available, high rates of teacher absenteeism and limited monitoring. Although enrolment rates are high in Elementary Prep (EP), completion rates are low with enrolment dropping by 38% by Grade 3⁵. Retention rates for girls are low, most notably in the Highlands⁶.

The Rapidly Improving Standards in Elementary (RISE PNG) program aims to improve the quality of early grade education for 100,000 4-8-year old's in three provinces of Papua New Guinea (PNG): East Sepik (ESP), Eastern Highlands (EHP) and the Autonomous Region of Bougainville (ARoB).

FIGURE 1. MAP OF PAPUA NEW GUINEA PROVINCES



¹ As measured by four Early Grade Reading Assessments (EGRA, 2011-2014), lower primary Pacific Islands Literacy and Numeracy Report (PILNA, 2013) and primary Curriculum Monitoring and Standards Test (CMST, 2009)
² GoPNG. (2013). Report of the Task Force for the Review of Outcomes Based Education. Government of Papua New Guinea.
³ Drinan, F. and Jones, R. (2014). Elementary English Teacher Development Report. Teaching Service Commission, British Council and Voluntary Service Overseas. Papua New Guinea.
⁴ Manikuali, R., et al (2014). Experiences of Elementary Pre-Service Teacher Training. PNG Education Institute, National Department of Education and Voluntary Service Overseas. Papua New Guinea.
⁵ In the Autonomous Region of Bougainville, enrolment drops from 12,118 in EP to 7,716 in Elementary Grade 2 (E2). In Eastern Highlands, 26,497 students enrol in EP yet by E2 this number is reduced to 16,229.
⁶ Gender parity sits at 0.91 in Eastern Highlands but by Grade 8 has dropped to 0.59.

Funded by the Australian Government in partnership with the government of Papua New Guinea, the project is scheduled to run from July 2017 to April 2020. RISE PNG is a consortium led by Save the Children in partnership with Callan Services for Persons with Disabilities and Summer Institute of Linguistics (SIL) PNG.

RISE PNG has developed a robust research and learning agenda to ensure the effectiveness of the interventions can be measured against changes in student learning outcomes and their participation rates overtime. Four integrated research studies are underway to identify baseline figures for the Monitoring and Evaluation Plan (MEP). This report is the first of five reports to be finalised as part of the RISE PNG baseline. Research studies for ECCE (EOP02), gender (EOP03), inclusive education (EOP03), and capacity (EOP04) are near finalisation. This report presents baseline information to support the following outcomes and intermediate outcomes of the MEP.

EOP01: Improved literacy and numeracy learning outcomes for elementary students	IO 1: Elementary teachers demonstrate confidence and competence teaching and assessing SBC English, Language and Maths
	IO 2: Elementary schools are adequately resourced with vernacular literacy instructional materials and reading texts.
	IO 3: Parents of early grade children demonstrate improved home reading practices
	IO 4: Improved assessment and monitoring of literacy and numeracy outcomes in elementary schools

The purpose of this baseline study was to assess elementary students' current literacy and numeracy competency in sampled schools in EHP, ESP and ARoB provinces of PNG using Save the Children's Literacy and Numeracy early grade assessment tool. Elementary teacher competency in delivering the Standards Based Curriculum (SBC) was also assessed using a modified Stallings method alongside elementary student self-reporting of their home learning environment.

METHODOLOGY

The baseline assessment was designed to test a sample of 20 Elementary One (E1) students (10 boys and 10 girls) from 72 schools (36 treatment and 36 control schools) in each of the three targeted provinces. The baseline assessment took place over a period of six weeks in October and November 2017.⁷

BASELINE:

Twenty elementary 1 students (ten boys and ten girls) from 72 schools (36 treatment and 36 control schools) in each of the three targeted provinces were originally part of the sample to be tested over a period of six weeks in late October and November 2017 as part of the baseline assessment.

INTERVENTION:

Prior to the beginning of the 2018 school year, teachers were provided with the first round of training as part of the Literacy Boost intervention⁸. Training will continue during school breaks throughout the 2018 school year.

MID-LINE:

At the end of Term 4 (November/December 2018), the literacy skills of the same students (who would be in Elementary 2 by then) will be assessed.

END-LINE:

Subsequently, in November 2019, the literacy and numeracy skills of a sample of the same students (who will be finishing Primary 3 by then) will be assessed to see if the gains from Literacy Boost are sustained over time.

The baseline assessment reached 253 schools, which was a slightly higher number than originally planned. There were 175 classroom lessons observed and 2,743 children were assessed (1,378 boys and 1,365 girls). The baseline involved 60 trained enumerators and 20 Save the Children staff deployed in the field over a six-week period. The literacy assessment measured children's foundational literacy skills in Tok Pisin and English. Schools were randomly selected to be representative of the E2 for 2018 student population at the provincial level and were divided into treatment and control groups so that impact of the interventions could be assessed against the comparison group at mid-line and end-line.

⁷ This study will help us assess RISE PNG's success in reaching part of the first end of project outcome – 'Improved literacy and numeracy learning outcomes for elementary students.'

⁸ The training is aimed at improving the competence and confidence of elementary teachers in teaching literacy skills.

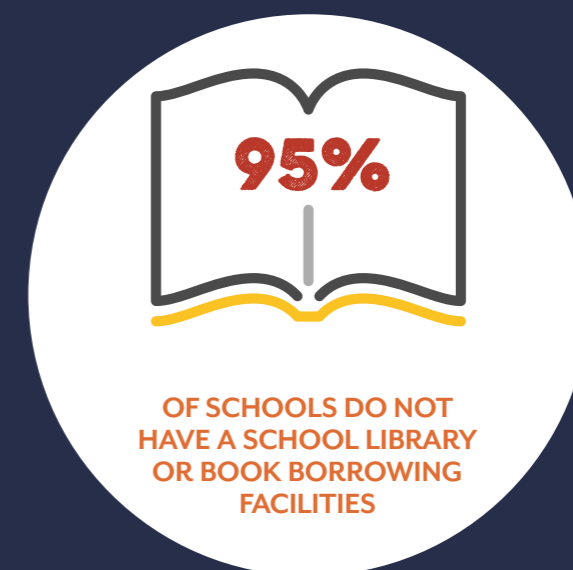
FINDINGS

This is the largest early grade literacy and numeracy assessment ever conducted in PNG and the first early grade numeracy assessment of its kind in the country. It is also the first time a literacy assessment has measured both English and Tok Pisin proficiency in the same cohort of children in PNG.



BACKGROUND AND SCHOOL CHARACTERISTICS

- **Children who had experiences of ECCE performed significantly better** in both the literacy and numeracy assessment items than children who did not.
- **Children with disabilities accounted for less than 3% of average enrolments**, illustrating limited inclusion in mainstream classrooms or limited identification of disabilities when children enroll in school. We would expect enrolment to be above 10% as this is the minimum expected percentage of children with a disability in a given population according to global estimates.
- **Student absenteeism is widespread.** Half of the students surveyed reported being absent at least once in the week prior to the assessment, with many students missing at least three days of the school week.
- **A third of students in EI were found to be repeaters.** Grade repetition did not increase literacy or numeracy assessment scores.
- **Many students in EI are much older than the 7 years of age** for the grade (8.5 years, on average). Close to 40% of girls were overage and 37% of boys were overage, with the eldest student assessed at 15 years of age.
- **Children who had breakfast on the day of the assessment performed better** across all literacy and numeracy competency areas.
- **Students whose parents are literate produced better overall results** in both the literacy and numeracy assessments.
- **Schools are operating in severely challenging conditions;** over 90% of schools have no access to electricity, 64% have no access to fresh water and 95% do not have a school library or book borrowing facilities.
- **Less than one third of schools surveyed had received a monitoring** visit or inspection in the past academic year.
- **The majority of schools closed earlier than the NDoE agreed end of school year date.** Most students are not receiving the expected 41 weeks of schooling.
- **91.6% of elementary schools surveyed were not registered with an Inclusive Education Resource Centre (IERC)⁹** and were not aware of the need to create linkages to IERCs.



⁹ IERCs are centres which children with a disability access for their learning in education and community-based rehabilitation services. IERCs have two programs; inclusive education and community-based rehabilitation services.



LITERACY RESULTS

- **25% of children were able to identify the 26 letters of the alphabet.**
- **47% of children were unable to identify a single word in English & almost 60% were not able to for Tok Pisin.**
- **Less than 20% of E1 students would qualify as early English readers¹⁰.** Less than 10% of the children qualify as Tok Pisin readers.
- **80% of E1 students are non-readers** and there was a high proportion of zero scores on comprehension from this cohort.
- **Students performed better on inferential comprehension questions than factual questions**



NUMERACY RESULTS

- **47% of children were able to identify the 12 numbers randomly selected which ranged from 1 to 46** although many children struggled to identify double digit numbers above 20.
- **56% of children could complete 10 multiples of 2 and 60% could complete 10 multiples of 5.** Enumerators however observed significant rote memorisation in this item and determined that children may not have fully understood what they were saying of the concept of skip patterns.
- **33% of children were able to complete all simple addition problems** although many students struggled with high order numbers.
- **More than one quarter of children were not able to complete a single subtraction problem** and only 16% could complete all the problems correctly.
- Children were less familiar with using manipulatives to solve problems and used tally lines more often than beads.
- **One third of children responded correctly to word problems** when they were presented verbally.
- **One quarter of children were able to answer five questions about shapes correctly.**
- **Half the students answered the questions about time correctly** although one quarter of students could not answer one question correctly.



STUDY HABITS AND HOME LEARNING ENVIRONMENT

- **Students positively assessed their home learning environments** despite knowledge that there are very few age appropriate story books or readers for children at home.
- **50% of children reported having story books at home.**
- **57% of children reported that someone had read a story to them** in the past week.
- **60% of children reported they had received assistance with their studies** and maths in the past week.



TEACHERS AND THE CLASSROOM LEARNING ENVIRONMENT

- **35% of elementary children are being taught either without a syllabus at all, or one that is out of date.** This is despite the recent roll out of the Standard Based Curriculum (SBC).
- **The majority of classrooms do not have sufficient SBC readers or storybooks**
- **36% of class time is spent on teacher instruction** in which students are either actively listening or writing from the blackboard and only 9% of class time is being spent on group or individual work. We can surmise from the observation data that the creative literacy activity is whole of class activity and may consist primarily of chanting or rote learning.
- **For 14% of class time, teachers are off task** meaning they are doing unrelated work.
- **Teachers did not provide any individualised student support** in any of the classes observed.
- **Negative forms of discipline were evident in 20% of lesson observations,** with shouting and verbal discipline being the most common.
- **54% of elementary teachers do not have a high school certificate.**

¹⁰ Defined here as the ability to read at a speed of ten words per minute or higher.

CONCLUSIONS

1. High teacher and student absenteeism, early school closure and frequent truancy reduce the amount of time students are in class, therefore potential 'learning' time and SBC coverage. Learning outcomes in all subjects and competencies will be impacted by this. Research¹¹ confirms that school attendance affects student achievement, especially absences not due to illness. High truancy rates, absenteeism and late school entry are strong predictors of early drop out¹². We can assume a causal link between drop out patterns and the attitudes of students and caregivers toward the importance of school attendance.
2. Many children may be entering elementary school without the necessary emergent literacy and numeracy skills required before they begin to read with fluency and comprehension. High numbers of children not knowing their letters, numbers and frequently used words is a strong indication of this. As was also observed in Solomon Islands¹³, the methods used by ECCE facilitators/teachers may not be effective in teaching letters, number identification and frequently used words for EP students. There is a strong indication that many children have memorised answers without fully understanding the concepts, such as skip patterns and multiples in mathematics. Teachers may be placing more emphasis on rote learning, copying text from the blackboard and direct instruction than other teaching methods that encourage 'thinking' and 'solving problems'.
3. English literacy skills amongst this cohort of children are higher than Tok Pisin literacy skills despite Tok Pisin being more readily spoken at home and in the community. It is evident that children lack exposure to Tok Pisin text and also vernacular text based on the results of the home learning environment and Tok Pisin literacy assessment. If not encouraged and promoted in early childhood, children are entering school competent in speaking and listening only. They do not have print awareness, book knowledge or understanding of sound and letter/word relationships which are necessary before the child can begin to read.
4. A positive reading culture outside the school walls will have a positive effect on the overall reading habits of children and their later success in reading at school, yet a large proportion of children are not exposed to any form of reading activity at home or in the community.

¹¹ Maynard, B. R. (2010). *The Absence of Presence: A Systematic Review and MetaAnalysis of Indicated Interventions to Increase Student Attendance*. Dissertations. Paper 254.

¹² No, F., Sam, C. & Hirakawa, Y. *Asia Pacific Educ. Rev.* (2012) 13: 573. <https://doi.org/10.1007/s12564-012-9220-2>

¹³ Save the Children (2018) *IDELA child assessment study across 4 provinces in Solomon Islands*, Save the Children, Honiara



KEY RECOMMENDATIONS

RECOMMENDATIONS SPECIFIC TO THE RISE PNG PROGRAM

1. Introduce modules in parent/care-giver workshops for Literacy and Numeracy Boost which address concerns raised in the baseline e.g. truancy and absenteeism, nutrition and in particular, breakfast before school.
2. Continue to enhance the quality of in-service teacher coaching and support activities in pedagogy practices for early grade literacy and focus more on 'thinking' and 'problem-solving' rather than overemphasising chanting and rote learning. Support individual learners in the classroom as a usual addition to in-service training. Greater use of manipulatives in mathematics is required alongside techniques for solving abstract mathematics problems.
3. Strengthen the concept of transition between ECCE and elementary by sharing the findings of this baseline with provincial ECCE committees when the IDELA (International Development and Early Learning Assessment) assessment is finalised and develop a shared commitment to improve transition from ECCE to elementary.
4. In the mid-line, revise the teacher lesson observation form so that it includes more explicit descriptors for teacher-led instruction so that assessors can more easily categorise observations. Include core competency areas using an appropriate Likert measure based on a competency rubric.
5. In the mid-line assessment include a caregiver survey component to cross reference student responses on the home learning environment.
6. Continue the development of vernacular story books for elementary and ECCE.

FOR CONSIDERATION BY THE AUSTRALIAN GOVERNMENT

1. It will be important to design appropriate program level advocacy objectives in light of the findings across the three projects implemented by Save the Children, World Vision and CARE Australia. Sharing results across the project sites will be incredibly valuable for joint policy dialogue with government and development partners.

FOR CONSIDERATION BY THE PNG GOVERNMENT

1. The language policy is inconsistently applied and it is potentially leading to underdevelopment of important emergent literacy skills necessary for reading competency. Further promotion of vernacular teaching and learning, including the provision of reading books in vernacular, may improve this area and provide a strong foundation for children to transition to English when they are in elementary school.
2. The system of monitoring and supervision of remote schools in PNG appears insufficient. Schools are not being visited frequently enough and/or there is a lack capacity or authority to address quality issues when they do visit. Opportunities should be explored to identify strategies which better support head teachers, school management and parents so that patterns of poor attendance, early drop out and truancy which may exist can be addressed.



CHAPTER ONE:

METHODOLOGY



SUMMARY OF RESEARCH STUDY

A randomised control trial (RCT) will examine if Literacy and Numeracy Boost improves literacy and numeracy skill levels of elementary students in three provinces of Papua New Guinea (PNG)¹⁴.

BASELINE:

Twenty elementary 1 students (ten boys and ten girls) from 72 schools (36 treatment and 36 control schools) in each of the three targeted provinces were originally part of the sample to be tested over a period of six weeks in late October and November 2017 as part of the baseline assessment.

INTERVENTION:

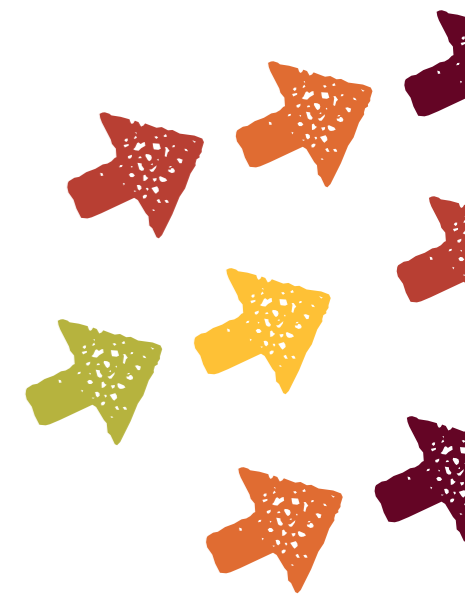
Prior to the beginning of the 2018 school year, teachers were provided with the first round of training as part of the Literacy Boost intervention¹⁵. Training will continue during school breaks throughout the 2018 school year.

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¹⁴ This study will help us assess RISE PNG's success in reaching part of the first end of project outcome – 'Improved literacy and numeracy learning outcomes for elementary students.'

¹⁵ The training is aimed at improving the competence and confidence of elementary teachers in teaching literacy skills.

SUMMARY

Schools visited: **253**¹⁶

Students assessed:
(1,365 boys and 1,378 girls) **2,743**¹⁷

Lessons observed: **175**

TABLE 1. SUMMARY OF SCHOOL OBSERVATIONS

Region	District	Schools Visited	Assessments Completed (Girls)	Assessments Completed (Boys)	Classroom Observations
Autonomous Region of Bougainville	Central Bougainville	30	82	107	8
Autonomous Region of Bougainville	North Bougainville	58	151	141	22
Autonomous Region of Bougainville	South Bougainville	33	138	119	15
Eastern Highlands Province	Goroka	15	135	124	17
Eastern Highlands Province	Henganofi	18	117	148	15
Eastern Highlands Province	Kainantu	5	37	38	5
Eastern Highlands Province	Obura/Wonenara	11	93	95	10
Eastern Highlands Province	Unggai/Benna	10	71	72	15
East Sepik Province	Angorum	31	197	183	31
East Sepik Province	Wewak	20	180	177	20
East Sepik Province	Yangoru Saussia	22	164	174	17
	Total	253	1,365	1,378	175

¹⁶ The sample size is higher than the recommended 23 schools for treatment and 23 schools for control as we anticipate high student turnover and absenteeism and are concerned about loss to follow up due to the experience of both EGRA and SMS Story assessments in PNG.

¹⁷ We may consider over-sampling girls as compared to boys as it may be harder to track girls over a two-year period.

PURPOSE

The purpose of the study is threefold,

1. To assess current literacy and numeracy levels in PNG¹⁸;
2. To assess the impact of the RISE PNG program on elementary students' learning outcomes and to;
3. Contribute to the PNG and global literature on 'what works' in improving early grade literacy and numeracy outcomes¹⁹.

DESIGN CONSIDERATIONS

To determine the research scope, information on the total number of elementary schools in the three provinces (1077 elementary schools) was collected and considered in relation to our target of 750 schools. The NDoE cluster schools as per Local Levels of Government (LLGs), was considered the best unit for sampling. The size of the clusters varies from province to province, although there are approximately 14 elementary schools per LLG cluster and between 1,100 – 1,800 students per cluster. We considered whether random sampling of schools would pose a problem and identified the following risks:

- Cross contamination if treatment and control schools are within the same LLG, and
- Dissatisfaction on the part of control schools.

These risks were mitigated by designing a phased implementation strategy which would see control schools receiving the full suite of interventions (treatment) from Year 2 onwards. The issue of having treatment schools in the same LLG as non-treatment schools was considered, along with likely contamination and the Hawthorne effect²⁰. We randomly selected the control schools in different LLGs to reduce the risk of contamination in the first year.

ASSUMPTIONS

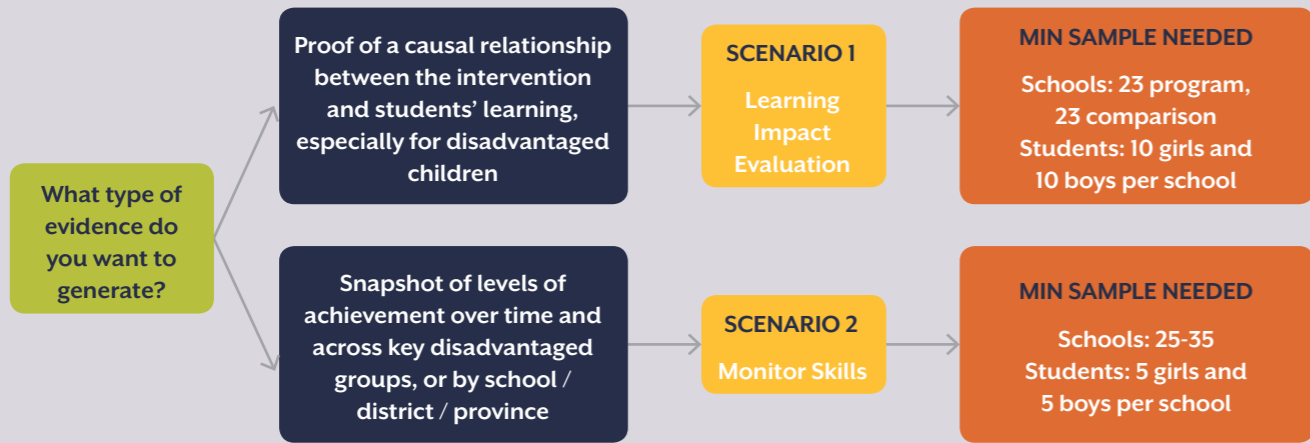
- Access to the latest EMIS data which contains up to date and accurate enrolment information.
- Enumerators with capacity to successfully administer the assessments using KOBO software on tablets.
- Students could be tracked over time. Both EGRA and SMS Story impact evaluations (IEs) in PNG suffered 40% loss to follow up due to high student turnover and absenteeism. The SMS Story IE switched to cohort level assessments as it became impossible to track students who had been assessed at baseline. Loss to follow up has been mitigated by selecting a large sample of students for the baseline.

¹⁸ The study will assess if Literacy and Numeracy Boost is a viable tool to improve literacy and numeracy skills in PNG.

¹⁹ This study will add to the rich evidence from over 25 impact studies on literacy and numeracy including Save the Children (2016) Rwanda Impact Evaluation which showed that children in literacy boost are 40% more likely than the control group to progress to Grade 3.

²⁰ Hawthorne Effect is a phenomenon in which individuals alter their behaviour in response to being observed.

FIGURE 2. DECISION TREE: LEARNING IMPACT EVALUATION OR MONITORING SKILLS?



In deciding the type of evaluation methodology, we were guided by the following:

RANDOM ASSIGNMENT

The sample universe was restricted to schools that have a dedicated first grade (so that E1 and E2 aren't combined classes) and school size which is within half a standard deviation of the median. Stratification was done at the LLG level.

In the research design the following random assignment was considered:

1. Government vs church based (85% of schools in Bougainville, 54% in East Sepik and 13% in Eastern Highlands Province are church based schools)
2. Remote vs close to district centre
3. Vernacular language clusters

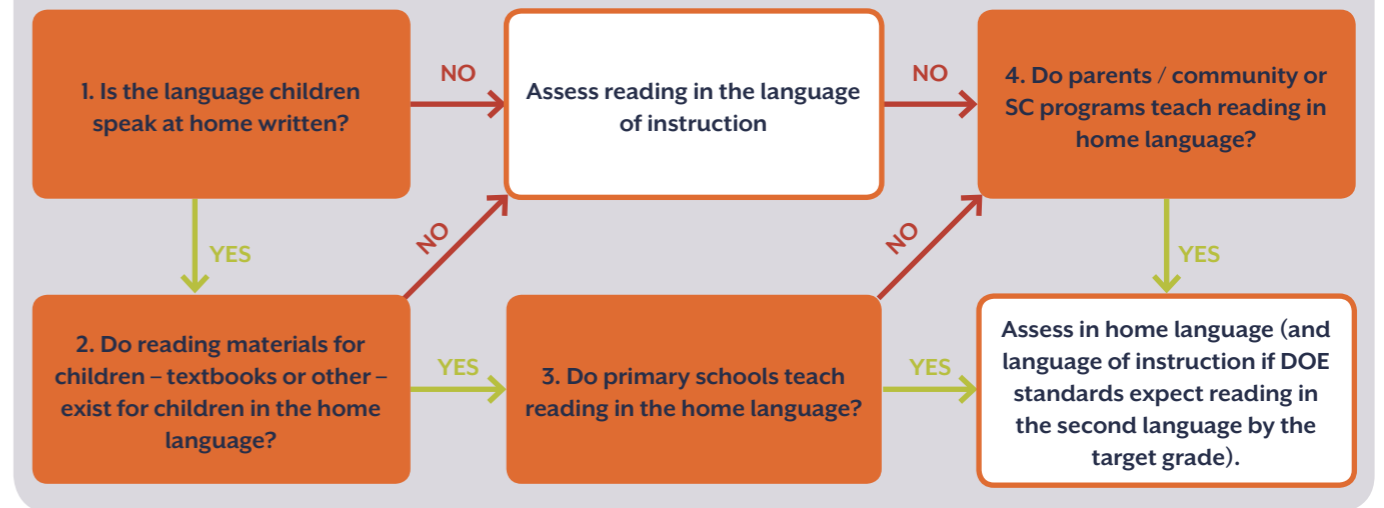
LANGUAGE CONSIDERATIONS

In determining which languages we would assess children, the following were considered:

1. Language of instruction
2. Language spoken at home and in community
3. Language policy
4. Use of vernacular
5. Curriculum

We were guided by the following process.

FIGURE 3. LANGUAGE DECISION TREE



TRAINING OF ENUMERATORS INCLUDING PILOTING PROCESS

All data collection tools were versioned and piloted both in the National Capital District Port Moresby and in provincial capitals prior to field work to allow for provincial dialectical differences in Tok Pisin and to ensure the assessments were accurately-pitched and completed in a timely manner. Piloting data is not included in the final report.

In each of the three provinces a team of six teacher trainers, three community education officers and eighteen enumerators were trained in field research ethics including informed consent to participate, child safe-guarding, community entry protocols, lesson observations, and literacy and numeracy assessment data collection. Enumerators were trained to enter data directly into an open-source software platform - Open Data Kit (ODK). The assessment forms were accessed using android devices and uploaded upon completion of each field visit. Data in OKD was transferred directly to Stata (data analysis and statistical software) for data cleaning and analysis.



CHAPTER TWO:

LITERACY ASSESSMENT



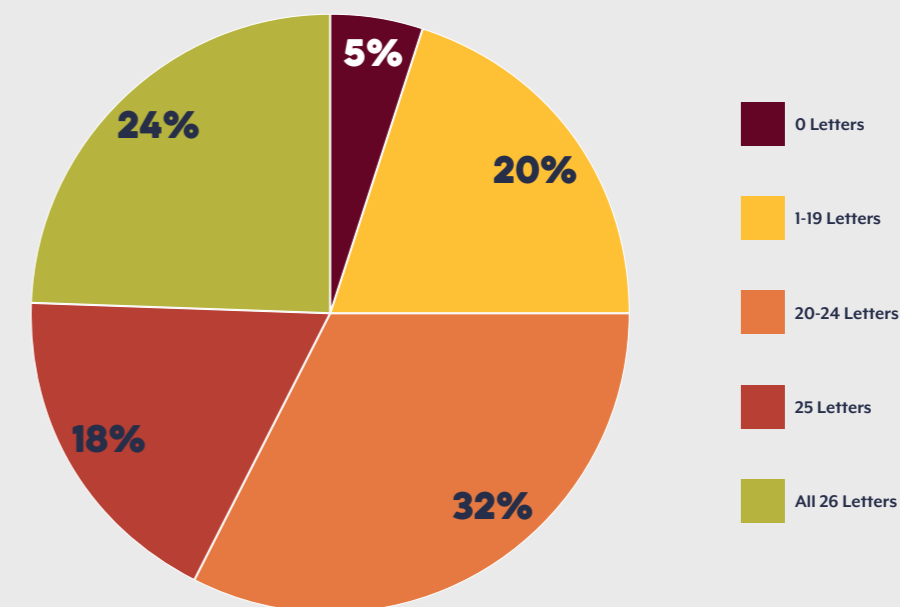
LETTER IDENTIFICATION

All 2,743 children who undertook the baseline assessment were shown the twenty-six letters of the alphabet. Among them, 136 or almost 5% of children were not yet able to identify a single letter. Almost 25% of children identified all 26 letters of the alphabet and 63% of children identified 23 or more letters of the alphabet. These results are consistent for both boys and girls who were equally likely to get a zero score on letter identification. However, girls were slightly more likely to be able to identify all twenty-six letters compared to boys.

The letter that students commonly had difficulty with was 'q'. More than half the assessed children could not identify that letter²¹. Letters 'k' and 'o' were the easiest for children with more than 90% of children being able to identify them.

Zero scores in letter identification ranged from less than 3% for the Autonomous Region of Bougainville to more than 7% in East Sepik Province. The data for East Sepik had longer tails at both ends of the spectrum and the percentage of children who identified all letters of the alphabet was also highest in this province at more than 30%.

FIGURE 4. FREQUENCY OF LETTERS IDENTIFIED BY STUDENTS



²¹ Though care was taken to ensure that all letters are shown in the font that children are used to seeing in school, the letter 'q' that children see in classrooms may have an upward tail. This may be the reason for so many children being unable to identify that particular letter.

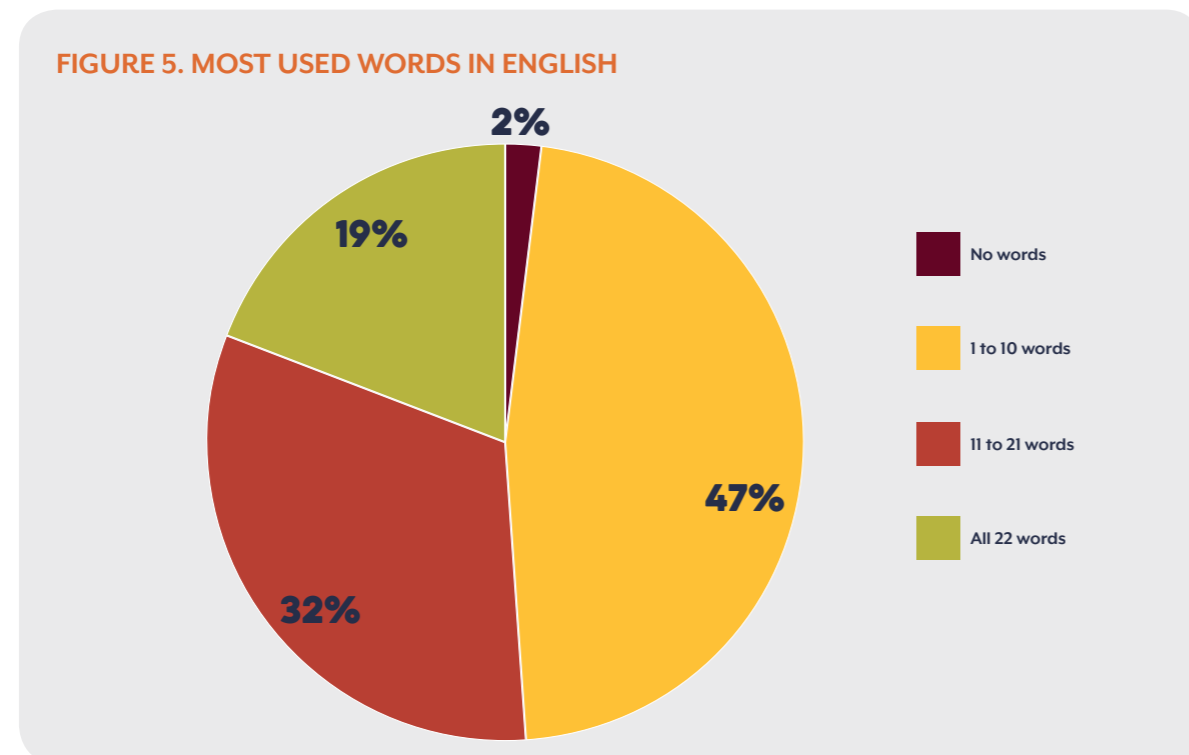
FREQUENTLY USED WORDS (ENGLISH)

The twenty most frequently used words from the E1 SBC English textbooks were shown to the children undergoing the assessment. The full list of words included two soft words from E1 word lists ('to' and 'and') to help the students gain some confidence at the beginning of the assessment.

TABLE 2. LIST OF MOST FREQUENTLY USED WORDS IN ENGLISH²² USED IN THE BASELINE ASSESSMENT

To	Took	And	Red	Us
Home	Say	Let	For	Made
How	Did	Ran	After	Play
Eat	Sat	Under	Fast	Lots
Car	Think			

Almost half the children who undertook the assessment (47%) weren't able to identify a single word from the list including 'to' and 'and.' Only 2.3% of the children were able to identify all the words. In Eastern Highlands Province, approximately one child in two hundred was able to identify all words. There were no gender differences observed in the distributions. Letters like 'fast' and 'did' were particularly difficult for children (with less than 10% of the children identifying these words). 'Say' was the most popular word and 30% of children were able to identify the word.



The low scores suggest that children are not being exposed to frequently used words in English in their written form as readily as assumed. This is despite the SBC curriculum and teaching guides commonly referencing these words.

²² The most frequently used words were taken from the SBC EP2 syllabus and cross checked with a sample of EP2 texts and referenced against the EGRA word list used for READ PNG 2014.

FREQUENTLY USED WORDS (TOK PISIN)

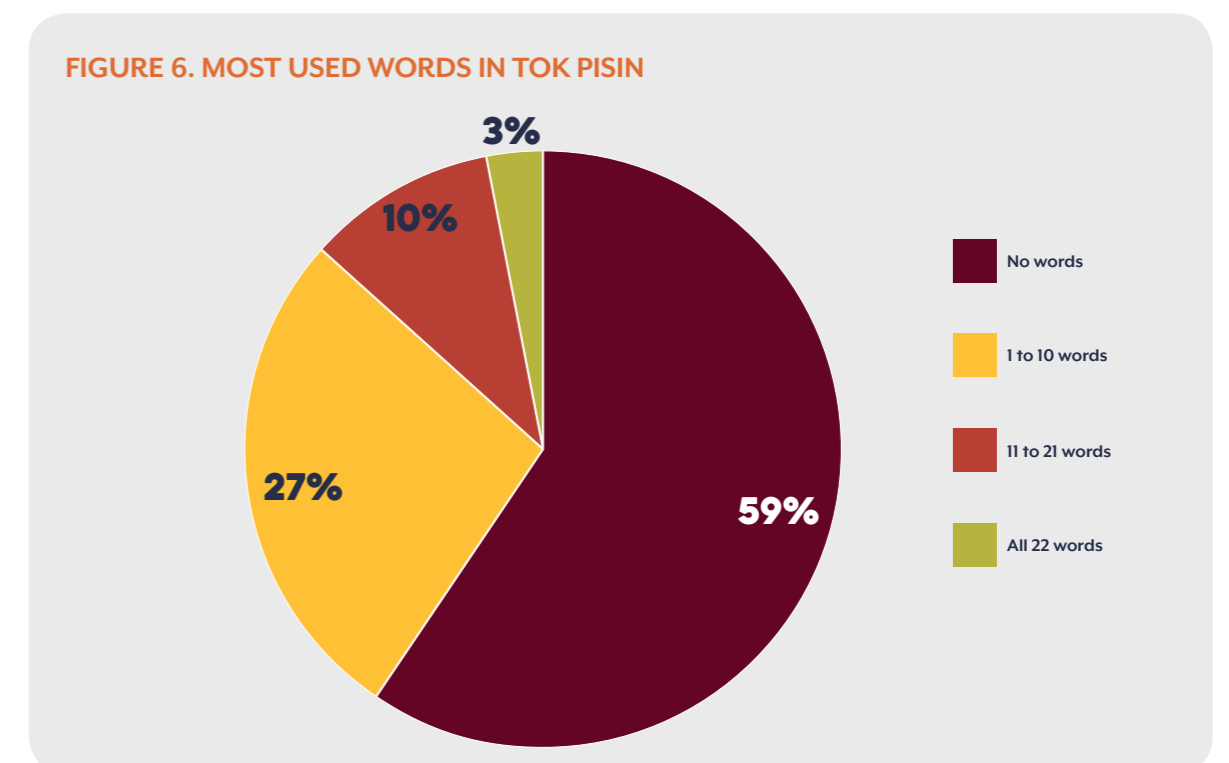
Summer Institute of Linguistics (SIL) helped identify the twenty most frequently used Tok Pisin words for the Elementary Two level.

TABLE 3. LIST OF MOST FREQUENTLY USED WORDS IN TOK PISIN USED IN THE BASELINE ASSESSMENT

Yu	Bilong	Meri	Man
Long	Olsem	Go	Gat
Dispela	Oi	Save	Na
Taim	Wanpela	Mekim	Em
Tok	Ken	Manmeri	Bai

Approximately 60% of the children were not yet able to identify a single word of Tok Pisin. Three percent of children were able to identify all the words. Eastern Highlands had the lowest scores for Tok Pisin as more than 72% of children were unable to identify a single word.

Tok Pisin is not readily available in written form so it's not surprising that results are lower in Tok Pisin compared to English. Tok Pisin is also not encouraged as a language of instruction or a vernacular language by the Department of Education, so is discouraged in the classroom²³. It remains a readily used oral language in the public domain and in EHP is the most common language spoken by the population. Not having Tok Pisin reading material available for children may be having a negative impact on overall literacy levels, particularly in EHP where more than 75% of families speak Tok Pisin at home²⁴. There were no gender differences to be observed in the distribution.



²³ During the lesson observation, observers recorded children being scolded for speaking in Tok Pisin.

²⁴ Household Literacy Survey 2011 in Eastern Highlands Province and Autonomous Region of Bougainville, Papua New Guinea <http://unesdoc.unesco.org/images/0022/002250/225035e.pdf>

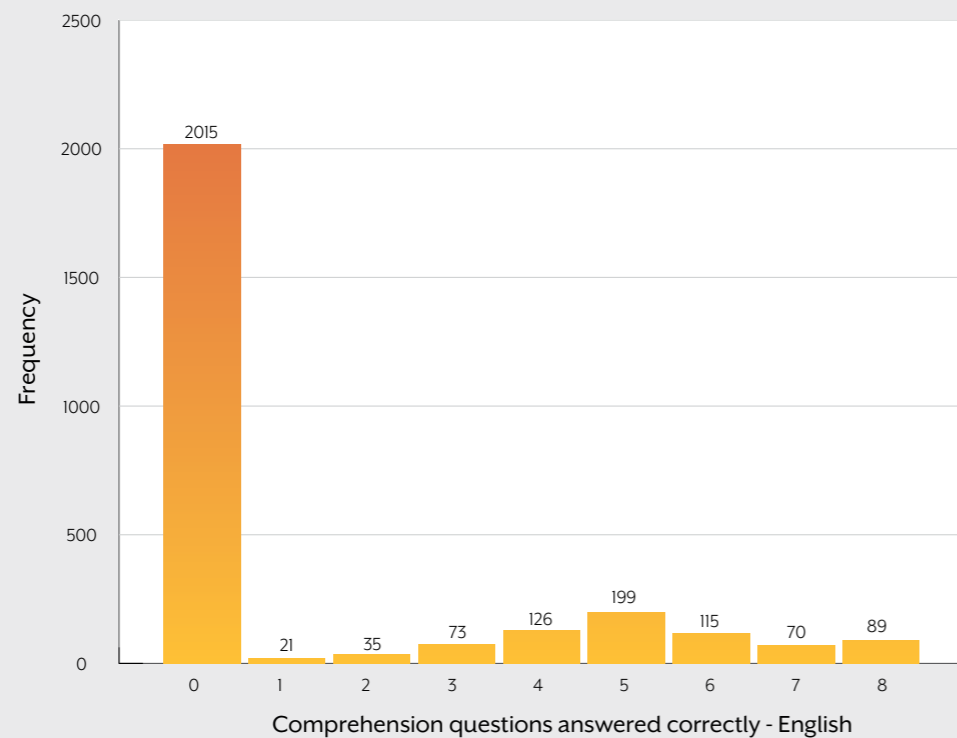
READING FLUENCY AND COMPREHENSION (ENGLISH)

In keeping with global standard assessment practices, fluent readers are defined as students with the ability to read at least ten words per minute. Students were given a small English passage of forty-three words, invited to read the passage and subsequently asked to respond to literal and inferential comprehension questions about the passage.

Every fifth child (19.25%) was able to read at least parts of the passage at a speed of at least ten words per minute. East Sepik had the highest proportion of fluent readers (25.3%).

As expected, with nearly 80% of non-readers, there were a high proportion of zero scores for comprehension questions (see figure below). For children who could read, the performance on inferential questions was better than on factual questions. For example, nearly 70% of readers were able to deduce that the pig from the passage must be digging for worms to eat them but only a quarter were able to identify that he lived in a hut. This may indicate that children were using their local knowledge to respond to enumerator questions rather than the information provided in the passage.

FIGURE 7. COMPREHENSION OF ENGLISH QUESTIONS.



However, when the universe of responses is restricted to students who were able to read fluently, better results on comprehension questions are evidenced. On average, fluent readers correctly answered five questions out of eight.

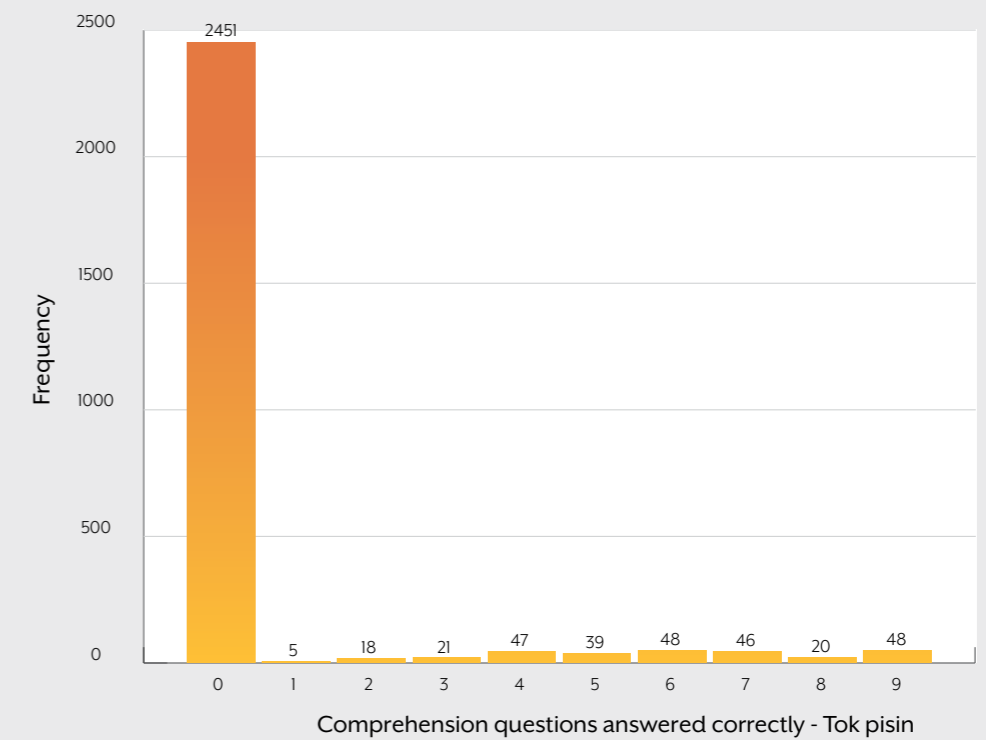
READING FLUENCY AND COMPREHENSION (TOK PISIN)

As with the English passage, readers are defined as students with the ability to read at least ten words of Tok Pisin per minute. Students were given a Tok Pisin passage of sixty-four words, invited to read the passage and subsequently respond to comprehension questions about the passage that were asked by the enumerator.

Only 7% of the children assessed were able to read at least parts of the passage at a speed of at least ten words per minute. East Sepik had the highest proportion of readers (10.3%).

With more than 90% of non-readers, there were a high proportion of zero scores for the nine comprehension questions associated with the passage (see figure below).

FIGURE 8. COMPREHENSION - TOK PISIN



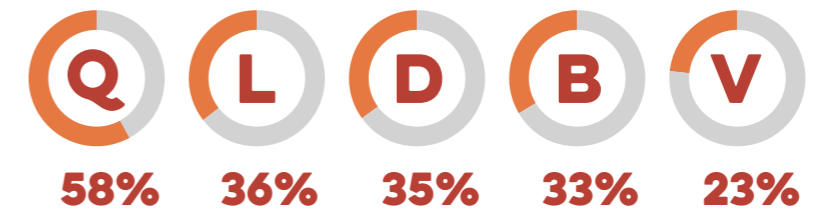
Again, when the universe of responses is restricted to students who were able to read the Tok Pisin passage, better results on comprehension questions are evident. On average, readers gave six correct responses from the nine questions.

TABLE 4. COMPREHENSION FOR READERS

Comprehension	Freq.	Percent
0	3	1.55
1	2	1.03
2	5	2.58
3	9	4.64
4	26	13.4
5	29	14.95
6	31	15.98
7	37	19.07
8	15	7.73
9	37	19.07
Total	194	100

The substandard results for identifying frequently used words, reading and comprehension in Tok Pisin confirm that English continues to be the dominant language of instruction and reading in Elementary schools across the three provinces that took part in the assessment. This finding is also supported by the lesson observations that were conducted during the baseline assessment. It may be relevant to note that mandated LOI (language of instruction) for elementary schools has changed on several occasions leading to confusion for teachers and students alike. Children are not given sufficient exposure to reading materials to grasp foundational reading skills and there is very little opportunity for reinforcement of learning at home if parents are not using English and there are no reading materials.

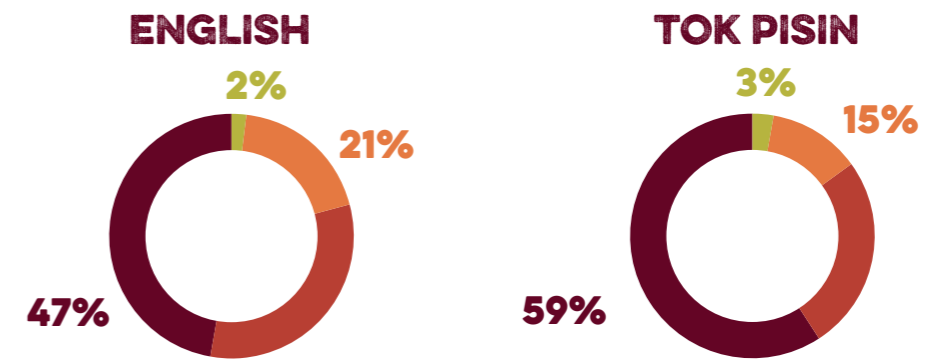
LETTER IDENTIFICATION



% of children unable to identify the most difficult letters



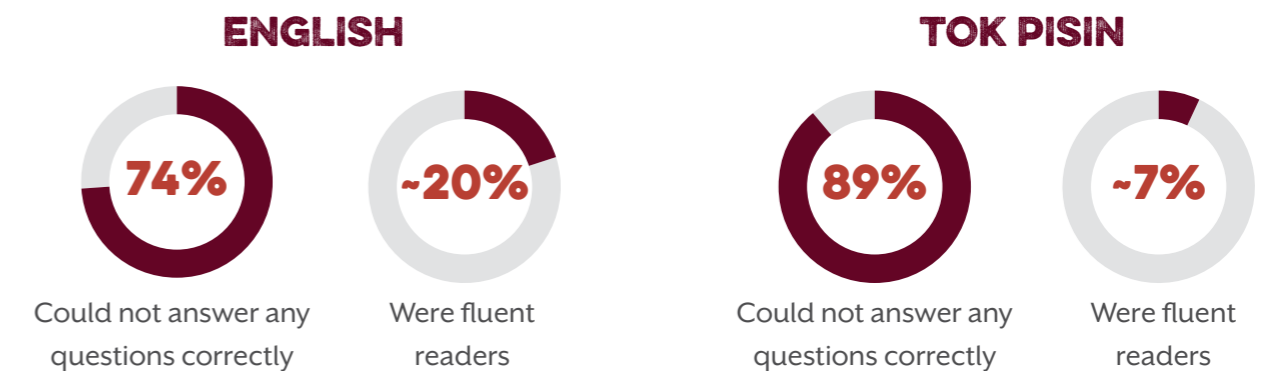
FREQUENTLY USED WORDS



Number of common words children could identify

100% >50% 0%

COMPREHENSION





CONCLUSION

The Tuition Fee Free (TFF) policy introduced in 2012 as a part of the Universal Basic Education (UBE) plan, 2010-2019 by the National Department of Education (NDoE) in PNG has afforded an increased number of students (especially girls) the opportunity to go to school. Between 2011 and 2012 alone the introduction of the TFF saw a 17% increase in overall enrolments²⁵. However, as this extensive dataset suggests, students are not transitioning from Elementary 1 to Elementary 2 with a strong foundation in literacy, indicating that provision of access alone does not guarantee students the quality of teaching and learning required to establish a positive early learning trajectory. The past two years of schooling should have furnished the assessed students with a critical foundation in emergent literacy skills such as phonemic awareness, letter sound knowledge and word recognition, yet half of the students cannot identify a single word in either of PNG's most widely spoken national languages.

There is a clear need for good quality in-service training to develop teachers' pedagogical knowledge and skills in early grade literacy. Teachers need strategies to teach reading, and require professional development with sufficient time for practice, collaboration and reflection through monitoring and mentoring.

A clear, well-communicated language policy which endorses vernacular in early years education will allow teachers to feel secure in their selection and application of an appropriate language of instruction. Greater emphasis on the transition from speaking and listening to foundational reading requires written material in Tok Ples, Tok Pisin (vernacular) and English to ensure full exposure to home language and a robust foundation for literacy development.

²⁵ http://www.dwu.ac.pg/en/images/Research_Journal/2015_Vol.23/5_Paraide_Challenges_with_the_tuition_fee_free_REV.PFG.pdf



CHAPTER THREE

NUMERACY ASSESSMENT



NUMBER IDENTIFICATION

Students were shown twelve single and double-digit numbers between zero and forty-six on a laminated card.

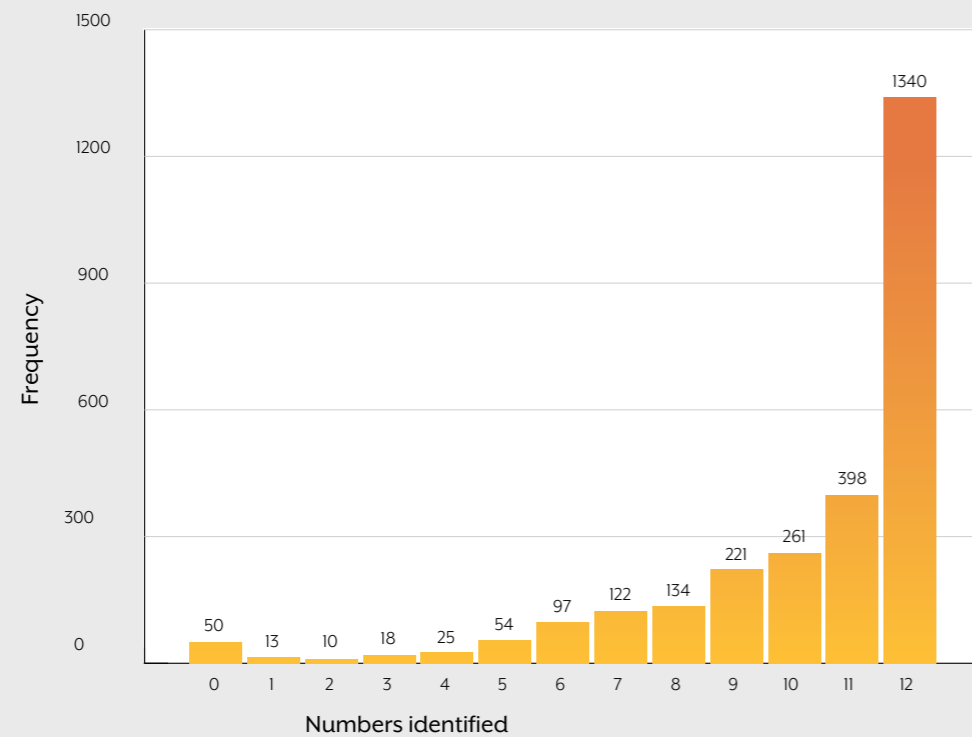
TABLE 5. NUMBERS SHOWN DURING ASSESSMENT

1	0	4	46
17	21	8	9
10	14	5	30

Less than half the students (47%) were able to identify all the numbers. However, 98% of the students were able to identify at least one of the numbers that they were shown. Children struggled with double digit numbers and particularly those numbers that were greater than twenty.

Scores were particularly low in Eastern Highlands Province where only 34% of students were able to identify all numbers. There were no gender differences observed throughout the distribution.

FIGURE 9. NUMBER IDENTIFICATION



SKIP PATTERNS/ MULTIPLES OF TWO AND FIVE

Students were also asked to count by twos and fives up to twenty and fifty respectively (the tenth multiple). One in every ten students was unable to count any numbers. Approximately 30% of the students started counting and then stopped before they could provide all ten multiples of two or five.

However, approximately 56% of the students were able to count all ten multiples of two. 60% of students were able to count by five. Enumerators noticed an element of rote memorisation – hinting that students may have memorised the two and five times tables without necessarily understanding the underlying concept.

FIGURE 10. SKIP PATTERNS BY TWO

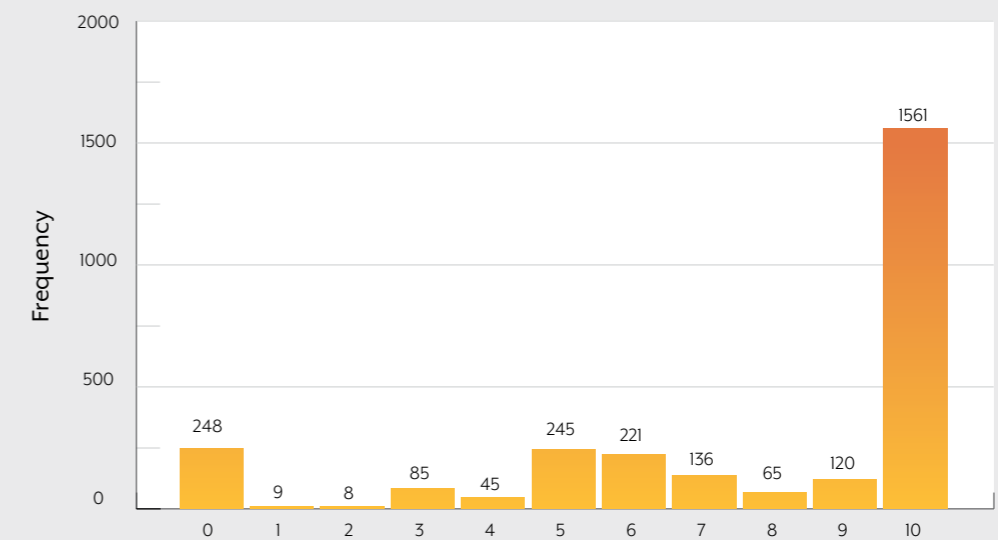
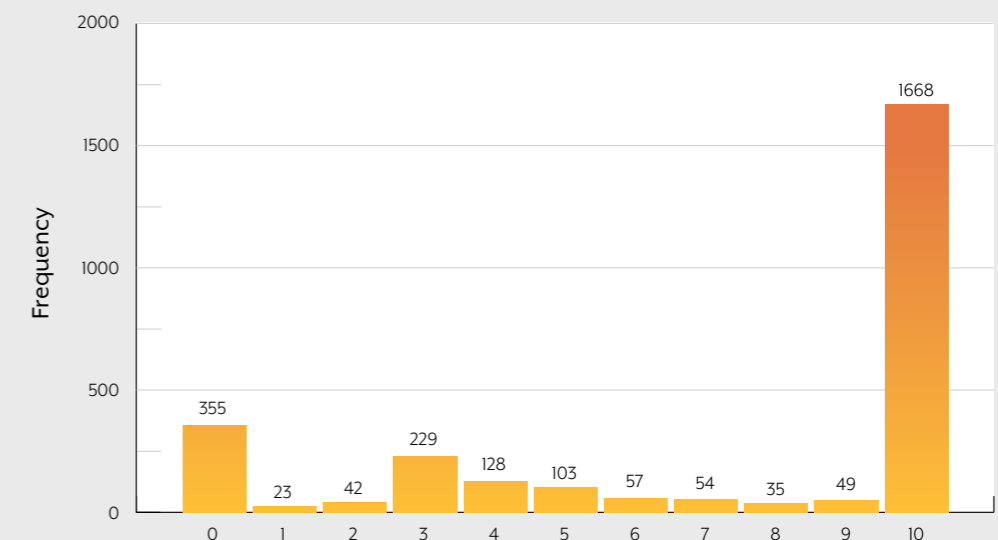


FIGURE 11. SKIP PATTERNS BY FIVE



ADDITION

Students were provided with ten basic single or double-digit addition problems. The first question was included to foster confidence. There were no time limits for providing responses.

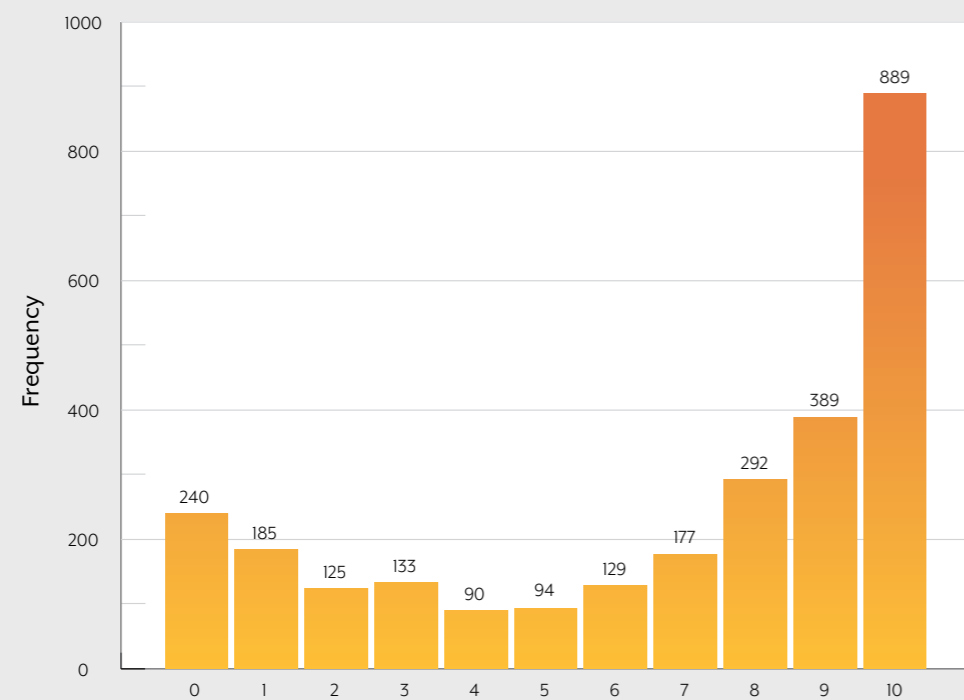
Students generally preferred to use tally marks to do arithmetic and required a pencil and paper (which was provided to them). Students were also provided with beads that they could use if they preferred them to pen and paper.

TABLE 6. ADDITION QUESTIONS ASKED IN THE BASELINE ASSESSMENT

1+1 (= 2)	6+8 (=14)
6+6 (=12)	7+6 (=13)
10+10 (=20)	5+6 (=11)
3+8 (=11)	16+1 (=17)
8+12 (=20)	17+3 (=20)

Approximately one third of the students were able to complete all addition problems. The proportion of students with all complete addition problems was the lowest in Eastern Highlands Province (33%). Ten percent of the children were not yet able to successfully complete any addition problems. This lower threshold was consistent across all provinces. Children struggled with higher order numbers.

FIGURE 12. ADDITION



SUBTRACTION

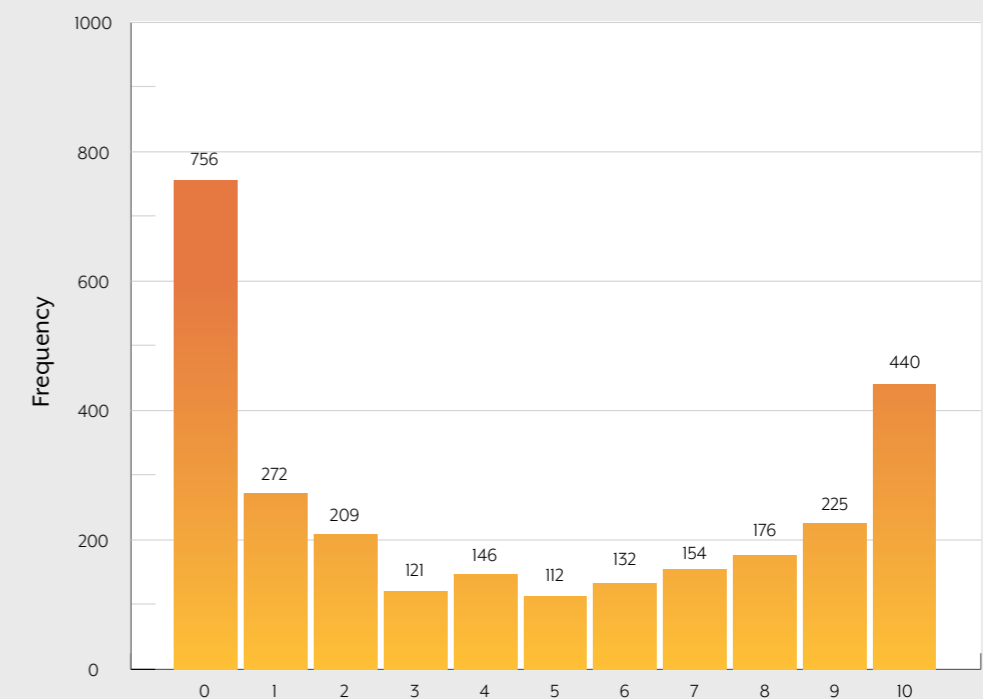
Students were asked to complete ten subtraction problems – once again, there were no restrictions in terms of how much time the students could spend on this sub-section of the assessment. The first was a confidence question. Children had access to a pencil, paper and beads and buttons to complete the addition and subtraction components. Children preferred to use pencil and paper indicating they had little experience using concrete materials to solve simple equations. Both the E1 syllabus and teaching guide address subtraction simultaneous to and in as much detail as addition. As students have not built a solid foundation using concrete materials before modelling at the abstract level, they found it difficult to perform an inverse operation of the same level of difficulty.

TABLE 7. SUBTRACTION PROBLEMS IN THE BASELINE ASSESSMENT

2-1 (=1)	18-2 (=16)
12-6 (=6)	13-6 (=7)
12-12 (=0)	11-6 (=5)
17-4 (=13)	20-14 (=6)
20-2 (=18)	10-10 (=0)

Students consistently performed poorly in subtraction. More than a quarter of children were not able to correctly complete a single problem among the ten. Only 16% of the students were able to complete all problems correctly though they took a long time to do so and along with reading the passages, subtraction was the sub-component that took students the longest time.

FIGURE 13. SUBTRACTION

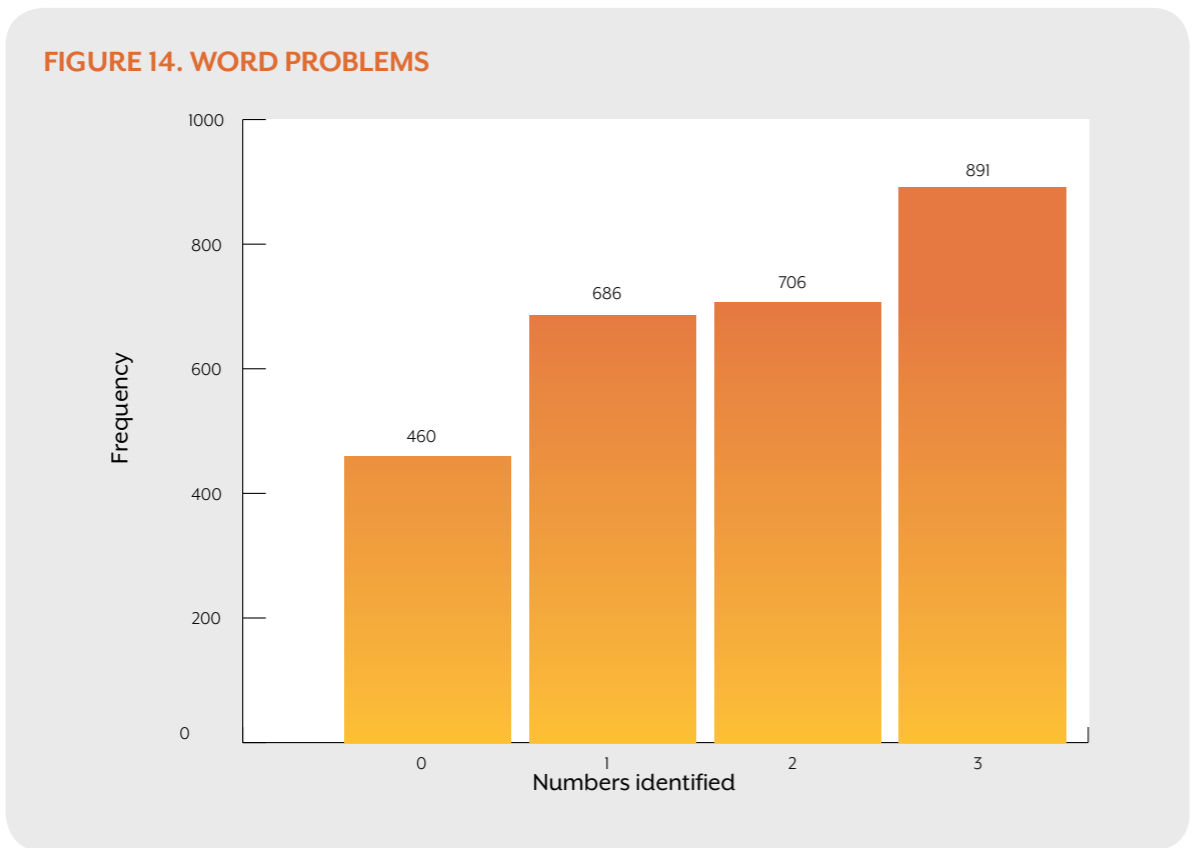


WORD PROBLEMS

Students were also tested on whether they could move beyond understanding basic mathematical concepts to practically solve real world problems. Students were verbally asked to respond to three math problems.

- Rosa has 3 pieces of chalk. She gathers 2 more from the teachers in her school. How many pieces of chalk does she have altogether? (Correct answer: 5)
- Vare made 12 baskets. He sold 4 of them. How many baskets did he have left? (Correct answer: 8)
- There are 3 dogs in a room. If each dog has 4 legs, how many dog-legs are in the room? (Correct answer: 12)

On average, a third of the students were able to respond correctly to all word problems. These results are positively skewed by East Sepik province where nearly half the students were able to correctly respond to all three questions. There were no gender differences observed throughout the distribution. It highlights that children’s oral comprehension is better than their reading comprehension as children were able to understand the questions when they were presented verbally.

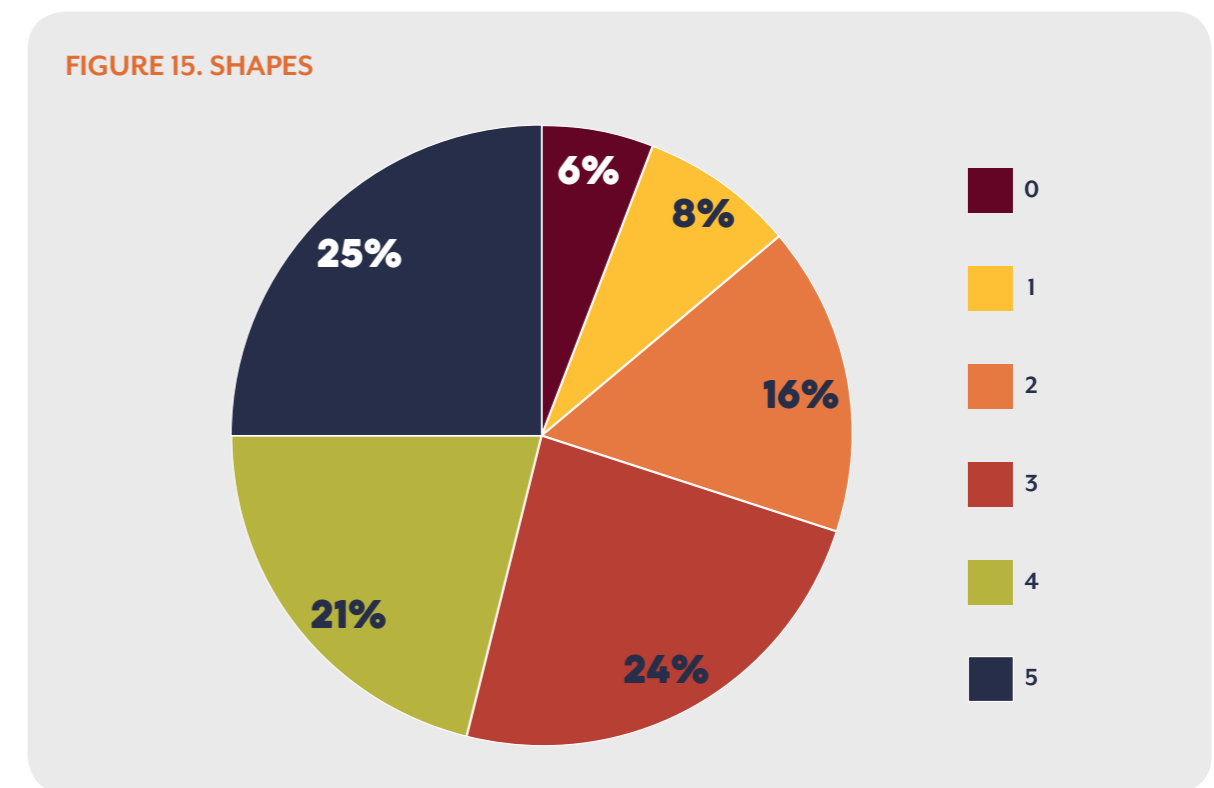


SHAPES

Students were also assessed on their familiarity with shapes by displaying images of different shapes and asking the children to identify them. Furthermore, they were assessed on whether they understood what markers differentiated various geometric patterns and were also asked to give real world examples of shapes.

- Can you show me which shape is the circle?
- Can you show me which shape is the triangle?
- How do you know it’s a triangle? *(Correct response: A response that includes any of these- it has three points, three sides, three angles) *
- Can you name a real object that has a shape like this? *(point to circle) *(Correct response: Any 3-dimensional object shaped like a sphere-a ball, a globe, an orange, a coconut, etc.) *
- Can you name a real object that has a shape like this? *(point to rectangle) (Correct response: Any 3-dimensional object shaped like a rectangle.) *

One quarter of the students were able to respond correctly to all the five questions while on average, students were able to answer at least three questions correctly. On this particular sub-component of the assessment, students from ARoB did not perform as well; more than 10% of the students in the province weren’t able to respond correctly to any of the questions on shapes suggesting that shapes may not be studied till later in the province or that it is covered earlier in the year and consequently forgotten by students.

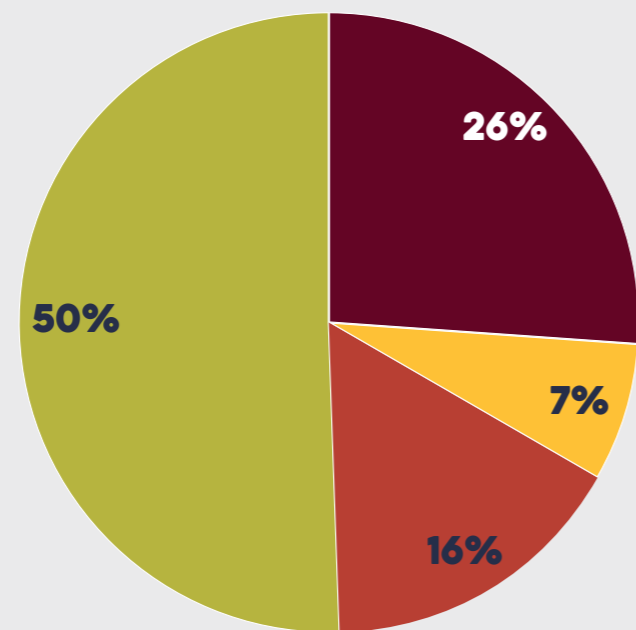


TIME

Finally, students were assessed on their ability to tell the time. On a simple card, students were shown three analogue clock faces times on the hour, (one o'clock, eleven o'clock and nine o'clock) and asked if they could read the time.

Though one quarter of the students were unable to tell time, nearly half the students were able to correctly identify all three. Results were consistent across genders and provinces.

FIGURE 16. TIME



Number of correct clock times identified (% of students)



CONCLUSION

Logical thinking, problem solving and reasoning are critical to active participation in community, work and daily life. Students completing their second year of education in all three provinces are, as yet, lacking the foundational understanding and mastery of basic numeracy skills known to be a strong predictor of later school success.

The numeracy assessment reveals an over reliance on rote learning and memorisation of mathematical information. When students are required to apply this knowledge, they lack skills and strategies to solve simple problems including basic number bonds to 10 and 20, demonstrating a fragile and shallow understanding of mathematical concepts. Assessment data reveals a quarter of students could not complete simple subtraction even when offered concrete materials to support their understanding. It is therefore unsurprising that two thirds of the students could not complete simple spoken and written word problems containing basic addition and subtraction. While the SBC to a degree encourages the use of manipulatives and pictorial representations for one to one correspondence, a wider range of tactile experiences prior to introducing abstract concepts is likely to benefit all students. Experiential learning becomes increasingly important as the syllabus addresses challenging foundational concepts such as the base ten system and place value. Similarly, the explicit teaching of multiple strategies to reaching the same answer allows students to consolidate concepts and to select and apply best or most efficient strategies. A rote learning context is unlikely to allow for a multiplicity of approaches or to promote the creativity required for effective problem solving.

The Numeracy Boost teacher training and community action components are designed to provide teachers with tools to take abstract concepts, operations and exercises, and transform them into relevant, hands-on, practical and engaging activities which address the gap between recall and application. The program encourages teachers and families to notice the everyday tools at their disposal to improve foundational numeracy. Parent and caregiver workshops encourage early exposure to math concepts, activities, ideas, and 'mathematics talk' all of which positively impact school achievement.



CHAPTER FOUR

HOME READING AND COMMUNITY PRACTICES



After the literacy and numeracy assessments, students provided responses to questions on home reading and community reading practices. As questions regarding home reading environment and community practices were asked nearly thirty minutes after the start of the assessment, enumerators reported that students were tired and slightly distracted. Thus, answers on this sub-component of the assessment must be treated with caution.

AVAILABILITY OF READING MATERIAL AT HOME

Students were initially queried about the availability of reading material at home. As the table below shows, more than three quarters of households had religious books at home. Approximately half the students reported to having newspapers and storybooks at home while 43% of students reported having textbooks at home.

TABLE 8. AVAILABILITY OF READING MATERIAL AT HOME

Reading Material	Obs	Percentage
Textbooks	2,713	43.16255
Religious books	2,731	75.83303
Newspapers	2,711	47.51014
Story books	2,719	48.95182

SUPPORT WITH READING

On average, students stated that they had five members in their households and three of these members were of primary school age or older. More than 86% of children attested to having at least one literate adult in the household. Moreover, 72% of children claimed that they had seen at least one member of the household read in the past week. These findings were consistent across all three provinces.

Fifty-seven percent of the students stated that a member of the household had read a story to them in the past week (these responses seem difficult to reconcile with the fact that only 49% of the students had story books at home) though students this young may not distinguish between telling and reading a story. Moreover, in Tok Pisin, the phrase for telling a story can be the equivalent of recounting an event or having a conversation. The language of 'stori' (sharing information) may have led to anomalous findings.

Sixty-five percent of the students stated that a member of the household had told them a story in the past week. Additionally, 61% of students reported having received help in math and 65% of students reported having received help in studying.

COMMUNITY READING ENVIRONMENT

Finally, students were asked about the community reading environment. More than 30% of the students reported having read outside school. Of these, nearly 70% stated that they had read by themselves.

A quarter of the students claimed to have helped someone (a sibling or someone else) with their reading. This finding is particularly hard to reconcile with the fact that even students who couldn't read a single letter of the alphabet or a single word in English claimed to have helped others read (though this percentage was lower – 5% for children who couldn't read the alphabet and 13% for children who couldn't read a word of English). Even so, results must be treated with caution as it appears that either children were too tired to respond accurately or gave such responses as they expected the enumerators wanted to hear. Or as stated earlier, children may have misunderstood the question due to the translation into Tok Pisin.

TABLE 9. COMMUNITY READING ENVIRONMENT

Responses	Obs	Percentage of respondents reporting yes
Read outside school	2,704	31.2%
If yes, did you read by yourself	840	69.0%
Have you helped anyone with reading	2,710	25.0%
Share books with anyone	2,704	32.5%
Do math with anyone	2,706	45.7%



CONCLUSION

Whilst anomalies may be present in the data collected from elementary children about their home learning and community reading environment, the consistency across the provinces suggests there are truths in the data set and that some reading books and reading activity is available for approximately 30% of the children assessed. This does mean however that a large proportion of children are not being exposed to any reading activity outside school.

Literacy Boost draws upon the broad base of research outlining what children need as they learn to read, including parent and adult involvement, exposure to a variety of books, and regular reading aloud with quality interactions²⁶. US-based research in particular has shown that the most successful way to improve the reading achievement of low-income children is to increase their access to print²⁷ and that the involvement of parents and caring adults in the community has an important, positive impact on a child's success in development of reading skills²⁸.

This research informs and supports Save the Children's own findings. In fact, data collected from Literacy Boost programs across the globe all reveal a positive correlational relationship, suggesting that children who have access to books and are read to more frequently score higher in reading competencies²⁹. A significant component of Save the Children literacy intervention is therefore focused on the home and community literacy environment. Community literacy activities, such as reading clubs, buddy reading programs and community book banks form a key part of PNG RISE. The aim is to increase the quantity of reading materials in the community as well as the practice of reading. Increasing the variety of print materials, including vernacular, Tok Pisin and English child-friendly fiction and non-fiction books, is hoped to give children more opportunity to read. The intervention also acknowledges a vital story-telling culture in PNG and recognises the way in which this tradition allows non-literate parents to engage children in valuable pre-reading activities. It also acknowledges that learning should be fun and that children will more likely develop positive reading habits if they enjoy reading.

²⁶ Goldenberg, C. (2001). *Making Schools Work for Low-Income Families in the 21st Century*. In Neuman, S.B. & Dickinson, D.K. (Eds.), *Handbook of Early Literacy Research*. (pp. 211-231). New York: The Guilford Press.; New, R.S. (2001). *Early Literacy and Developmentally Appropriate Practice: Rethinking the Paradigm*. In Neuman, S.B. & Dickinson, D.K. (Eds.), *Handbook of Early Literacy Research*. (pp 245-262). New York: The Guilford Press.; Pang, E.S., Muaka, A., Bernhardt, E.B., & Kamil, M.L. (2003). *Teaching Reading*. Paris: UNESCO International Bureau of Education and International Academy of Education.; Wagner, D. A. (1993). *Literacy, Culture and Development: Becoming Literate in Morocco*. Cambridge University Press.

²⁷ Newman, S. (2000). *Americans' Child Care Crisis: A Crime Prevention Tragedy; Fight Crime; Invest in Kids*.

²⁸ Bingham, G.E. (2007). *Maternal Literacy Beliefs and the Quality of Mother-Child Book-reading Interactions: Associations with Children's Early Literacy Development*. *Early Education & Development*. 18(1), 23-49.

²⁹ Save the Children (2011) *Literacy Boost Community Action – Creating a culture of reading outside school walls*. Save the Children, Washington



CHAPTER FIVE

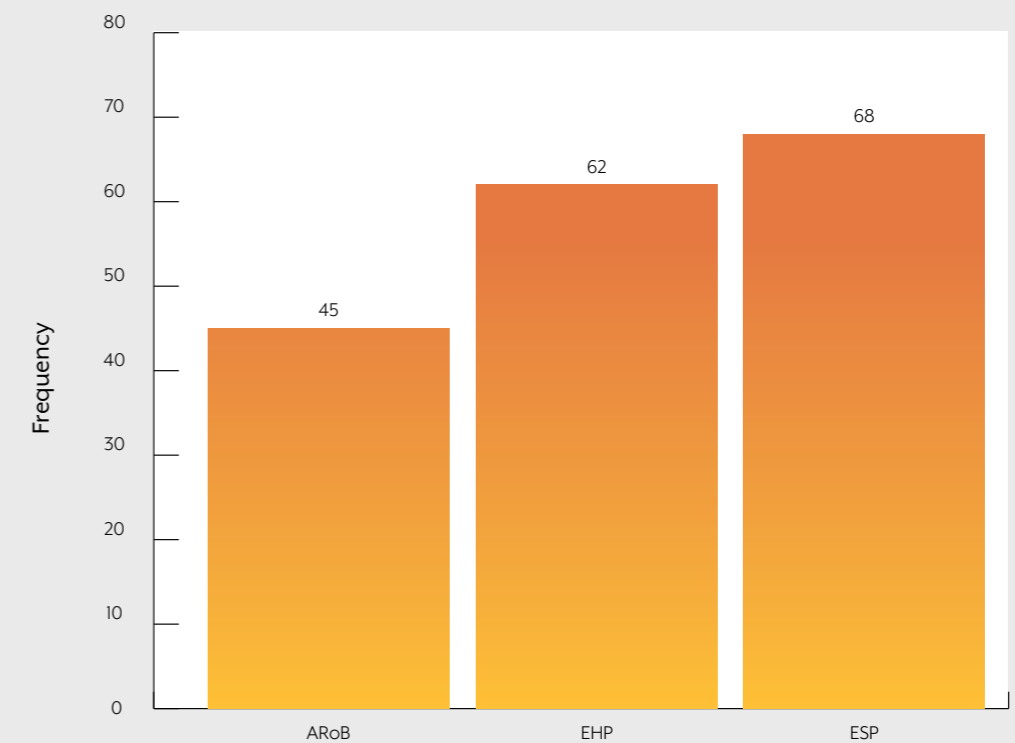
TEACHER PRACTICES/ LESSON OBSERVATION



TEACHER PRACTICES/ LESSON OBSERVATION

During the baseline assessment, 175 lessons across the three provinces of PNG were observed. Most schools in ARoB had closed by the time of the assessment (late November/early December). It therefore has the lowest number of observations available for analysis.

FIGURE 17. LESSON OBSERVATIONS BY PROVINCE



Lesson observations were conducted by a primary observer (usually a teacher trainer working with Save the Children). In most schools, the teacher trainers were accompanied by an enumerator who served as a secondary observer. Two data points from the same classroom allowed us to conduct additional quality and consistency checks on the data.

Almost all lesson observations (92%) took place in E2 classrooms. A few took place in multi-grade classrooms where either E1 and E2 or all grades were combined. In most cases, multi-grade classrooms were the result of staff shortages, staff absenteeism on the day of the assessment or small grade size.



SNAPSHOTS OF TIME SPENT ON TASK

The observers took five 'snapshots' of an E2 literacy lesson at five-minute intervals from the start of the assessment. Similar to the minute by minute Stallings assessments, these snapshots allow us to quantify the lesson snapshots across discrete categories rather than relying on a subjective assessment of the lesson. The Stallings snapshot focuses on student, teacher and classroom level interactions and classifies each activity (and the intended audience of that activity). Data is captured at regular intervals (usually every 2-5 minutes) wherein interactions are recorded as though through a photograph—a single instant in time is the focus of the observation. This makes it a low-inference, quantitative tool for measuring time on task³⁰. The benefits of using a snapshot analysis is that it provides a useful proxy for quality to the extent that it can draw attention to time off task and provide a general picture of the extent to which the teacher is allowing more time for learner-centred approaches.

With 175 classroom observations and 5 snapshots per classroom, there are 875 (175 x 5) observations. Observers were asked to choose from the following discrete categories for each snapshot:

- **Teacher-led instruction:** Teacher in the front of the room providing instruction. Includes lecture, student question/answer, copying from the blackboard and choral reading. Students are responding (or not) or actively listening to teacher.
- **Creative Literacy Activity:** Teacher engages students in tasks to reinforce understanding of literacy concepts being taught. Students are singing, chanting, playing word and letter games, drama or role play, building word patterns, drawing pictures to match sounds, retelling a story, etc.
- **Reading:** Teacher is engaged in guided oral reading to the whole class or a small group from the SBC or other relevant story book, or teacher is listening to students read aloud or asking literal, inference or evaluative comprehension questions about a book. Students are reading: individual (silent) reading, in pairs or small groups or verbally predicting and responding to texts e.g. answering questions about a book they have read.
- **Writing:** Teacher is engaged in modelled writing or monitoring student writing and providing feedback. Students are practicing letter patterns, writing words, sentences, paragraphs or stories, handwriting, labelling, answering written comprehension questions.
- **Group work, pair work, or individual work:** Code the teacher as participating in this activity if they are assisting students i.e. Teacher walks through the room to attend to small groups or individuals. Students are working (answering comprehension questions, practicing writing, completing spelling or vocabulary tasks, etc.), either individually, in pairs, or in groups.
- **Transitions/preparing activities:** Teacher and/or students are involved in classroom management: handing out reading books, changing activities, putting away materials, preparing to leave.
- **Discipline:** One or more students are being corrected or disciplined for poor behavior or are being sent out of the room for disruption to class.
- **Uninvolved or Off-Task:** Teacher and/or students are involved in activities that are unrelated to the lesson plan. This includes social interactions (conversations, teasing, bullying) or non-social interactions (staring out the window, sleeping); also applies if the teacher or students have stepped out of the classroom.

TEACHER TIME ON TASK

TABLE 10. CLASSROOM ACTIVITY OF TEACHERS

Classrooms activity of teachers	
Teacher-led Instruction	36.11%
Creative Literacy Activity	13.94%
Reading	15.77%
Writing	14.17%
Individual/group work	9.94%
Transition	4.69%
Discipline	1.49%
Uninvolved or off task	3.89%
Number of unique observations	875

More than a third of the time was spent on teacher-led instruction where students are passive respondents either actively listening to the teacher while they speak or writing from the blackboard. The observations do not distinguish 'good' teacher-led instruction such as presenting new material in small steps or asking a large number of questions³¹ from 'poor' teacher-led instruction where no student interaction occurs. Globally, while teacher-led instruction is often criticised, there is a growing body of evidence that knowledge building is best done with some guided instruction. This is generally the finding across numerous studies in the UK and US but it assumes knowledge is already built in the teacher and that teachers have the skills to impart this knowledge through guided instruction. These assumptions rarely hold true in developing countries where the teaching workforce is often unqualified and inexperienced in student engagement strategies.

For developmentally appropriate practice, teacher-led activities should be carefully balanced with child-initiated activities. It is also evident that when a teacher joins with students to support them that this is often the most productive and is also one most enjoyed and valued by children. Best practice seeks a balance between teacher-led instruction, group and individual enquiry and consolidation. The findings suggest that a suitable proportion of time is being spent on teacher-led instruction but the low proportion of time spent on individual and group work suggests that students may not be spending sufficient time on practice, application and consolidation. This is where activities focused on comprehension generally take place and may indicate that not enough time is being spent on consolidating learning during class time.

Literacy focused activities and time spent on reading and writing is well balanced and constitutes 44% of class time. The concern however lies in the proportion of whole class literacy focused activity, which we have to assume is high vs individual and group work where reflective learning is more likely. It is also likely that the teacher is not spending sufficient time with individual students as a result of their preoccupation with teacher instruction and whole class activity. Individualised support to students who may require assistance is likely negligible.

Whilst some time for transition is important, 14% of class time is currently not focused on the lesson content, with almost 4% of time not on task. This falls within the Stallings Benchmark for effective time use, currently set at 6%³².

³⁰ UNESCO (2016) Measures of quality through classroom observation for the Sustainable Development Goals: Lessons from low-and-middle-income countries, available: <http://unesdoc.unesco.org/images/0024/002458/245841E.pdf>

³¹ Rosenshine, Barak., Principles of Instruction, American Educator, Spring 2012 <https://www.aft.org/sites/default/files/periodicals/Rosenshine.pdf>

³² Stallings and Knight (2013)

STUDENT TIME ON TASK

For each snapshot, the observers also recorded whether the children in the classroom were engaged and on task. For example, if the classroom was tasked with a writing assignment, observers noted the percentage of the classroom engaged in this writing task.

TABLE 11. CLASSROOM ENGAGEMENT

Student engagement with ongoing activity	
None of the students	11.89%
One or a few students	6.06%
Half the students	6.29%
Almost all	38.51%
All	37.26%
Number of unique observations	875

In a class size of 30 students, 23 students are engaged and 7 students are either completely disengaged or partly disengaged from the learning task. Findings from research on engaged time or time on task demonstrate that the more engaged time students have, the higher they achieve. Highly interactive instructional styles led to greater amounts of student engaged time, and, consequently, increased student learning³³. The baseline result suggests that a small proportion of students are not receiving the kind of instruction that might stimulate their engagement. This may be the result of teacher influences or student influences. For instance, a student may be drowsy either due to boredom or because of hunger if they missed breakfast. Both are plausible in the context of PNG Elementary schools. Student engagement is often a consequence of learning preferences and intrinsic motivation, which is somewhat influenced by how the teacher engages the student in the teaching-learning process.



DISCIPLINE AND CONFLICT MANAGEMENT

Observers also observed issues concerning classroom discipline and conflict management.

TABLE 12. DISCIPLINE PRACTICES

	Freq	Percent
Physical discipline	5	2.86
Shouting/ verbal discipline	31	17.71
Positive discipline	139	79.43
Total	175	100

Most elementary teachers observed used positive discipline as the primary classroom behaviour management strategy. Negative forms of discipline on student wellbeing are evident in 20% of elementary schools where shouting and verbal discipline is the most common form of negative discipline. Three percent of children were witnessed experiencing physical discipline, which influences these children's ability to learn. Given the assessment was observation rather than a self-reported survey, teachers may be less likely to strike a child or discipline a child harshly in the company of other adults. This percentage is therefore a low estimate of the likely incidence.

Students who experience corporal punishment in school are more likely to have learning or developmental delays than other students. This suggests that 20% of children are at a disadvantage due to the negative consequences of various forms of abuse in the classroom. Corporal punishment is lawful in schools under the provision for the use of force "by way of correction" in article 278 of the Criminal Code 1974 (see under "Home"). The Education Act 1983 does not prohibit corporal punishment. Corporal punishment is discouraged in schools by way of policy (not law). For example, the Teaching Service Commission *Disciplinary Policy and Procedures for Members of the Teaching Service* (2009) lists corporal punishment as a "serious offence" and the Ministerial *Behaviour Management Policy for the National Education System of Papua New Guinea* (2009) emphasises that corporal punishment should not be used at any time³⁴.

³³ University of California (1980) *Time-on-Task: A Strategy that Accelerates Learning*, <https://jeaweb.org/time-on-task-a-teaching-strategy-that-accelerates-learning>

³⁴ Global Initiative to End All Corporal Punishment of Children (2017), <http://www.endcorporalpunishment.org/progress/country-reports/papua-new-guinea.html>

TABLE 13. RESPONSE TO STUDENTS' QUESTIONS

	Freq	Percent
Annoyance	7	4
Mixed	44	25.14
Warmth and affection	124	70.86
Total	175	100

The findings on students' response to questions correlate with the findings on positive discipline where 70% of elementary teachers are using positive forms of feedback with expressions of warmth and affection. It does mean however that 30% of teachers are either not giving positive feedback consistently or never giving positive feedback. It is probable that teachers who are responding with annoyance may also be disciplining students in a negative manner. One quarter of teachers are using a mixed approach when responding to questions in the classroom, which suggests that these teachers are aware and able to respond to students in a warm and supportive way but in some instances they do not.

TABLE 14. CONFLICT AMONG STUDENTS

	Freq	Percent
Does not manage conflict	40	22.86
Stops bullying	13	7.43
Stops bullying & helps students reflect	122	69.71
Total	175	100

A clear majority of teachers were observed confronting bullying and helping students reflect on the impact their behavior was having on other children. There were 40 instances however where teachers did not manage the conflict, allowing students under their care to be harassed, hurt or bullied. There are possible reasons for this linked to the teacher's confidence, awareness and agency or authority. According to research findings outside this study, a teacher may not know how to recognise bullying, a teacher may be distracted by other pressing demands on their time, a teacher may believe it's better for students to resolve their own issues, and some teachers are bullies themselves or victims of bullying³⁵. The teacher may not be aware that bullying is harmful to children, and given society often expresses itself in violent ways, it is normalised. If bullying goes unattended it can undermine key values that schools aim to promote in students such as respect, trust and honesty³⁶.

³⁵ Hancock (2016), *Bully Vaccine*, <https://www.quora.com/Why-do-some-teachers-tolerate-bullying-in-their-school>

³⁶ <https://bullyingnoway.gov.au/WhatsBullying/Documents/faqs.pdf>

TABLE 15. SENSITIVITY TO GENDER ISSUES

	Freq	Percent
Mostly boys	10	5.71
Mixed	78	44.57
Makes extra effort to engage both genders	87	49.71
Total	175	100

According to the observers, most teachers showed no gender biases in calling on boys or girls to respond to questions. This is a positive finding, however, given the underlying disparities in PNG, the result may have been influenced by the observers own bias.^{37,38} This could also be explained by the young age of the children when gender bias is less visible.

Given the proportion of time teachers are leading discussion, student engagement in questioning and answering questions is likely low. Whilst further investigation is required, observations of teaching practice in project sites suggest teachers either speak in a rhetorical style or field questions to no one in particular and girls are the most compliant – listening and raising their hands.

³⁷ This is an interesting finding given that women's literacy, education and employment rates in PNG are lower than those of males, and violence against women is reported to be one of the highest in the world.

³⁸ Edwards (2015), *Gender and Education Assessment, Papua New Guinea: A review of the literature on girls and education*, <http://dfat.gov.au/about-us/publications/Documents/png-gender-and-education-assessment-review-literature-girls-education.pdf>

LANGUAGE USED IN THE CLASSROOM

TABLE 16. LANGUAGES USED IN THE CLASSROOM

Used Languages (all combinations)	Freq	Percent
Tok Pisin and English	86	49.14
English only	45	25.71
Tok Pisin only	19	10.86
Tok Pisin, English and Tok Ples	14	8
Tok Pisin and Tok Ples	5	2.86
English and Tok Ples	4	2.29
Tok Ples only	2	1.14
Total	175	100

TABLE 17. USE OF INDIVIDUAL LANGUAGES

Language used in the classroom	
English	85.14%
Tok Pisin	70.86%
Tok Ples	14.29%

Observers found little evidence of Tok Ples being used in the classroom by E2. Out of the 175 lessons observed, only two teachers taught the entire lesson in Tok Ples. Nearly 15% of lessons had some words of Tok Ples. English continued to remain the dominant language with nearly a quarter of the lessons taking place only in English. This is despite English being the teachers and students third or fourth language. VSO and the British Council assessed elementary teachers in 2013 (n=750) using the International English Language Testing System (IELTS). Among their findings, approximately 40% of elementary teachers had ‘very limited English proficiency’³⁹. As the most language rich nation in the world, linguistic diversity in the classroom is a natural and expected reality for children. This does however create challenges for literacy acquisition. Combined with teachers’ low English proficiency it is no surprise this continues to be a significant challenge in elementary school classrooms. This is why the scripted lessons in the SBC were introduced but to date this has not resolved the issue of language proficiency. All the evidence suggests that emergent and foundational literacy skills are best taught first in a child’s first or vernacular language. In the same way teachers’ Lol should be their language of fluency. English however is the language of instruction and the language used in official communication. Tok Pisin is used in the social domain whereas at home children frequently use vernacular. The high frequency of English used in the classroom could be the result of English only teaching and learning materials and the language policy that stipulates a preference for instruction in English. Whilst the lesson observation did not assess code switching it is expected that students are not being exposed to rich models of language but rather a confusion of distorted languages.

³⁹ Drinan and Jones, 2013, <https://jyx.jyu.fi/dspace/bitstream/handle/123456789/48094/URN:NBN:fi:juu-201512144012.pdf?sequence=1>

SYLLABUS

TABLE 18. SYLLABUS USED FOR THE LESSON

	Freq.	Percent
SBC	115	65.71
None	21	12
OBE	21	12
Other	11	6.29
Pre-OBE	4	2.29
Don’t know	3	1.71
Total	175	100

Most teachers were following the SBC syllabus, although 35% of children are being taught either without a syllabus at all or one that is out of date. This is concerning particularly if the material that is being used does not align to the performance standards of the SBC and does not include the content which is expected to be covered to graduate children into primary levels.

TABLE 19. AVAILABILITY OF SBC MATERIALS

Availability of SBC materials	
SBC English Syllabus	79.43%
SBC English teacher guides	81.71%
SBC Language Syllabus	70.29%
SBC Language teacher guides	69.71%

Nearly a quarter of the teachers had access to all necessary SBC materials within the classroom.

TABLE 20. LESSON MATCH

Lesson match	
Week	72.17%
Term	74.78%
Grade	84.35%

Two thirds of all lessons matched the SBC guide in terms of the week and term. This finding does not tell us whether the lesson plan was followed exactly but the fact that the lesson sequence is followed according to the weekly schedule is positive.

SKILLS DISPLAYED BY THE TEACHER

Observers were asked to note down whether the teacher gave instruction or provided time on task for the following skills –

- Letter identification (for example: pointing to letters and saying their names)
- Vocabulary (for example: teaching new words and their meaning, matching words and pictures)
- Phonemic/Phonological awareness (for example: practicing saying sounds, identifying objects with the same initial sound, rhyming)
- Decoding reading using phonics knowledge (for example: sounding words out, such as “c-a-t = cat”)
- Reading fluency (for example: Repeated reading of sight words and phrases, oral reading to teacher, choral reading, partner reading)
- Reading comprehension (for example: answering questions about a book/text)
- Writing (for example: tracing, handwriting, labelling, story-writing)
- Listening and speaking (for example: role play, story-telling, focused discussion)

TABLE 21. SKILLS DISPLAYED BY THE TEACHER

Skills displayed by the teacher	
Letter Identification	48.57%
Vocabulary	52.57%
Phonemic/Phonological awareness	52.00%
Decoding reading	45.14%
Reading fluency	46.29%
Reading comprehension	40.00%
Writing	40.00%
Listening and speaking	28.57%
None of the above	12.00%

A broad coverage of literacy skills is demonstrated by teachers with vocabulary, phonemic awareness and letter identification being the most common skills shown during the lesson. The observations made highlight skills which were displayed, not the quality of the skills displayed. The SBC does not explicitly address vocabulary nor include strategies on how to teach it, so it’s uncertain and perhaps inconclusive that vocabulary is being taught. The least common literacy skills demonstrated were listening and speaking which correlates with results from the time on task observations which noted a preference towards teacher-led instruction rather than student-led discussion, small group work or individual work. The preference towards phonemic awareness is perhaps not surprising given the strong push by advocates in PNG of literacy approaches such as Creative Phonics© during the past decades. It is however an incredibly difficult area to cover for teachers. As English may be their third and least used language, teachers may not know the correct pronunciation, or attempt to sound out sight words because they have a limited grasp of the language.



CLASSROOM ENVIRONMENT

TABLE 22. CLASSROOM ENVIRONMENT

Classroom Environment	
Lots ⁴⁰ of printed materials on classroom walls	28.53%
Lots of printed materials in English	29.71%
Lots of printed materials in Tok Pisin	0.57%
Lots of printed materials in Tok Ples	5.71%
Sufficient SBC E2 readers	14.86%
Sufficient student reading books	16.57%
Sufficient storybooks in English	9.14%
Sufficient storybooks in Tok Pisin	0.57%
Storybooks in local languages	1.14%
Black boards and chalk	96%
Notebooks and pencils	81.71%
Children’s work displayed	34.86%
Clock	24.57%
Chairs/benches/mats	56.57%
Sufficient light	76.57%
Tidy	70.29%

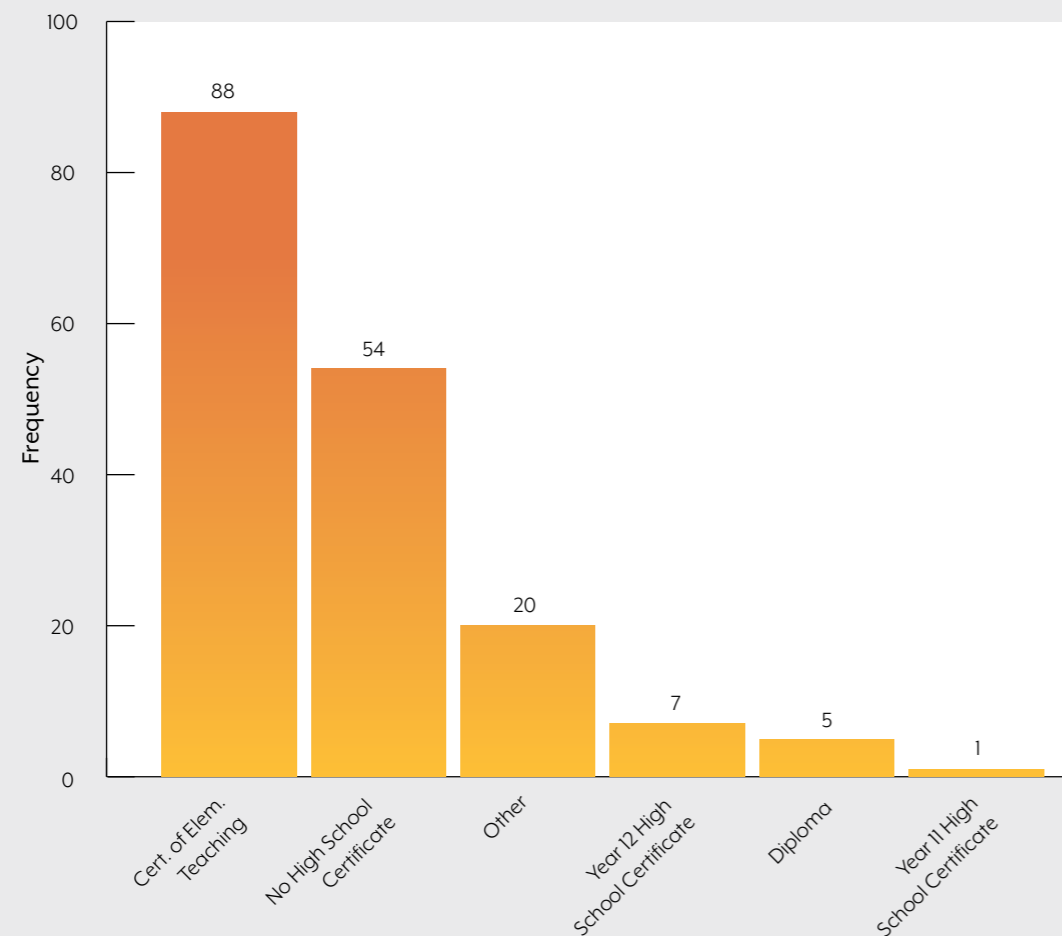
The classroom environments are generally print poor with less than 30% of classrooms with print materials displayed on walls. Most of the materials on display were in English with nominal material in Tok Pisin and Tok Ples. It is unclear whether teaching and learning resources are available, just not displayed or not available. Considering the TFF policy where funds to schools are to support teaching and learning, it is surprising that there is such a low proportion of schools with adequate resources on display. A very low proportion of schools displayed story books and books in local languages were rarely sighted. It would be challenging for teachers to encourage reading without books and yet this might be the reality for many elementary teachers in PNG. Remoteness is also a factor likely to influence availability of resources. With 17% increase in enrolments since introducing the TFF however there is no real-time EMIS data to support increased funding for additional enrolments. Given the sudden rise in enrolments, school infrastructure (also covered by the TFF) is likely to be viewed as a more pressing need than consumables i.e. teaching and learning resources. Low numbers of school inspections are also a risk to the TFF as the Board of Management (BOM) has no mechanism for reporting expenditure to Provincial Department of Education (PDoE). The BOM is entitled to collect up to 30% of the TFF in administrative fees.

⁴⁰ Lots being more than a quarter of the room filled with material Sufficient being one resource between three students.

TEACHER DETAILS

In line with EMIS data, most teachers observed during the lesson observation were female (52%). The median age of the teachers was 37 years. On average, a teacher had about 11 years of experience. Most of the experience was in the same school (10 years).

FIGURE 18. TEACHER EDUCATION



Most teachers have a certificate of elementary teaching which is a 20-week residential course over four terms. More than 50% of teachers do not have a high school certificate and only 5% have a diploma. Over a decade of educational restructuring in elementary education has brought commensurate reform in elementary teacher education involving the training of some 16,000 elementary teachers by the early 2000s⁴¹. Many of the elementary teachers currently in schools would have received their core training from this program.

STUDENT DETAILS

There were 2,867 boys and 2,595 girls enrolled in the 175 classrooms observed. The average class size was 31 students. The gender parity ratio in the classrooms was .91 (there were 91 girls to every 100 boys enrolled). On the day of assessment, 66% of girls enrolled in those classes were present while 62% of boys enrolled in those classes were present. Student absenteeism stood at 36% (lower than the overall recorded absenteeism rate from the school survey). More on this issue is discussed in the subsequent chapter.

CONCLUSION

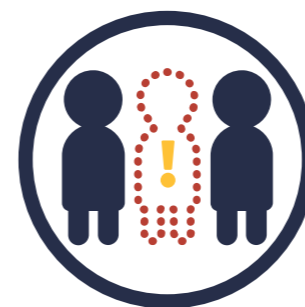
According to the data gathered, the classroom learning environment and the role of the teacher in supporting literacy and numeracy skills acquisition are important predictors of student learning outcomes. The classroom learning environment is generally print poor and 35% of classrooms observed are without the SBS or using an out of date version of the curriculum. In more than 80% of classrooms there are insufficient SBS readers and storybooks for children. There are virtually no readers or stories in Tok Ples or Tok Pisin despite being common languages spoken by children. Many of the teachers are relying on instruction for the majority of the lesson rather than group work and individual work. We can surmise from the observation data that children are receiving little individualised support from the teacher or given sufficient time to apply and practice what they have learnt in groups or individually. Copying from the blackboard and listening to the teacher constitutes the majority of time students spend in the class. They are least engaged in speaking activities compared to writing and reading activities which raises concerns about the opportunities students are given to practice speaking English and responding to questions.

⁴¹ Ikupu, A., & Glover, A. (2002). Papua New Guinea elementary teacher education: Mixed mode teacher training for 16000 village teachers. *Australian Journal of Early Childhood*, 28 (2), 39-45.



CHAPTER SIX:

OTHER FINDINGS OF INTEREST



ABSENTEEISM (PERSISTENT AND TRANSIENT)

The baseline attempted to get an accurate picture of student absenteeism in Papua New Guinea and closely examine the difference between persistent absenteeism (students who are listed in the register but never attend) and transient absenteeism (students that are frequently absent but attend school) by measuring student absenteeism in three ways:

- A. All the Elementary students who were present were physically counted by the enumerators on the day of the assessment and the number was compared to the total number of students in the enrolment register
- B. Teachers were asked about how many students were enrolled in their classrooms and enumerators counted the numbers who were present on assessment day
- C. Students were asked how often they were absent in the past week

FINDINGS:

All three provinces displayed a high rate of student absenteeism (between 46% and 52%). Teachers reported lower classroom enrolment rates as compared to the school enrolments reported by Teachers in Charge (TICs). Self-reported student absenteeism was in line with the data provided by teachers (second measure of absenteeism).

These findings lead us to surmise that there may be two kinds of student absenteeism in Papua New Guinea - persistent absenteeism and transient absenteeism. Persistent absenteeism would mean that the student is technically enrolled in school but never attends. So, the school might be collecting TFF for that child (and would count that child as enrolled in school) but s/he is not enrolled in any particular teacher's class. For the teacher, in the absence of an attendance register, that child may not exist at all.

Our measure of transient absenteeism comes from the children who are enrolled in a class and attend regularly or irregularly. The teacher notes their presence and only counts these children for the total enrolment in the classroom. This hypothesis is supported by the fact that the total enrolment recorded by the lesson observation is only 32 students per class (while EMIS records it as around 39 or 40 at the E2 level for the three provinces that were studied).

The other hypothesis could be that students in EP and EI are younger and therefore absent more frequently than E2 students due to distance from home to school or tiredness⁴².

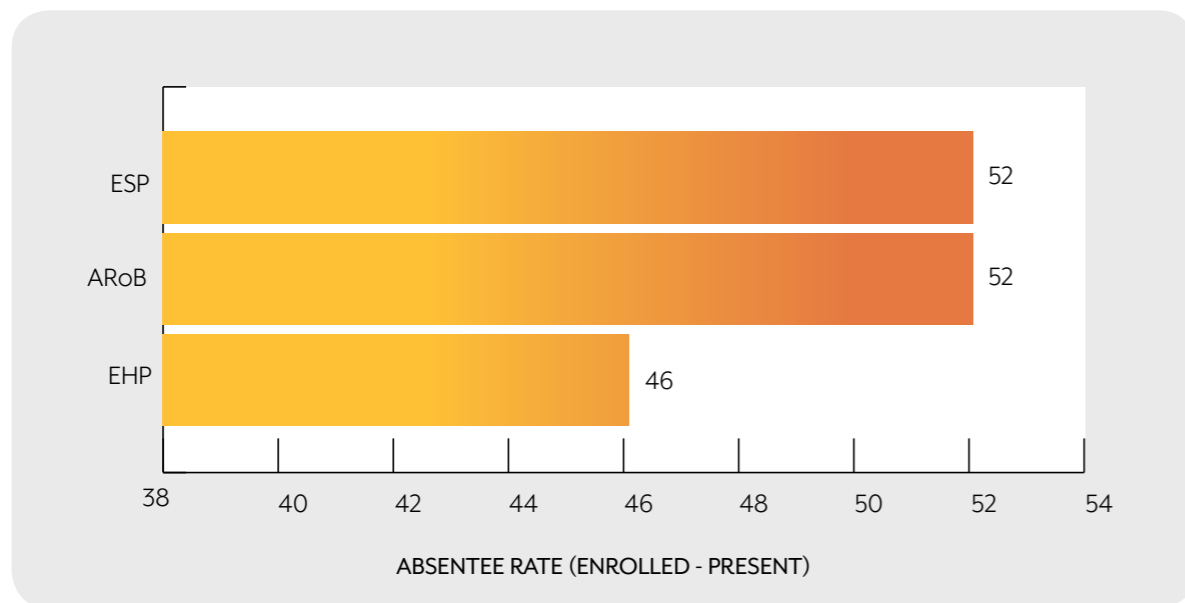
⁴² Only 2.74% of children cite distance to school as a reason for absenteeism. Illness is the most common reason that children give for their absence (37.3%) followed by teacher absenteeism (16.15%).

TABLE 23. STUDENT ABSENTEEISM USING TWO DIFFERENT MEASURES

Province	Absenteeism Rate (Enrolled in school – Present in school)	Second Measure Absentee Rate (Enrolled in E2 class – Present in E2 class)
Eastern Highlands	46%	43%
Autonomous Region of Bougainville	52%	29%
East Sepik Province	52%	30%

FIGURE 19. STUDENT ABSENTEEISM IN THREE PROVINCES OF PAPUA NEW GUINEA

Half the enrolled students aren't attending class regularly and this raises significant concerns regarding time on task.

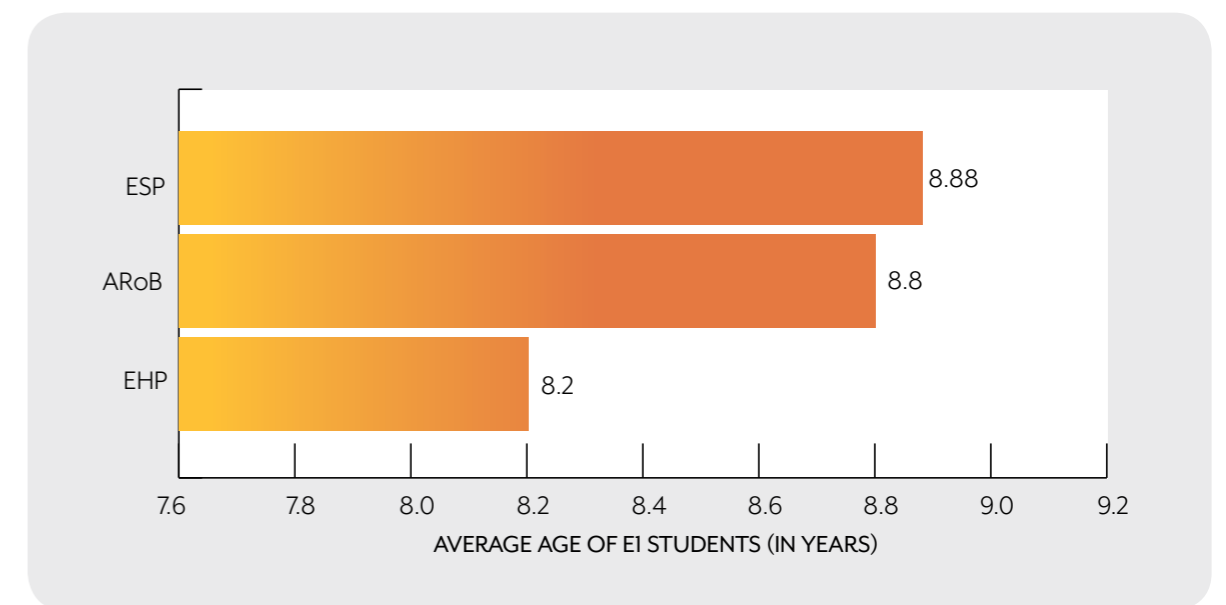


DO OVER-AGE CHILDREN PERFORM BETTER?

All students were asked for their ages during the assessment. However, 51.4% of the students who were assessed were unable to recall their age. This means age data for only 1,333 students (48.6% of the students) exists and there is a gap in self-awareness among students regarding their age.

Findings: The average age of the children in E1 was 8.54 years, approximately one and a half years 'over-age'. The expected age of children in E1 based on NDoE policy is 7 years. The mean age by province is shown in the figure below. The median age was 9 for ARoB and ESP and 8 for EHP.

FIGURE 20. AVERAGE AGE OF ELEMENTARY STUDENTS IN E1



For the children for whom data was obtained, it was found that age was a significant factor for numeracy scores (number identification, addition, subtraction, skip patterns, problem solving and telling time) but not on literacy in a multi-variate model that controlled for several other attributes like gender, socio-economic status etc. The effect size was limited – that is to say, the difference may have been statistically significant but was relatively small. For example, if a child was able to identify 8.34 numbers on average, an additional year was associated with an increase in number identification scores of 0.146. So, a 9.5 year old child would be able to identify 8.48 numbers and a 10.5 year old child would be likely to identify 8.62 numbers (on average).

FIGURE 21. MOST USED WORDS IN TOK PISIN – SCORES FOR 9 YEAR OLDS AND 8 YEAR OLDS (SIMILAR SCORES FOR AN 8 YEAR OLD CHILD AND A 9 YEAR OLD CHILD)

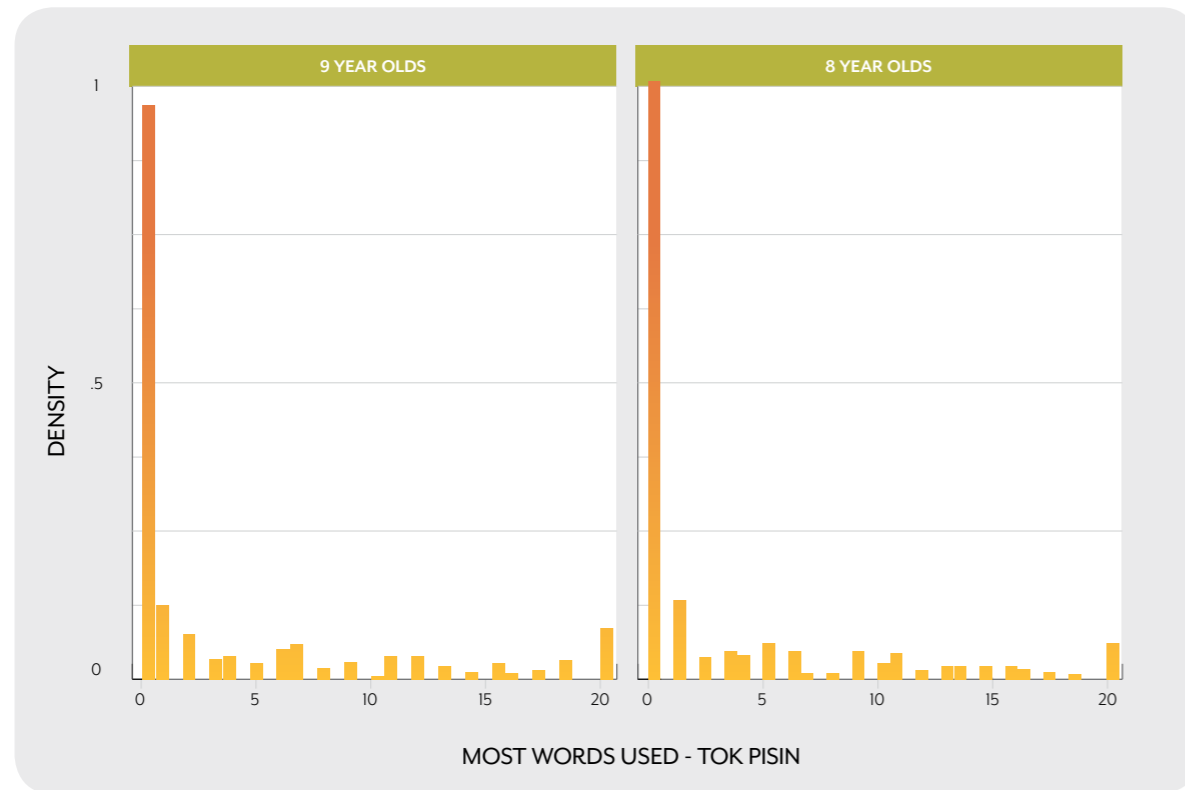
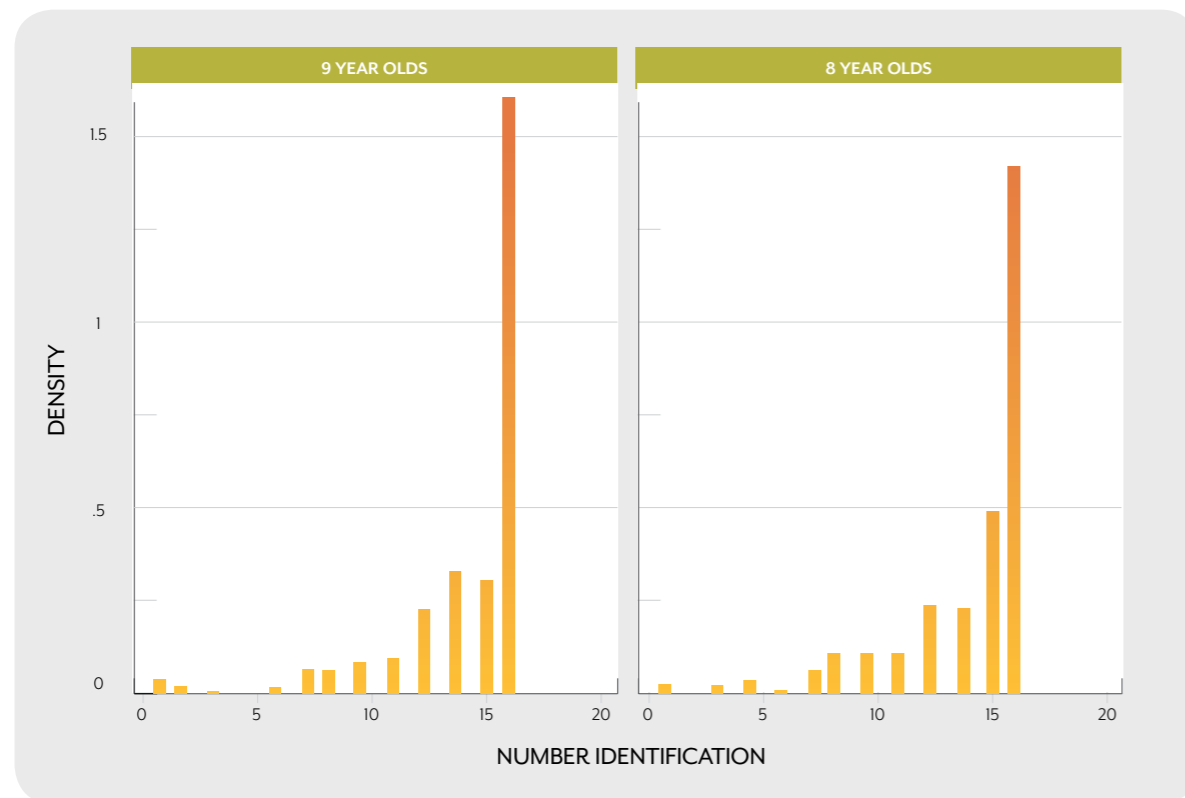


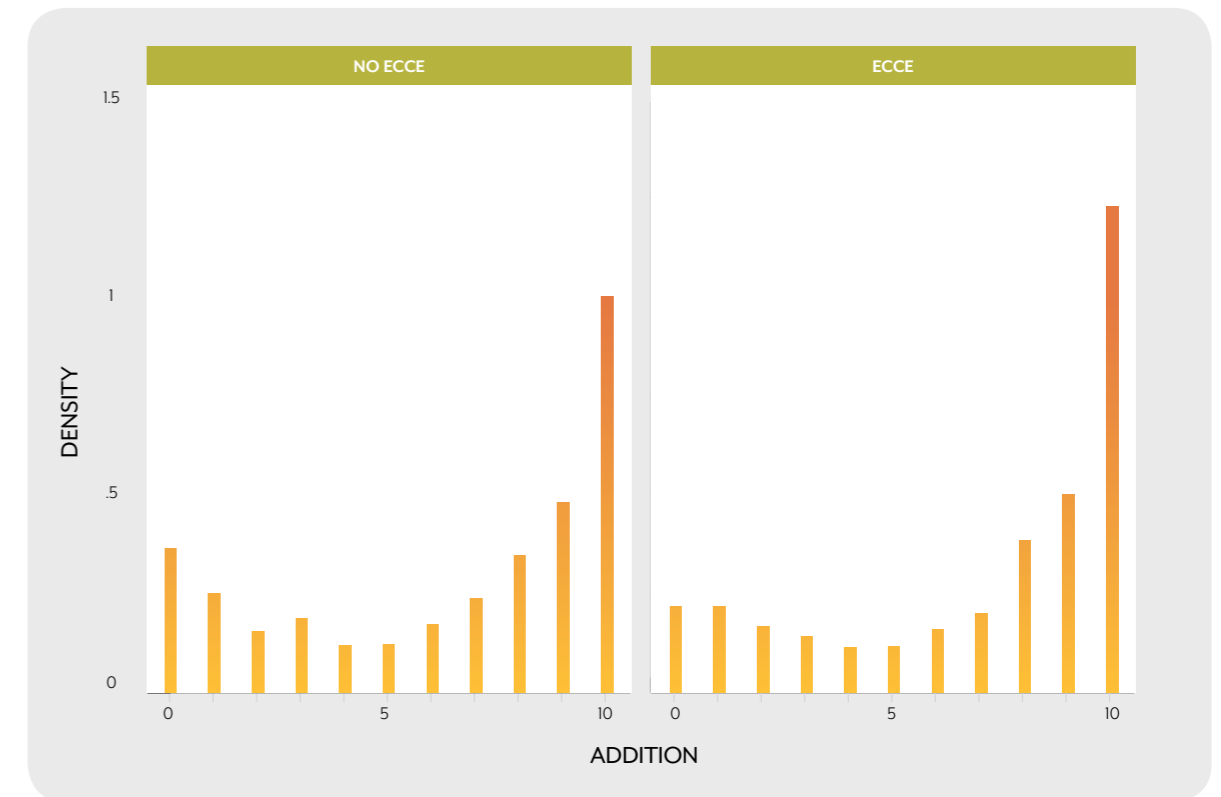
FIGURE 22. NUMBER IDENTIFICATION - SCORES FOR 9 YEAR OLDS AND 8 YEAR OLDS (WIDER GAP DUE TO A YEAR'S DIFFERENCE IN AGE)



EARLY CHILDHOOD EDUCATION

On average, children who have ECCE experience perform significantly better than children who don't have ECCE experience across all three provinces. For example, on average, a child with ECCE experience is likely to identify nearly two additional letters of the alphabet as compared to a child without ECCE experience. Similar differences can be seen on nearly all the assessment components. An example of these differences can be seen from the graph below that shows the difference in ability to complete addition problems (children with ECCE experience and children without ECCE experience). A child with ECCE is much more likely to complete all ten addition problems correctly.

FIGURE 23. DIFFERENCE IN ADDITION SCORES AMONG CHILDREN WITH NO ECCE EXPERIENCE AND ECCE EXPERIENCE

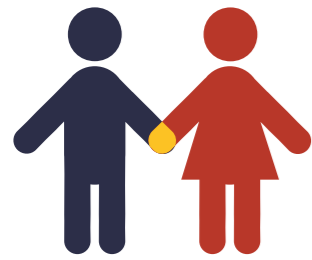


These findings are consistent with the mounting evidence around the world demonstrating the importance of early childhood development programs in shaping cognitive, social and language skills, as well as lifelong approaches to learning⁴³. Furthermore, children's early learning and development is directly related to their future academic success. Children who begin school with weak prior knowledge and skills in relevant emergent literacy domains, most notably general verbal abilities, basic phonological awareness, familiarity with the basic purposes and mechanisms of reading, and letter knowledge, are particularly likely to have difficulty with learning to read in the primary grades⁴⁴. Exposure to early childhood care and education has also been shown to have a positive impact on other school outcomes such as lower repetition and dropout rates, higher enrolment rates, better long-term cognitive development, and greater educational attainment. Reducing the number of children who enter school with inadequate early learning experiences is an important step toward preventing school dropout and later learning difficulties and enabling long-term school success⁴⁵. Improving children's readiness for school will help them take advantage of their right to education.

⁴³ Scarborough, 1998; Lonigan, Schatschneider & Westberg, 2008; Lonigan, Burgess & Anthony, 2000; Wagner, Torgesen, Rashotte, Hecht, Barker, Burgess, & Garon, 1997; Young Lives, 2010

⁴⁴ Snow, Burns, & Griffin, 1998

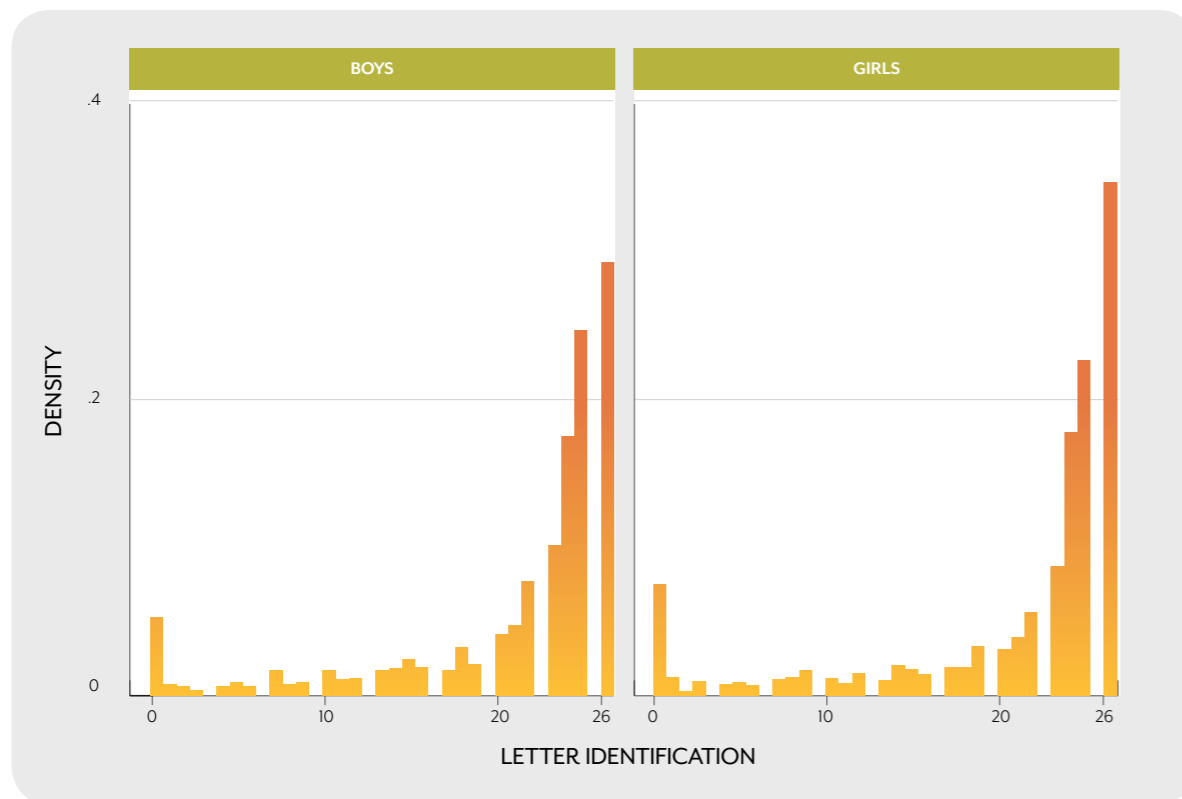
⁴⁵ Engle et al, 2011



DOES GENDER MAKE A DIFFERENCE?

There are no gender differences observed apart from the fact that girls are more likely to know all the twenty six letters of the alphabet (get a full score on the letter identification component of the assessment) as compared to boys and girls performed worse than boys on the telling time component of the assessment⁴⁶. Irrespective of wide gender disparities in the country, it is encouraging to see girls perform on par with boys on all components of the assessment. Gender disparities in education in the Pacific are most visible post elementary and into secondary where girls are more likely to drop out early from school, attend irregularly and least likely to complete primary education.

FIGURE 24. LETTER IDENTIFICATION BY GENDER



⁴⁶ The difference in zero scores on letter identification among boys and girls is statistically insignificant.

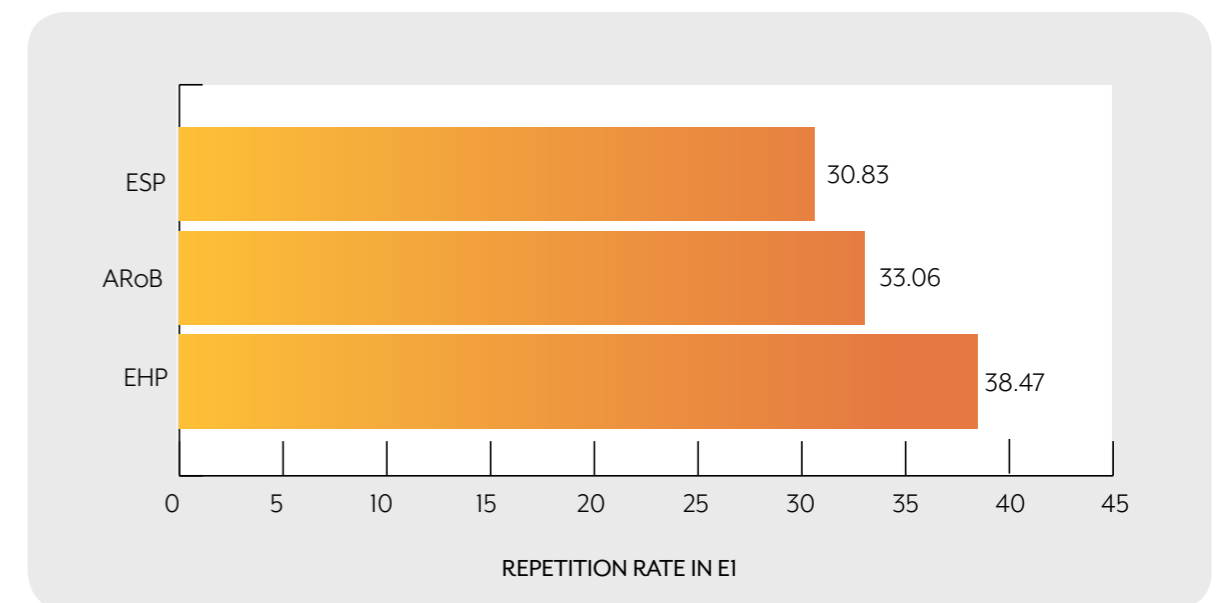
HOW DO REPEATERS PERFORM?

A third of the students in EI were found to be repeaters. Repetition rate is the highest in Eastern Highlands where nearly 40% of the randomly selected children (and thus, representative of the provincial EI student profile) were repeating the grade. There were no gender differences observed in repetition rates.

TABLE 24. OVERALL REPETITION RATE

	Freq.	Percent
Non-repeater	1,799	65.97
Repeater	928	34.03
Total	2,727	100

FIGURE 25. REPETITION RATE BY PROVINCE



For our full set of observations, repeaters were more likely to fail to identify a single letter of the alphabet. Their numeracy scores were on par with non repeaters.

BREAKFAST HABITS

Children who had breakfast on the day of the assessment performed better across all literacy and numeracy skill areas. For example, on average, a child who had breakfast in the morning was able to identify three additional letters of the alphabet as compared to a child who hadn't. Their comprehension scores (in English and Tok Pisin) and numeracy scores were also higher than the children who hadn't had breakfast.

This does not mean that providing breakfast is a singular answer to improving literacy and numeracy. Omitted variable bias does not allow direct attribution of higher assessment scores to eating breakfast as children who regularly have breakfast are also more likely to come from families where there are stronger routines, greater investment in education, more literacy rich households and caregivers are able to afford a breakfast for their children.

FIGURE 26. LETTER IDENTIFICATION FOR CHILDREN WHO DIDN'T HAVE BREAKFAST AND WHO HAD BREAKFAST PRIOR TO THE ASSESSMENT



APPENDICES

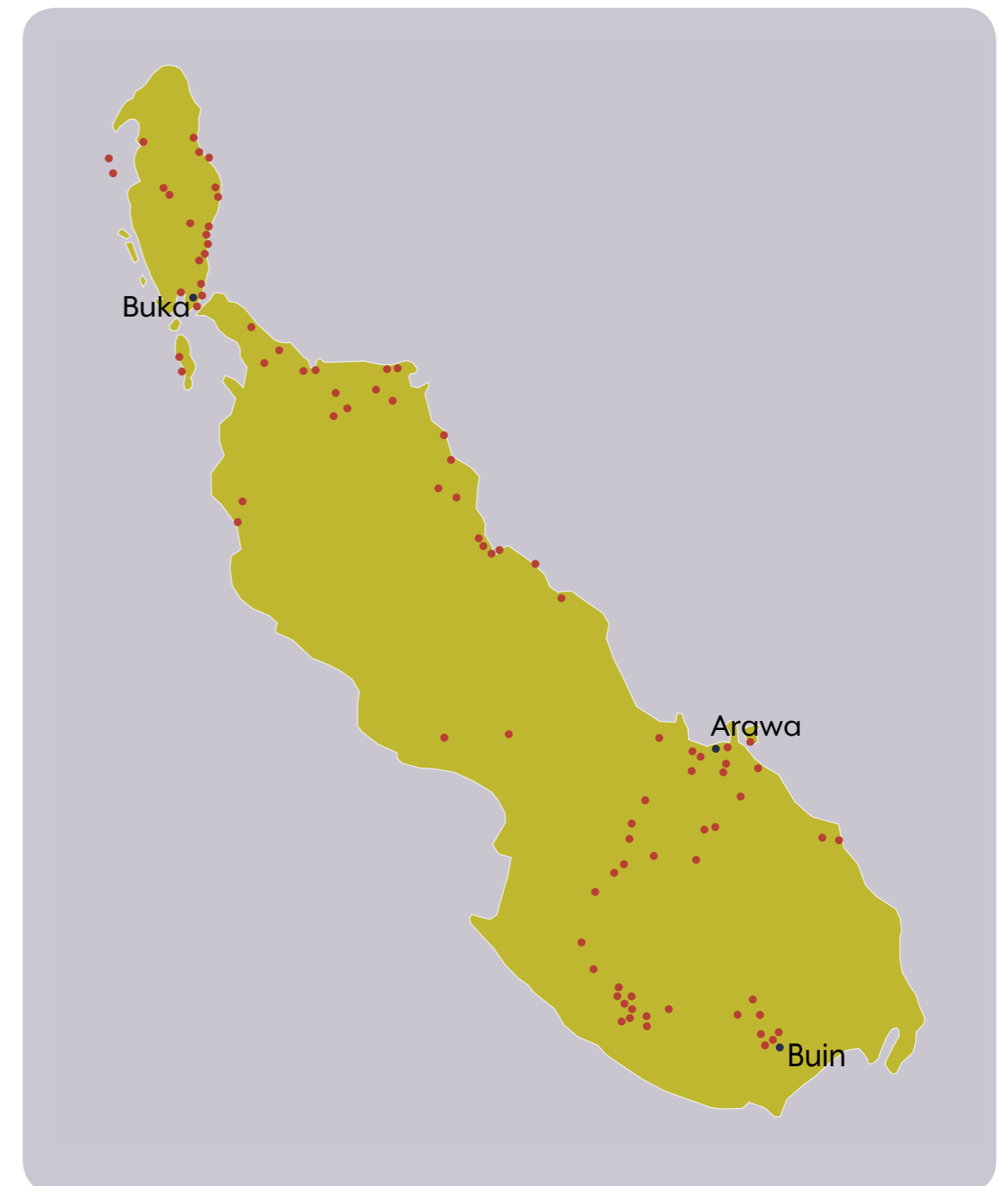


APPENDIX 1:

HEADLINE NUMBERS

AUTONOMOUS REGION OF BOUGAINVILLE

FIGURE 27. MAP OF SCHOOLS VISITED FOR RISE BASELINE (ARoB)

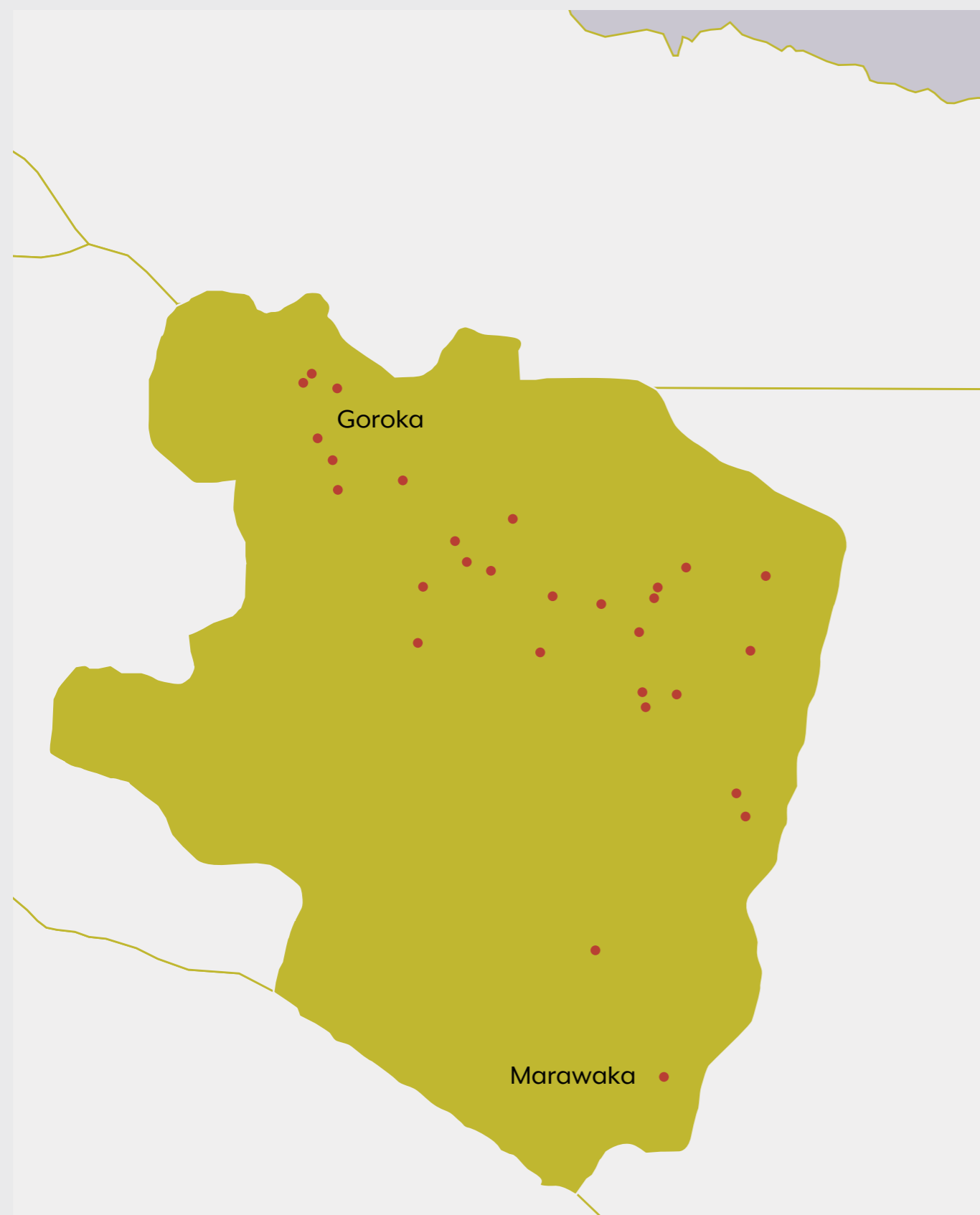


Headline Numbers from School Survey	ARoB
Background	
Number of schools visited	121
Number of schools with GPS data	100
Percentage of schools from treatment LLGs	49%
Percentage of schools from control LLGs	51%
Percentage of male teachers in charge (TICs)	40%
Percentage of female teachers in charge (TICs)	60%
Percentage of male school board chairpersons (SBCs)	94%
Percentage of female school board chairpersons (SBCs)	6%
Average number of teachers per school (median)	2
Average number of teachers per school (mean)	3
Enrolment and Absenteeism	
Average enrolment per school (median)	76
Average enrolment per school (mean)	87
Average number of children present in school on a given day (median)	39
Average number of children present in school on a given day (mean)	42
Percentage of students present on a given day	48%
Percentage of students absent on a given day (student absenteeism)	52%
Disabilities	
Percentage of schools with no SERC registration	95%
Percentage of disabled children enrolled in school	3%
Average number of children with disabilities (median)	1
Average number of children with disabilities (mean)	2
Infrastructure	
Percentage of schools with access to electricity	5%
Percentage of schools without access to electricity	95%
Percentage of schools with access to water	50%
Percentage of schools without access to water	50%
Percentage of schools with no toilets	42%
Average number of toilets per school (median)	1
Average number of toilets per school (mean)	1
Percentage of schools with a school library	7%
Percentage of schools with school libraries & borrowing facilities	3%
Percentage of schools without a school library	93%
Percentage of schools that received an SBC kit	92%
Percentage of schools that didn't receive an SBC kit	8%
Average number of SBC kits received per school (median)	1
Average number of SBC kits received per school (mean)	2
School Inspection	
Percentage of schools that received an inspection	31%
Percentage of schools that didn't receive an inspection	69%
Average number of school inspections per year (median)	-
Transition from ECCE to Elementary	
Percentage of schools with no children with prior ECCE experience	48%
Percentage of schools with no transitional activities in school	71%
Primary Language of Instruction	
Primary Language of Instruction: English	31%
Primary Language of Instruction: Tok Pisin	32%
Primary Language of Instruction: Tok Ples	37%

Headline Numbers (Student Assessment)	ARoB
Background	
Total children assessed	738
Girls	371
Boys	367
Average Age (EI students)	8.8
Letter Identification	
Percentage of children who can identify all letters	22.36%
Percentage of children who cannot identify any letters	2.98%
Average letters identified correctly (out of 26)	20.85
English words	
Percentage of children who can identify all English words	1.90%
Percentage of children who cannot identify any English words	44.44%
Average English words identified correctly (out of 22)	4.47
Tok Pisin words	
Percentage of children who can identify all Pisin words	4.34%
Percentage of children who cannot identify any Pisin words	57.05%
Average Pisin words identified correctly (out of 20)	3.63
Number identification	
Percentage of children who can identify all numbers	54.34%
Percentage of children who cannot identify any numbers	1.49%
Average numbers identified correctly (out of 12)	10.55
Skip pattern (by 2)	
Percentage of children who can count by 2 (all correct)	46.34%
Percentage of children who cannot count by 2 (none correct)	13.55%
Average correct responses in counting by 2 (out of 10)	6.82
Skip pattern (by 5)	
Percentage of children who can count by 5 (all correct)	29.27%
Percentage of children who cannot count by 5 (none correct)	24.25%
Average correct responses in counting by 5 (out of 10)	4.76
Addition Problems	
Percentage of children who can answer all addition problems	35.37%
Percentage of children who cannot answer any addition problems	7.18%
Average correct responses of addition problems (out of 10)	7.11
Subtraction Problems	
Percentage of children who can answer all subtraction problems	16.94%
Percentage of children who cannot answer any subtraction problems	26.83%
Average correct responses of subtraction problems (out of 10)	4.88
Percentage of children who can answer all word problems	20.87%
Percentage of children who cannot answer any word problems	27.10%
Average correct responses for word problems (out of 3)	1.4
Shapes	
Percentage of children who can identify all the shapes	14.91%
Percentage of children who cannot identify any shapes	11.65%
Average correct responses of shape questions (out of 5)	2.67
Telling Time	
Percentage of children who can answer all the clock questions	45.26%
Percentage of children who cannot answer any clock questions	27.10%
Average correct responses of clock questions (out of 3)	1.83

EASTERN HIGHLANDS PROVINCE

FIGURE 28. MAP OF SCHOOLS VISITED FOR RISE BASELINE (EHP)

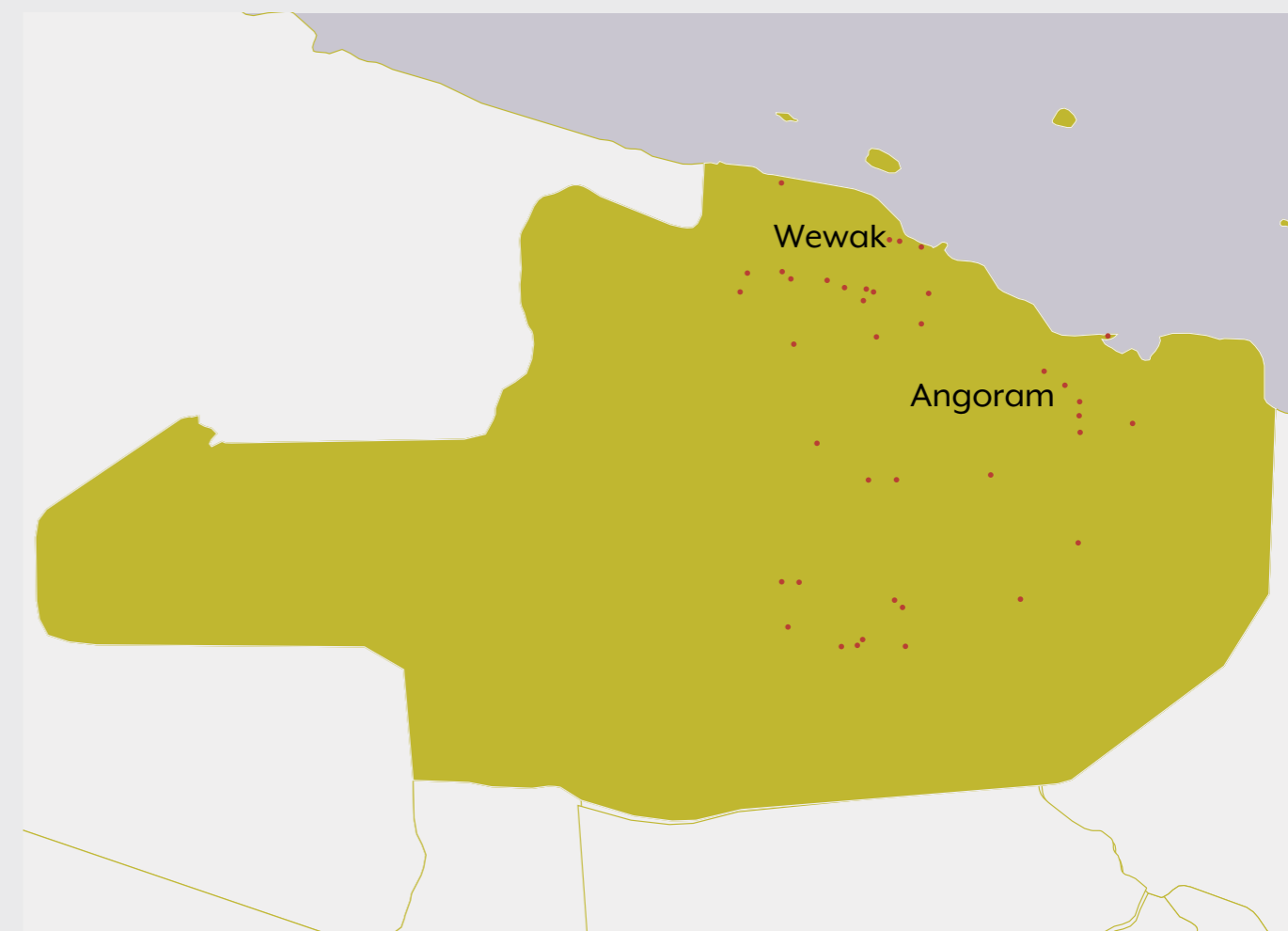


Headline Numbers from School Survey	EHP
Background	
Number of schools visited	59
Number of schools with GPS data	29
Percentage of schools from treatment LLGs	34%
Percentage of schools from control LLGs	66%
Percentage of male teachers in charge (TICs)	51%
Percentage of female teachers in charge (TICs)	49%
Percentage of male school board chairpersons (SBCs)	100%
Percentage of female school board chairpersons (SBCs)	0%
Average number of teachers per school (median)	2
Average number of teachers per school (mean)	3
Enrolment and Absenteeism	
Average enrolment per school (median)	116
Average enrolment per school (mean)	136
Average number of children present in school on a given day (median)	57
Average number of children present in school on a given day (mean)	74
Percentage of students present on a given day	54%
Percentage of students absent on a given day (student absenteeism)	46%
Disabilities	
Percentage of schools with no SERC registration	96%
Percentage of disabled children enrolled in school	1%
Average number of children with disabilities (median)	1
Average number of children with disabilities (mean)	1
Infrastructure	
Percentage of schools with access to electricity	12%
Percentage of schools without access to electricity	88%
Percentage of schools with access to water	32%
Percentage of schools without access to water	68%
Percentage of schools with no toilets	7%
Average number of toilets per school (median)	2
Average number of toilets per school (mean)	3
Percentage of schools with a school library	7%
Percentage of schools with school libraries & borrowing facilities	2%
Percentage of schools without a school library	93%
Percentage of schools that received an SBC kit	85%
Percentage of schools that didn't receive an SBC kit	15%
Average number of SBC kits received per school (median)	2
Average number of SBC kits received per school (mean)	3
School Inspection	
Percentage of schools that received an inspection	46%
Percentage of schools that didn't receive an inspection	54%
Average number of school inspections per year (median)	0
Transition from ECCE to Elementary	
Percentage of schools with no children with prior ECCE experience	91%
Percentage of schools with no transitional activities in school	68%
Primary Language of Instruction	
Primary Language of Instruction: English	71%
Primary Language of Instruction: Tok Pisin	25%
Primary Language of Instruction: Tok Ples	3%

Headline Numbers (Student Assessment)	EHP
Background	
Total children assessed	930
Girls	453
Boys	477
Average Age (EI students)	8.2
Letter Identification	
Percentage of children who can identify all letters	18.92%
Percentage of children who cannot identify any letters	3.87%
Average letters identified correctly (out of 26)	20.92
English words	
Percentage of children who can identify all English words	0.65%
Percentage of children who cannot identify any English words	54.84%
Average English words identified correctly (out of 22)	3.07
Tok Pisin words	
Percentage of children who can identify all Pisin words	1.18%
Percentage of children who cannot identify any Pisin words	72.37%
Average Pisin words identified correctly (out of 20)	1.59
Number identification	
Percentage of children who can identify all numbers	34.73%
Percentage of children who cannot identify any numbers	1.51%
Average numbers identified correctly (out of 12)	9.83
Skip pattern (by 2)	
Percentage of children who can count by 2 (all correct)	53.55%
Percentage of children who cannot count by 2 (none correct)	7.42%
Average correct responses in counting by 2 (out of 10)	7.87
Skip pattern (by 5)	
Percentage of children who can count by 5 (all correct)	75.05%
Percentage of children who cannot count by 5 (none correct)	7.96%
Average correct responses in counting by 5 (out of 10)	8.4
Addition Problems	
Percentage of children who can answer all addition problems	21.83%
Percentage of children who cannot answer any addition problems	8.82%
Average correct responses of addition problems (out of 10)	6.04
Subtraction Problems	
Percentage of children who can answer all subtraction problems	8.49%
Percentage of children who cannot answer any subtraction problems	32.15%
Average correct responses of subtraction problems (out of 10)	3.28
Word Problems	
Percentage of children who can answer all word problems	26.34%
Percentage of children who cannot answer any word problems	17.20%
Average correct responses for word problems (out of 3)	1.63
Shapes	
Percentage of children who can identify all the shapes	25.59%
Percentage of children who cannot identify any shapes	5.05%
Average correct responses of shape questions (out of 5)	3.34
Telling Time	
Percentage of children who can answer all the clock questions	49.78%
Percentage of children who cannot answer any clock questions	24.95%
Average correct responses of clock questions (out of 3)	1.92

EAST SEPIK PROVINCE

FIGURE 29. MAP OF SCHOOLS VISITED FOR RISE BASELINE (ESP)



Headline Numbers from School Survey	ESP
Background	
Number of schools visited	73
Number of schools with GPS data	41
Percentage of schools from treatment LLGs	43%
Percentage of schools from control LLGs	57%
Percentage of male teachers in charge (TICs)	76%
Percentage of female teachers in charge (TICs)	24%
Percentage of male school board chairpersons (SBCs)	99%
Percentage of female school board chairpersons (SBCs)	1%
Average number of teachers per school (median)	2
Average number of teachers per school (mean)	3
Enrolment and Absenteeism	
Average enrolment per school (median)	115
Average enrolment per school (mean)	126
Average number of children present in school on a given day (median)	50
Average number of children present in school on a given day (mean)	60
Percentage of students present on a given day	48%
Percentage of students absent on a given day (student absenteeism)	52%
Disabilities	
Percentage of schools with no SERC registration	84%
Percentage of disabled children enrolled in school	2%
Average number of children with disabilities (median)	1
Average number of children with disabilities (mean)	2
Infrastructure	
Percentage of schools with access to electricity	5%
Percentage of schools without access to electricity	95%
Percentage of schools with access to water	25%
Percentage of schools without access to water	75%
Percentage of schools with no toilets	7%
Average number of toilets per school (median)	2
Average number of toilets per school (mean)	2
Percentage of schools with a school library	1%
Percentage of schools with school libraries & borrowing facilities	1%
Percentage of schools without a school library	99%
Percentage of schools that received an SBC kit	29%
Percentage of schools that didn't receive an SBC kit	71%
Average number of SBC kits received per school (median)	2
Average number of SBC kits received per school (mean)	4
School Inspection	
Percentage of schools that received an inspection	19%
Percentage of schools that didn't receive an inspection	81%
Average number of school inspections per year (median)	0
Transition from ECCE to Elementary	
Percentage of schools with no children with prior ECCE experience	74%
Percentage of schools with no transitional activities in school	53%
Primary Language of Instruction	
Primary Language of Instruction: English	81%
Primary Language of Instruction: Tok Pisin	19%
Primary Language of Instruction: Tok Ples	0

Headline Numbers (Student Assessment)	ESP
Background	
Total children assessed	1,075
Girls	541
Boys	534
Average Age (EI students)	9
Letter Identification	
Percentage of children who can identify all letters	30.51%
Percentage of children who cannot identify any letters	7.26%
Average letters identified correctly (out of 26)	20.36
English words	
Percentage of children who can identify all English words	4.00%
Percentage of children who cannot identify any English words	42.14%
Average English words identified correctly (out of 22)	6.48
Tok Pisin words	
Percentage of children who can identify all Pisin words	4.74%
Percentage of children who cannot identify any Pisin words	49.67%
Average Pisin words identified correctly (out of 20)	4.85
Number identification	
Percentage of children who can identify all numbers	57.30%
Percentage of children who cannot identify any numbers	2.33%
Average numbers identified correctly (out of 12)	10.32
Skip pattern (by 2)	
Percentage of children who can count by 2 (all correct)	67.07%
Percentage of children who cannot count by 2 (none correct)	7.35%
Average correct responses in counting by 2 (out of 10)	8.21
Skip pattern (by 5)	
Percentage of children who can count by 5 (all correct)	70.14%
Percentage of children who cannot count by 5 (none correct)	9.49%
Average correct responses in counting by 5 (out of 10)	8.01
Addition Problems	
Percentage of children who can answer all addition problems	39.53%
Percentage of children who cannot answer any addition problems	9.77%
Average correct responses of addition problems (out of 10)	7.01
Subtraction Problems	
Percentage of children who can answer all subtraction problems	21.95%
Percentage of children who cannot answer any subtraction problems	24.09%
Average correct responses of subtraction problems (out of 10)	4.88
Word Problems	
Percentage of children who can answer all word problems	45.77%
Percentage of children who cannot answer any word problems	9.30%
Average correct responses for word problems (out of 3)	2.07
Shapes	
Percentage of children who can identify all the shapes	30.33%
Percentage of children who cannot identify any shapes	3.63%
Average correct responses of shape questions (out of 5)	3.43
Telling Time	
Percentage of children who can answer all the clock questions	53.30%
Percentage of children who cannot answer any clock questions	26.42%
Average correct responses of clock questions (out of 3)	1.95



APPENDIX 2:

RESULTS FROM THE RCT

This appendix provides detailed tables and graphs to show the balance between the treatment and control group across and within each of the three provinces. In line with best practice, all regressions estimate the difference between treatment and control groups with robust standard errors clustered at the school level.

As the first table below shows, across the three provinces (pooling data from all three provinces), on average, there is no difference between the treatment and the control schools across any of the specifications for which data was analysed (apart from the fact that children in treatment schools are marginally less likely to live in households with a tin roof. However, with a 95% level of significance, you would expect one statistically significant result for every twenty regressions due to pure chance)⁴⁷.

READING THE REGRESSION TABLES

Looking at variable (26) in Table 1, for example, 47% of the 2,494 children who responded to this question lived in a home with a tin roof (the value of the constant). However, for children who lived in treatment schools, this value was slightly lower at 38% (the coefficient on the treatment variable is $-.09$ and $.47 - .09 = .38$). This is the only significant difference between the treatment and control groups that is statistically significant.

TABLE 24. DIFFERENCE BETWEEN TREATMENT AND CONTROL GROUPS FOR REGRESSION SPECIFICATIONS (POOLED DATA)

	Variables	Treatment	t stat	Constant	t stat	obs
(1)	Breakfast	0.0146	(0.79)	0.894***	(62.03)	2497
(2)	Student Age	-0.0954	(-0.63)	8.564***	(90.83)	1255
(3)	Gender	-0.0145	(-0.85)	0.511***	(42.11)	2504
(4)	Letter Identification	1.080	(1.50)	20.01***	(38.21)	2504
(5)	Most Used Words - English	0.512	(0.82)	4.304***	(10.72)	2504
(6)	Most Used Words - Tok Pisin	0.219	(0.43)	3.145***	(9.63)	2504
(7)	Comprehension (English)	0.0582	(0.29)	1.269***	(9.39)	2504
(8)	Comprehension (Tok Pisin)	0.00743	(0.05)	0.576***	(6.18)	2504
(9)	Number Identification	0.214	(0.89)	10.05***	(53.17)	2504
(10)	Addition	0.0650	(0.23)	6.603***	(33.42)	2504
(11)	Subtraction	0.0627	(0.20)	4.218***	(19.44)	2504
(12)	Skip Pattern (Multiples of 2)	0.431	(1.79)	7.406***	(39.54)	2504
(13)	Skip Pattern (Multiples of 5)	0.674	(1.79)	6.811***	(22.84)	2504
(14)	Problem Solving	-0.0337	(-0.42)	1.727***	(30.77)	2504
(15)	Shapes	-0.00761	(-0.07)	3.196***	(43.87)	2504
(16)	Telling Time	-0.0408	(-0.45)	1.906***	(30.07)	2504
(17)	Literate Family Members	0.0571	(0.58)	2.221***	(29.20)	2504
(18)	Family Members who read	0.0885	(0.91)	1.548***	(21.12)	2504
(19)	Family Members who read to child	0.0326	(0.44)	1.046***	(18.44)	2504
(20)	Family Members who tell stories	0.132	(1.33)	1.316***	(17.66)	2504
(21)	Family Members who help with math	0.101	(1.14)	1.198***	(18.43)	2504
(22)	Family Members who help child study	0.0469	(0.49)	1.338***	(18.42)	2504
(23)	English Readers	0.0125	(0.40)	0.179***	(7.95)	2504
(24)	Tok Pisin Readers	-0.00979	(-0.55)	0.0713***	(5.58)	2504
(25)	Access to electricity at home	0.0542	(1.56)	0.233***	(12.04)	2496
(26)	Household with a tin roof	-0.0921*	(-2.08)	0.470***	(15.27)	2494
(27)	Access to television at home	-0.00623	(-0.21)	0.189***	(10.10)	2495
(28)	Access to radio at home	0.00173	(0.06)	0.406***	(19.68)	2496
(29)	Access to mobile at home	-0.0159	(-0.49)	0.679***	(28.56)	2495
(30)	Textbooks at home	-0.0182	(-0.60)	0.440***	(19.21)	2475
(31)	Religious books at home	0.0387	(1.32)	0.739***	(33.34)	2494
(32)	Newspapers at home	-0.0225	(-0.72)	0.485***	(19.23)	2477
(33)	Story books at home	-0.0110	(-0.36)	0.494***	(21.33)	2482

⁴⁷ Angrist, J. D., & Pischke, J. (2009). *Mostly harmless econometrics: An empiricist's companion*.

Table 2 below shows the results for only the Autonomous Region of Bougainville. Children in treatment schools are less likely to read and comprehend Tok Pisin or recognise various shapes but they are better at subtraction.

TABLE 25: RESULTS FROM AUTONOMOUS REGION OF BOUGAINVILLE ONLY

	Variables	Treatment	t stat	Constant	t stat	obs
(1)	Breakfast	0.0130	(0.71)	0.958***	(63.84)	700
(2)	Student Age	-0.174	(-0.66)	8.904***	(45.17)	315
(3)	Gender	0.0153	(0.42)	0.505***	(22.02)	703
(4)	Letter Identification	1.412	(1.36)	20.20***	(28.09)	703
(5)	Most Used Words - English	-0.0562	(-0.06)	4.539***	(7.33)	703
(6)	Most Used Words - Tok Pisin	-1.253	(-1.53)	4.228***	(7.48)	703
(7)	Comprehension (English)	-0.324	(-1.12)	1.453***	(7.45)	703
(8)	Comprehension (Tok Pisin)	-0.596*	(-2.63)	0.972***	(4.89)	703
(9)	Number Identification	0.566*	(2.20)	10.30***	(47.05)	703
(10)	Addition	0.709	(1.82)	6.793***	(26.51)	703
(11)	Subtraction	1.432**	(2.67)	4.231***	(11.10)	703
(12)	Skip Pattern (Multiples of 2)	0.684	(1.61)	6.474***	(20.97)	703
(13)	Skip Pattern (Multiples of 5)	0.926	(1.99)	4.282***	(14.37)	703
(14)	Problem Solving	-0.133	(-1.09)	1.448***	(18.39)	703
(15)	Shapes	-0.369*	(-2.17)	2.858***	(23.79)	703
(16)	Telling Time	0.00356	(0.02)	1.813***	(15.55)	703
(17)	Literate Family Members	-0.186	(-1.40)	2.521***	(23.18)	703
(18)	Family Members who read	-0.183	(-1.16)	1.710***	(14.17)	703
(19)	Family Members who read to child	-0.0709	(-0.56)	1.254***	(13.92)	703
(20)	Family Members who tell stories	-0.0568	(-0.33)	1.464***	(10.90)	703
(21)	Family Members who help with math	-0.0495	(-0.33)	1.425***	(12.82)	703
(22)	Family Members who help child study	-0.0161	(-0.12)	1.767***	(16.58)	703
(23)	English Readers	-0.0250	(-0.46)	0.233***	(6.33)	703
(24)	Tok Pisin Readers	-0.0906*	(-2.66)	0.135***	(4.68)	703
(25)	Access to electricity at home	0.119**	(2.76)	0.327***	(12.56)	699
(26)	Household with a tin roof	-0.159*	(-2.52)	0.662***	(16.32)	697
(27)	Access to television at home	0.0275	(0.76)	0.135***	(5.82)	697
(28)	Access to radio at home	0.0427	(0.90)	0.326***	(12.75)	699
(29)	Access to mobile at home	-0.0650	(-1.24)	0.670***	(18.99)	699
(30)	Textbooks at home	0.0218	(0.52)	0.540***	(16.59)	696
(31)	Religious books at home	0.0173	(0.49)	0.797***	(32.81)	698
(32)	Newspapers at home	0.0506	(1.07)	0.470***	(15.03)	698
(33)	Story books at home	0.0140	(0.34)	0.542***	(18.01)	695

In Eastern Highlands Province, a balance between treatment and control groups apart from minor differences in gender proportions and fluency in reading Tok Pisin is observed.

TABLE 26: RESULTS FROM EASTERN HIGHLANDS PROVINCE ONLY

	Variables	Treatment	t stat	Constant	t stat	obs
(1)	Breakfast	-0.00645	(-0.23)	0.867***	(40.51)	893
(2)	Student Age	-0.226	(-1.38)	8.297***	(74.68)	599
(3)	Gender	-0.0706**	(-2.81)	0.523***	(26.88)	896
(4)	Letter Identification	0.537	(0.59)	20.67***	(25.72)	896
(5)	Most Used Words - English	-0.312	(-0.48)	3.316***	(6.89)	896
(6)	Most Used Words - Tok Pisin	0.413	(1.05)	1.375***	(5.36)	896
(7)	Comprehension (English)	-0.0927	(-0.40)	0.944***	(5.23)	896
(8)	Comprehension (Tok Pisin)	0.127	(1.27)	0.117	(1.93)	896
(9)	Number Identification	0.174	(0.51)	9.745***	(33.62)	896
(10)	Addition	-0.250	(-0.61)	6.214***	(18.98)	896
(11)	Subtraction	-0.591	(-1.53)	3.625***	(11.43)	896
(12)	Skip Pattern (Multiples of 2)	0.282	(0.83)	7.686***	(27.28)	896
(13)	Skip Pattern (Multiples of 5)	0.492	(0.99)	8.115***	(17.76)	896
(14)	Problem Solving	-0.0468	(-0.44)	1.666***	(19.31)	896
(15)	Shapes	0	(0.00)	3.375***	(25.40)	896
(16)	Telling Time	-0.216	(-1.84)	2.043***	(21.27)	896
(17)	Literate Family Members	0.378*	(2.38)	2.087***	(14.93)	896
(18)	Family Members who read	0.270	(1.78)	1.635***	(12.75)	896
(19)	Family Members who read to child	0.108	(0.91)	1.077***	(11.42)	896
(20)	Family Members who tell stories	0.322*	(2.12)	1.469***	(11.02)	896
(21)	Family Members who help with math	0.208	(1.62)	1.242***	(11.71)	896
(22)	Family Members who help child study	0.0955	(0.72)	1.240***	(12.11)	896
(23)	English Readers	0.00255	(0.08)	0.105***	(4.38)	896
(24)	Tok Pisin Readers	0.0272*	(2.63)	0.00255	(1.00)	896
(25)	Access to electricity at home	0.0592	(0.91)	0.261***	(7.76)	894
(26)	Household with a tin roof	-0.0484	(-0.64)	0.485***	(9.78)	894
(27)	Access to television at home	-0.0247	(-0.43)	0.283***	(8.03)	895
(28)	Access to radio at home	-0.0283	(-0.63)	0.404***	(11.54)	894
(29)	Access to mobile at home	0.00725	(0.15)	0.676***	(18.07)	894
(30)	Textbooks at home	-0.00404	(-0.10)	0.352***	(12.08)	892
(31)	Religious books at home	0.0674	(1.52)	0.758***	(18.82)	895
(32)	Newspapers at home	-0.00795	(-0.17)	0.509***	(12.32)	892
(33)	Story books at home	-0.0561	(-1.13)	0.556***	(13.43)	894

Finally, in East Sepik Province, treatment and control groups are also balanced across all key variables.

TABLE 27: RESULTS FOR EAST SEPIK PROVINCE ONLY

	variable	treatment	t stat	Constant	t stat	ons
(1)	Breakfast	0.0556	(1.59)	0.862***	(29.43)	904
(2)	Student Age	0.255	(0.74)	8.713***	(45.71)	341
(3)	Gender	0.0235	(0.88)	0.505***	(24.50)	905
(4)	Letter Identification	1.305	(0.81)	19.27***	(17.91)	905
(5)	Most Used Words - English	2.137	(1.68)	4.954***	(5.93)	905
(6)	Most Used Words - Tok Pisin	1.665	(1.63)	3.748***	(6.15)	905
(7)	Comprehension (English)	0.611	(1.46)	1.392***	(4.94)	905
(8)	Comprehension (Tok Pisin)	0.477	(1.52)	0.635***	(4.29)	905
(9)	Number Identification	0.125	(0.24)	10.10***	(24.96)	905
(10)	Addition	0.0937	(0.17)	6.777***	(17.11)	905
(11)	Subtraction	-0.0102	(-0.02)	4.716***	(12.05)	905
(12)	Skip Pattern (Multiples of 2)	0.218	(0.53)	7.954***	(26.00)	905
(13)	Skip Pattern (Multiples of 5)	0.00550	(0.01)	7.829***	(19.77)	905
(14)	Problem Solving	0.0293	(0.24)	2.015***	(22.00)	905
(15)	Shapes	0.145	(0.91)	3.328***	(31.32)	905
(16)	Telling Time	0.0754	(0.42)	1.867***	(17.02)	905
(17)	Literate Family Members	-0.0541	(-0.30)	2.083***	(16.62)	905
(18)	Family Members who read	0.0760	(0.45)	1.337***	(10.96)	905
(19)	Family Members who read to child	0.0415	(0.33)	0.845***	(8.87)	905
(20)	Family Members who tell stories	0.0302	(0.19)	1.059***	(9.54)	905
(21)	Family Members who help with math	0.107	(0.66)	0.969***	(9.11)	905
(22)	Family Members who help child study	0.122	(0.73)	1.061***	(8.64)	905
(23)	English Readers	0.0776	(1.24)	0.197***	(4.30)	905
(24)	Tok Pisin Readers	0.0328	(0.99)	0.0766***	(4.15)	905
(25)	Access to electricity at home	0.00932	(0.22)	0.129***	(4.14)	903
(26)	Household with a tin roof	-0.0701	(-1.13)	0.296***	(6.48)	903
(27)	Access to television at home	-0.0417	(-1.01)	0.154***	(4.98)	903
(28)	Access to radio at home	-0.00384	(-0.07)	0.476***	(12.41)	903
(29)	Access to mobile at home	-0.00778	(-0.12)	0.690***	(14.52)	902
(30)	Textbooks at home	-0.0253	(-0.43)	0.431***	(9.78)	887
(31)	Religious books at home	0.0248	(0.40)	0.675***	(15.72)	901
(32)	Newspapers at home	-0.101	(-1.62)	0.477***	(9.03)	887
(33)	Story books at home	0.0131	(0.23)	0.400***	(9.75)	893

Thus, there is balance between treatment groups and control groups within and across all three provinces. By end-line (scheduled for October and November of 2018), it will be possible to observe if Literacy Boost, Numeracy Boost and community literacy support led to a statistically significant shift in literacy and numeracy levels for the treatment groups in all three provinces.

In order to visually assess balance at baseline, figures are provided for the above regression specifications.

FIGURE 30. STUDENT AGE BY TREATMENT AND CONTROL

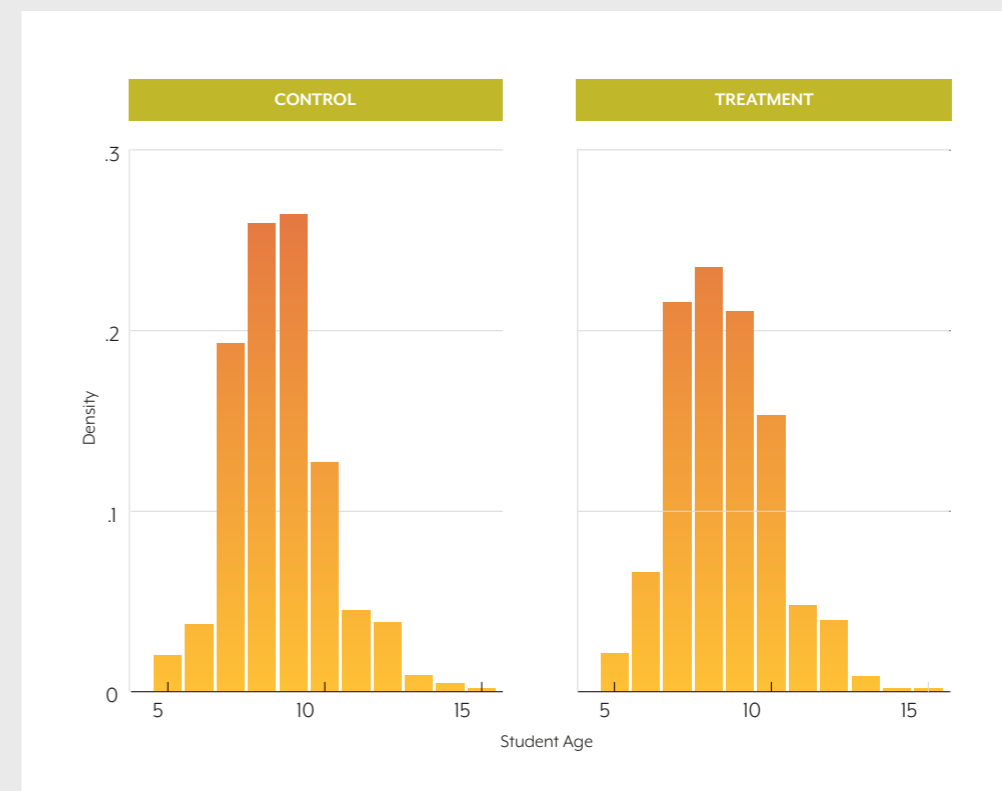


FIGURE 31. BREAKFAST ON THE MORNING OF THE ASSESSMENT BY TREATMENT AND CONTROL

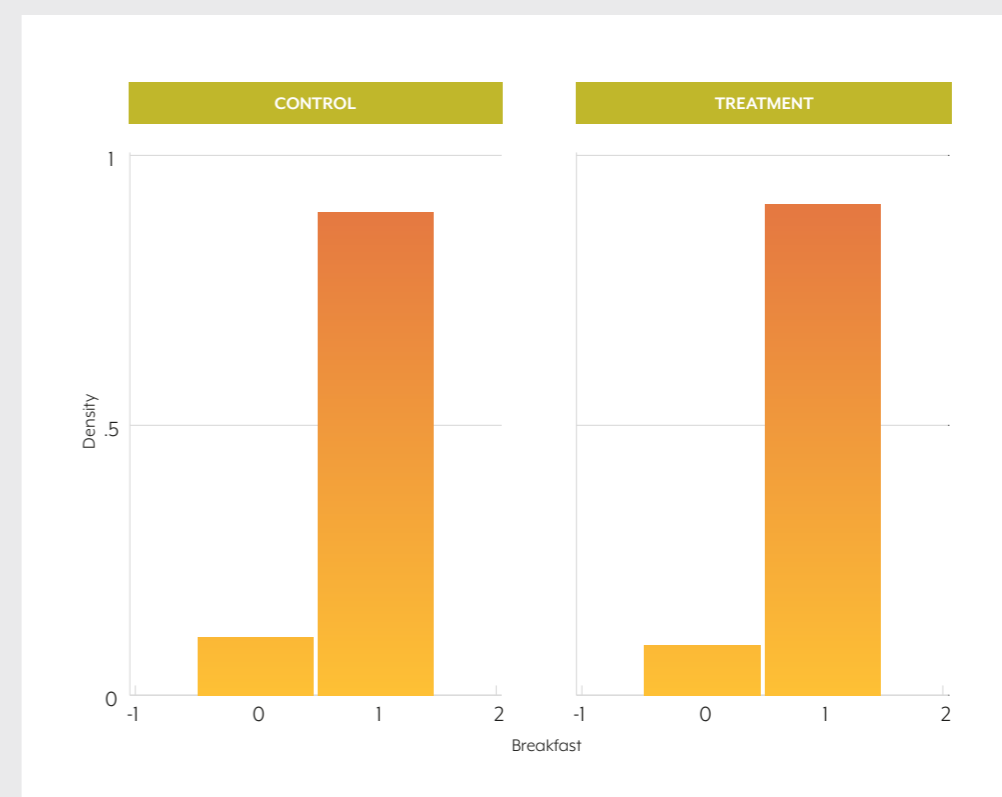


FIGURE 32. GENDER BY TREATMENT AND CONTROL

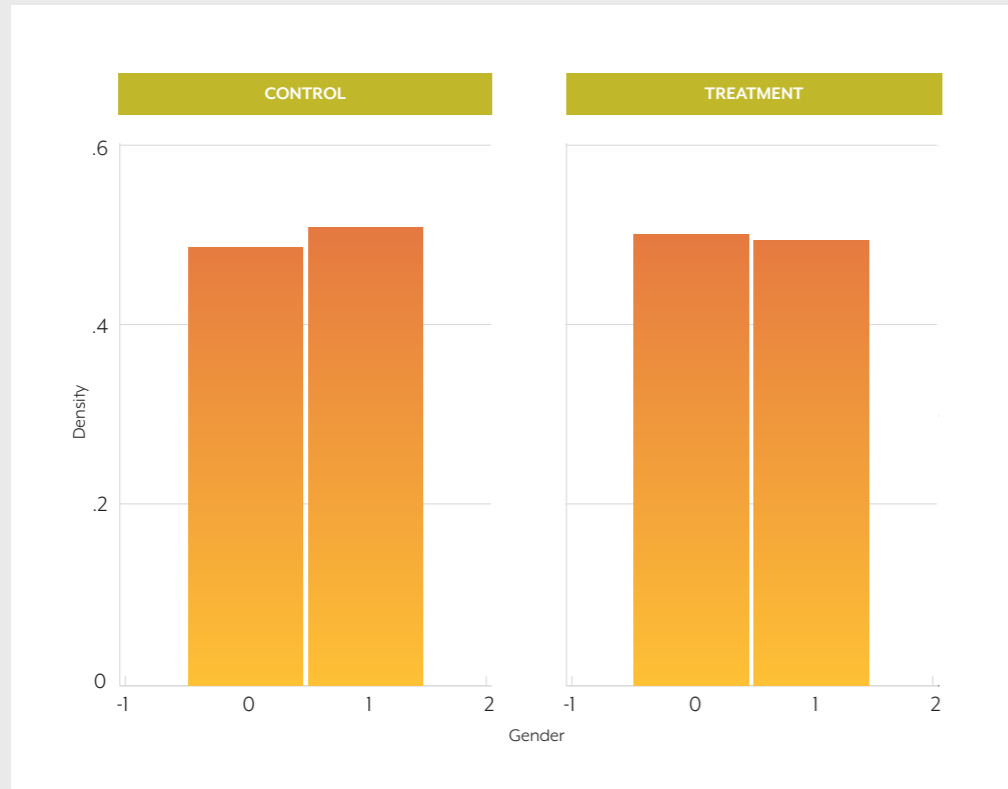


FIGURE 33. LETTER IDENTIFICATION BY TREATMENT AND CONTROL

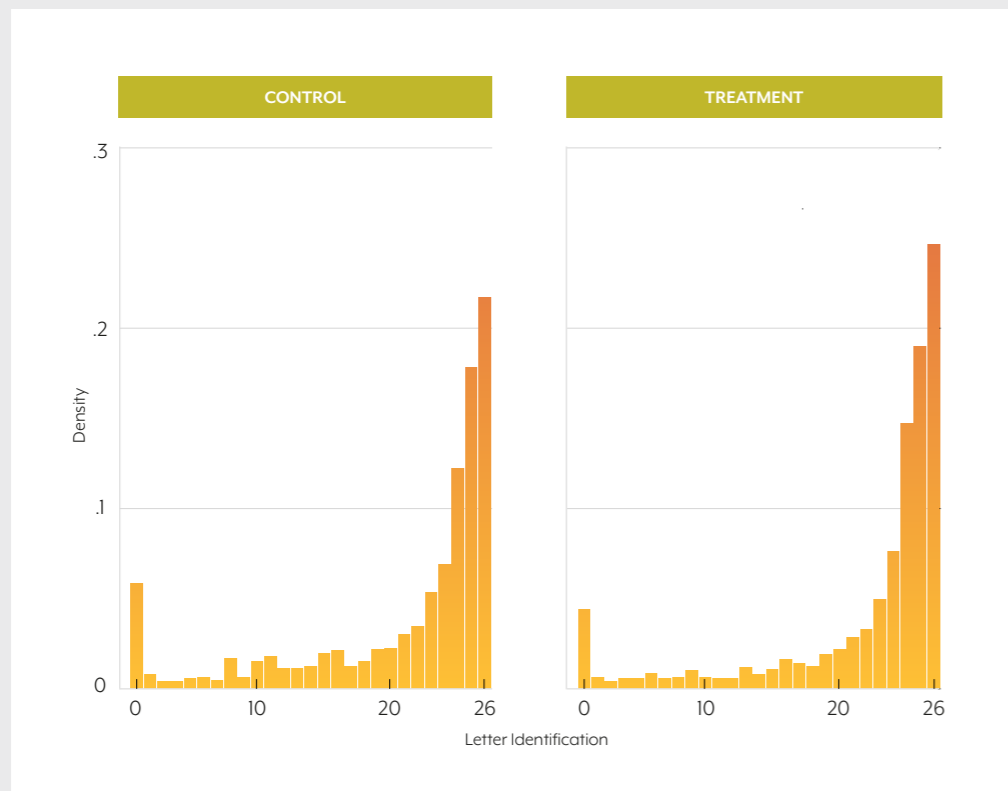


FIGURE 34. MOST USED WORDS (ENGLISH) BY TREATMENT AND CONTROL

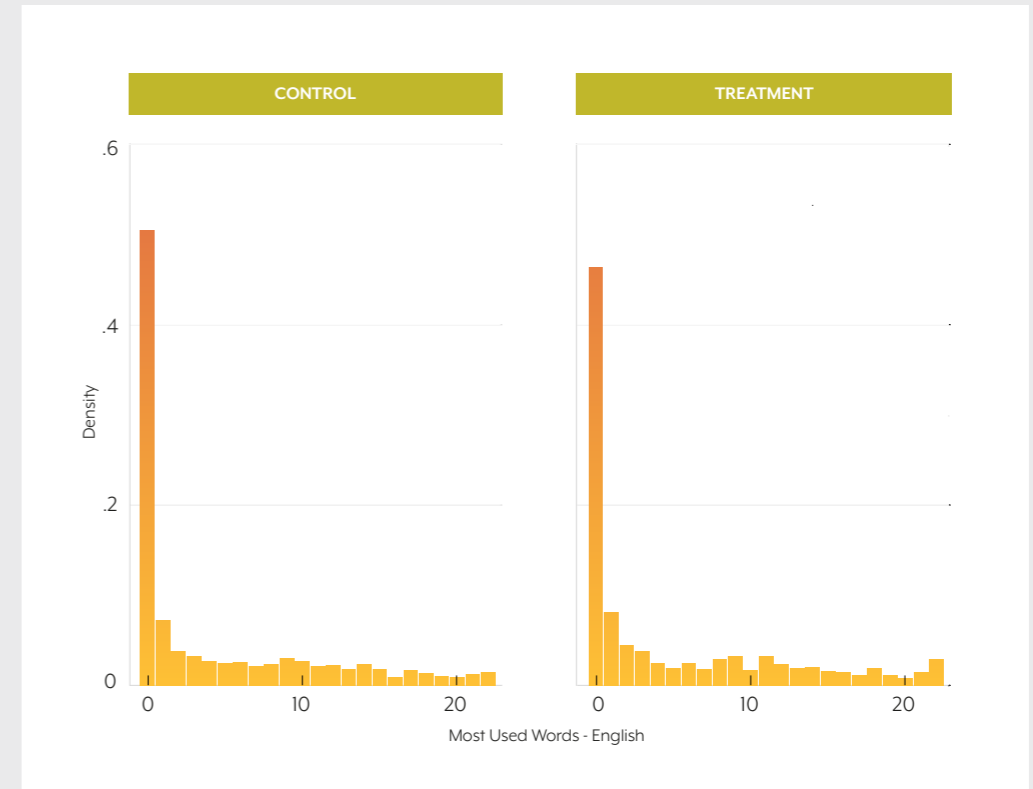


FIGURE 35. MOST USED WORDS (TOK PISIN) BY TREATMENT AND CONTROL

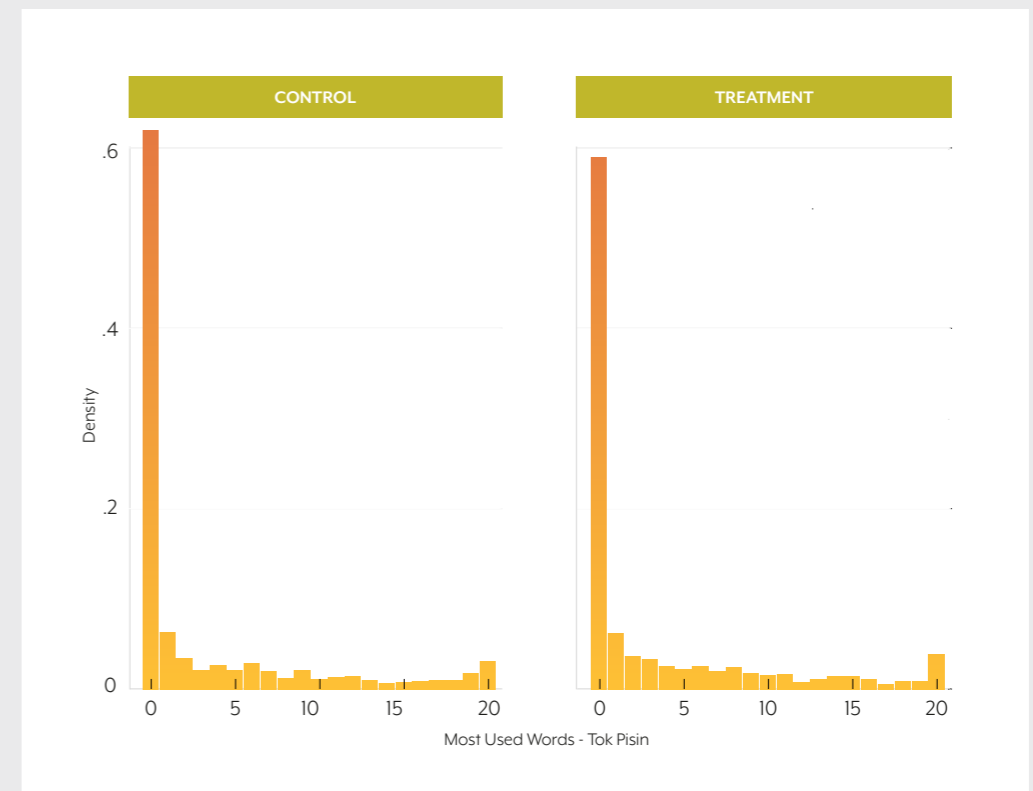


FIGURE 36. COMPREHENSION (ENGLISH) BY TREATMENT AND CONTROL

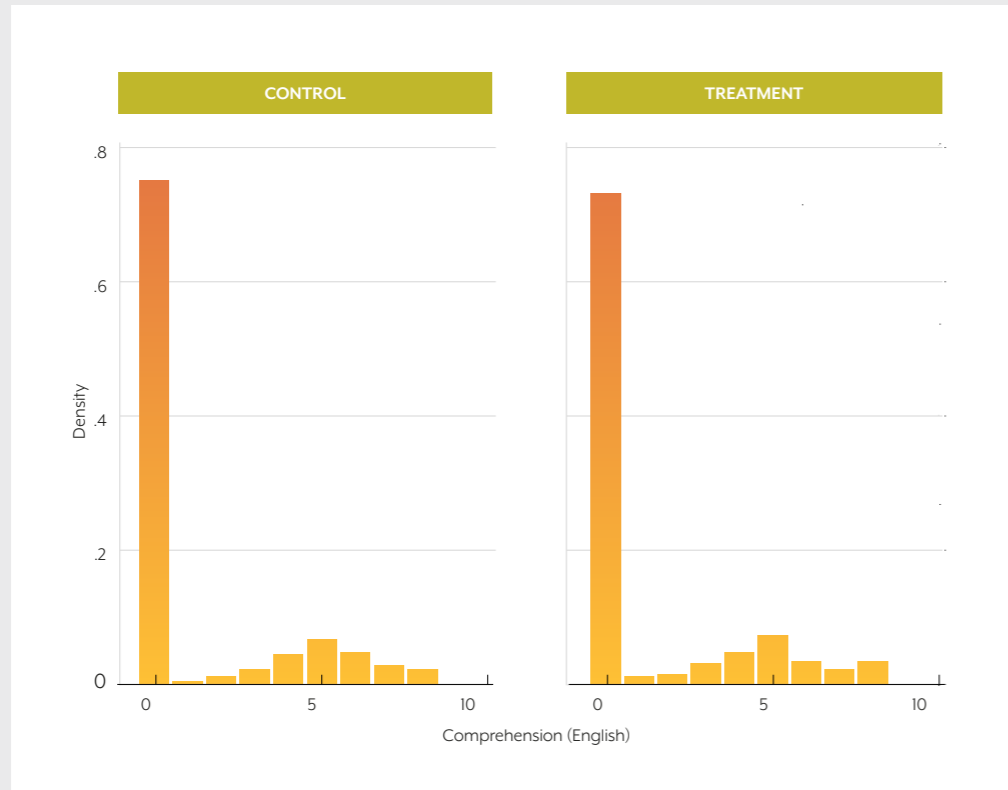


FIGURE 38. NUMBER IDENTIFICATION BY TREATMENT AND CONTROL

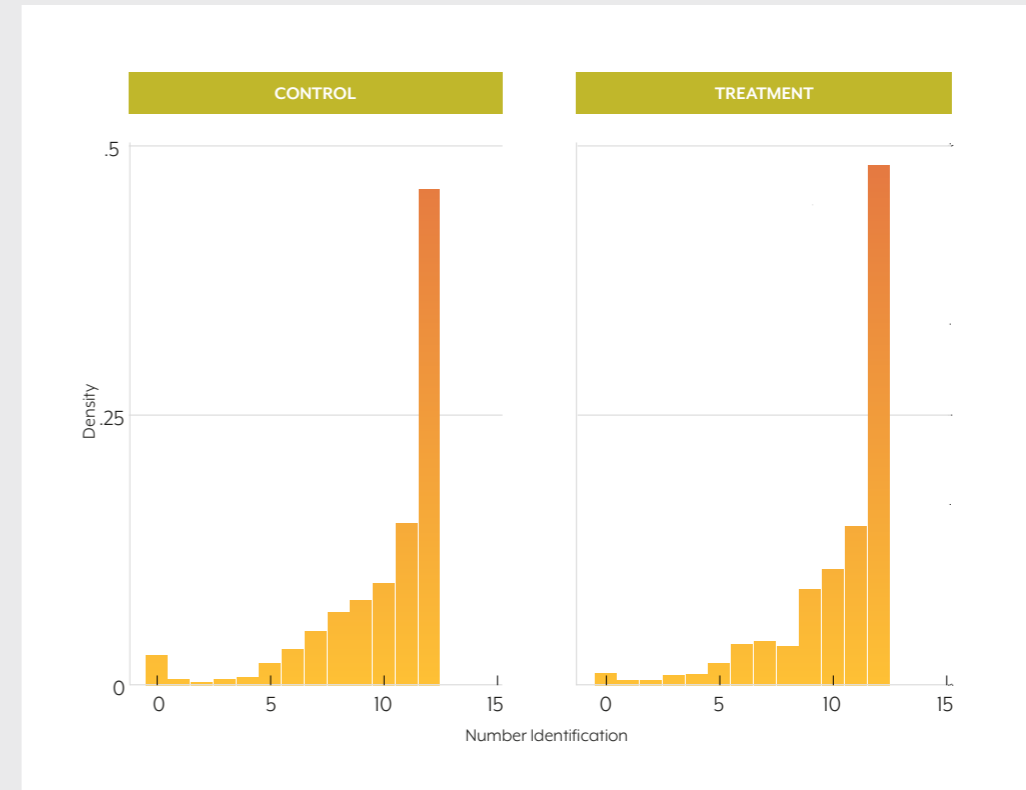


FIGURE 37. COMPREHENSION (TOK PISIN) BY TREATMENT AND CONTROL

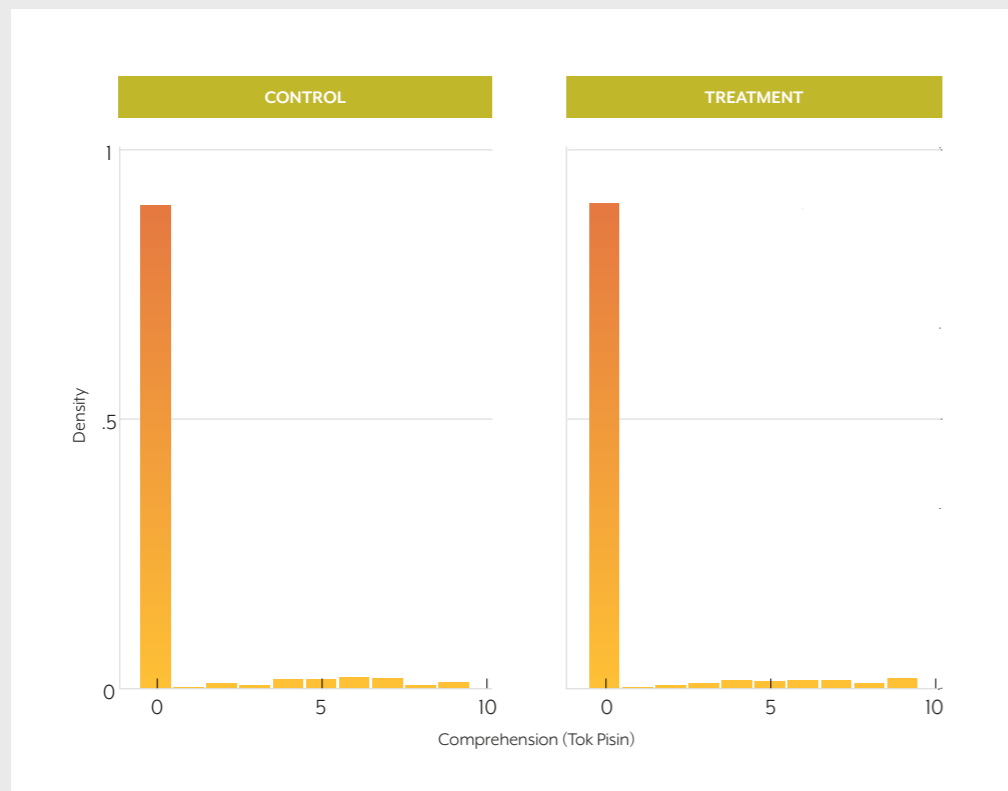


FIGURE 39. ADDITION BY TREATMENT AND CONTROL

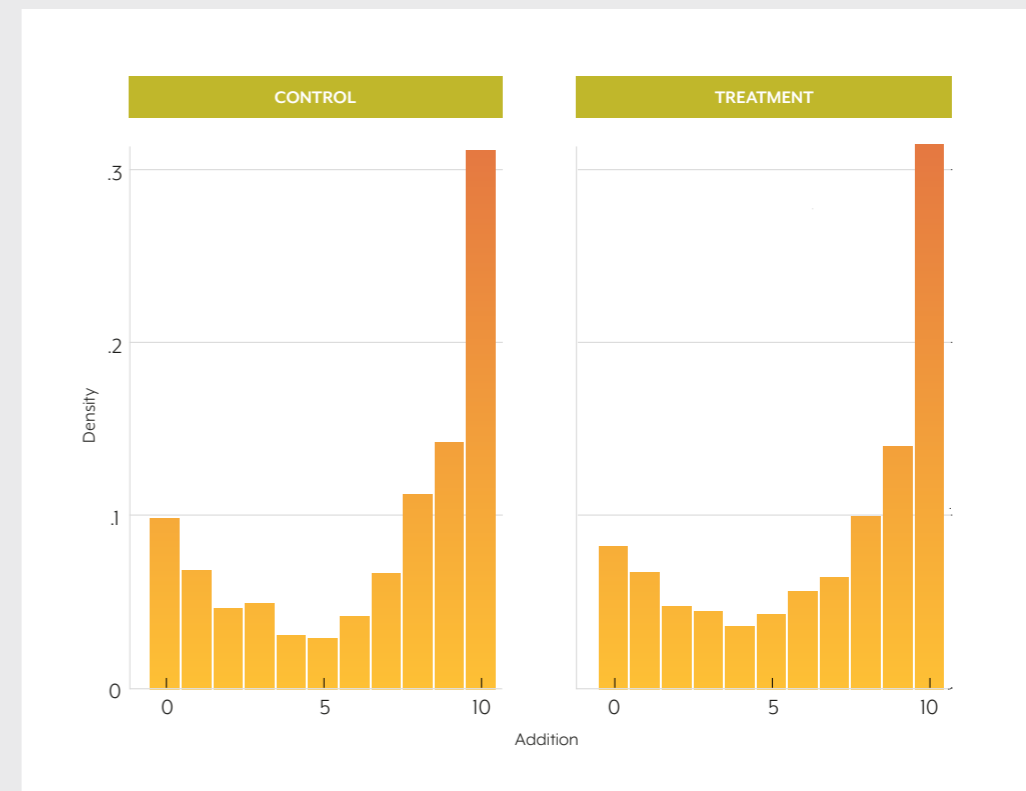


FIGURE 40. SUBTRACTION BY TREATMENT AND CONTROL

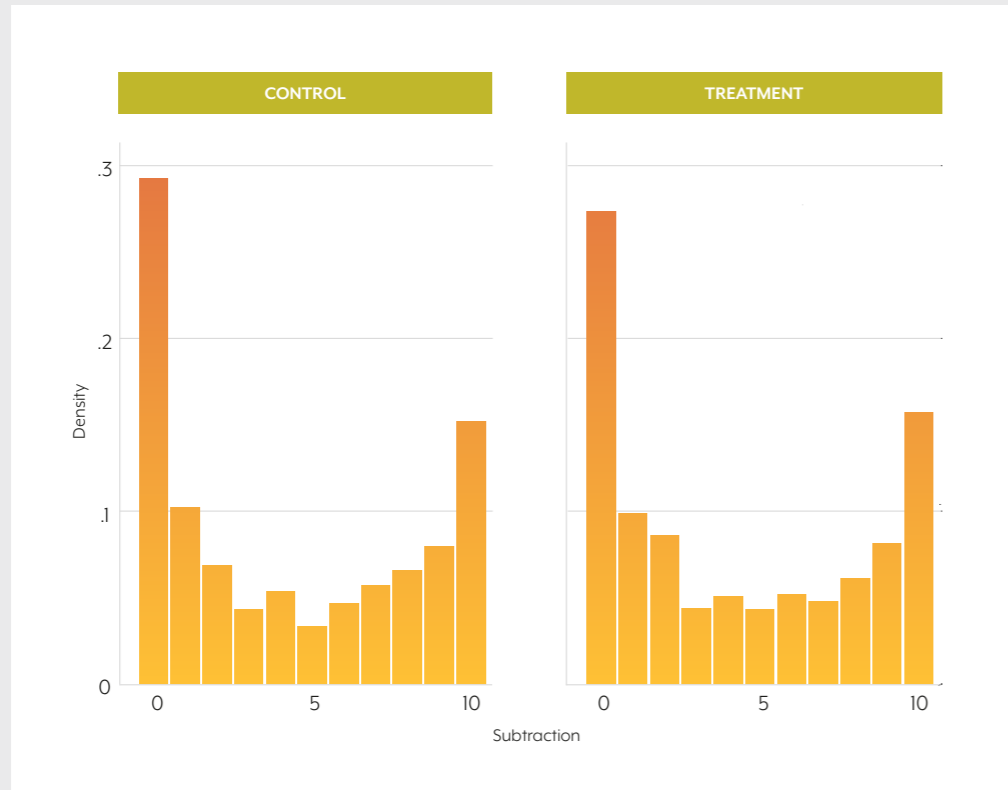


FIGURE 42. SKIP PATTERNS (MULTIPLES OF FIVE) BY TREATMENT AND CONTROL

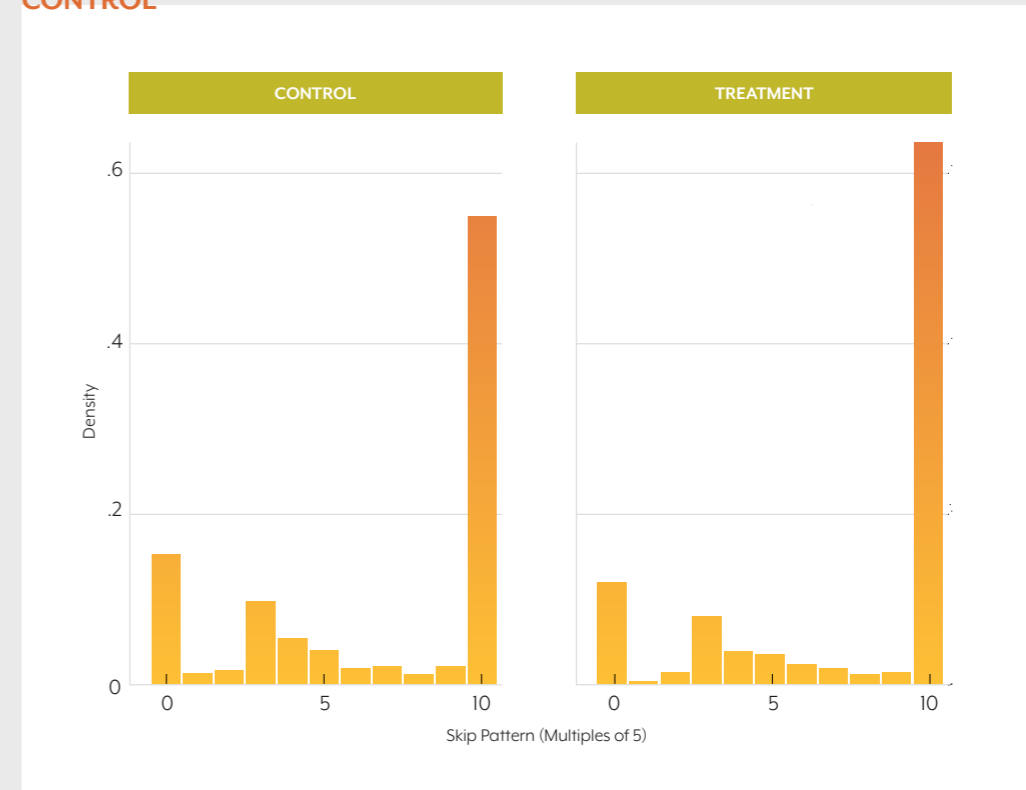


FIGURE 41. SKIP PATTERNS (MULTIPLES OF TWO) BY TREATMENT AND CONTROL

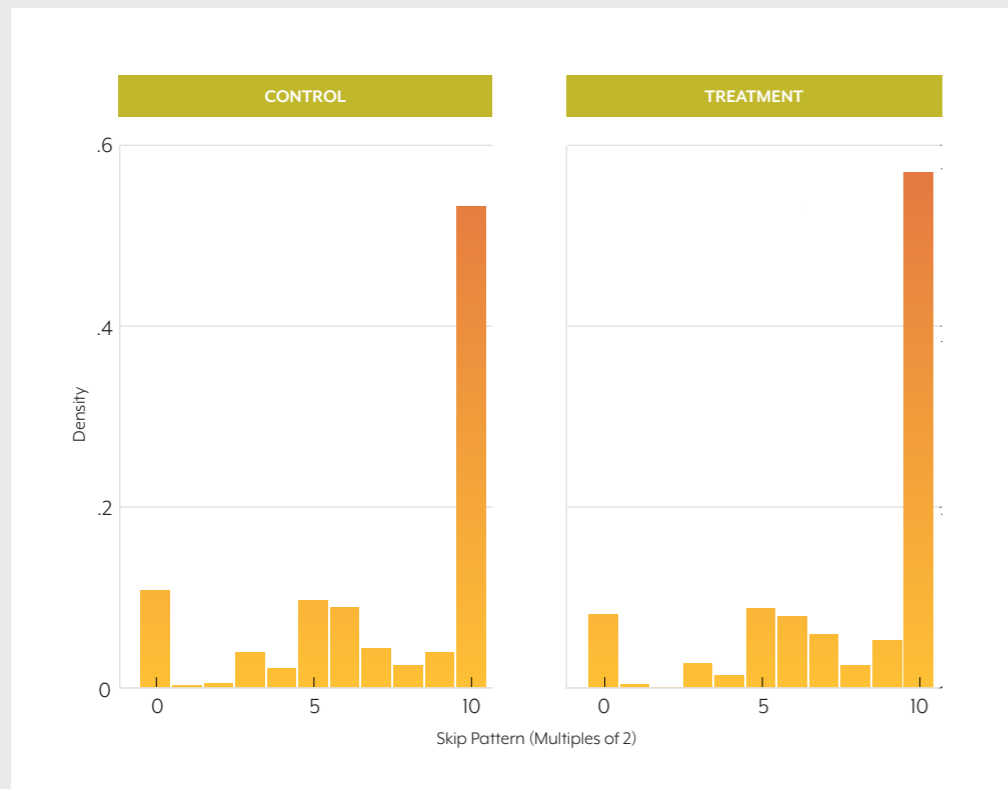


FIGURE 43. PROBLEM SOLVING BY TREATMENT AND CONTROL

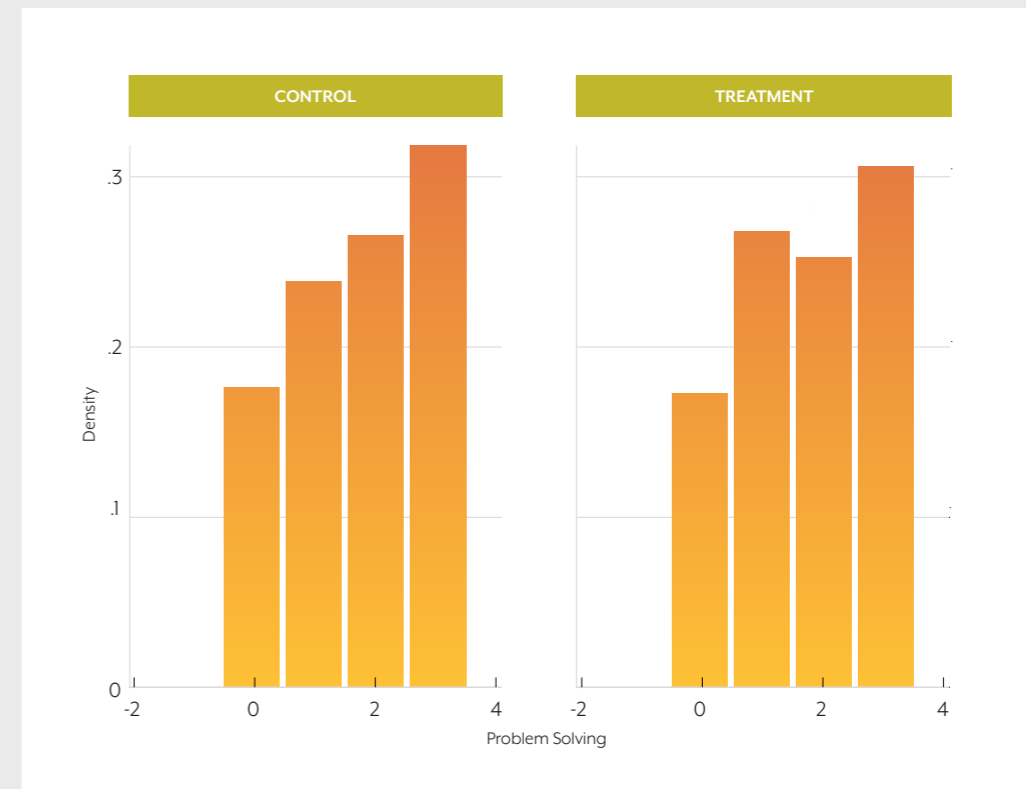


FIGURE 44. SHAPE RECOGNITION BY TREATMENT AND CONTROL

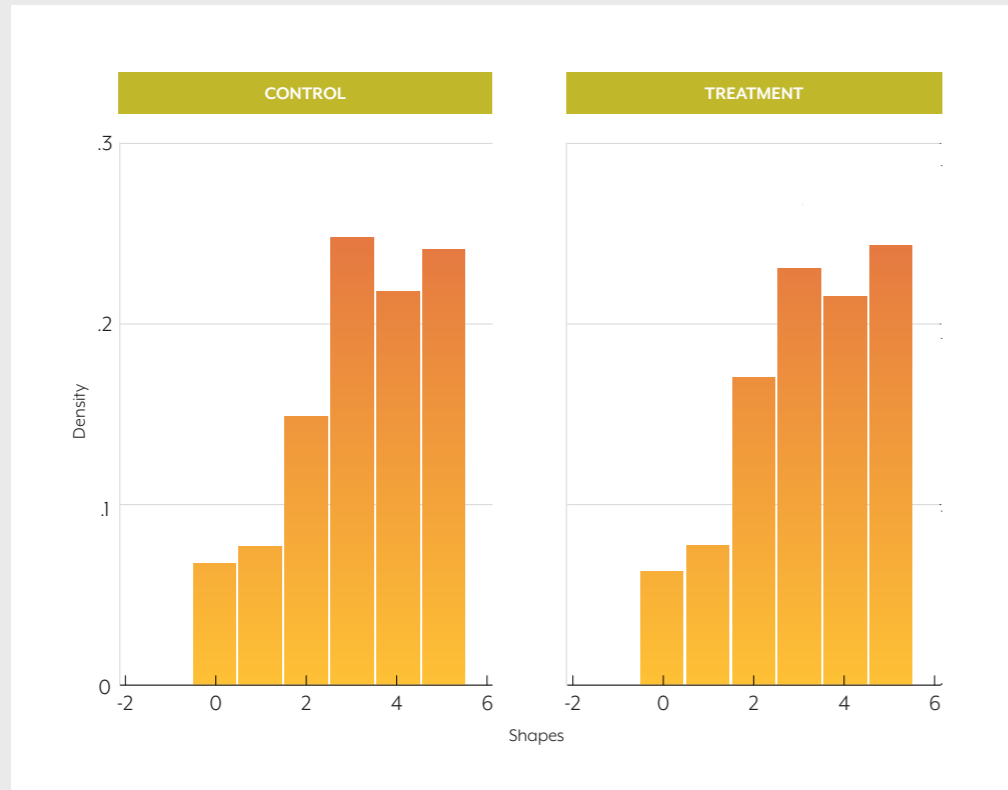


FIGURE 46. ACCESS TO ELECTRICITY AT HOME BY TREATMENT AND CONTROL

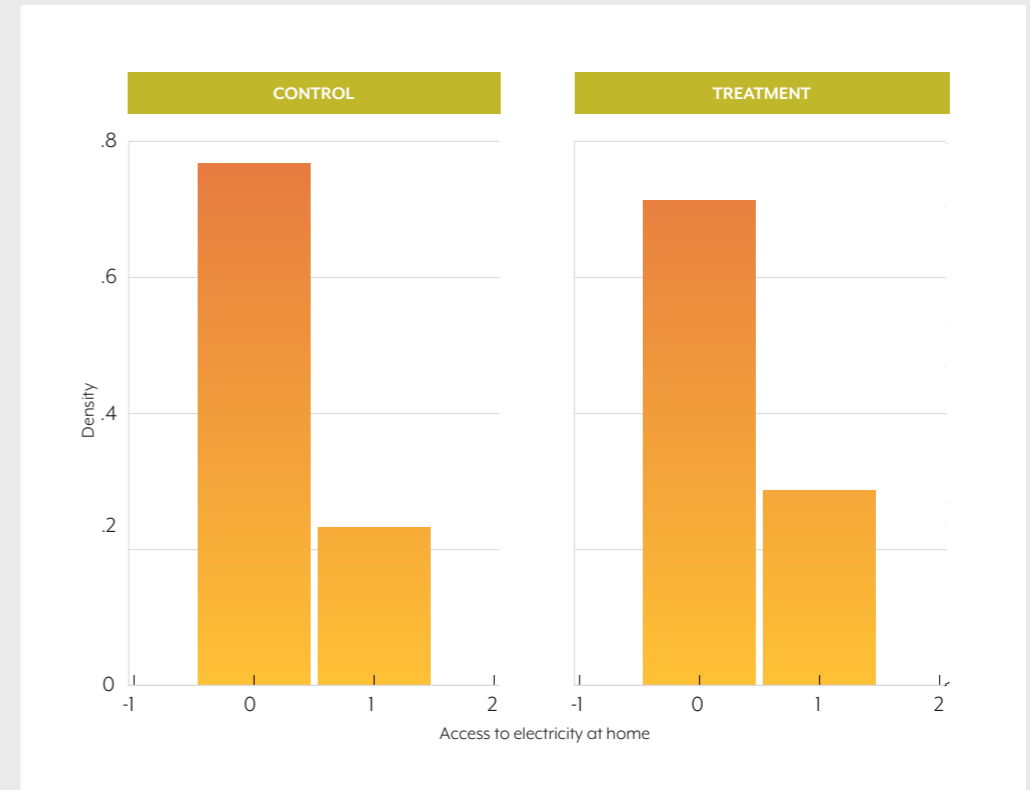


FIGURE 45. TELLING TIME BY TREATMENT AND CONTROL

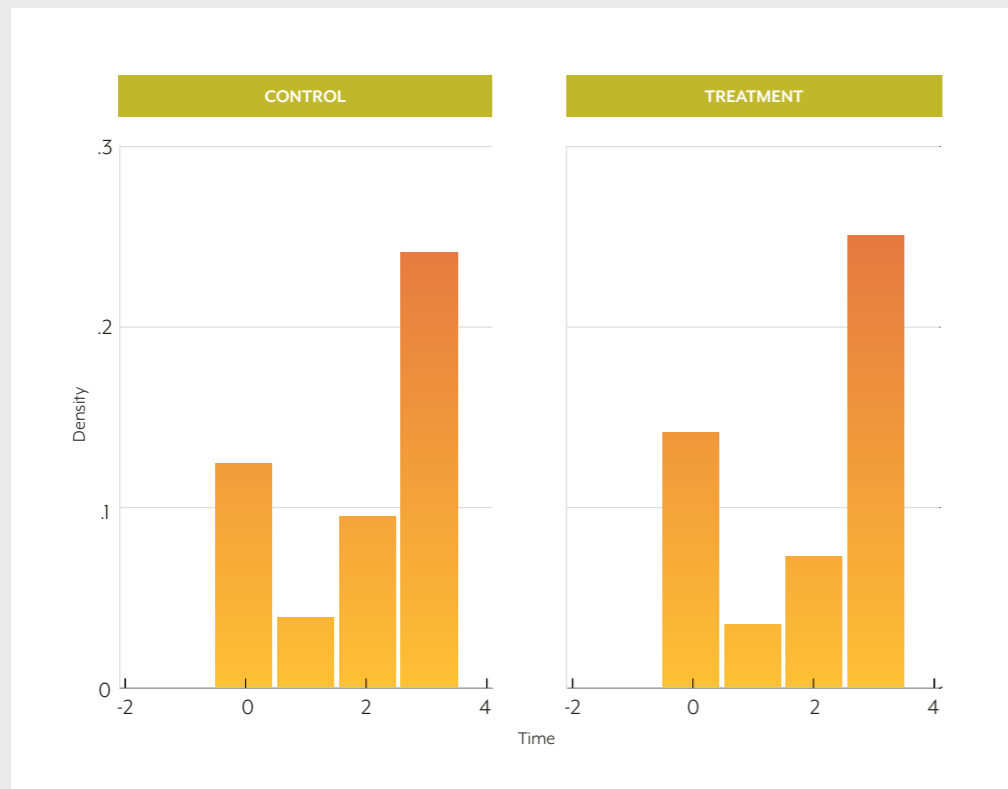


FIGURE 47. ACCESS TO MOBILE PHONES AT HOME BY TREATMENT AND CONTROL

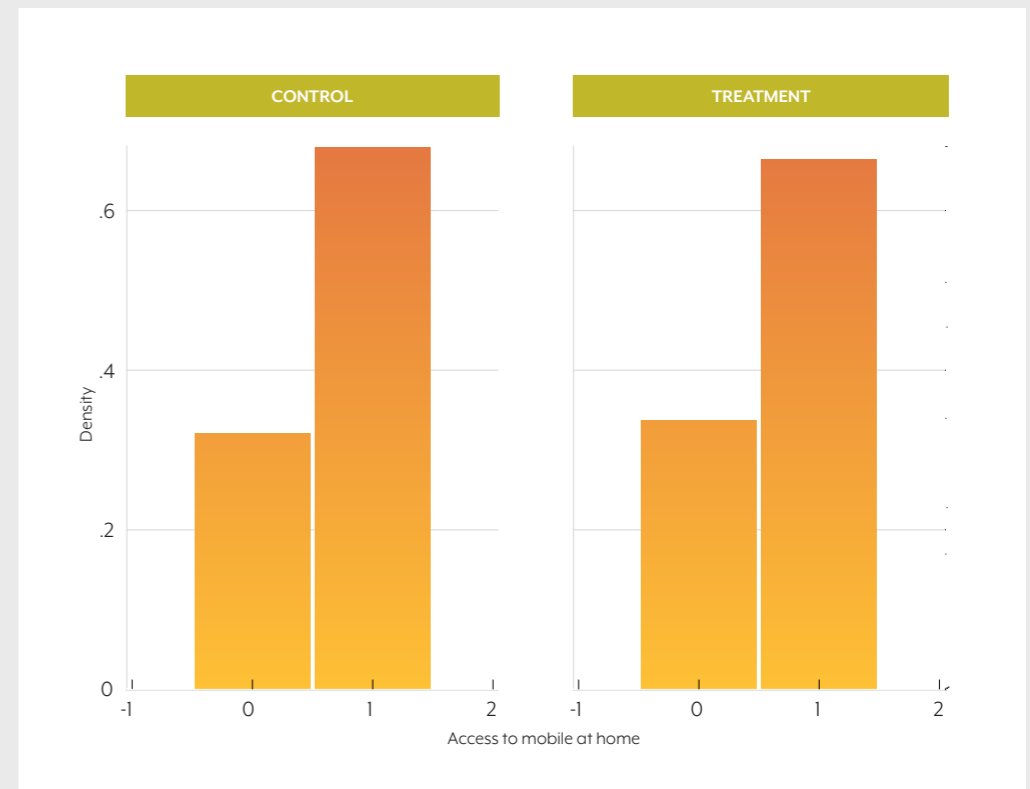


FIGURE 48. ACCESS TO TELEVISION AT HOME BY TREATMENT AND CONTROL

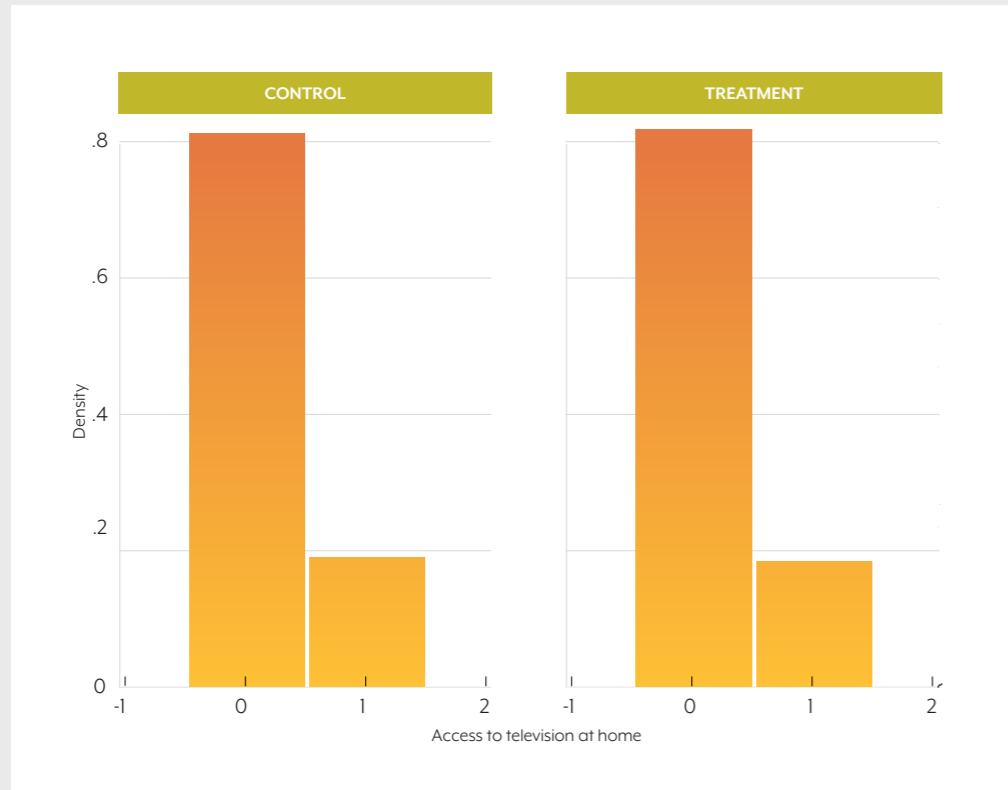


FIGURE 50. ACCESS TO RADIO AT HOME BY TREATMENT AND CONTROL

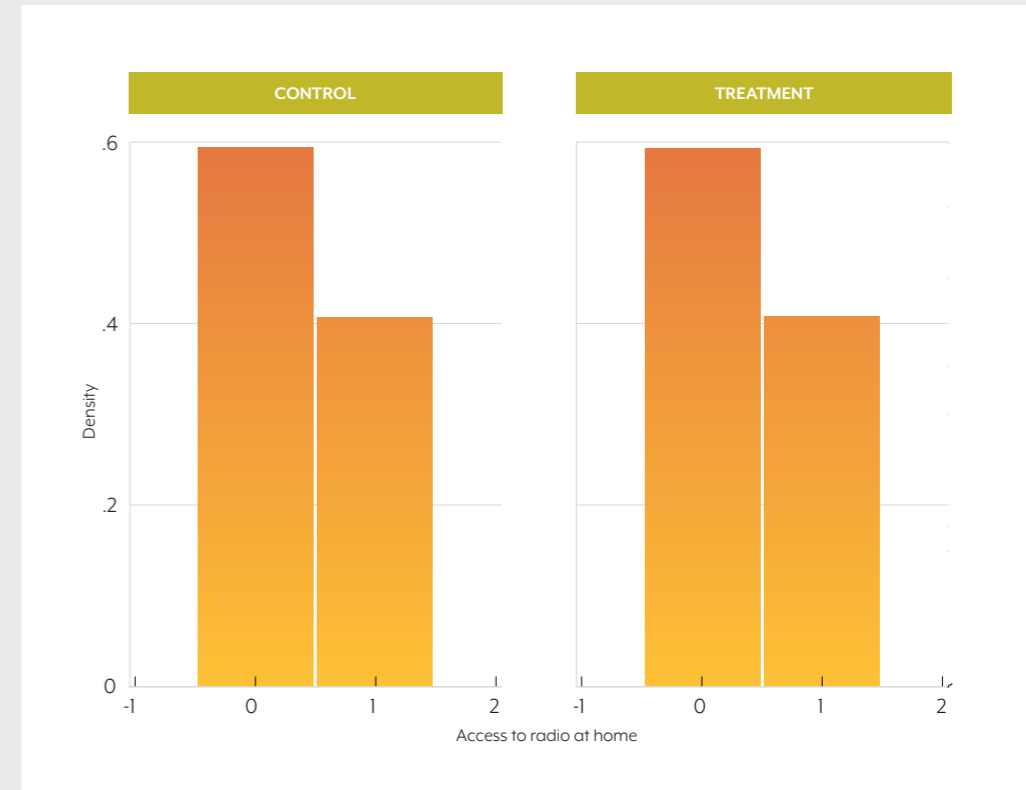


FIGURE 49. HOUSEHOLD WITH A TIN ROOF BY TREATMENT AND CONTROL

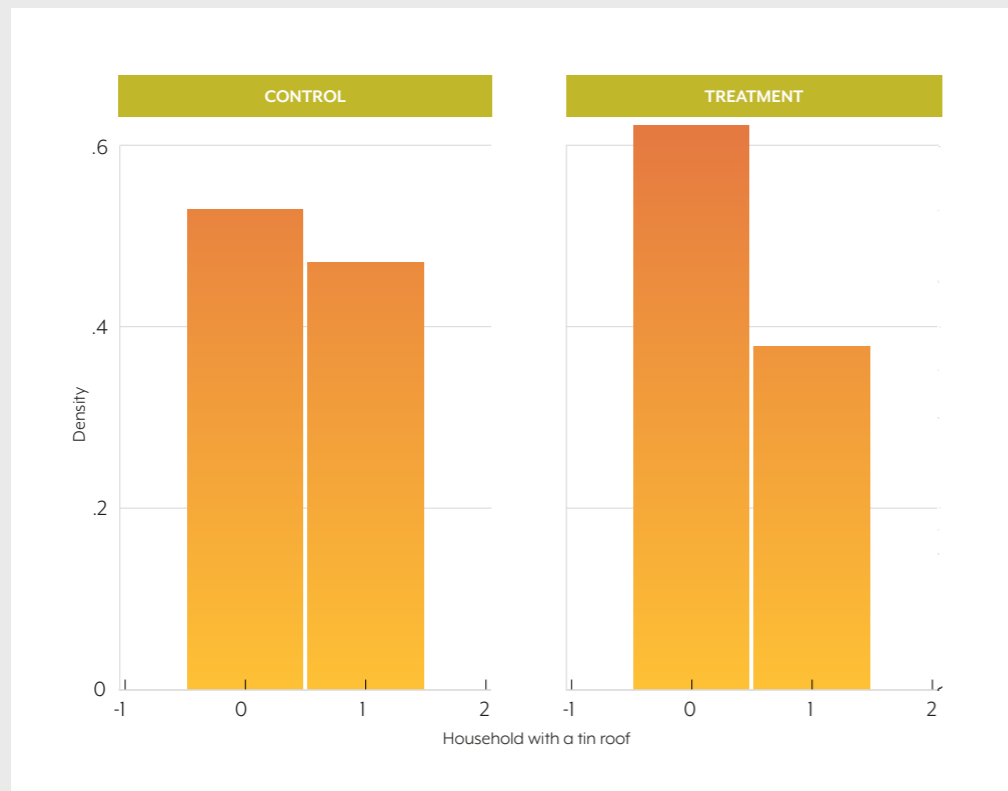


FIGURE 51. NEWSPAPERS AT HOME BY TREATMENT AND CONTROL

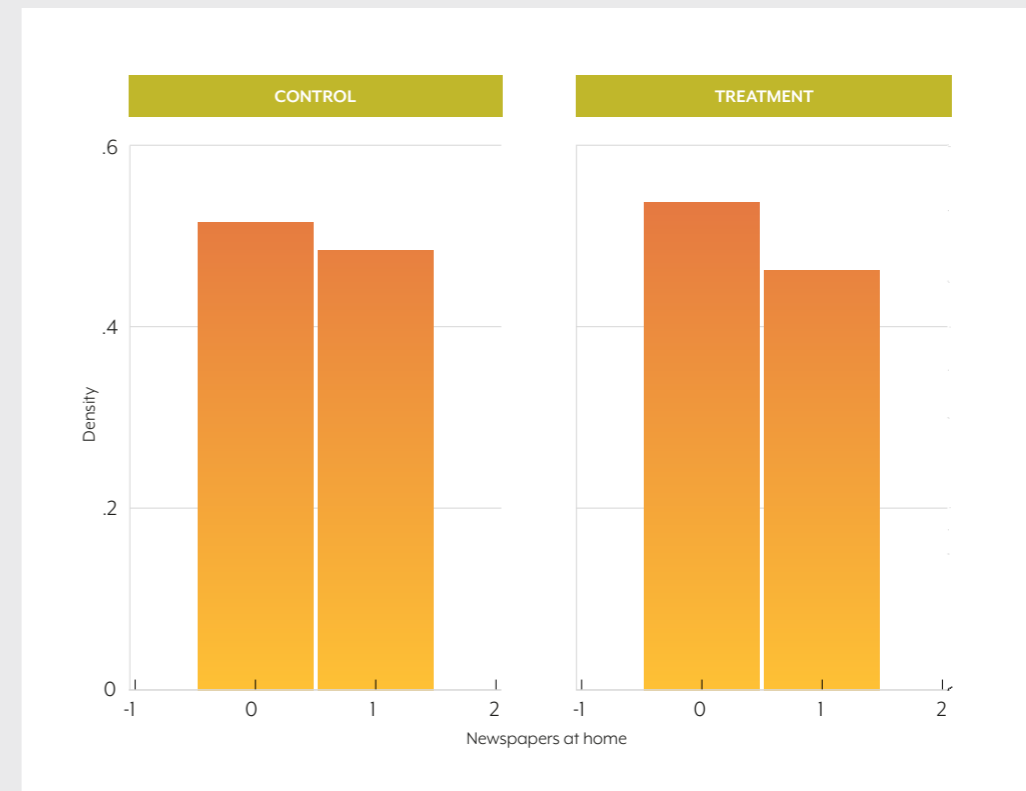


FIGURE 52. RELIGIOUS BOOKS AT HOME BY TREATMENT AND CONTROL

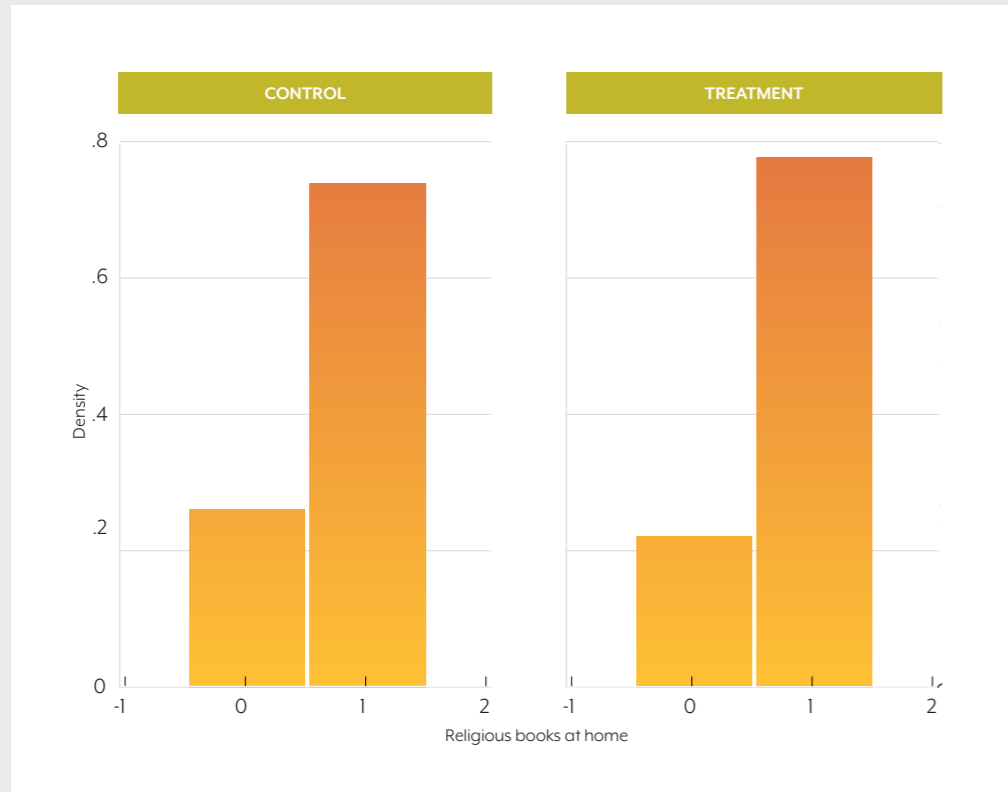


FIGURE 54. ACCESS TO TEXT BOOKS AT HOME BY TREATMENT AND CONTROL

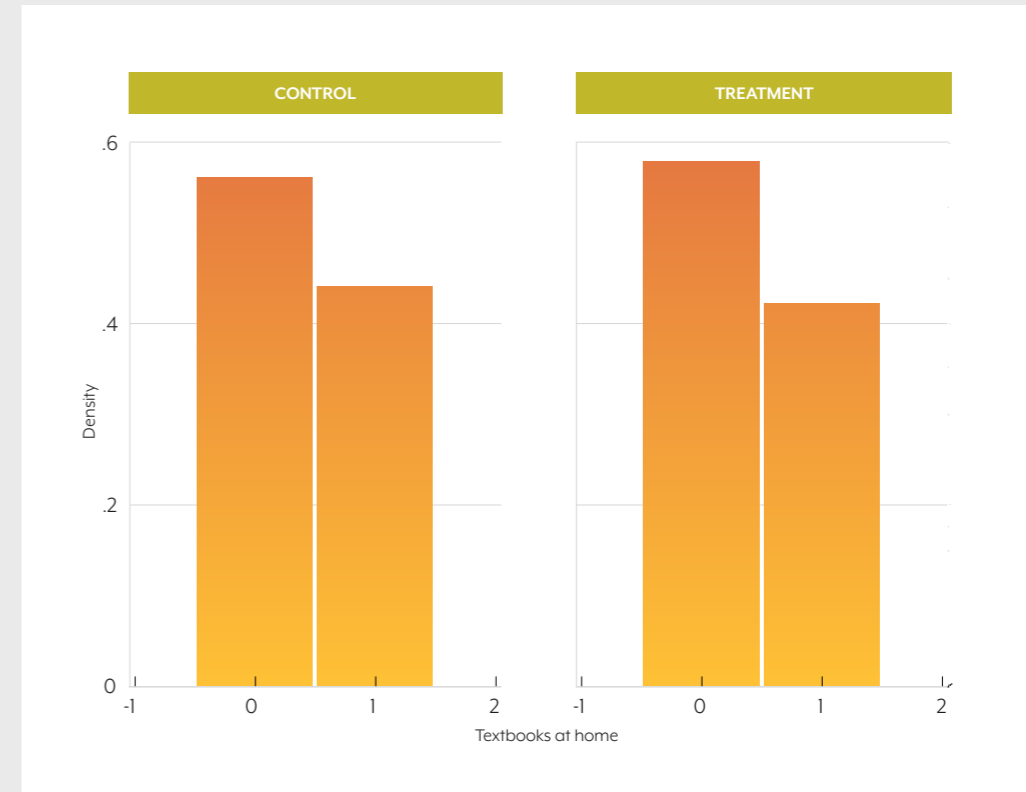
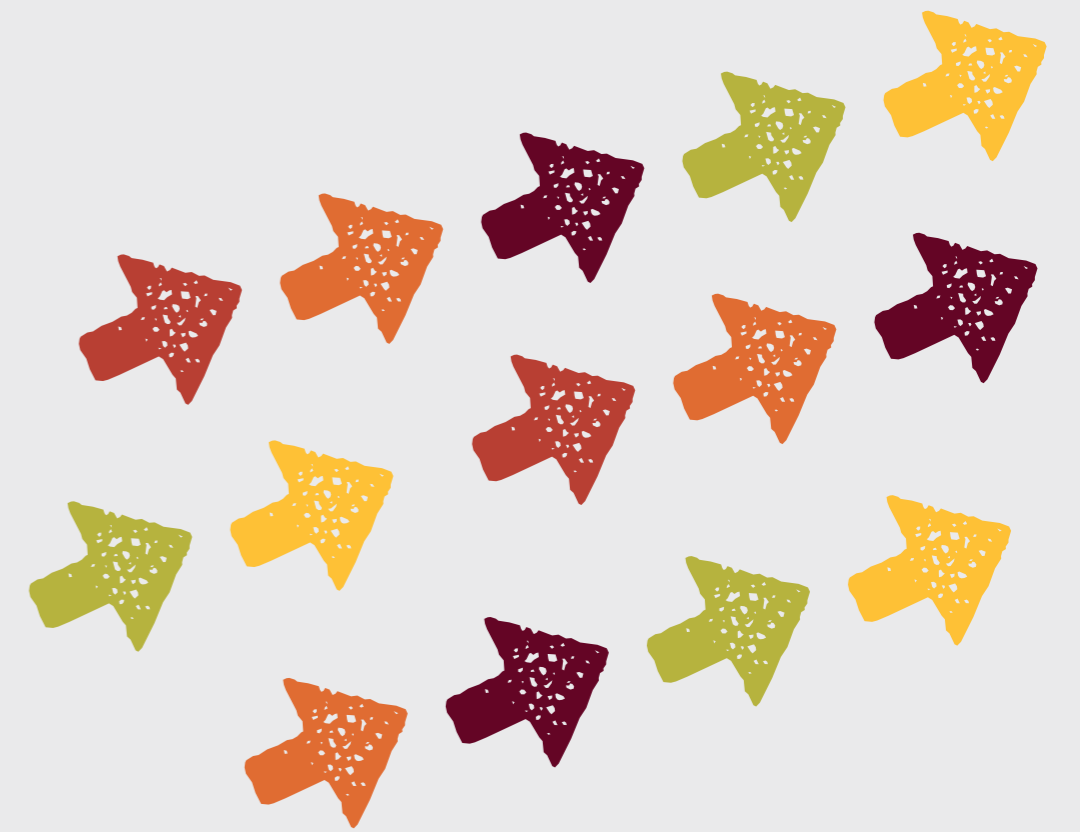
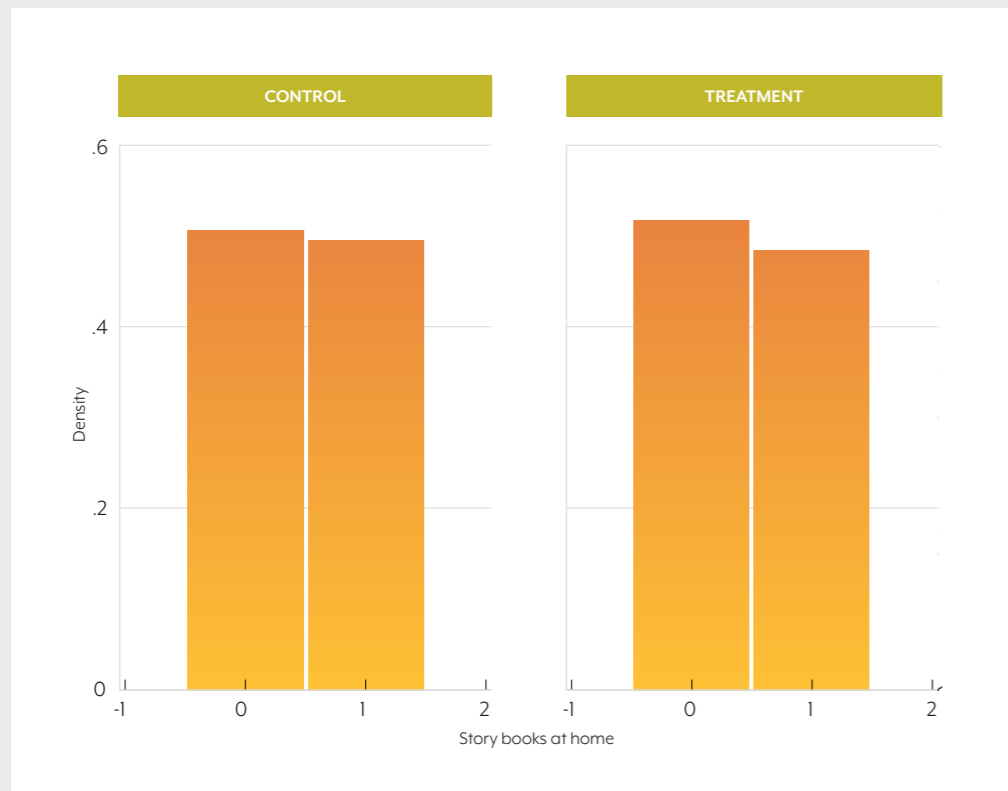


FIGURE 53. STORY BOOKS AT HOME BY TREATMENT AND CONTROL





APPENDIX 3:

LITERACY AND NUMERACY INDICES

Combined indices were created for both the literacy and numeracy domains using the results from the baseline assessment in order to provide a clear aggregate indicator for the Monitoring and Evaluation Plan (MEP).

The literacy index of .2405 was calculated by providing equal weightage to all seven domains of the literacy assessment –

1. Letter identification
2. Most frequent words (English)
3. Most frequent words (Tok Pisin)
4. Comprehension (English)
5. Comprehension (Tok Pisin)
6. Proportion of Readers (English)
7. Proportion of Readers (Tok Pisin)

TABLE 28. LITERACY (OVERALL)

Label	Obs	Unique	Mean	Min	Max
Letter Identification	2,743.00	27.00	0.80	-	1.00
Most Frequent Words (English)	2,743.00	23.00	0.22	-	1.00
Most Frequent Words (Tok Pisin)	2,743.00	21.00	0.17	-	1.00
Comprehension (English)	2,743.00	9.00	0.17	-	1.00
Comprehension (Tok Pisin)	2,743.00	10.00	0.07	-	1.00
Readers (English)	2,743.00	1.00	0.19	0.19	0.19
Readers (Tok Pisin)	2,743.00	1.00	0.07	0.07	0.07
Literacy Index	2,743.00	1,084.00	0.2405	0.04	0.75

However, as only the treatment LLGs are receiving the suite of interventions in the first year, the literacy score for schools from the treatment schools is more relevant to the MEP for 2018 (however, there is no significant difference between an index of .2405 and .2403).

TABLE 29. LITERACY SCORE IN TREATMENT LLGS

Variable	Obs	Unique	Mean	Min	Max
Letter Identification	1,269.00	27.00	0.81	-	1.00
Most Frequent Words (English)	1,269.00	23.00	0.22	-	1.00
Most Frequent Words (Tok Pisin)	1,269.00	21.00	0.17	-	1.00
Comprehension (English)	1,269.00	9.00	0.17	-	1.00
Comprehension (Tok Pisin)	1,269.00	10.00	0.06	-	1.00
Readers (English)	1,269.00	1.00	0.19	0.19	0.19
Readers (Tok Pisin)	1,269.00	1.00	0.06	0.06	0.06
Literacy Index	1,269.00	575.00	0.2403	0.04	0.75

THE NUMERACY INDEX WAS SIMILARLY CREATED BY PROVIDING EQUAL WEIGHTAGE TO EIGHT DOMAINS OF NUMERACY ASSESSED DURING THE BASELINE ASSESSMENT –

8. Number Identification
9. Addition
10. Subtraction
11. Skip Pattern (Twos)
12. Skip Pattern (Fives)
13. Problem Solving
14. Shape Identification
15. Time

TABLE 30. NUMERACY INDEX

Variable	Obs	Unique	Mean	Min	Max
Number Identification	2,743.00	13.00	0.85	-	1.00
Addition	2,743.00	11.00	0.67	-	1.00
Subtraction	2,743.00	11.00	0.43	-	1.00
Skip Pattern (Twos)	2,743.00	11.00	0.77	-	1.00
Skip Pattern (Fives)	2,743.00	11.00	0.73	-	1.00
Problem Solving	2,743.00	4.00	0.58	-	1.00
Shape Identification	2,743.00	6.00	0.64	-	1.00
Time	2,743.00	4.00	0.63	-	1.00
Numeracy Index	2,743.00	475.00	0.6635	-	1.00

Once again, the numeracy score for schools from the treatment schools is more relevant to the MEP for the current year (however, there is no significant difference between an index of .6635 and .6633).

TABLE 31. NUMERACY INDEX IN TREATMENT LLGS

Variable	Obs	Unique	Mean	Min	Max
Number Identification	1,269.00	13.00	0.86	-	1.00
Addition	1,269.00	11.00	0.67	-	1.00
Subtraction	1,269.00	11.00	0.43	-	1.00
Skip Pattern (Twos)	1,269.00	11.00	0.78	-	1.00
Skip Pattern (Fives)	1,269.00	11.00	0.75	-	1.00
Problem Solving	1,269.00	4.00	0.56	-	1.00
Shape Identification	1,269.00	6.00	0.64	-	1.00
Time	1,269.00	4.00	0.62	-	1.00
Numeracy Index	1,269.00	383.00	0.6633	-	1.00

The Literacy and Numeracy Indices also illustrate the differences between the literacy and numeracy levels between the three provinces.

FIGURE 55. LITERACY INDEX BY PROVINCE

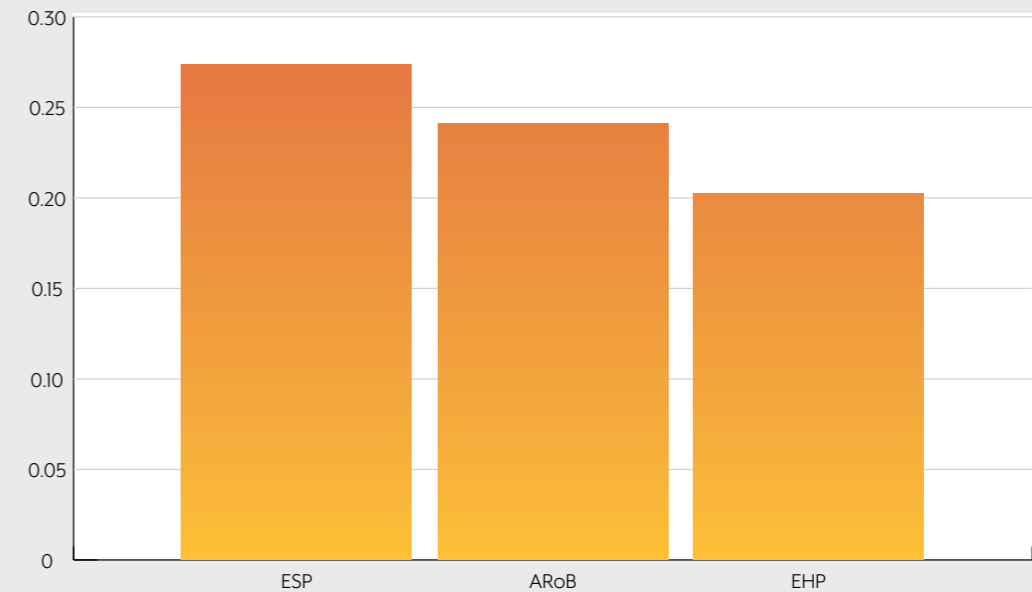
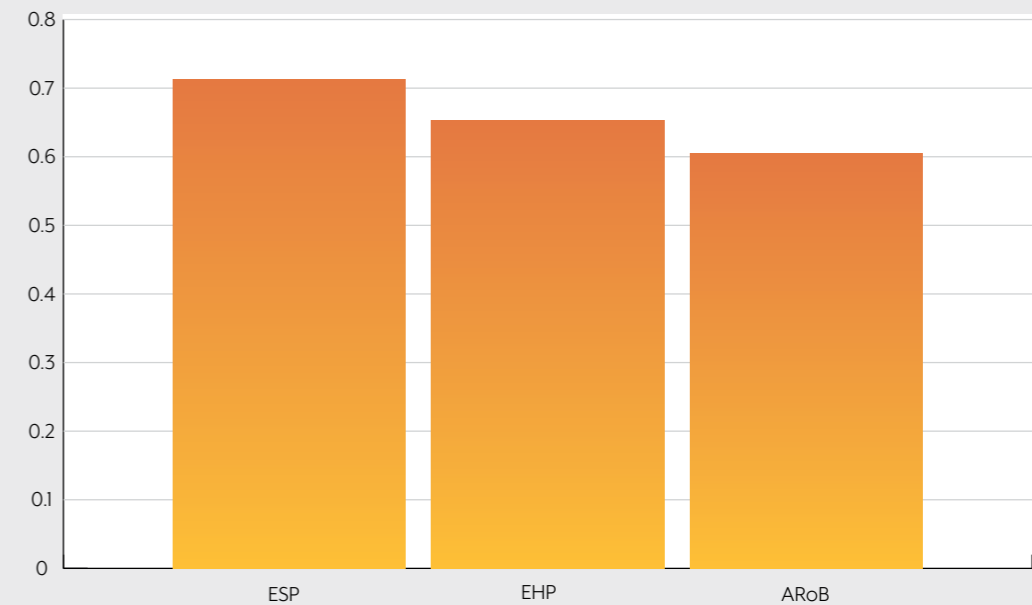


FIGURE 56. NUMERACY INDEX BY PROVINCE





APPENDIX 4:

DISTRICT LEVEL BREAKDOWN

TABLE 32. COMPLETED SCHOOL ASSESSMENTS

Region	District	Frequency	Percentage
Autonomous Region of Bougainville	Central Bougainville	30	24.79
Autonomous Region of Bougainville	North Bougainville	58	47.93
Autonomous Region of Bougainville	South Bougainville	33	27.27
Eastern Highlands Province	Goroka	15	25.42
Eastern Highlands Province	Henganofi	18	30.51
Eastern Highlands Province	Kainantu	5	8.47
Eastern Highlands Province	Obura/Wonenara	11	18.64
Eastern Highlands Province	Unggai/Benna	10	16.95
East Sepik Province	Angorum	31	42.47
East Sepik Province	Wewak	20	27.4
East Sepik Province	Yangoru Saussia	22	30.14
	Total	253	

TABLE 33. COMPLETED LITERACY AND NUMERACY ASSESSMENTS FOR GIRLS (BASELINE STUDY)

Region	District	Frequency	Percent
Autonomous Region of Bougainville	Central Bougainville	82	6.01
Autonomous Region of Bougainville	North Bougainville	151	11.06
Autonomous Region of Bougainville	South Bougainville	138	10.11
Eastern Highlands Province	Goroka	135	9.89
Eastern Highlands Province	Henganofi	117	8.57
Eastern Highlands Province	Kainantu	37	2.71
Eastern Highlands Province	Obura/Wonenara	93	6.81
Eastern Highlands Province	Unggai/Benna	71	5.2
East Sepik Province	Angorum	197	14.43
East Sepik Province	Wewak	180	13.19
East Sepik Province	Yangoru Saussia	164	12.01
	Total	1,365	100

TABLE 34. COMPLETED LITERACY AND NUMERACY ASSESSMENTS FOR BOYS (BASELINE STUDY)

Region	District	Frequency	Percent
Autonomous Region of Bougainville	Central Bougainville	107	7.76
Autonomous Region of Bougainville	North Bougainville	141	10.23
Autonomous Region of Bougainville	South Bougainville	119	8.64
Eastern Highlands Province	Goroka	124	9
Eastern Highlands Province	Henganofi	148	10.74
Eastern Highlands Province	Kainantu	38	2.76
Eastern Highlands Province	Obura/Wonenara	95	6.89
Eastern Highlands Province	Unggai/Benna	72	5.22
East Sepik Province	Angorum	183	13.28
East Sepik Province	Wewak	177	12.84
East Sepik Province	Yangoru Saussia	174	12.63
	Total	1,378	100

TABLE 35. COMPLETED CLASSROOM OBSERVATIONS

Region	District	Frequency	Percent
Autonomous Region of Bougainville	Central Bougainville	8	4.57
Autonomous Region of Bougainville	North Bougainville	22	12.57
Autonomous Region of Bougainville	South Bougainville	15	8.57
Eastern Highlands Province	Goroka	17	9.71
Eastern Highlands Province	Henganofi	15	8.57
Eastern Highlands Province	Kainantu	5	2.86
Eastern Highlands Province	Obura/Wonenara	10	5.71
Eastern Highlands Province	Unggai/Benna	15	8.57
East Sepik Province	Angorum	31	17.71
East Sepik Province	Wewak	20	11.43
East Sepik Province	Yangoru Saussia	17	9.71
	Total	175	

FIGURE 57. COMPLETED SCHOOL ASSESSMENTS

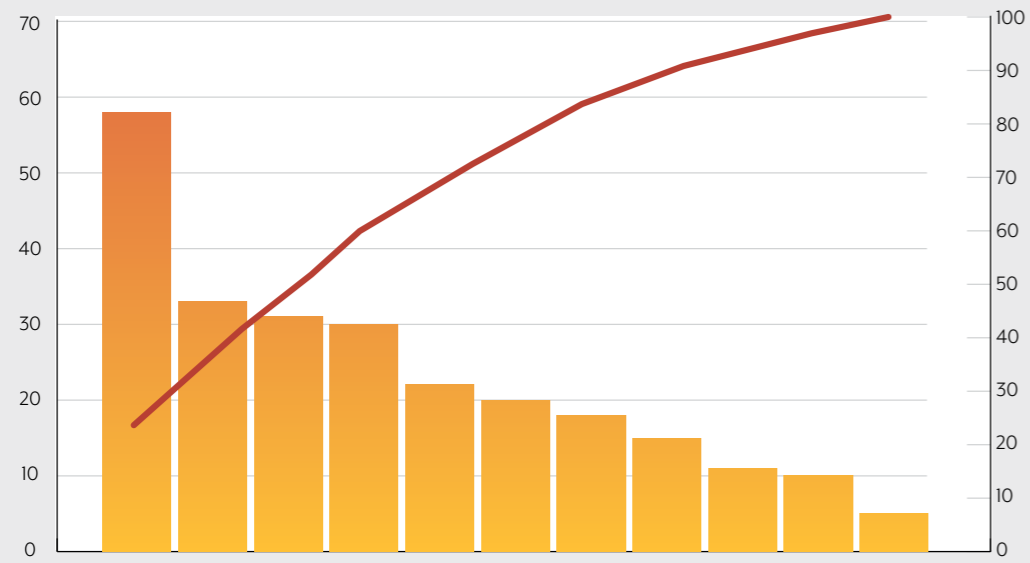


FIGURE 59. COMPLETED ASSESSMENTS FOR BOYS (BASELINE STUDY)

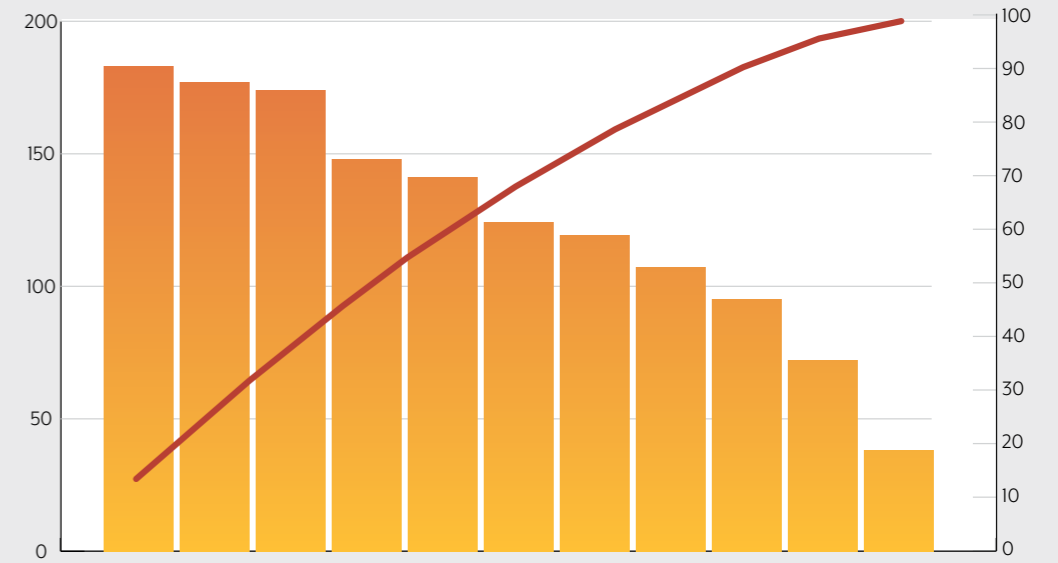


FIGURE 58. COMPLETED ASSESSMENTS FOR GIRLS (BASELINE STUDY)

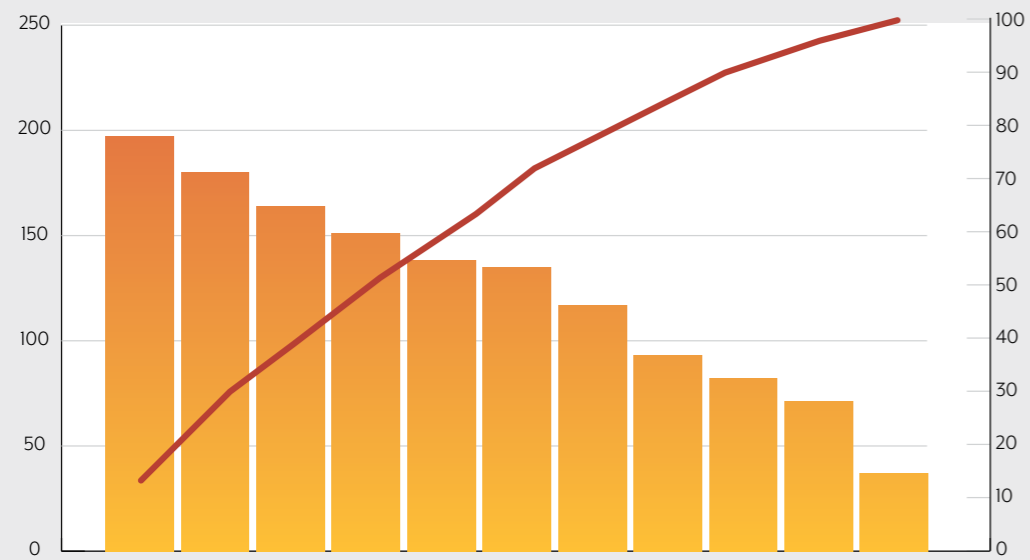


FIGURE 60. COMPLETED CLASSROOM OBSERVATIONS

