

The Early Childhood Education Project in Lao PDR: Impact Evaluation Report

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Abbreviations

CAC Community Awareness Campaign

CCDG Community Child Development Groups

ECE Early Childhood Education

EMIS Education management Information System

eHCI early Human Capability Index

KG Kindergarten

MAT Multi-Age Teaching

MELE Measuring Early Learning Environment

MODEL Measurement of Development and Early Learning

MoES Ministry of Education and Sport

PDR People's Democratic Republic

PP Pre-Primary

SD Standard Deviation

SDG Sustainable Development Goals

VEDC Village Education Development Committee

Executive Summary

The Early Childhood (ECE) Project aimed to support the expansion of quality ECE services and improve the overall development of children aged 3 to 5 years in disadvantaged communities across Northern Lao PDR. This report presents findings from the project's impact evaluation after approximately four years of intervention implementation. Overall, results sought to determine the efficacy of project interventions in improving children's development across target villages.

Impact of three interventions were measured through three clustered randomized control trials.

- **Community Child Development Groups (CCDGs):** locally recruited caregivers were trained to facilitate community-based playgroups for children aged 3-4 years. **Multi-Age Teaching (MAT):** local pre-primary teachers were trained to deliver ECE curriculum to children of different ages (ranging from 3 to 5 years old) in the same classroom.
- **Community Awareness Campaign (CAC):** where local Village Education Development Committees underwent training in early childhood health and development and implemented training to parents in their village.

Investigation of both longitudinal data as well as repeat cross-sectional observations over time enabled exploration of the impact of interventions on children's participation in ECE, the home environment, parental knowledge of early child health and development, and children's development outcomes. ECE quality and the relationship between ECE attendance, quality, and children's developmental outcomes was also explored.

Results support the conclusion that both CCDGs and MAT greatly increased ECE attendance among children aged 3-4 years. As per project objectives, increased attendance was associated with enhanced learning and development outcomes. There was little difference in the quality of different ECE modalities, which was a positive result for CCDGs considering they were a new ECE modality, delivered by trained caregivers rather than formal teachers. Changes in the home environments to support early child health, development and early education were found over the period of these studies, though results showed little difference in impacts between interventions.

Unfortunately, the CAC showed no impact on ECE attendance, caregiver interactions at home to support children's development, or indeed basic knowledge around child health and safety. Monitoring data indicates that this result was likely due to the inadequate implementation of the CAC intervention in most intervention villages, rather than inefficacy of the intervention itself.

Taken together, while CCDGs produced slightly better child learning and development outcomes relative to MAT, results support the scale-up of either form of ECE. At the conclusion of this report, we discuss a series of implementation considerations including delays in implementation and payments, reduced training, monitoring and oversight, all of which are important to consider and strengthen as Lao PDR continues to scale-up ECE. It is essential that central organisational capacity is adequately resourced to support a quality national ECE system.

Part One: Introduction and Background

Country Context

Lao People's Democratic Republic (PDR) has experienced strong economic growth over recent years, with the country poised to graduate from Least Developed Country status in 2026 (1). Nevertheless, significant economic disparities, particularly between the country's diverse ethnic groups and across geographical regions, continue to persist (Bader et al., 2016; Warr et al., 2015). Early childhood education has become a growing area of priority for the Government of Lao PDR, with investments in the early years a key strategy for advancing the nation's social mobility and future prosperity.

Together with countries across the world, Lao PDR ratified the 2030 Agenda for Sustainable Development, which includes 17 Sustainable Development Goals (SDGs) to end poverty, fight inequality and injustice, ensure inclusive and quality education and tackle climate change by 2030 (United Nations, 2015). Specifically, Target 4.2 is focused exclusively on early childhood development, and states that countries must ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education. Prior to this, the Government of Lao PDR outlined steps for the Education for All National Plan of Action 2003-2015 to: (i) promote coordination between the Government, community and private sector; (ii) mobilize communities in favour of pre-primary education, and promote the development of community pre-primary education; and (iii) promote access to pre-primary education for 5-year-olds by establishing a pre-primary class or community-based school readiness program to prepare them for Grade 1, targeting ethnic groups, girls and children from the poorest families.

Despite greater commitment to making early childhood development a priority, coverage of early childhood education remained insufficient. In 2013, only a third of all children aged 3 to 5 years were enrolled in early childhood education, a figure lower compared to countries with similar income levels (World Bank, 2014). Further, the majority of early childhood education programs took the form of pre-primary classes located with primary schools and thus predominately catered for 5-year-olds, limiting access for younger children. Coverage also varied considerably according to ethnicity and geography. Lao-Tai children comprised 90% of enrolments and less than 8% of children from the lowest income quintile, from rural areas without roads, or from non Lao-Tai communities had access to early childhood education services (World Bank, 2014). Lack of access to early education, combined with poverty and malnutrition, is detrimental to children's development and their readiness to learn at school. Unaddressed, this fosters long term negative implications for human development in Lao PDR.

The Early Childhood Education Project

Against this background, the World Bank provided USD\$28 million, comprised of an International Development Association (IDA) Grant (USD\$14 million) and IDA credit (USD\$14 million), to the Government of Lao PDR for the Early Childhood Education (ECE) Project. The aim of the ECE Project was to support the expansion of quality ECE services and improve the overall development and school readiness of children aged 3 to 5 years in disadvantaged communities across Northern Lao PDR.

To achieve this objective, the project supported three key components:

Component One focused on increasing the coverage of ECE through (i) the provision of construction grants and training for target villages, for the construction of community huts, generally on primary school grounds for early childhood education using community-based contracting; and (ii) the establishment of Community Child Development Groups (CCDGs) (to be delivered in the newly built huts). Previously, while pre-primary classrooms are intended for 5-year-old children, children who attend often bring their younger siblings along to class with them. CCDGs aimed to provide a separate, more informal learning environment for 3 and 4-year-old children before they enter a pre-primary classroom. While CCDGs were the focus of the program, technical support was also provided to develop teaching and learning materials for multi-age teaching for 3 to 5-year-olds, to support Multi-Age Teaching (MAT) in existing pre-primary classes (to be delivered in communities where a CCDG was not built).

Component Two focused on improving the quality of ECE services through (i) a supporting services package, technical assistance and training; and (ii) teacher and education officer training. The supporting services package provided a package of services to targeted communities to improve the quality of ECE, and increase the demand for ECE services, by delivering:

- (i) A community awareness campaign to engage parents in parental education, and increase the knowledge and understanding of community members about the importance of early child health and development in the first 1,000 days of a child's life, appropriate parenting skills and early stimulation, nutrition, health, hygiene and childhood disability awareness.
- (ii) The provision of school meals to children at CCDGs, pre-primary and primary school to encourage the attendance of boys and girls in remote rural communities, and to provide children with nutritious meals in order to facilitate concentration.

Prior to the project, target districts had a shortage of qualified pre-primary school teachers. Further, teachers were not qualified to manage the multi-age classes that resulted from 5-year-old children bringing their younger siblings to class with them. Therefore the second component of the ECE project

supported pre-service training of pre-primary school teachers, as well as in-service training on multi-age techniques for pre-primary teachers in target areas.

Component Three focused on strengthening project management, capacity development, and monitoring and evaluation at all levels of the early childhood education sector. The component's main activities included (i) capacity development and support for financial management, procurement, environmental and social safeguards and internal audits; and (ii) support for monitoring and evaluation activities including a results framework and monitoring system. Also included in this component was the three independent impact evaluations of the different project modalities on a range of child outcomes.

Research conducted in low, middle, and high income countries demonstrates that ECE is one of the most cost-effective and equitable interventions in promoting human development. Investment in ECE has been shown to reduce school dropout and grade repetition rates (Davoudzadeh, McTernan, & Grimm, 2015; Nores & Barnett, 2010), increase graduation rates in post-secondary education, and improve labor force productivity and wages (Gertler et al., 2014; Supplee & Meyer, 2015). By intervening in the early years, the project sought to strengthen foundations for children's healthy physical, cognitive, social and emotional development. To this end, project investments were expected to contribute to increased educational attainment which is associated with higher income later in life (World Bank, 2014a). Research also demonstrates that disadvantaged children gain more benefit from ECE participation compared to their more advantaged peers. In this way, the project also sought to reduce disparities in educational attainment across income and ethnic groups and contribute to shared prosperity and educational equity.

Project Impact Evaluation

Included within the scope of the third component of the ECE project was a series of three parallel impact evaluations. The first of the three impact evaluations focused on comparing the impact of CCDGs versus Multi-Age teaching.

- **Community Child Development Groups (CCDGs)** in which locally recruited caregivers were trained to facilitate community-based playgroups for children aged 3-4 years. Located in purpose-built huts, parents were encouraged to participate in CCDGs with their children, which sought to provide an additional informal learning context for children prior to entering pre-primary. CCDGs were delivered every weekday, for the entire school day.
- **Multi-Age Teaching (MAT)** where local pre-primary teachers were trained to deliver ECE curriculum to children of different ages (ranging from 3 to 5 years old) in the same classroom.

Essentially existing Pre-primary classes, originally intended to service 5 year old children only, were opened up to officially allow children aged 3 and 4 to attend as well as. MAT was delivered every weekday, for the entire school day.

The second and third impact evaluations concentrated on the impact of a Community Awareness Campaign given different background contexts (communities with no ECE at all or communities with an existing Kindergarten).

- **Community Awareness Campaign (CAC)** where local Village Education Development Committees (VEDCs) underwent a 12-module training course in early childhood health and development, ranging in topics from appropriate parenting skills and early stimulation to nutrition and hygiene. In a cascade approach, subsequently, VEDCs were to implement the community awareness training of parents in their village.

Baseline data for the ECE Project were collected from late 2015 to early 2016 prior to the implementation of interventions, which took place from 2016 to 2020. Midline data were collected in 2017, and endline data in 2020. The purpose of this report is to present findings on the impact of interventions after approximately four years of implementation, at the completion of the project.

Overall, results seek to determine the efficacy of interventions in improving children's development across Northern Laos PDR. Further, the impact of the interventions on children's participation in ECE, parent-child engagement in the home environment, parental knowledge of early child health and development, and children's learning and development outcomes is investigated. The quality of ECE interventions and the relationship between ECE attendance, quality, and children's developmental outcomes is also explored. This is done through investigation of both (i) longitudinal data for the same cohort of children over time, and (ii) repeat cross-sectional observations over time.

Before presenting results from the impact evaluation, first details regarding research design, instruments used to collect data, and findings from the project's baseline and midline data collections are summarised below.

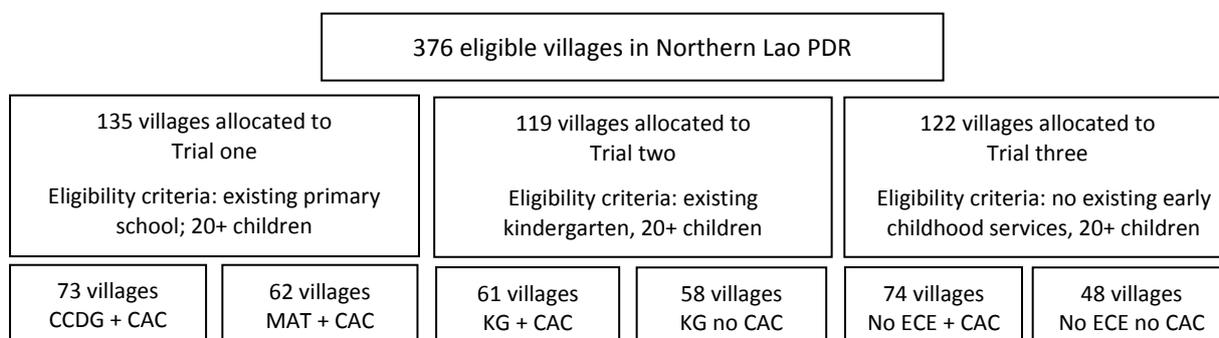
Research design

The project was implemented in 376 villages across five provinces in Northern Lao PDR. Evaluation of the ECE project was conducted through three pragmatic randomised controlled trials clustered by community. The trials were pragmatic in that interventions were implemented within existing service systems. As the project was implemented at the community level, a clustered design was necessary to determine community level outcomes as well as to prevent contamination (individuals in the control group learning about the intervention and changing their behaviour accordingly). Moreover,

the pragmatic clustered design meant it was possible to track how well communities were implementing the interventions over time.

- **Trial 1:** Villages with a pre-primary school were randomly allocated to the CCDG or MAT intervention. This trial aimed to determine which ECE program caused the greatest improvement in ECE attendance, parental stimulation in the home environment, and ultimately children’s developmental and learning outcomes.
- **Trial 2:** Villages with an existing kindergarten were randomly allocated to receive the CAC intervention or not. This trial aimed to determine whether providing the CAC intervention, in addition to existing ECE services, improved children’s development, parental stimulation in the home environment, parental knowledge of early child health and development, and ECE attendance.
- **Trial 3:** Villages with no existing ECE services were randomly allocated to receive the CAC intervention or not. This trial aimed to determine whether providing the CAC intervention, without existing ECE services, improved children’s development, parental stimulation in the home environment, parental knowledge of early child health and development, and ECE attendance.

Figure 1. Research design



Although each trial had a unique pre-existing condition (i.e., the existence of a pre-primary, the existence of a kindergarten, or no ECE), each trial was run parallel allowing for quasi-experimental comparison of results across all six arms of the three trials.

Previously reported findings

Baseline and Midline results have been reported on previously and can be found at the following website: [Snapshots of Early Childhood Education in Northern Lao PDR \(worldbank.org\)](https://www.worldbank.org/). However, to provide context for this report we provide some key details here. Baseline data collection, prior to implementation of the project interventions, provided an understanding of children’s early environments, health, and development. Overall, results showed that young children in Lao PDR had

poor health and development, with disparities evident across ethnic groups and socioeconomic backgrounds. Children's literacy skills in particular were low, with for example, only 12% of children aged 2-5 able to recognise and name a letter of the alphabet, while less than half (41%) knew how to open a book correctly. Stunting, being too short for one's age as the result of chronic undernutrition, was identified to be of very high public health significance according to World Health Organisation guidelines, with approximately half of all children stunted. When exploring children's early learning environments, results showed that early inputs to promote children's development were low. Just 25% of children had attended some form of ECE, and children were receiving very low levels of parental stimulation and support for their development. Encouragingly, children who had attended ECE and those whose parents engaged in activities with them in the home environment, such as reading, storytelling, singing, and playing, had better development compared to children who did not have these learning opportunities.

Data were collected again at the project's midline, approximately two years after the project commenced. Results focused on trial 1 (CCDG versus MAT) showed that both ECE attendance and parent-child interactions in the home increased significantly across Northern Laos since implementation of the project. Compared to the MAT intervention, CCDGs had a larger positive impact on ECE attendance and home learning activities, particularly for younger children and the most disadvantaged children. Encouragingly, these positive impacts also translated into improved child development outcomes. Relative to the MAT intervention, CCDGs had a slightly larger positive impact on children's literacy skills. For 4-year-olds in particular, the greater positive impact of CCDGs extended to overall development, though small effect sizes were observed.

Lastly, results also revealed that the proportion of stunted children had decreased by almost 10% from baseline to midline, with the 4-year-old cohort experiencing the greatest reduction in stunting. Such a significant reduction in stunting prevalence was unprecedented and required further investigation, despite not being an original aim of the impact evaluation. Quasi-experimental analysis revealed that the provision of school meals, a component of the ECE project, may have explained the reduction in stunting observed.

Conversely trial 2 and 3 indicated that the CAC intervention had not impacted ECE attendance or parent-child interactions in the home environment. However, monitoring data revealed this was likely due to implementation issues, with the majority of villages having delivered less than two of the 12 information sessions that formed the CAC.

Report Aims

Final impact evaluation results of the ECE Project presented in this report aim to build on findings at midline to determine the efficacy of interventions in improving children's development across Northern Laos PDR. To do so, the third and final wave of data is used, collected at the project's endline in 2020. At this time, interventions had been implemented for approximately four years which enables investigation of sustained implementation and impacts over time. It is important to note that final data collection occurred in March 2020, prior to the closure of schools due to the COVID-19 pandemic.

Analyses were guided by the following research questions:

- How can children's early learning environments be best promoted in Lao PDR?
 - Which type of ECE (CCDG vs MAT) was most effective in increasing ECE attendance?
 - Which type of ECE (CCDG vs MAT) was most effective in increasing parent-child engagement in learning activities in the home?
 - Were positive impacts greater for sub-groups of children, including children from the poorest households, ethnic minority groups, and children of particular ages?
- Which ECE intervention was most effective in promoting children's development?
 - Which type of ECE (CCDG vs MAT) had the greatest positive impact on children's early learning and development?
 - Did impacts differ across different domains of development?
 - Were positive impacts greater for sub-groups of children, including children from the poorest households, ethnic minority groups, and children of particular ages?
- Does a Community Awareness Campaign make a difference?
 - Did implementation of the CAC have a positive impact on parent knowledge of child health and development, ECE attendance, and parent-child engagement in the home?
 - Did impacts of the CAC differ when accompanied by ECE or not?
 - What are lessons learned from implementation challenges of the CAC?
- What is the status of ECE quality in Lao PDR and how does this impact children's learning?
 - What is the quality of CCDG vs MAT classrooms?
 - What is the relationship between ECE quality and children's development?
 - How could quality be enhanced to better support children's development as these programs are expanded to other areas of the country?
- What are the optimal ECE pathways for children's development?

- What combination of various forms of ECE (including CCDG, MAT, Kindergarten and Pre-Primary) is most effective for promoting children's development?

Part Two: Methods

Sample

Endline data collection was conducted in the same 376 villages in Northern Laos that participated in baseline and midline data collections¹. Information was collected for two cohorts of children. First, children who had participated in both baseline and midline data collections aged 7-9 years at the time of endline collection (Cohort 1), and second, a new cohort of children aged 2-5 years at endline (Cohort 2). While the first cohort enabled longitudinal investigation of effects at the individual level, addition of the second cohort at endline enabled repeated cross-sectional observations of children in the project's target age range (2-5 years) over time. The latter made it possible to observe, for example, ECE attendance over time and whether benefits observed at midline are seen for cohorts of children to follow. To this end, implementation can be investigated and improved for future scale up. The program was targeted at the poorer districts within 5 provinces in northern Laos. The three impact evaluations determined which communities the program was to be implemented in with a key set of criteria. At baseline villages were required to have at least 20 children aged between 2 and 5 years of age. Then depending on the status of ECE in the community they were eligible for trial 1 if they had a pre-primary class, trial 2 if they had a kindergarten and trial 3 if they had no ECE service in their community. Considering this ECE precondition, communities in trial 1 were randomised to receive either the CCDG or the MAT ECE modality, communities in trial 2 and 3 were randomised to receive either the Community Awareness Campaign or not. Further detailed information regarding sampling of households and children can be found in the projects baseline report.

A total of 7,520 children were included at the project's baseline. Appendix 3 presents the child level sample throughout each wave of data collection of the ECE Project according to intervention type. At midline, a small number of children (the eldest) were excluded from subsequent data collection as due to program procurement and implementation delays the eldest children in the baseline collection aged out of the program eligibility prior to the program actually being implemented. Further, some children were lost to follow up as a result of death or serious illness, being in the field at the time of data collection, or moving out of the village. At both midline and endline, children from the same villages (or where possible, the same household) as children excluded or lost to follow up were added into data collection. At endline, this included the addition of Cohort 2.

¹ Two additional villages were included at the project's endline as a result of two villages originally included in the study being separated and forming four villages.

In this report, three different participant samples (independent of the trial number) are used depending on the analysis being conducted and the research question being explored.

- **Child level panel:** children who participated in all three waves of data collection, aged 2-4 years at baseline and 6-9 years at endline. These children were exposed to project interventions for the life of the project and longitudinal data were used to explore impacts on trajectories over time. See Table 1.
- **Community level panel:** children aged 2-5 years at each baseline, midline, and endline (i.e. not the same children, but rather children of the same age in communities at each time point). This sample was used in cross-sectional analyses to examine the impact of the interventions at the community level over time. See Table 2.
- **Endline only:** children aged 2-5 years at endline i.e. Cohort 2. This sample was used in analyses investigating developmental outcomes among children at one time point only, upon completion of the project. See Table 3.

		Child age (years)								
Baseline	2015					1	2	3	4	5
	2016				1	2	3	4	5	6
Midline	2017			1	2	3	4	5	6	7
	2018		1	2	3	4	5	6	7	8
	2019	1	2	3	4	5	6	7	8	9
Endline	2020	2	3	4	5	6	7	8	9	10

Table 1. Child level panel²

Intervention implemented

Child panel

Table 2. Community level panel

		Child age (years)								
Baseline	2015					1	2	3	4	5
	2016				1	2	3	4	5	6
Midline	2017			1	2	3	4	5	6	7
	2018		1	2	3	4	5	6	7	8
	2019	1	2	3	4	5	6	7	8	9
Endline	2020	2	3	4	5	6	7	8	9	10

Intervention implemented

Community level panel

Table 3. Endline only

		Child age (years)								
Baseline	2015					1	2	3	4	5
	2016				1	2	3	4	5	6
Midline	2017			1	2	3	4	5	6	7
	2018		1	2	3	4	5	6	7	8
	2019	1	2	3	4	5	6	7	8	9
Endline	2020	2	3	4	5	6	7	8	9	10

Intervention implemented

Endline only

Instruments

Five data collection instruments were used to provide a comprehensive understanding of the factors impacting children's health and development in Lao PDR. Before initial use at the project's baseline,

² The child panel ranges in age at endline from 5-9 years as a result of baseline data collection occurring in two rounds (late 2014 to early 2015), together with varied time between baseline and endline collections).

all instruments³ underwent a process of adaptation to ensure their suitability to the Laos context. Detailed information on adaptation processes can be found in the baseline report.

- **Village Questionnaire** designed to collect data from the head of each village, including information regarding village residents, amenities, transport and services available.
- **Household Questionnaire** completed by the head of each selected household, collecting data regarding members living in the home and household assets.
- **Caretaker Questionnaire** completed by the primary caretaker of each child for whom data was collected, designed to collect information on the child's nutrition, health and development, experience of ECE and health services, as well as parenting practices.
- **Direct Child Assessment** administered to each child selected to participate by a trained enumerator, directly assessing a range of skills and abilities through a series of tasks.
- **Education Quality Assessment** in the form of a timed observation of early childhood education classes designed to measure structural and process aspects of quality.

Further details regarding specific tools used to measure child development and ECE classroom quality are presented in Appendix 1. Information on data collection procedures are in Appendix 2.

³ The education quality assessment tool was first utilised at endline data collection, see details to follow.

Part Three: Findings

Participants

The number and ages of children that form each of the three analysis samples are shown in Table 4. In sections to follow, we describe the sample used for each analysis and if it was further refined (e.g. restricted to a particular age range or trial) to be able to explore specific research questions.

Table 4. Age in years (n, %) by analytical data set (child panel, community panel, and endline only samples) by intervention arms

Age (yr)	Trial 1		Trial 2		Trial 3	
	CCDG n (%)	MAT n (%)	KG n (%)	KG + CAC n (%)	No ECE + No CAC n (%)	No ECE + CAC n (%)
Child panel						
5	6 (0.6)	1 (0.1)	2 (0.3)	0 (0.0)	6 (0.9)	9 (0.9)
6	223 (22.3)	192 (22.5)	120 (16.5)	139 (18.2)	139 (21.5)	243 (24.1)
7	319 (31.9)	285 (33.3)	242 (33.2)	232 (30.4)	207 (32.0)	328 (32.5)
8	402 (40.2)	338 (39.5)	325 (44.6)	343 (44.9)	269 (41.6)	400 (39.6)
9	49 (4.9)	39 (4.6)	40 (5.5)	50 (6.5)	26 (4.0)	29 (2.9)
Total n	999	855	729	764	647	1,009
Community panel						
2	631 (16.99)	548 (17.23)	467 (15.75)	533 (17.26)	476 (19.41)	688 (18.34)
3	828 (22.29)	727 (22.86)	661 (22.29)	665 (21.53)	566 (23.08)	867 (23.11)
4	1,131 (30.45)	1,001 (31.48)	910 (30.68)	957 (30.99)	768 (31.32)	1,213 (32.33)
5	1,124 (30.26)	904 (28.43)	928 (31.29)	933 (30.21)	642 (26.18)	984 (26.23)
Total n	3,714	3,180	2,966	3,088	2,452	3,752
Endline only						
2	269 (19.26)	258 (20.98)	221 (19.10)	249 (20.11)	229 (24.13)	299 (20.92)
3	354 (25.34)	318 (25.85)	285 (24.63)	314 (25.36)	248 (26.13)	398 (27.85)
4	409 (29.28)	367 (29.84)	352 (30.42)	365 (29.48)	287 (30.24)	448 (31.35)
5	365 (26.13)	287 (23.33)	299 (25.84)	310 (25.04)	185 (19.49)	284 (19.87)
Total n	1397	1230	1157	1238	949	1429

How do we best promote children's early learning environments in Lao PDR?

ECE Attendance

One of the central aims of the ECE Project was to improve availability of ECE across Northern Laos and therefore increase the number of children attending early education before school. To explore impacts of project interventions on ECE attendance, the community panel sample was used (children aged 2-5 years at baseline, midline, endline) with a focus on trial 1; CCDG and MAT villages. Analyses

investigated if increases in ECE attendance were evident in CCDG and MAT villages at endline and, if so, which ECE modality caused the greatest improvements in attendance.

Table 5 below describes the sample of children aged 2-5 years in CCDG and MAT communities (n=6,894) at endline. Evidently there were slightly less females than males and the majority of children were of Khmu ethnicity, across both intervention arms. Socioeconomic status (an index derived from a range of household level variables) among children was also relatively balanced across interventions, though there was a slightly larger proportion of children living in the most socioeconomically advantaged households in the CCDGs communities.

Table 5. Descriptive statistics (n, %) of community panel sample in CCDG and MAT villages

	MAT (n=3,180)	CCDG (n=3,714)
Gender		
Male	1,669 (52.5)	1,939 (52.3)
Female	1,508 (47.5)	1,766 (47.7)
Ethnicity		
Lao Tai	564 (17.8)	779 (21.0)
Khmu	1,028 (32.4)	1,519 (41.0)
Hmong	969 (30.5)	677 (18.3)
Other	612 (19.3)	727 (19.6)
Socioeconomic Status		
1 (most disadvantaged)	621 (19.6)	651 (17.6)
2	629 (19.8)	735 (19.8)
3	743 (23.4)	856 (23.1)
4	726 (22.9)	794 (21.4)
5 (least disadvantaged)	455 (14.3)	668 (18.0)

Caretakers were asked if their child had ever attended any form of ECE. Figure 3 demonstrates the percentage of children who had attended ECE across the three data waves. This cross-sectional comparison provides insight into improvements in ECE access and attendance at the community level. Despite there being a dramatic increase in attendance between baseline and midline, attendance decreased from midline to endline. Indeed, only 52% of all children measured at endline had attended ECE (compared to 75% at midline). This result may reflect reduced popularity of the programs or a reduction in central and district level system supports for the programs over time. Nonetheless, a significantly larger proportion of children aged 2-5 years had attended early education at endline compared to that at baseline and sections to follow explore how this has influenced their learning and development outcomes. When exploring changes in ECE attendance in CCDG versus MAT communities, results show that attendance remained higher in CCDG communities over time. In this

way, CCDGs may be a more appealing and sustainable form of early education rather than simply changing the delivery of pre-primary classes to cater for the needs of 3- and 4-year-old children.

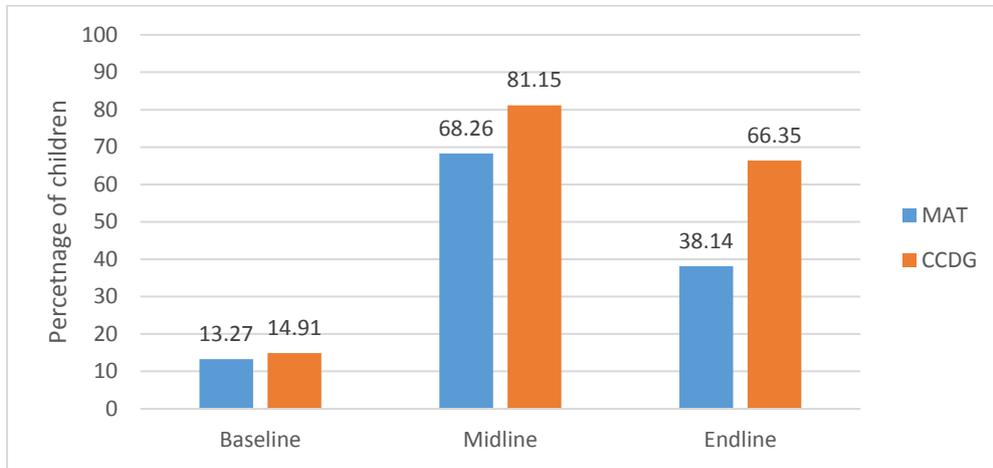


Figure 2. ECE attendance (%) in CCDG and MAT villages at each data wave

Home Learning Environments

A nurturing and stimulating home environment provides children with opportunities to learn, explore, and play, all of which are essential for healthy development. Playgroup is a unique form of ECE in that it is designed to not only engage children in learning, but also parents. CCDGs encouraged parents to stay for the session, rather than simply drop off and pick up their children, which would enable learning about the sorts of activities they could engage in at home to help support their child's development. Using the child level panel (Table 6) we explored the impact of CCDG versus MAT interventions on the quantity of interactions between caregivers and their children in the home. Caregivers were asked about engagement in a range of different learning activities with their children in the past 7 days including reading a book; telling a story; drawing; listening to music, singing or dancing; playing games; and playing outside.

Table 6. Descriptive statistics (n, %) of child panel sample in CCDG and MAT villages

		MAT (n=865)	CCDG (n=1,001)
Gender	Male	472 (54.6)	526 (52.5)
	Female	393 (45.4)	475 (47.5)
Ethnicity	Lao Tai	170 (19.7)	207 (20.7)
	Khmu	299 (34.6)	420 (42.0)
	Hmong	252 (29.1)	175 (17.5)
	Other	144 (16.6)	199 (19.9)
Socioeconomic Status			
	1 (most disadvantaged)	138 (16.0)	188 (18.8)
	2	173 (20.0)	207 (20.7)
	3	205 (23.7)	227 (22.7)
	4	209 (24.2)	210 (21.0)
	5 (least disadvantaged)	140 (16.2)	169 (16.9)

At endline, 90.4% of children in MAT and 89.0% of children in CCDG villages had engaged in at least one of these activities in the past 7 days, compared to 66.0% in MAT and 71.8% in CCDG villages at midline, and 51.6% in MAT and 52.2% in CCDG villages and baseline. This means that the proportion of children engaged in at least one activity at home in the last week increased by 38% in MAT and 36.8% in CCDG villages from baseline to endline.

When exploring results by each activity, results were somewhat mixed (Table 7). Encouragingly, there was an increase in the proportion of children engaged in learning activities by their caregiver over the data waves, as children grew older. This increase was particularly evident when looking at frequency of reading books and telling stories. Figure 4 demonstrates that, although there was a clear difference in caregiver-child interactions in CCDG versus MAT villages at midline, this was less prominent at endline. Seemingly the differences seen at midline had levelled out by the time the child reached the ages of 7 to 9 years. This may be related to children across both groups entering primary school education and thus a convergence of effects of ECE modalities prior. Interestingly, findings regarding caregivers playing with their child shifted from favouring the MAT intervention at baseline, to the CCDG intervention at midline at endline. This may be a reflection of the play-based learning curriculum implemented in the CCDG intervention, together with parents being encouraged to attend, that was then being practiced by families in their homes.

Table 7. Caregiver-child interactions (n, %) in CCDG and MAT villages at each data wave

		MAT	CCDG
Read book	Baseline	190 (22.0)	250 (25.0)
	Midline	252 (33.3)	344 (38.7)
	Endline	251 (46.0)	310 (48.7)
Told stories	Baseline	206 (23.8)	224 (22.4)
	Midline	218 (28.8)	278 (31.3)
	Endline	213 (39.0)	264 (41.5)
Sing/dance	Baseline	240 (27.7)	269 (26.9)
	Midline	195 (25.8)	251 (28.3)
	Endline	212 (38.8)	228 (35.8)
Draw	Baseline	220 (25.4)	258 (25.8)
	Midline	263 (34.8)	365 (41.1)
	Endline	247 (45.2)	299 (47.0)
Play	Baseline	160 (18.5)	143 (14.3)
	Midline	95 (12.6)	176 (19.8)
	Endline	132 (24.2)	171 (26.9)
Play outside	Baseline	186 (21.5)	217 (21.7)
	Midline	96 (12.7)	159 (17.9)
	Endline	110 (20.0)	129 (20.3)

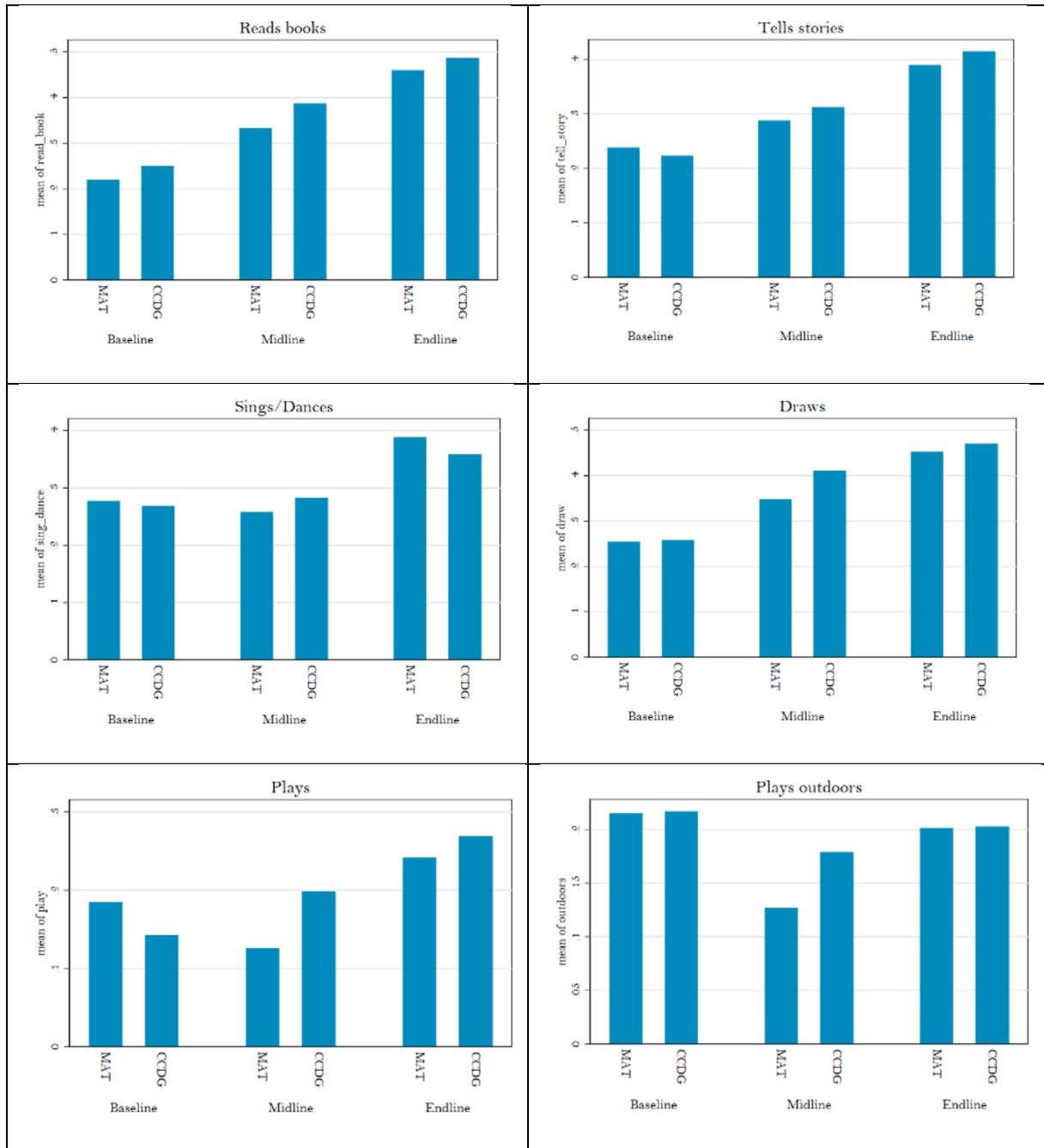


Figure 3. Caregiver-child interactions in CCDG and MAT villages at each data wave

Key findings

1. ECE attendance among children aged 2-5 years increased dramatically in villages where new ECE modalities (i.e. CCDGs and MAT) were implemented. Overall, the proportion of children attending ECE at endline had decreased from that at midline, with attendance remaining higher in CCDG communities over time. Results suggest CCDGs may be a more appealing and sustainable form of early education rather than simply changing delivery of pre-primary classes to cater to the needs of 3 and 4-year-old children.
2. There was an increase in the proportion of children engaged in learning activities by their caregiver over the data waves, and as children grew older. Parents and children were engaging in more book reading and storytelling in particular. Playing was more common among families in CCDG villages at midline and endline, which may be a reflection of the play-based learning curriculum implemented in the CCDG intervention, together with parents being encouraged to attend, that was then being practiced by families in their homes.

Which type of ECE is most effective in promoting children's early development?

Participation in quality ECE is critical for improving children's development and readiness for the school environment. This section focuses on intervention impacts on children's early development outcomes, as measured by caregiver report as well as direct assessment measures.

Child development at the community level

Table 8 presents results on the caregiver reported measure of child development, the eHCI, for children living in CCDG and MAT villages among the community panel sample (Table 5) over time. Results indicate that CCDGs and MAT significantly increased children's scores on literacy (reading and writing) and numeracy domains at a community level. Across intervention villages, mean literacy scores increased from an average of 0.14 at baseline to 0.22 at endline, and numeracy scores increased from 0.36 at baseline to 0.46 at endline. In other words, both ECE interventions improved the literacy and numeracy abilities of young children in target villages in Northern Lao PDR.

Figure 5 presents these results disaggregated by children's age (2-5 years). The eHCI literacy domain displayed the most improvement over time. In addition, CCDGs were found to have a greater positive impact than MAT for 4- and 5-year-old children, with this effect particularly pronounced at midline where 4-year-olds in MAT villages scored an average of 0.16, compared to 0.22 in CCDG villages. At endline, 5-year-olds scored an average of 0.37 and 0.49 on the literacy domain in MAT and CCDG villages, respectively. Community-level improvement in child development was also observed on the

eHCI domain of social and emotional skills; however, all other eHCI domains showed inconsistent results or were lower at endline than baseline. It is important to re-iterate that these were not the same children scoring more poorly over time. Rather, children of the same age in communities over time, thus lower scores could be a reflection of a number of sociodemographic and service factors occurring in villages throughout the time of the intervention.

Table 8. Caregiver reported child development scores in CCDG and MAT villages at each data wave

		MAT Mean (SD)	CCDG Mean (SD)
Verbal communication	Baseline	0.86 (0.25)	0.87 (0.23)
	Midline	0.87 (0.25)	0.88 (0.24)
	Endline	0.83 (0.28)	0.83 (0.28)
Cultural knowledge	Baseline	0.70 (0.22)	0.71 (0.21)
	Midline	0.69 (0.24)	0.70 (0.24)
	Endline	0.68 (0.25)	0.70 (0.25)
Social and emotional skills	Baseline	0.50 (0.14)	0.50 (0.14)
	Midline	0.54 (0.14)	0.55 (0.15)
	Endline	0.55 (0.16)	0.55 (0.16)
Perseverance	Baseline	0.50 (0.25)	0.51 (0.26)
	Midline	0.38 (0.26)	0.41 (0.26)
	Endline	0.43 (0.26)	0.44 (0.25)
Approaches to learning	Baseline	0.69 (0.28)	0.71 (0.25)
	Midline	0.68 (0.28)	0.69 (0.27)
	Endline	0.69 (0.26)	0.69 (0.27)
Literacy	Baseline	0.14 (0.17)	0.14 (0.17)
	Midline	0.19 (0.22)	0.23 (0.24)
	Endline	0.21 (0.23)	0.23 (0.25)
Numeracy	Baseline	0.36 (0.26)	0.36 (0.26)
	Midline	0.48 (0.29)	0.50 (0.29)
	Endline	0.46 (0.29)	0.46 (0.31)
Overall development	Baseline	0.53 (0.14)	0.54 (0.14)
	Midline	0.55 (0.16)	0.57 (0.16)
	Endline	0.55 (0.17)	0.56 (0.17)

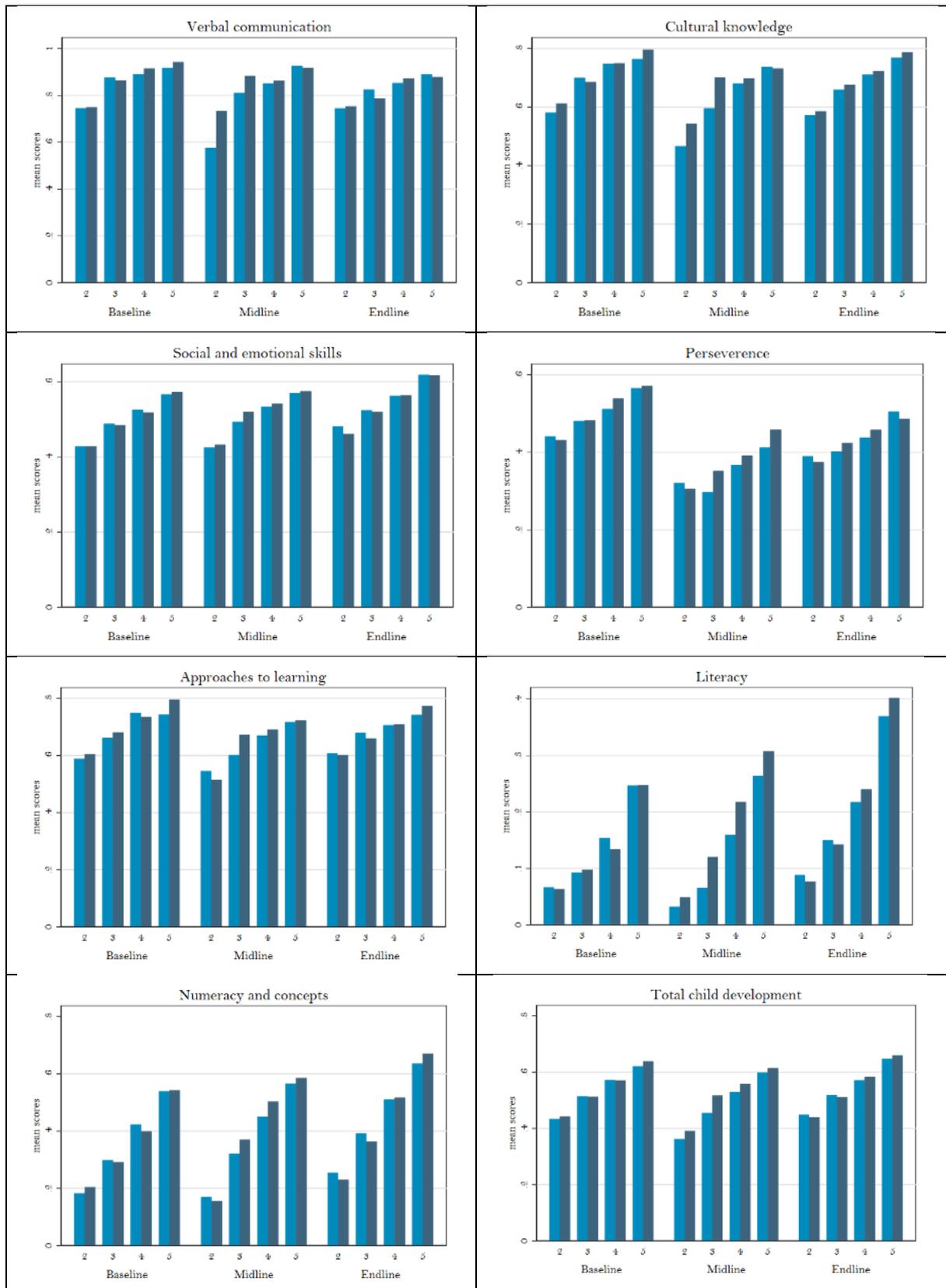


Figure 4. Caregiver reported child development in CCDG and MAT villages by age at each data wave



Table 9 and Figure 6 present this analysis repeated using the direct assessment measure of child development, the MODEL, as the outcome. Specifically, the overall literacy, numeracy, and executive function scores. As with results above, here they show that CCDGs and MAT significantly increased children’s scores on literacy, numeracy, and executive function domains at a community level. Again, the literacy domain displayed the most improvement over time, with significant improvement in executive function also. Age 5 is around when children are able to master some of the skills directly assessed in the executive function domain of the MODEL, such as forward and backward digit span, and the head and shoulders tasks that requires children to do the opposite action of what they are told. This is evident in analysis by children’s age, where executive function scores among 5-year-olds showed the greatest improvement from baseline to endline in both CCDG and MAT villages.

Table 9. Directly assessed child development scores in CCDG and MAT villages at each data wave

		MAT Mean (SD)	CCDG Mean (SD)
Literacy	Baseline	0.06 (0.10)	0.07 (0.12)
	Midline	0.10 (0.14)	0.13 (0.18)
	Endline	0.07 (0.12)	0.09 (0.14)
Numeracy	Baseline	0.24 (0.21)	0.26 (0.23)
	Midline	0.34 (0.20)	0.38 (0.21)
	Endline	0.29 (0.19)	0.30 (0.20)
Executive function	Baseline	0.18 (0.26)	0.19 (0.28)
	Midline	0.29 (0.28)	0.32 (0.30)
	Endline	0.25 (0.28)	0.28 (0.30)

Overall, the child development outcomes here reflect the pattern of ECE attendance, with the largest improvement seen between baseline and midline, with a drop at endline. To further investigate the impact of ECE attendance on developmental outcomes, a per-protocol analysis was conducted in which outcomes were stratified by children’s ECE attendance. Results from this analysis indicated that there was a substantial increase in eHCI literacy scores for children who attended ECE compared to children who did not attend (Figure 7), with similar results found in direct assessments of children’s literacy abilities (Figure 8). Among children who attended ECE, CCDGs resulted in higher scores at midline relative to MAT, though there was minimal difference between interventions at endline. Given that this analysis used cross-sectional data (i.e. the community panel sample), we can conclude that long-term implementation of any ECE modality, whether it be CCDGs or MAT, results in significant improvements in child development outcomes provided attendance is maintained.

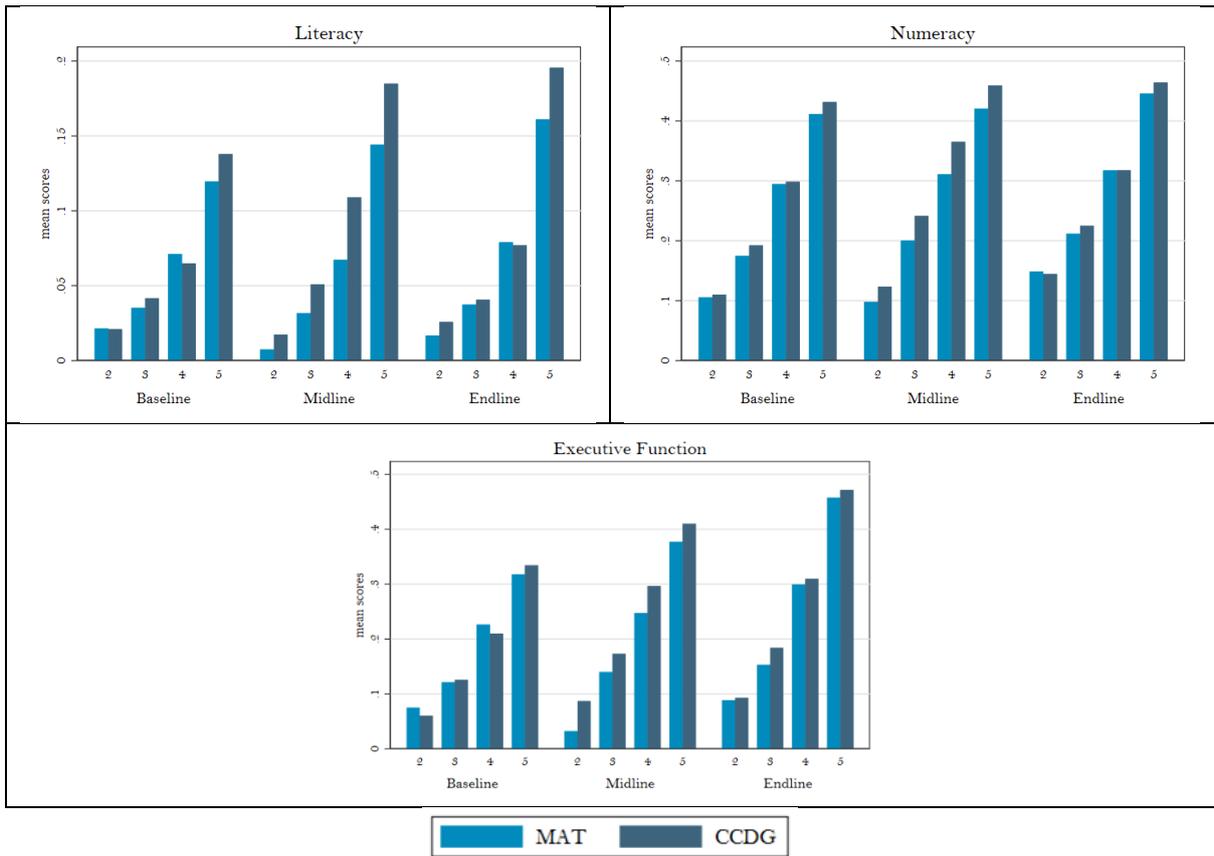


Figure 5. Directly assessed child development in CCDG and MAT villages by age at each data wave

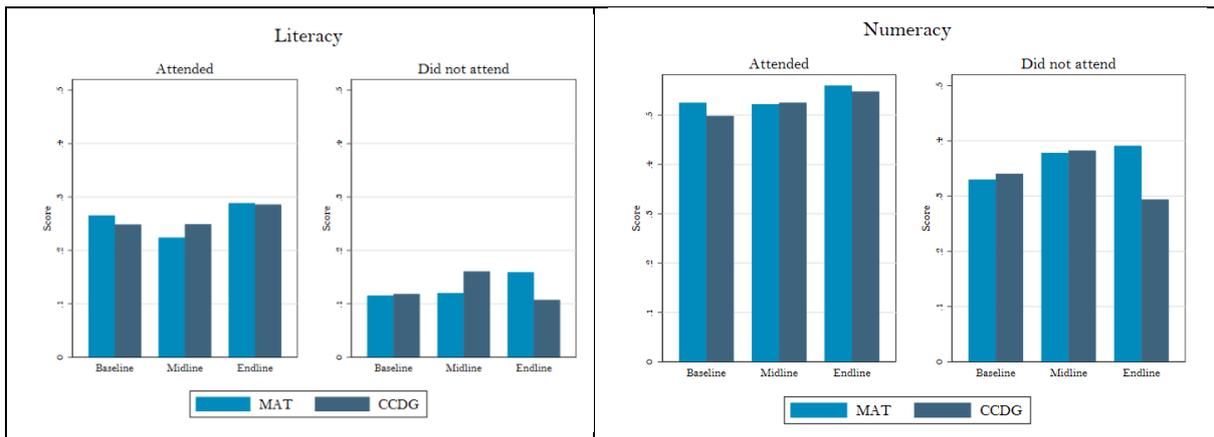


Figure 6. eHCI literacy and numeracy by ECE attendance in CCDG and MAT villages at each data wave

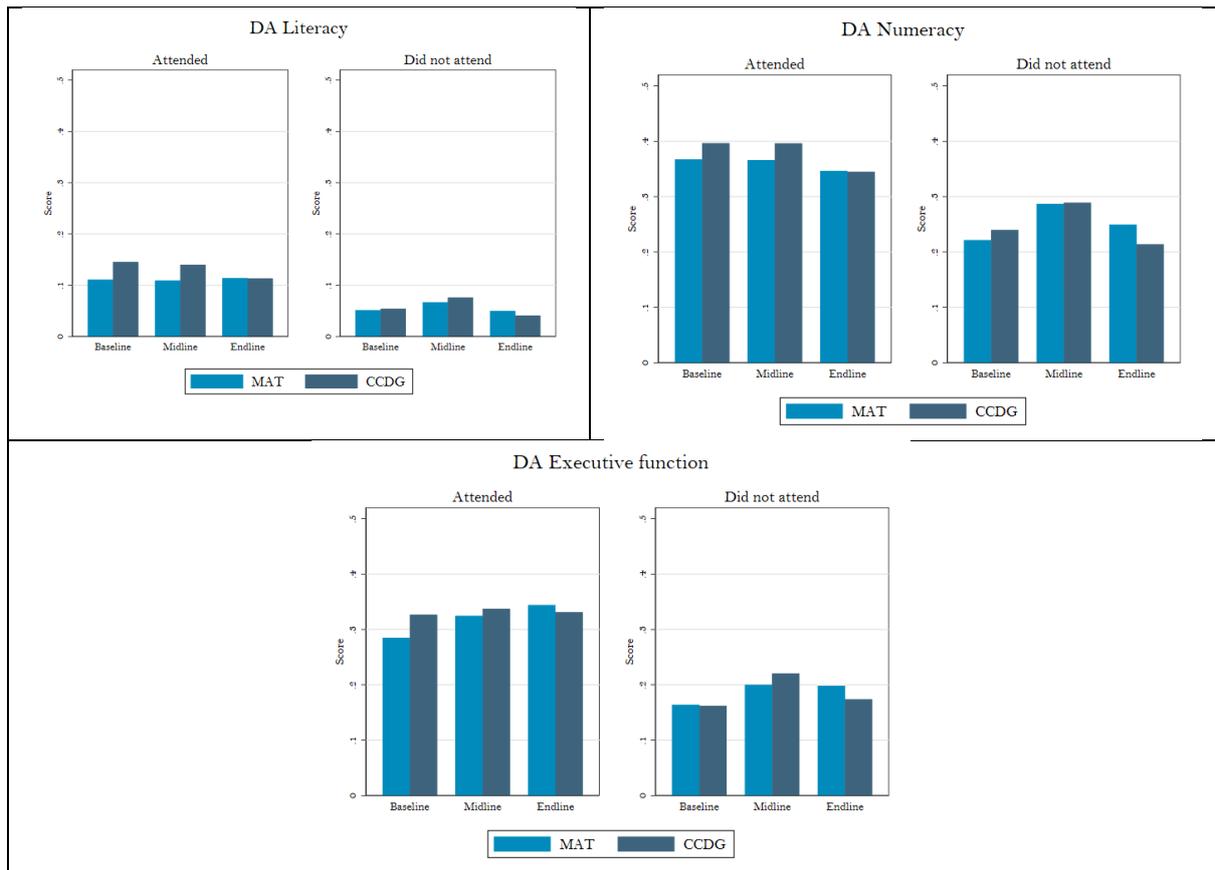


Figure 7. Directly assessed child development by ECE attendance in CCDG and MAT villages at each data wave

Evidence shows that children’s development outcomes are socioeconomically patterned; that is children living in more socioeconomically disadvantaged households will have, on average, poorer development than their more advantaged peers. In project data collected, socioeconomic status and ethnicity were found to be closely related, with ethnic minorities of Khmu, Hmong, and others more likely to have lower socioeconomic scores when compared to Lao Tai children. Further, there are significant geographical divides within ethnic differences in Lao PDR. In general, people of Lao-Tai ethnicity live in more urban settings where infrastructure and general standard of living is increased, whereas Hmong and Khmu ethnic groups typically reside in more remote areas of Northern Laos where access and infrastructure are highly limited. Our sample reflects this geographic patterning with a higher proportion of Khmu in our study, reflecting the targeting of the ECE program to the poorer districts in Northern Laos.

Figure 9 shows mean scores on eHCI developmental domains by intervention (CCDG versus MAT), and ethnic group (Lao-Tai, Hmong, Khmu, Other). Results show differences in development by ethnicity and intervention were present particularly on the literacy domain. Specifically, Lao-Tai children living in MAT villages were more likely to have higher literacy scores compared to those in CCDG villages. Conversely, children not of Lao-Tai ethnicity living in CCDG villages had better literacy development compared to those in MAT villages. Again, there was evidence of a stronger contrast between the two interventions at midline, with these differences subsequently reduced at endline. For example, Hmong children in CCDG villages outperformed Hmong children in MAT villages, but this difference was not maintained at endline. Similar results were observed when using the direct assessment of children's development as the outcome measure (Figure 9). Encouragingly, improvements in development were seen for children across all ethnic backgrounds. In some cases, CCDGs appeared to have a greater positive impact for non Lao-Tai children, while MAT seemed to have a greater positive impact for children of Lao-Tai ethnicity. This is an important and interesting finding and may reflect the fact that CCDG "facilitators" were not formally trained teachers. In CCDG communities two local people were recruited and trained to facilitate the CCDGs. Those that were recruited were mainly women and reflected the ethnic background of the village and thus also speaking the local language. By comparison, the MAT modality was implemented by an existing formally trained teacher, who was less likely to have been from the community and most likely to be of Lao Thai background. These results provide interesting insights for consideration when looking to promote ECE among different ethnicity groups.



Figure 8. eHCI scores in CCDG and MAT villages by ethnicity at each data wave

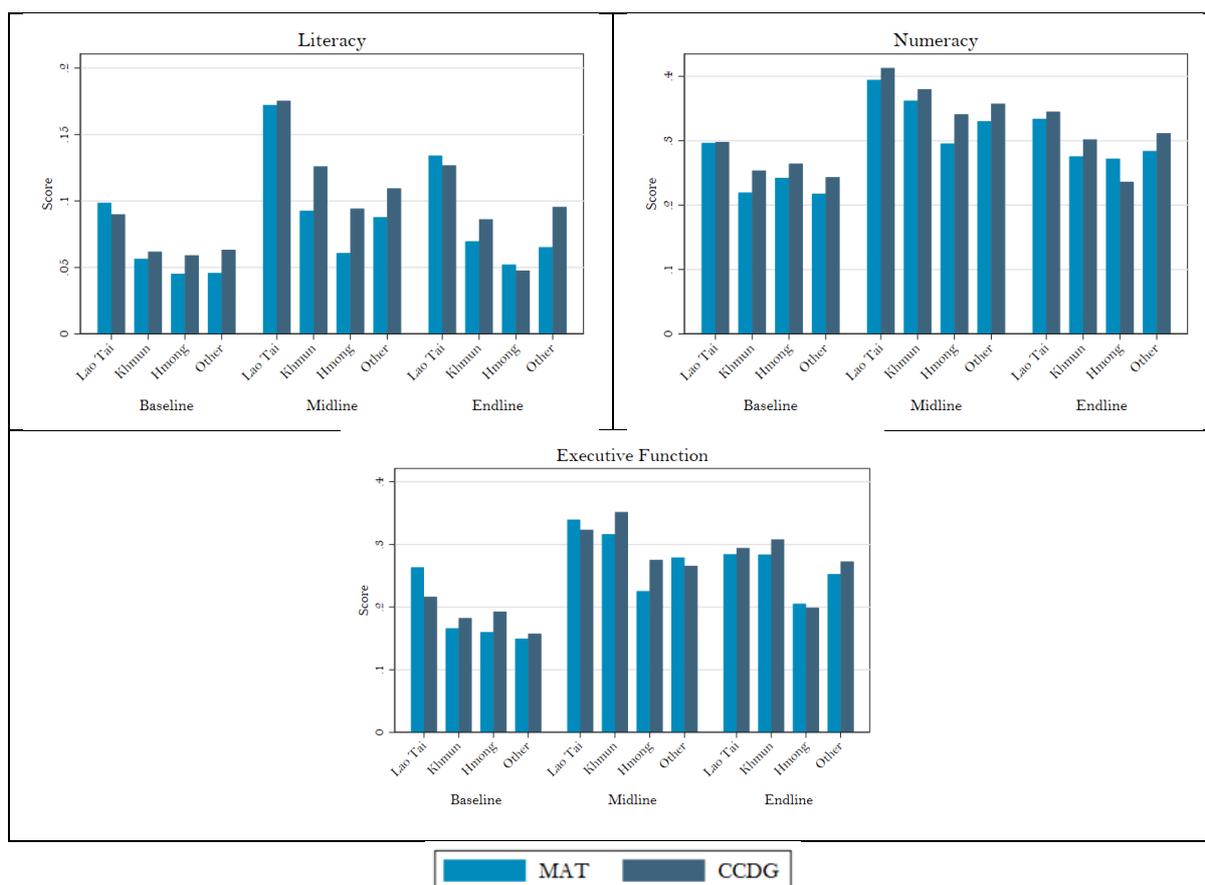


Figure 9. Directly assessed child development in CCDG and MAT villages by ethnicity at each data wave

Child development at the individual level

Next, analyses were conducted among children who were tracked across the three data waves (the child panel sample). Given that children were restricted based on data wave and age range (Table 1), a sample of 1,866 children at baseline, 1,644 at midline, and 1,182 at endline were included in an intent-to-treat analysis to examine differences in developmental outcomes (both caregiver reported and directly assessed) between children exposed to the CCDG intervention and children exposed to the MAT intervention. First, Table 10 presents mean eHCI domain scores among children in CCDG and MAT villages over time. Figure 10 presents this information, disaggregated by age.

As we would expect from a cohort of increasing age, scores increased as children grew older. However, similar to the cross-sectional analyses presented earlier in this report, CCDGs at midline had a greater positive impact on eHCI literacy, numeracy, and social and emotional skills relative to MAT, yet there were minimal differences in scores between CCDGs and MAT at endline. Indeed, for the eHCI social and emotional skills domain, MAT at endline outperformed CCDGs. For all other eHCI domains, scores

either slightly favoured MAT or did not differ. It is important to recognise that in this analysis (i.e. based on the panel/longitudinal data) most children at endline were attending primary school, and thus the lack of difference at endline is less likely to be a reflection of differing attendance levels in ECE but rather a reflection of their continuing education in primary school. Indeed, this phenomenon, often termed fade-out effects, is not uncommon and has been observed in early years interventions in low- and middle-income and well as high income countries. Notably, convergence of intervention groups in primary school, as observed here, does not necessarily mean effects cannot re-emerge or play out later in life, including adulthood.

Overall, results from both longitudinal and cross-sectional analyses suggest that ECE, regardless of modality, is likely to improve the literacy, numeracy, and social and emotional skills of young children.

Table 10. Caregiver reported child development scores in CCDG and MAT villages at each data wave (panel data)

		MAT Mean (SD)	CCDG Mean (SD)
Verbal communication	Baseline	0.84 (0.26)	0.85 (0.25)
	Midline	0.91 (0.20)	0.91 (0.20)
	Endline	0.93 (0.17)	0.93 (0.19)
Cultural knowledge	Baseline	0.68 (0.22)	0.69 (0.22)
	Midline	0.74 (0.21)	0.74 (0.21)
	Endline	0.85 (0.16)	0.85 (0.19)
Social and emotional skills	Baseline	0.48 (0.13)	0.48 (0.13)
	Midline	0.57 (0.15)	0.57 (0.15)
	Endline	0.70 (0.12)	0.71 (0.12)
Perseverance	Baseline	0.48 (0.25)	0.49 (0.26)
	Midline	0.42 (0.27)	0.45 (0.25)
	Endline	0.58 (0.22)	0.57 (0.22)
Approaches to learning	Baseline	0.67 (0.28)	0.68 (0.26)
	Midline	0.72 (0.26)	0.72 (0.26)
	Endline	0.80 (0.21)	0.83 (0.21)
Literacy	Baseline	0.11 (0.14)	0.10 (0.13)
	Midline	0.28 (0.26)	0.31 (0.26)
	Endline	0.75 (0.26)	0.75 (0.27)
Numeracy	Baseline	0.31 (0.24)	0.30 (0.24)
	Midline	0.58 (0.29)	0.60 (0.28)
	Endline	0.89 (0.17)	0.89 (0.17)
Overall development	Baseline	0.51 (0.13)	0.51 (0.13)
	Midline	0.60 (0.15)	0.61 (0.15)
	Endline	0.79 (0.12)	0.79 (0.13)

Table 11. Directly assessed child development scores in CCDG and MAT villages at each data wave (panel data)

		MAT Mean (SD)	CCDG Mean (SD)
Literacy	Baseline	0.04 (0.07)	0.04 (0.08)
	Midline	0.16 (0.19)	0.19 (0.22)
	Endline	0.49 (0.27)	0.50 (0.28)
Numeracy	Baseline	0.20 (0.18)	0.21 (0.19)
	Midline	0.44 (0.22)	0.47 (0.23)
	Endline	0.77 (0.18)	0.75 (0.21)
Executive function	Baseline	0.14 (0.23)	0.14 (0.24)
	Midline	0.38 (0.31)	0.41 (0.33)
	Endline	0.73 (0.26)	0.72 (0.28)

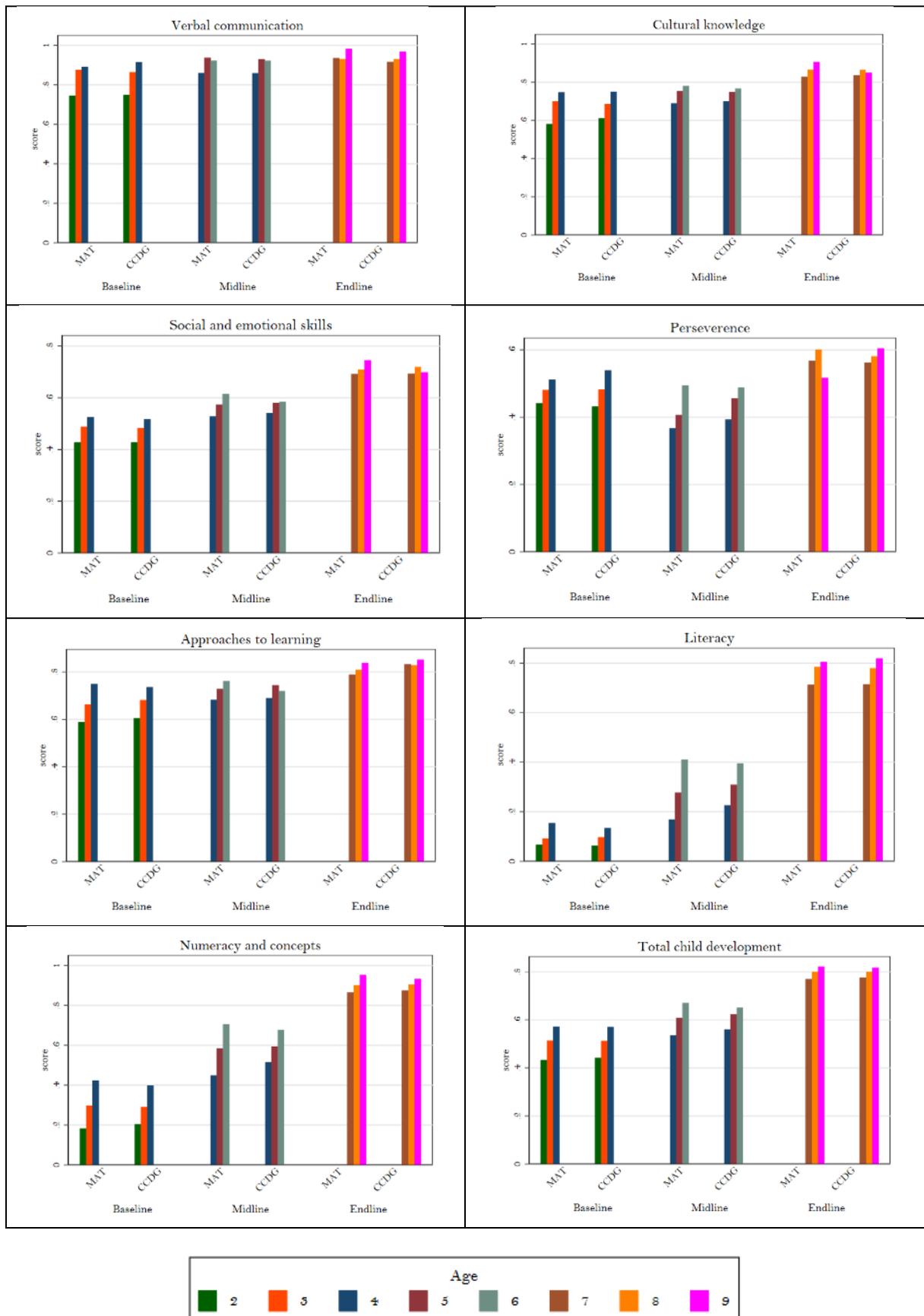


Figure 10. Caregiver reported child development scores in CCDG and MAT villages at each data wave

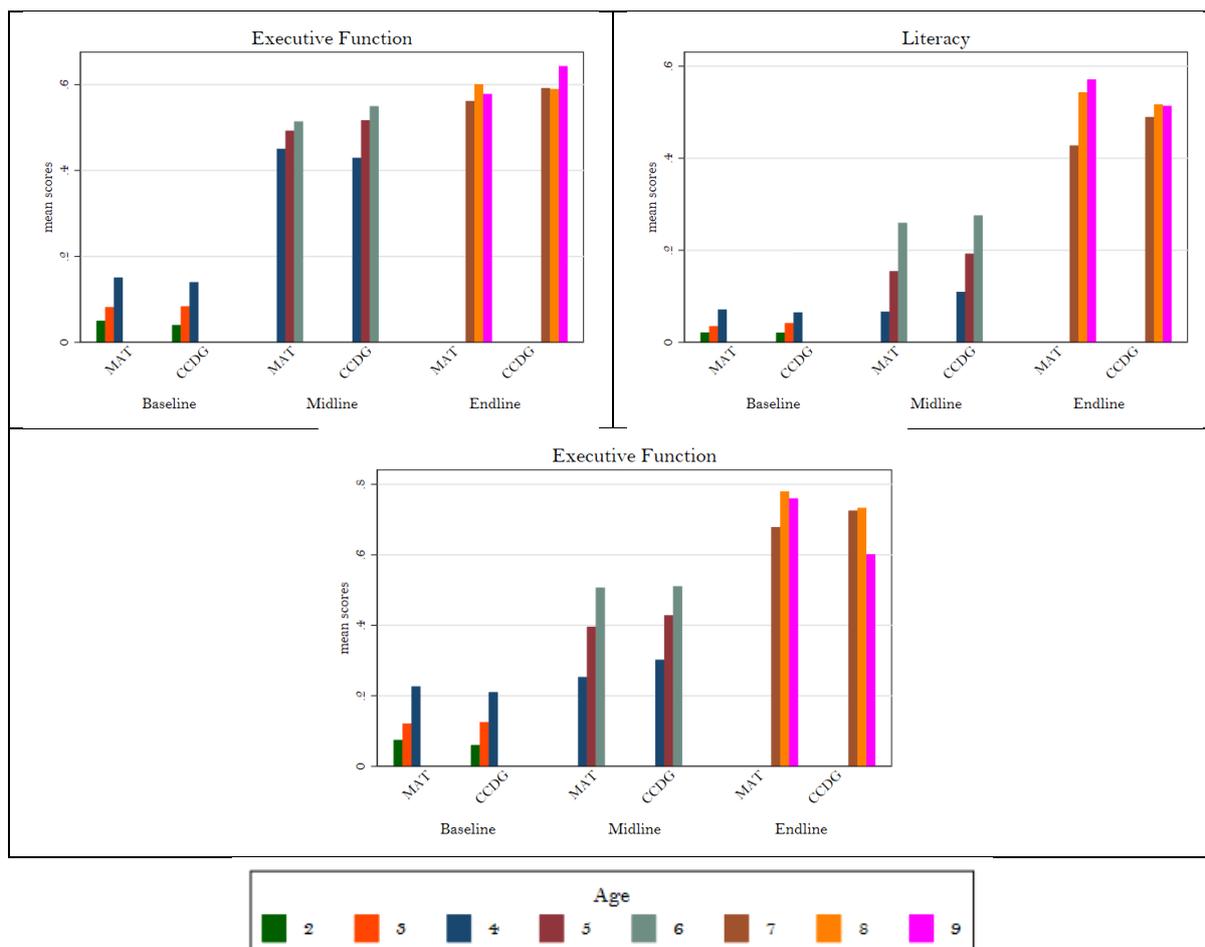


Figure 11. Directly assessed child development in CCDG and MAT villages by age at each data wave

Key findings

1. At the community level, children’s literacy, numeracy, social emotional and executive function skills improved over time. Results favoured CCDG relative to MAT in some instances. ECE attendance decreased at endline relative to midline, thus strong gains in development at midline tapered off at endline. However, results indicate that implementation of CCDGs or MAT results in improvements in child development provided attendance is maintained.
2. Panel analysis demonstrated similar findings. Overall, results from both longitudinal and cross-sectional analyses suggest that ECE, regardless of modality, is likely to improve the literacy, numeracy, and social and emotional skills of young children.
3. Improvements in development were seen among children of all ethnic backgrounds, especially at midline. CCDGs seemed to have a greater positive impact on literacy outcomes among non Lao-Tai children, whereas MAT seemed to have a more positive impact on literacy abilities of Laos-Thai children.

Does a Community Awareness Campaign make a difference?

Family and community engagement in children’s early years play a critical role in ensuring healthy development for young children. It is important that caregivers understand the importance of the early years as well as what is needed to provide quality early environments for children to thrive. One of the interventions implemented to achieve project aims was a Community Awareness Campaign (CAC); an early childhood health and development training course provided to local Village Education Development Committees (VEDC). Once trained, it was intended that each VEDC then undertake 12 modules of community awareness training with parents in their village. Modules covered topics including health and nutrition in the first 1000 days, hygiene and sanitation, injury prevention, disability awareness, early stimulation in the home environment, and the importance of quality early ECE. The overall objective of the CAC intervention was to increase the knowledge of parents of children aged 0-5 years, as well as that of other community members in target villages.

Here we explore to what extent the CAC intervention achieved this aim. Two project trials were used to explore this question; Trial 2 in which villages with an existing kindergarten were randomized to either receive the CAC intervention or not, and Trial 3 in which villages who did not have any existing ECE services were randomized to either receive the CAC intervention or not. This design enabled exploration of effects of providing the CAC intervention both with and without existing ECE services. Analysis included the community panel sample, restricted to children aged 3-5 years at baseline (n=3,271) and endline (n=3,775) in Trials 2 and 3 (Table 11). This age range was chosen because these children will have been exposed to the CAC intervention from infancy to early childhood.

Table 11. Descriptive statistics (n, %) of community panel sample in Trial 2 and Trial 3 villages

		Trial 2		Trial 3	
		KG	KG + CAC	No ECE No CAC	No ECE + CAC
Baseline (total n)		825	823	649	974
Child gender	Male	404 (49.0)	411 (49.9)	338 (52.1)	490 (50.3)
	Female	421 (51.0)	412 (50.1)	311 (47.9)	484 (49.7)
Child age	3 years	283 (34.3)	252 (30.6)	226 (34.8)	338 (34.7)
	4 years	295 (35.8)	298 (36.2)	236 (36.4)	356 (36.6)
	5 years	247 (29.9)	273 (33.2)	187 (28.8)	280 (28.7)
Endline (total n)		936	989	720	1130
Child gender ⁴	Male	441 (47.1%)	437 (44.2%)	294 (40.8%)	504 (44.6%)
	Female	387 (41.3%)	422 (42.7%)	304 (42.2%)	478 (42.3%)
Child age	3 years	285 (30.4%)	314 (31.7%)	248 (34.4%)	398 (35.2%)
	4 years	352 (37.6%)	365 (36.9%)	287 (39.9%)	448 (39.6%)
	5 years	299 (31.9%)	310 (31.3%)	185 (25.7%)	284 (25.1%)

⁴ At endline, child gender data were missing for 108 (11.5%) children in KG, 130 (13.1%) in KG + CAC, 122 (16.9%) No ECE No CAC, and 148 (13.1%) No ECE + CAC.

Caregivers were asked a series of multiple response questions about their understanding of early child health and development. These topics were covered directly within the CAC. Five of these questions (and correct responses) are reported below.

- How many times do you think pregnant women should have antenatal visits? (*8 or more visits*)
- How long do you think children should be fed only mother’s milk? (*6 months or older*)
- When a child has diarrhoea, how much water/liquid should they be fed? (*more than normal*)
- Even from birth a child can start to learn, so it is important that parents interact and stimulate their children to help them learn before they go to kindergarten. (*strongly agree / agree*)
- Children who go to ECE will do better in school. (*strongly agree / agree*)

As the CAC intervention intended to educate parents about child health and development, it was expected that, at endline, parents in villages assigned to the CAC intervention would show a higher proportion of correct responses. Table 12 demonstrates that, to some extent, there was an improvement in parental knowledge across all villages from baseline to endline. For instance, there was a slight increase in the percentage of parents who knew the recommended number of antenatal visits at endline relative to baseline; however, overall, this percentage remained low. Further there is no evidence of positive impact from the CAC campaign, with no significant improvement in knowledge in the CAC villages compared to the Non-CAC villages. Positive impact was not found in either trial, indicating that the CAC campaign was no more successful in communities with or without any early childhood education service.

Table 12. Parents (n, %) who responded correctly to child health and development questions in CAC vs non-CAC villages

		Trial 2		Trial 3	
		KG	KG + CAC	No ECE No CAC	No ECE + CAC
Baseline					
	Q1	159 (19.3)	162 (19.7)	90 (13.9)	98 (10.1)
	Q2	379 (45.9)	354 (43.0)	296 (45.6)	447 (45.9)
	Q3	358 (43.4)	347 (42.2)	283 (43.6)	383 (39.3)
	Q4	803 (97.3)	796 (96.7)	629 (96.9)	941 (96.6)
	Q5	803 (97.3)	784 (95.3)	621 (95.7)	941 (96.6)
Endline					
	Q1	205 (21.9)	213 (21.5)	103 (14.3)	144 (12.7)
	Q2	498 (53.2)	519 (52.5)	337 (46.8)	453 (40.1)
	Q3	409 (43.7)	444 (44.9)	310 (43.1)	463 (41.0)
	Q4	902 (96.9)	942 (95.2)	703 (97.6)	1,092 (96.6)
	Q5	864 (92.3)	917 (92.7)	678 (94.2)	1,049 (92.8)

The small improvements in parental knowledge were not consistent across intervention arms and knowledge topics. Figure 12 highlights that at endline, more parents understood exclusive breastfeeding practices compared to baseline, though this was not the case in villages assigned the CAC intervention without existing ECE. Consistent decreases in knowledge about the importance of ECE for children’s school readiness were also observed, which is in contrast with one of the main findings of the project, in that ECE attendance increased dramatically over time. Overall, no significant differences in parental knowledge were found between parents in CAC versus non-CAC villages.

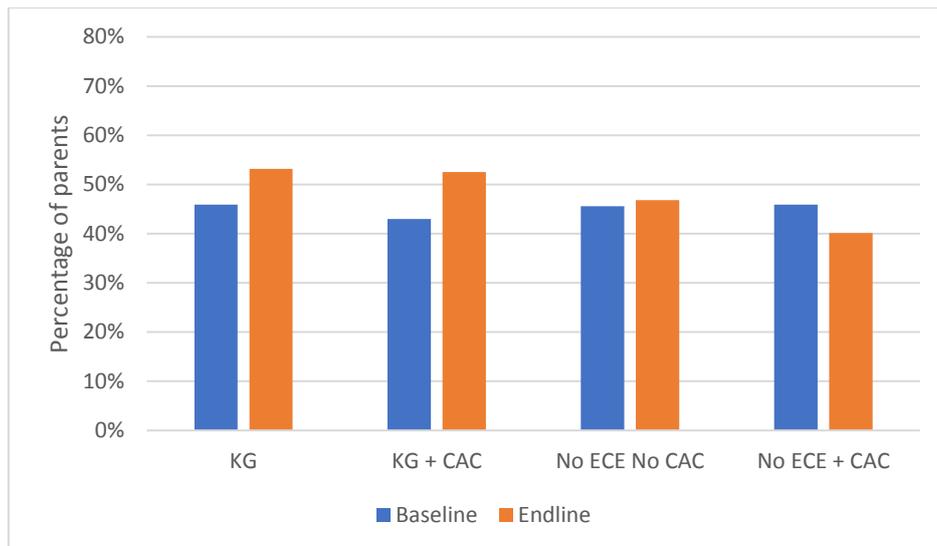


Figure 11. Percentage of parents who responded correctly to the exclusive breastfeeding question (i.e. 6 months or older) in CAC vs non-CAC villages

Considering the CAC intervention included modules on the importance of early education for healthy child development, it was expected that there would be greater increases in ECE attendance among children in CAC villages. However, results showed that from baseline to endline, there were no significant differences in ECE attendance trajectories between CAC and non-CAC villages (Figure 13). Given that all villages at endline (apart from KG + CAC) experienced an increase in children attending ECE, this highlights that the CAC intervention did not cause the shifts in ECE attendance. Indeed, increases in ECE attendance were typically lower in CAC villages compared to non-CAC villages.

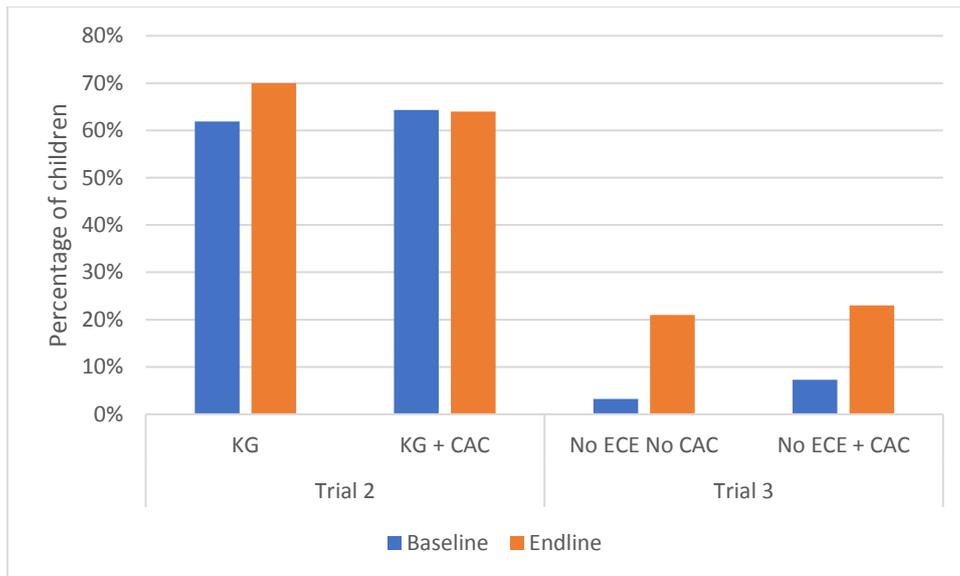


Figure 12. Percentage of children attending ECE in CAC vs non-CAC villages

The CAC intervention also sought to educate parents about developmentally appropriate early stimulation. Thus, we expected that results would show a higher proportion of children engaged in home learning activities in villages where the CAC intervention was assigned. Encouragingly, results revealed a widespread increase in the percentage of children engaged in home learning activities between baseline and endline (with the exception of book reading in KG villages, and outdoor play in No ECE villages; Table 13). However, this increase was not greater among CAC villages (Figure 14), which indicates that improvements in early stimulation are not attributable to the CAC intervention.

Table 13. Children (n, %) engaged in home learning activities in CAC vs non-CAC villages

	Trial 2		Trial 3	
	KG	KG + CAC	No ECE No CAC	No ECE + CAC
<i>Baseline</i>				
Read book	344 (41.7)	351 (42.6)	191 (29.4)	250 (25.7)
Tell story	251 (30.4)	290 (35.2)	175 (27.0)	211 (21.7)
Draw	333 (40.4)	352 (42.8)	194 (29.9)	266 (27.3)
Sing/dance	299 (36.2)	300 (36.5)	213 (32.8)	229 (23.5)
Play	139 (16.8)	161 (19.6)	163 (25.1)	187 (19.2)
Housework	224 (27.2)	264 (32.1)	216 (33.3)	231 (23.7)
Play outside	190 (23.0)	210 (25.5)	211 (32.5)	289 (29.7)
<i>Endline</i>				
Read book	366 (39.1)	449 (45.4)	248 (34.4)	391 (34.6)
Tell story	352 (37.6)	413 (41.8)	272 (37.8)	406 (35.9)
Draw	451 (48.2)	529 (53.5)	253 (35.1)	414 (36.6)
Sing/dance	465 (49.7)	510 (51.6)	318 (44.2)	481 (42.6)
Play	285 (30.4)	344 (34.8)	209 (29.0)	381 (33.7)
Housework	458 (48.9)	485 (49.0)	346 (48.1)	536 (47.4)
Play outside	245 (26.2)	264 (26.7)	133 (18.5)	231 (20.4)

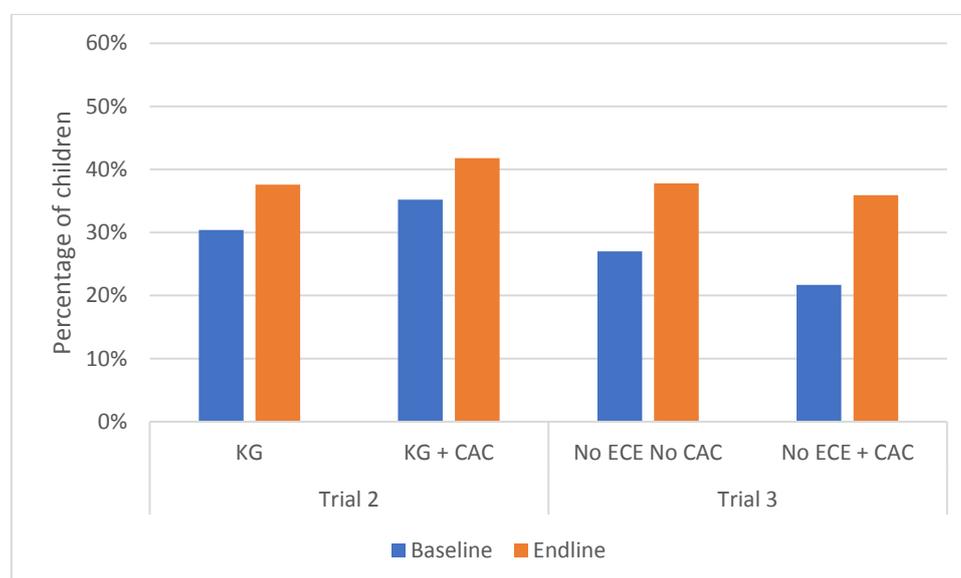


Figure 13. Percentage of children who were told a story in the last 7 days in CAC vs non-CAC villages

Given that the CAC intervention, whether implemented in villages with or without existing ECE services, did not have an impact on outcomes as expected, monitoring data was analysed to explore the extent to which the CAC intervention had been implemented. Monitoring data was collected from

the head of the VEDC in 132 (98%) villages assigned to deliver the CAC intervention. All villages reported receiving training for at least one member of the VEDC with the intention of them then delivering the CAC in their village.

In fact, the majority of villages reported training 3 or 4 VEDC members (73.3% KG + CAC villages; 69.4% No ECE + CAC villages). Despite adequate training of the VEDC, approximately half of all villages in both trials reported that they delivered from 0 to 3 CAC sessions in the last year (50.0% KG + CAC villages; 48.6% No ECE + CAC villages), with only 3 (5.0%) of KG + CAC villages and 5 (6.9%) of No ECE + CAC villages having delivered 12 CAC sessions within the last year (Figure 15). When CAC sessions were delivered, monitoring data indicated that sessions were well attended by community members, with 38.7% of villages reporting that more than 50 village members consistently attended CAC sessions. About 1 in 5 villages were able to produce attendance records to demonstrate attendance among their community.

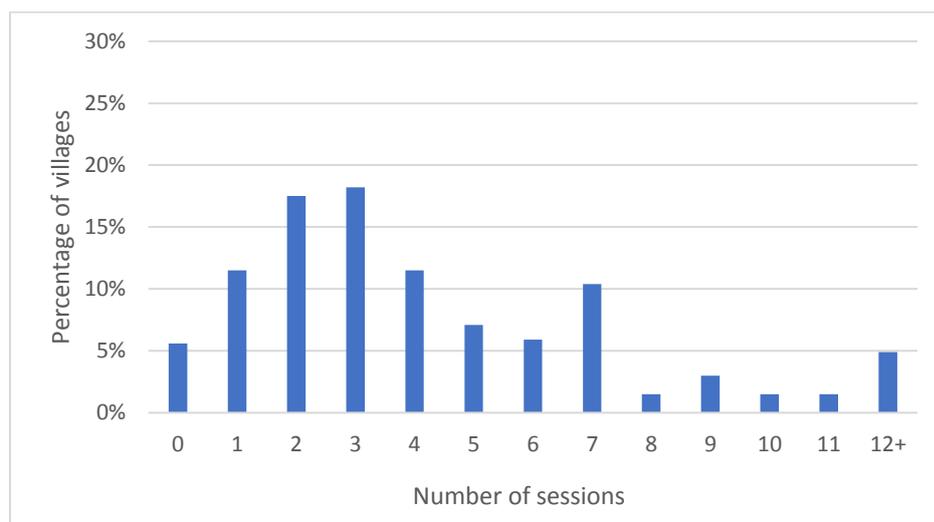


Figure 14. Number of sessions delivered in the last year in all CAC villages

Overall, these results highlight that in the majority of villages assigned to implement CAC, the intervention was not delivered as intended. These findings are similar to those observed at the project’s midline (ref midline snapshot). This lack of fidelity to the planned schedule of the CAC intervention, resulting in limited delivery of community training is likely to explain the lack of impact on parental knowledge, ECE attendance, and engagement in learning activities in the home environment. Challenges to implementation appear to be related to session delivery rather than community participation. However, further information from those in villages assigned to deliver the CAC is needed to identify barriers to implementation of the intervention.

Key findings

1. Results highlight that, on average, parental knowledge of early child health and development, rates of ECE attendance, and caregiver-child engagement in learning activities in the home increased across both CAC and non-CAC villages between baseline and endline data collection. Analyses show that these increases are not a result of the CAC intervention.
2. Monitoring data highlights that this result is likely due to the inadequate implementation of the CAC intervention in most intervention villages. Although all villages had VEDC members trained to deliver the CAC, about half of all villages reported implementing from 0 to 3 CAC sessions in the last year. Although the CAC intervention method has been used previously in Lao PDR (e.g. for nutrition promotion projects), results highlight barriers to implementation that should be explored.

How is ECE quality impacting children's early development?

As reported earlier, ECE attendance increased in both CCDG and MAT communities. Further, enhancements in developmental outcomes were found among children who had participated in ECE. Considering both CCDGs and MAT are new ECE modalities in Lao PDR, it is important to understand how the quality of these programs could be enhanced to better support child development as they are expanded to other areas of the country. Here we explore the quality of CCDGs, MAT, and standard pre-primary (PP) classrooms, and the relationship between ECE quality and children's development.

Classroom quality was assessed for 72 CCDGs, 59 MAT, and 46 PP classrooms across 132 villages in Northern Lao PDR. Although the focus was to compare the quality of CCDGs and MAT, inclusion of standard PP classrooms in analyses ensured a fair comparison. As CCDGs were designed for children aged 3-4 years and MAT for children aged 3-5 years, assessing the quality of PP classrooms in CCDG communities also allowed comparisons of services for 5-year-olds.

The Laos version of the MELE was used to measure four aspects of classroom quality considered important to children's experiences of early learning environments: learning activities; classroom interactions and approaches to learning; classroom arrangement, space, and materials; and facilities and safety. However, scores on the MELE learning activities domain are not reported. Unlike the remaining three quality aspects, items measured in the learning activities domain were highly dependent on the day and time of observation. For example, although the nature of a teacher's interactions with children or the materials available in the classroom are consistent, the day and/or time of observation will determine the lesson being conducted and thus quality scores on the instrument. Hence, descriptions of the remaining three MELE domains are reported below:

- The **interactions and approaches to learning quality** aspect captured teachers' use of verbal and physical disciplinary strategies; engagement and supervision of children; lesson facilitation through explicit instruction; individualised instruction; use of different teaching formats (i.e. individual or groupings); and creating a supportive learning environment.
- The **arrangement, space, and materials** aspect included classroom and yard space; children's access to a seat and writing surface; tracking of children's learning and development; organisation of classroom materials; and availability of and children's engagement with materials such as writing utensils, art, fantasy play, maths materials, and storybooks.
- The **facilities and safety** aspect captured availability of drinking; handwashing facilities and practices; toilet facilities and conditions; and safety conditions and hazards (including broken equipment, lighting and ventilation, fencing, dangerous terrain etc).

Scores on each quality aspect as well as overall quality across ECE settings are presented in Table 14. Scores range from 0 to 1, with 1 representing high quality. Overall, there was no difference in quality between the CCDGs in comparison to pre-primary classrooms, be they MAT or standard PP. This is a positive result for CCDGs considering they are a new modality of early education, delivered by trained caregivers rather than formal teachers. When investigating results across the three different aspects of quality, PP scored higher on interactions and approaches to learning, which is likely to reflect the level of pre- and in-service training formal teachers will have received in comparison to the quantity of training the CCDG facilitators received during the program. In terms of arrangement, space, and materials, both MAT and CCDG modalities performed equally well, likely reflecting the resourcing provided through the ECE project and training on how to manage classes with a wider age range. Scores on the facilities and safety domain did not differ significantly across the three ECE settings.

Table 14. Mean scores of classroom quality across ECE settings

	CCDG	MAT	PP
Interactions and approaches to learning	.59	.64	.65
Arrangement, space, and materials	.44	.44	.33
Facilities and safety	.50	.47	.52
Overall quality	.45	.45	.45

Next, the relationship between classroom quality and child development outcomes was explored for children aged 3 and 4 years living in CCDG and MAT communities. The sample was restricted to this age range to enable a focus on the effects of interventions implemented as part of the ECE project on children’s development. Analyses to follow are pooled, rather than split by intervention type, as results from Table 14 indicated no difference in classroom quality across interventions. The characteristics of children included in the following analyses are presented in Table 15.

Table 15. Descriptive statistics (n, %) of 3-4-year-olds in Trial 1 villages at endline

		n (%)
Child gender	Male	667 (47.9)
	Female	656 (47.1)
	Missing	69 (5.0)
Child age	3 years	644 (46.3)
	4 years	748 (53.7)
Child ethnicity	Lao-Tai	240 (17.2)
	Other	1152 (82.8)
Socioeconomic status	Quintile 1 (most disadvantaged)	274 (19.7)
	Quintile 2	291 (20.9)
	Quintile 3	305 (21.9)
	Quintile 4	301 (21.6)
	Quintile 5 (least disadvantaged)	217 (15.6)
	Missing	4 (0.3)

Results showed that children’s overall development as reported by caregivers was, on average, higher in communities with better quality early education. Figure 16 shows that across all quality aspects, children in communities with the lowest quality CCDG and MAT classrooms had lower overall development scores, compared to children in communities with higher quality services.

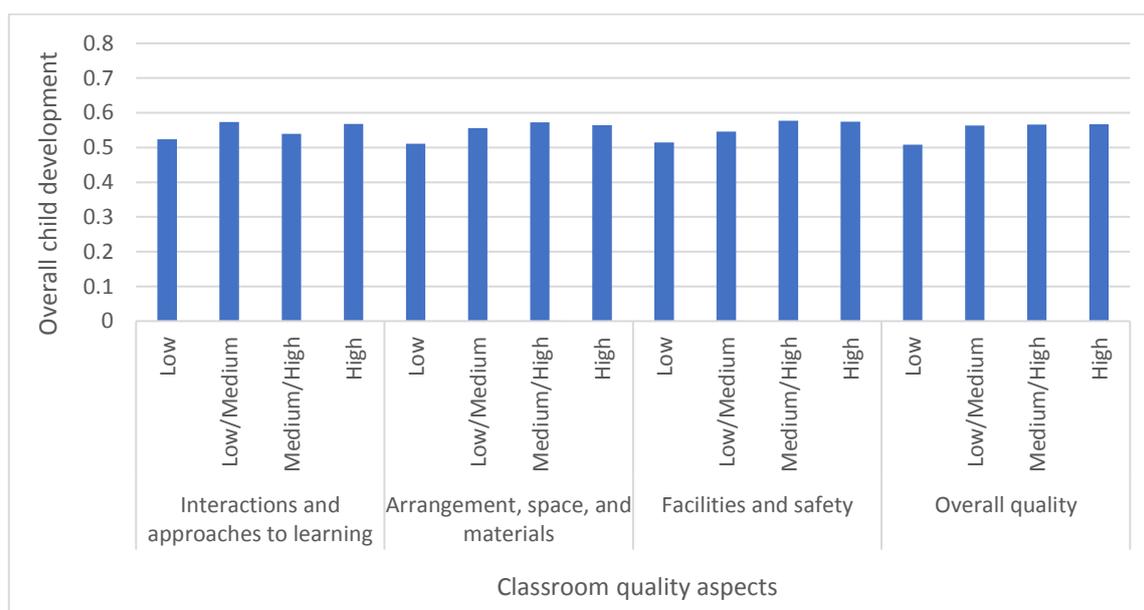


Figure 15. Relationship between overall caregiver-reported child development and classroom quality

The relationship between ECE quality and child development varied across different subgroups of children. Figure 17 demonstrates that the relationship between ECE quality and child development was stronger among Lao-Tai children relative to children of other ethnicities. In other words, the difference in overall child development scores for Lao-Tai children between lowest and highest quality CCDG and MAT communities was more pronounced than for children of other ethnicities. Figure 17 also highlights that while development of children from the most socioeconomically disadvantaged backgrounds was not related to classroom quality, children from the most advantaged backgrounds were able to reap the benefits of high-quality early education.

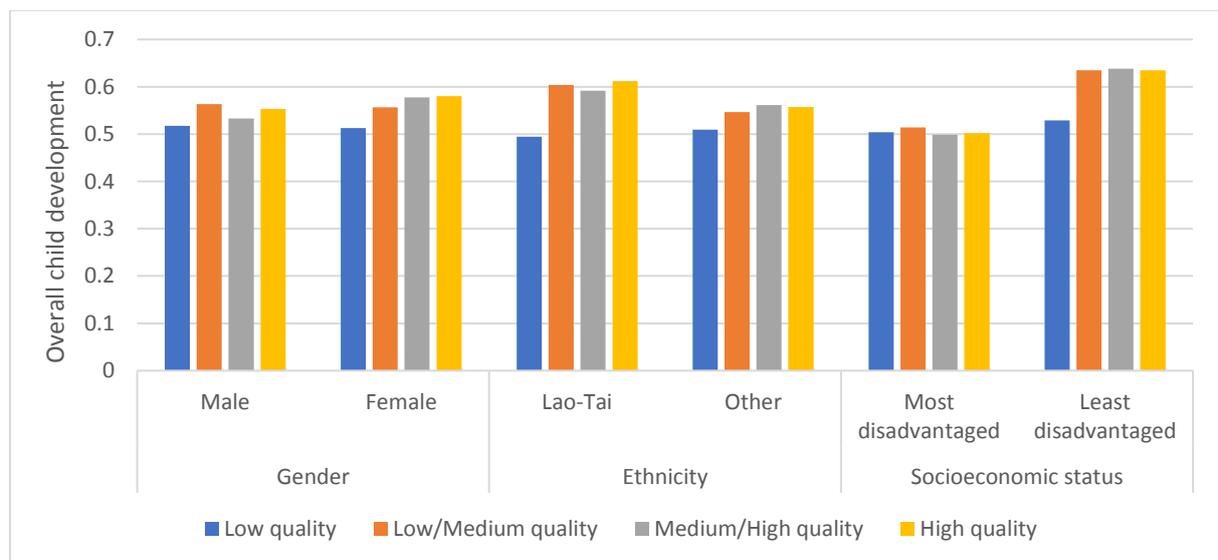


Figure 16. Relationship between overall caregiver-reported child development and overall classroom quality by children’s gender, ethnicity, and socioeconomic status

Similar results were found when examining children’s development measured via direct assessment. Figure 18 presents the percentage of children who were able to open a book correctly (i.e. a measure of familiarity with print that is important for pre-literacy development). The proportion of children able to complete this task correctly in communities with lowest overall quality early education was 16%, almost half that of children in communities with higher quality services available. This same pattern was observed when looking at children’s counting ability, yet the relationship was even more pronounced (Figure 19). These results are likely intertwined with poverty; however, these patterns remained even after adjusting for a variety of factors including household socioeconomic status.

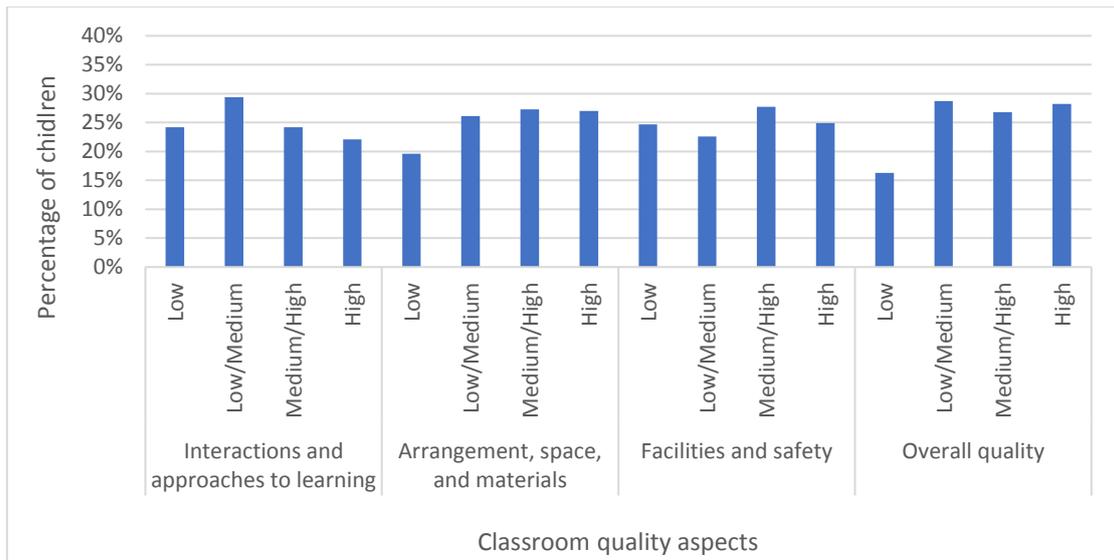


Figure 17. Percentage of children who could correctly open a book by classroom quality

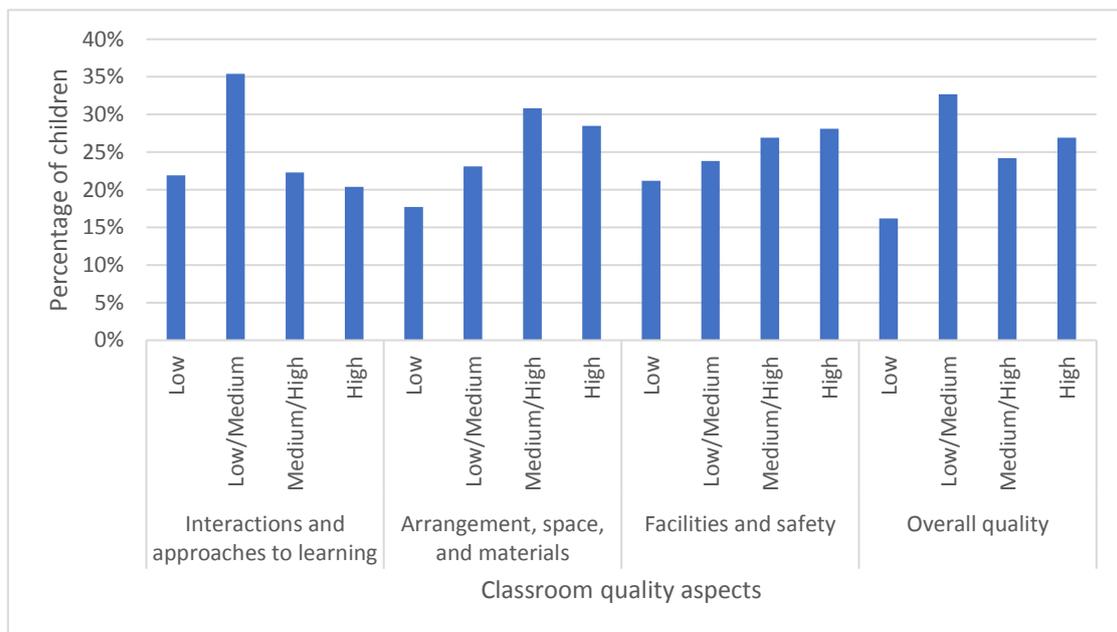


Figure 18. Percentage of children who could correctly count to 10 by classroom quality

Overall, results highlight that the lowest quality ECE is associated with poorer child development scores. Nevertheless, child outcomes did not vary considerably between children in low/medium, medium/high, and high quality classrooms. This may suggest a threshold of classroom quality exists that is important in promoting positive outcomes for children’s learning and development.

Finally, Figure 20 presents results exploring the relationship between ECE quality and directly assessed overall child development across different subgroups of children. As with caregiver-reported results,

directly assessed child development scores exhibited a stronger relationship with classroom quality among children from more advantaged backgrounds (i.e. Lao-Tai children and children from households with the least socioeconomic disadvantage). This is an important finding to consider in future service provision, as results indicate it is the least disadvantaged children who are able to gain the most benefit from high quality ECE, while quality is less influential for the most disadvantaged. This result would not be considered consistent with international literature, where it is generally the poorest children who benefit the greatest from high quality early childhood education. As discussed, language of instruction in ECE programs should be an important consideration.

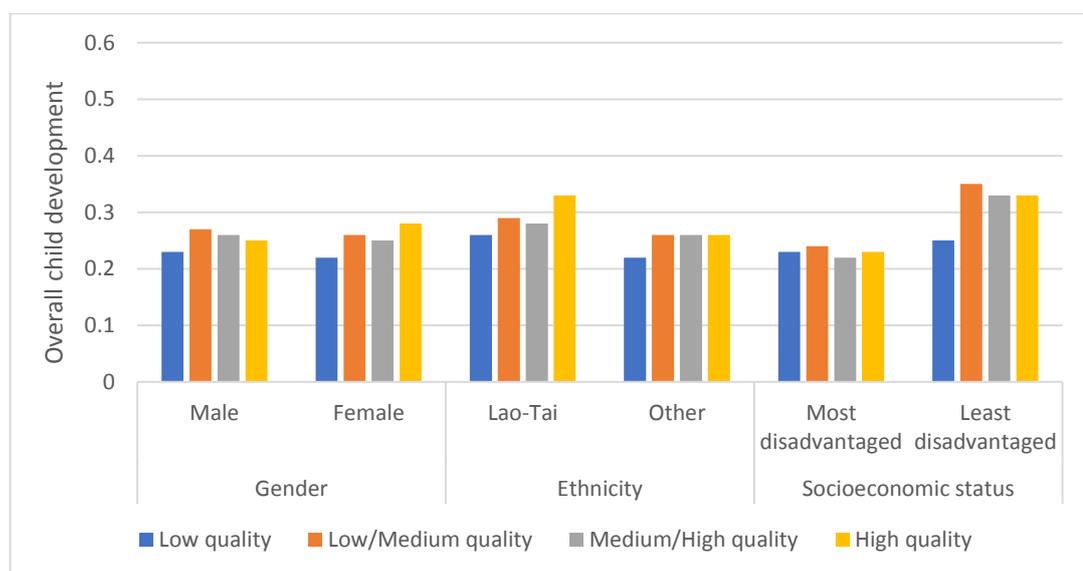


Figure 19. Relationship between overall directly assessed child development and overall classroom quality by children's gender, ethnicity, and socioeconomic status

Key findings

1. Overall, there was no difference in quality between CCDGs relative to both MAT and standard PP classrooms. There is strength in that CCDGs were able to achieve the same level of quality as PP, despite being a new modality of early education in the Laos context, as well as an informal support delivered by trained caregivers rather than formal teachers.
2. There was a positive relationship between overall quality of early education and children's development, and results maintained after adjusting for a variety of factors including socioeconomic status. However, classroom quality was not related to all measures of child development, and relationships did vary dependent upon the aspect of quality in question.

Importantly, results indicate there might exist a threshold of classroom quality that is important in promoting positive outcomes for children's development.

3. Results suggest that it is the least disadvantaged children who are able to gain most benefit from high quality early education, while quality appears less influential for the most disadvantaged children. This will be very important to monitor as early childhood education services in Laos continue to expand.

What are the optimal ECE pathways for children's development?

There are a range of early education and care modalities that children can attend at different ages throughout early childhood. A summary of services available to children in the ECE Project is below.

- **Playgroup:** Offers a more informal, play-based early learning environment for children of any age. In the majority of circumstances, children attending playgroup will have been attending a CCDG, however in some instances, playgroups are also delivered by non-government service providers and/or privately run services.
- **Kindergarten:** Kindergarten forms part of preschool services for children, typically for children aged 3-4, before entering pre-primary.
- **Pre-primary:** The purpose of pre-primary is to prepare children to enter grade 1 of primary school. Learning occurs in a classroom setting, and children attending are typically 5 years old. Children attending pre-primary will include MAT as well as standard pre-primary classes.

Thus, a child's "pathway" through the ECE system is often unique. Determining the pathway that best supports children's development before school is important to guide investment in and expansion of the types of care that produce the best outcomes for children and families. Two new ECE modalities, CCDGs and MAT, were trialled as part of the ECE Project, expanding the types of early years services available to children in Northern Laos. In this section, we explore children's experiences of ECE and their later development. Analyses use the child level panel sample, across all three trials, but restricted to children aged 7 years at endline (n=1,576). In contrast to other findings presented in this report, analyses here do not utilise the study's randomised design. Rather, children from across all villages are pooled and descriptive statistics are presented.

To calculate the possible pathways that children could take through the different ECE modalities in Northern Laos, information from the caretaker survey collected at the project's baseline, midline and endline was used. Caregivers were asked if their child had attended a baby/childcare centre, playgroup (i.e. CCDGs implemented as part of the ECE Project), kindergarten, or pre-primary (which will include MAT as well as standard pre-primary classes) in the last 24 months. So, it is important to note that in the majority of circumstances children attending a playgroup were mainly attending a CCDG, however in a few circumstances playgroups are delivered by non government service providers and/or privately run local day care type service. Children were categorised as attending a particular type of ECE if their caregiver recorded them as attending at either baseline, midline, or endline. By combining these records across data collections, a summary ECE history variable was created for each child. This resulted in 11 unique ECE pathway combinations. Three of these pathways were excluded due to small numbers, resulting in the 8 ECE pathways below:

- No-ECE
- Pre-primary only
- Kindergarten only
- Kindergarten + Pre-primary
- Playgroup only
- Playgroup + Pre-primary
- Playgroup + Kindergarten
- Playgroup + Kindergarten + Pre-primary

Table 16 presents the proportion of children that went through each ECE pathway and their demographic characteristics across the different pathway groups. Evidently, the most common ECE pathway before entering school was kindergarten, with 41.9% of children attending only this type of ECE. The second most common pathway was no ECE attendance (28.9%), followed by kindergarten + pre-primary (10.2%), pre-primary only (6.5%), or playgroup + other types of education/care (ranging from 1.9% to 3.8%). It is important to note that membership in the ECE pathway groups was also a function of the ECE Project study design and thus the ECE attendance patterns observed in this sample may not be representative of the wider population of children in Lao PDR.

The gender distribution within ECE pathway groups was relatively even, with some exceptions. The children in the playgroup + kindergarten + pre-primary group were predominantly male (66.7%), with more males also observed in the playgroup + pre-primary (55.2%), kindergarten + pre-primary (55.9%), pre-primary (54.4%), and no-ECE group (52.8%). However, the largest group of ECE attendance (kindergarten) had a slightly higher proportion of females (52.7%). Comparison of ECE pathway groups by ethnicity revealed that children of a Lao-Tai background constituted a smaller proportion of children in the kindergarten + pre-primary group (11.8%), with higher proportions in the kindergarten (41.8%) and playgroup + kindergarten group (36.7%). Lastly, children living in the least poor households were much less likely to be in the no-ECE group (5.9%) compared to those in poorer households, with higher proportions in kindergarten (28.7%) and playgroup + pre-primary (39.7%).

As measured by the eHCI, overall child development scores at age 7 varied across the eight ECE pathway groups (see Figure 21). Importantly, for the majority of ECE pathway groups (except for kindergarten + pre-primary), overall development scores at age seven were higher in the ECE groups compared to the no-ECE group. The highest levels of development compared to no-ECE were observed for playgroup and playgroup + other education/care combinations. However, it should be noted that there was only a 5% range in development across all groups (i.e., 0.75 to 0.80). Analyses to follow explore the relationship between ECE pathway and children's development in greater detail, accounting for such factors.

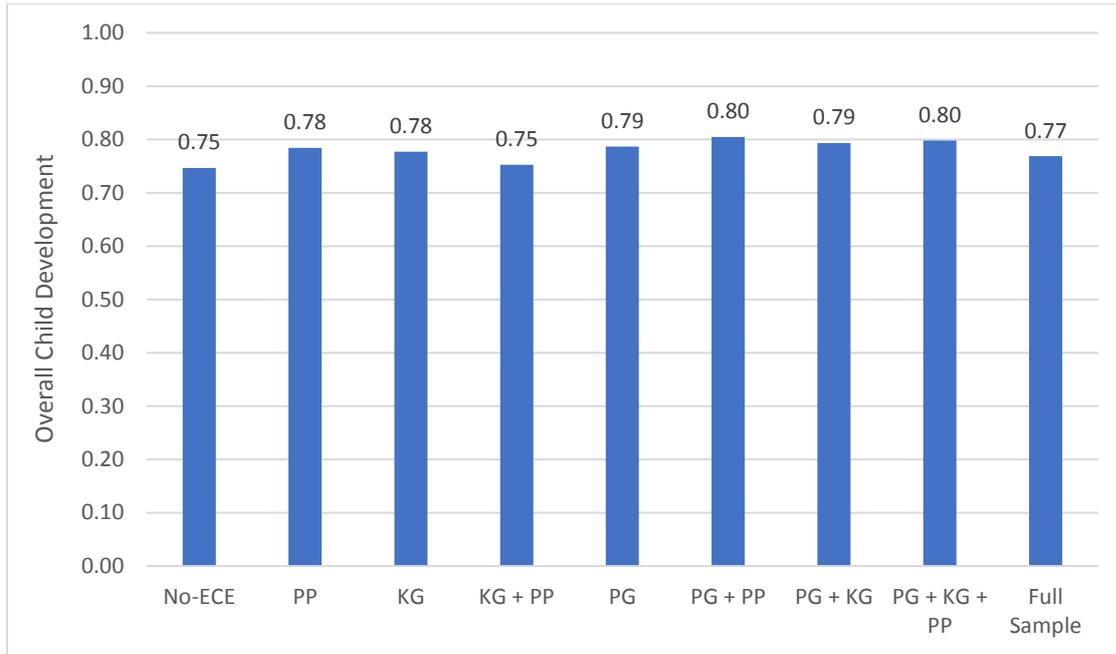


Figure 20. Caregiver reported overall child development by ECE pathway

Table 16. Demographic characteristics of child panel sample (aged 7 years at endline) by ECE pathway (n=1,576)

	No-ECE (n=455)	PP (n=103)	KG (n=661)	KG + PP (n=161)	PG (n=48)	PG + PP (n=58)	PG + KG (n=60)	PG + KG + PP (n=30)	Full sample (n=1576)
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
No. children	455 (28.9)	103 (6.5)	661 (41.9)	161 (10.2)	48 (3.0)	58 (3.7)	60 (3.8)	30 (1.9)	1,576 (100.0)
Child gender									
Male	240 (52.8)	56 (54.4)	313 (47.4)	90 (55.9)	23 (47.9)	32 (55.2)	30 (50.0)	20 (66.7)	804 (51.0)
Female	215 (47.3)	47 (45.6)	348 (52.7)	71 (44.1)	25 (52.1)	26 (44.8)	30 (50.0)	10 (33.3)	772 (49.0)
Child ethnicity									
Lao-Tai	98 (21.5)	20 (19.4)	276 (41.8)	19 (11.8)	12 (25.0)	17 (29.3)	22 (36.7)	10 (33.3)	474 (30.1)
Non Lao-Tai	357 (78.5)	83 (80.6)	385 (58.3)	142 (88.2)	36 (75.0)	41 (70.7)	38 (63.3)	20 (66.7)	1,102 (69.9)
Socioeconomic status									
Poor (Quintile 1-4)	428 (94.1)	80 (77.7)	471 (71.3)	138 (85.7)	40 (83.3)	35 (60.3)	52 (86.7)	23 (76.7)	1,267 (80.4)
Least poor (Quintile 5)	27 (5.9)	23 (22.3)	190 (28.7)	23 (14.3)	8 (16.7)	23 (39.7)	8 (13.3)	7 (23.3)	309 (19.6)

Table 17. Child development outcomes subgroup analysis by ECE pathway (n=1,576)

	No-ECE (n=455)	PP (n=103)	KG (n=661)	KG + PP (n=161)	PG (n=48)	PG + PP (n=58)	PG + KG (n=60)	PG + KG + PP (n=30)	Full sample (n=1576)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Total child development	0.75 (0.15)	0.78 (0.12)	0.78 (0.14)	0.75 (0.15)	0.79 (0.10)	0.80 (0.12)	0.79 (0.13)	0.80 (0.13)	0.77 (0.14)
Overall	0.75 (0.15)	0.78 (0.12)	0.78 (0.14)	0.75 (0.15)	0.79 (0.10)	0.80 (0.12)	0.79 (0.13)	0.80 (0.13)	0.77 (0.14)
Child gender									
Male	0.73 (0.15)	0.77 (0.12)	0.76 (0.14)	0.76 (0.12)	0.77 (0.12)	0.78 (0.14)	0.77 (0.13)	0.78 (0.14)	0.75 (0.14)
Female	0.76 (0.15)	0.80 (0.11)	0.79 (0.13)	0.74 (0.18)	0.80 (0.09)	0.84 (0.09)	0.81 (0.13)	0.84 (0.09)	0.78 (0.14)
Child ethnicity									
Lao-Tai	0.80 (0.12)	0.81 (0.12)	0.82 (0.11)	0.82 (0.10)	0.81 (0.06)	0.82 (0.08)	0.83 (0.09)	0.84 (0.11)	0.82 (0.11)
Non Lao-Tai	0.73 (0.16)	0.78 (0.11)	0.75 (0.15)	0.74 (0.15)	0.78 (0.12)	0.80 (0.14)	0.77 (0.15)	0.78 (0.13)	0.75 (0.15)
Socioeconomic status									
Poor (Quintile 1-4)	0.74 (0.15)	0.77 (0.12)	0.75 (0.14)	0.74 (0.15)	0.78 (0.11)	0.78 (0.14)	0.79 (0.14)	0.78 (0.14)	0.75 (0.15)
Least poor (Quintile 5)	0.81 (0.10)	0.84 (0.08)	0.83 (0.10)	0.84 (0.08)	0.83 (0.06)	0.84 (0.08)	0.83 (0.07)	0.86 (0.03)	0.83 (0.10)

To understand the equity impacts of these different ECE attendance patterns, subgroup analyses by gender, ethnicity, and socioeconomic status were conducted (see Table 17). Results revealed that females tended to have higher overall development scores compared to males across a majority of the ECE pathway groups, except for the kindergarten + pre-primary pathway. The largest differences between males and females were seen in the playgroup + other ECE groups, with twice as large a gap observed compared to most other ECE pathways. Children with Lao-Tai ethnicity had higher levels of overall development across all ECE pathway groups compared to their non Lao-Tai peers, with the smallest gaps in development seen in the playgroup, pre-primary, and playgroup + pre-primary groups. Children living in the least poor households had higher levels of development compared to children living in poor households, with this relationship observed across all ECE pathways.

Given that child development across the ECE pathway groups varied by gender, ethnicity, and socioeconomic status, it was important to conduct analyses in which these sociodemographic characteristics were controlled for to obtain a better understanding of the association between ECE pathways and later child development. Hence, linear regressions adjusted for gender, ethnicity, and socioeconomic status were conducted. Adjusted means for all eHCI development domains, as well as overall development, are presented in Table 18. Further, five individual direct assessment items (verbal counting, listening comprehension, sound discrimination, name writing, and sound identification) that exhibited high levels of variation at age 7 were also examined (Table 19).

Children who attended ECE typically had higher levels of development (according to both caregiver report and direct assessment) at age 7, after accounting for gender, ethnicity, and household socioeconomic status. When looking across all results, playgroup, pre-primary, or a combination of these forms of ECE appear to result in the most consistent positive development outcomes for children in Northern Lao PDR. Most notably, the playgroup + pre-primary pathway showed significant positive effects across all five of the direct assessment domains presented, after adjustment.

Key findings

- As is the case in many countries, children in Northern Laos experienced a range of unique ECE pathways before starting school. Longitudinal data revealed that the majority of children attended kindergarten only, while the second most common pathway was no ECE.
- Overall, results demonstrate that any ECE attendance during early childhood is significantly associated with better development outcomes when children reach 7 years. In particular, attendance at playgroup, pre-primary or a combination of these types of ECE resulted in consistent, positive outcomes across a range of child development outcomes.

Table 18. Regression results: caregiver reported child development outcomes by ECE pathway

	No-ECE (n=455)	PP (n=103)	KG (n=661)	KG + PP (n=161)	PG (n=48)	PG + PP (n=58)	PG + KG (n=60)	PG + KG + PP (n=30)
	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)
Overall child development	0.76 (0.01)	0.79 (0.01)	0.77 (0.01)	0.77 (0.01)	0.79 (0.02)	0.80 (0.02)	0.79 (0.02)	0.80 (0.02)
Verbal communication	0.90 (0.01)	0.96 (0.02)	0.89 (0.01)	0.91 (0.02)	0.90 (0.03)	0.95 (0.03)	0.92 (0.03)	0.95 (0.04)
Approaches to learning	0.78 (0.01)	0.84 (0.02)	0.79 (0.01)	0.77 (0.02)	0.87 (0.03)	0.88 (0.03)	0.82 (0.03)	0.83 (0.04)
Numeracy and concepts	0.85 (0.01)	0.87 (0.02)	0.87 (0.01)	0.87 (0.01)	0.89 (0.03)	0.91 (0.02)	0.89 (0.02)	0.90 (0.03)
Cultural knowledge	0.82 (0.01)	0.84 (0.02)	0.83 (0.01)	0.83 (0.02)	0.85 (0.03)	0.87 (0.03)	0.88 (0.02)	0.88 (0.04)
Formal literacy	0.70 (0.01)	0.75 (0.03)	0.72 (0.01)	0.73 (0.02)	0.74 (0.04)	0.73 (0.03)	0.76 (0.03)	0.78 (0.05)
Social and emotional skills	0.69 (0.01)	0.70 (0.01)	0.68 (0.00)	0.69 (0.01)	0.71 (0.02)	0.70 (0.02)	0.68 (0.02)	0.71 (0.02)
Perseverance	0.57 (0.01)	0.58 (0.02)	0.58 (0.01)	0.56 (0.02)	0.56 (0.03)	0.54 (0.03)	0.61 (0.03)	0.55 (0.04)

Note: Bold denotes this effect was significant at a 5% level when compared to the baseline category (No-ECE), adjusting for gender, ethnicity, and socioeconomic status.

Table 19. Regression results: directly assessed child development outcomes by ECE pathway

	No-ECE (n=455)	PP (n=103)	KG (n=661)	KG + PP (n=161)	PG (n=48)	PG + PP (n=58)	PG + KG (n=60)	PG + KG + PP (n=30)
	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)
Verbal counting	0.75 (0.02)	0.93 (0.03)	0.76 (0.01)	0.86 (0.03)	0.87 (0.05)	0.87 (0.04)	0.81 (0.04)	0.93 (0.06)
Listening comprehension	0.35 (0.01)	0.44 (0.03)	0.37 (0.01)	0.40 (0.02)	0.54 (0.04)	0.53 (0.04)	0.44 (0.04)	0.46 (0.06)
Sound discrimination	0.20 (0.01)	0.22 (0.03)	0.15 (0.01)	0.21 (0.02)	0.25 (0.04)	0.34 (0.04)	0.26 (0.04)	0.35 (0.05)
Name writing	0.72 (0.02)	0.86 (0.04)	0.76 (0.01)	0.80 (0.03)	0.82 (0.05)	0.84 (0.05)	0.74 (0.05)	0.90 (0.07)
Sound identification	0.34 (0.02)	0.42 (0.04)	0.30 (0.02)	0.37 (0.03)	0.47 (0.06)	0.50 (0.05)	0.37 (0.05)	0.48 (0.07)

Note: Bold denotes this effect was significant at a 5% level when compared to the baseline category (No-ECE), adjusting for gender, ethnicity, and socioeconomic status.

Part Four: Implementation Considerations

It is worth reflecting on some of the implementation challenges that were encountered during the progress of the ECE project and the impact evaluation itself. Many of these challenges are not unique to Lao PDR, let alone this project specifically. They are not documented to criticize, merely they are detailed upon request of Dubai Cares as part of their research funding agreement. Further, these challenges help to interpret the findings provided within this report.

Sampling

Although documented fully in the baseline report, the initial sampling for the three parallel impact evaluations were made on the basis of data provided by the Education Management Information System (EMIS). This system records crucial details, such as the type of ECE service in a community, the number of children in the community by age, number of teachers etc. It was known from previous studies undertaken in Laos that the EMIS data was unreliable in that it regularly inflated the actual number of children in any given village. As such, before baseline collection in mid-2015, data was also sourced from the Department of Health and the local Early Childhood Unit additionally phoned through to local district officials to gain an up-to-date list of villages with important eligibility criteria details, i.e. number of children aged 0-5 in the community, and if the community had a local PP or KG. On the basis of this new list, all villages in the north of Lao with 20 or more children were allocated to one of the three trials and then randomised to either arm.

After the baseline data was completed and Indochina returned to Vientiane, we discovered that the original eligibility criteria for many villages was not as was supposed to be. For example, a community where there was supposed to be a primary school didn't actually have one, or instead they had a kindergarten only. This was a problem not just for the impact evaluation, but the program itself (i.e., CCDGs were to be built in communities where there was an existing Pre-Primary School). In terms of the impact evaluations, communities that didn't match their original criterion were placed back into the pool of the trial in which they should have actually been allocated to and then randomised to either arm. After this process, some of the arms of the trials did not reach the sample size required. Indochina Research went back out in the field to collect Baseline "batch 2" to be able to reach the sample size of community clusters required and to confirm where the different program modalities could be implemented.

Since this time the EMIS has been upgraded from an aggregate system to an individual-child-based system with significant training and technical support being provided at a central, provincial and district level to support the new system. These upgrades are crucial for policy and planning, resource allocation and service monitoring. Of course, they will also provide more reliable data to plan any future impact evaluations.

Procurement and implementation delays

Like many projects, the Early Childhood Education program did not escape difficulties associated with procurement and resultant implementation delays. Although this is not a comprehensive list, we highlight here some of the key procurement and implementation delays that we believe will have had an impact on the fidelity and potential impact of the ECE project.

Delayed implementation of the ECE program was due to a number of factors. Procurement delays were encountered for the original construction of the CCDG huts, however these were mainly caused by the EMIS data inaccuracies identified through the baseline data collection. As such, the final list of CCDG villages could not be provided until baseline stage 2 was completed.

Procurement delays also impacted the purchase and delivery of toys and educational materials for the CCDGs and MAT Pre-Primary schools. These resources were to be replenished on a 6 monthly basis. However, the original batch was severely delayed, and resource replenishments only occurred once throughout the entire project.

Procurement delays also impacted the fieldwork for the impact evaluation. Variations in the contract with Indochina Research to include monitoring and delivery of resources to intervention communities (originally to be undertaken by government staff) meant protracted negotiations within the government. As such, endline data collection was delayed.

Staffing

The recruitment of local Technical Assistance funded through the ECE project was significantly delayed and then once secured contracts were not always renewed in time resulting in large employment and technical support gaps. These delays had particular ramifications in the development of all program curriculum and associated training resources.

Training for the CCDG facilitators and MAT teachers were crucial and regular training updates were supposed to be a key feature of the ECE program. Training was also a crucial component of the Community Awareness Campaign, where refresher training was to be conducted regularly. Only a fraction of the training for all ECE modalities originally scheduled was actually conducted and this was especially true in the later years of the program. Further, significant gaps in local technical assistance during the program meant that curriculum and student activities to be delivered in the CCDGs and MATs for 3 to 4 year olds were not updated throughout the project. This lack of training and lack of updated resources and activities might help to explain the reduced attendance and impact found between midline and endline. It may also help to explain the reduced implementation of the CAC sessions in communities. Without strong central system leadership and support with regular touch points/renewals, it is difficult to expect programs to continue to be implemented with full fidelity and enthusiasm.

In addition to shortages in local technical assistance, government staffing was also stretched, with heads of implementing units sometimes not replaced for many months and staff within the units having to manage competing demands from other donors, as well as other government demands. This was again particularly evident between midline and endline.

Although the project saw five different World Bank Task Team Leaders during the project, stability was provided by various World Bank consultants. Within the government, crucially the Deputy Director General and some other key government staff were involved in the project from initiation through to completion.

Part Five: Conclusion

Overall, the results support the conclusion that both the Community Child Development Groups and the Multi-Age Teaching modalities greatly increased access and attendance of 3- to 4-year-old children in early childhood education. Moreover, this increased attendance was associated with enhanced child development and learning outcomes. Both ECE modalities will support Lao PDR to reach SDG target 4.2: by 2030 ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education.

When comparing the impact of CCDGs to MAT, CCDGs produced slightly better outcomes than MAT. Interestingly, CCDGs seemed to particularly support children of ethnic minority backgrounds. This may be due to CCDG facilitators being recruited from the local community and thus able to speak the local language and potentially are more connected with the community. Quality measures showed little difference between the different early childhood education modalities, despite the formal training of MAT teachers. While undramatic, better quality was associated with slightly higher child development outcomes.

Changes in the home environments to support early child health, development and early education were found over the period of these studies. In both CCDG and MAT communities caregivers increased various activities to support their children in the early years and this included; reading books, singing and dancing with their children, telling stories, drawing and playing. The prevalence of these activities in the home were higher in communities with some form of early childhood education than in communities with no ECE. Unfortunately, the Community Awareness Campaign showed no impact on caregiver interactions to support child development and learning, or indeed basic knowledge around child health and safety.

Taken all together, these results support the scale-up of either CCDG and/or MAT. Although the initial costs of the CCDGs are higher (i.e., the building of a new hut within a primary school) the running costs of CCDGs are lower, with CCDG facilitators receiving lower salary levels than the formally trained MAT teachers. MAT may be considered a quicker and easier solution to increasing children's access to ECE using resources already available (i.e., an existing pre-primary class and an existing pre-primary teacher). However, it is important to understand how the different modalities supported children of different ages and of different ethnic backgrounds. The results indicate that 3 – 4-year-old children were better supported by the CCDG modality in comparison to MAT. Additionally, children from ethnic minority groups were also better supported by CCDGs in comparison to MAT. Considering CCDGs were specifically designated to support children under the age of 5 years and that facilitators were recruited from the local community these results are perhaps unsurprising. Further, during field visits, MAT teachers reported having difficulty managing children across the wide developmental range of children aged from 3 through to 5, and that the learning practices/pedagogy needed for 3- to 4-year-old children (i.e. mainly play based) was very different to how they had been trained to deliver primary education for children aged from 5 years and older.

When investigating children's various ECE pathways, results indicated that children who attended playgroups only, pre-primary only or a combination of playgroup and pre-primary education resulted in consistent, positive outcomes across a range of child development and learning outcomes. Many communities in Lao currently have no early childhood education service at all. As the government expands ECE services into such green-field communities, especially if these villages are of high ethnic diversity, an informal community run CCDG with initial set-up and training investment from the government may be considered a viable option, with likely positive outcomes for increased access, attendance and readiness for primary school.

Lastly it is important to note that the results found at endline were not as positive as those at midline. Though it is unclear exactly why this was the case, there were a number of implementation delays, including reduced training, monitoring, and general oversight from the central government during this time. Monitoring data collected by Indochina Research as well as findings from supervision missions over this time period also indicated lack of payments to CCDG facilitators and VEDC heads, a lack of resources (activities, play equipment, toy libraries) and a lack of refresher trainings. These findings are important to consider as Lao PDR continues to scale-up early childhood education. It is essential that central organisational capacity is adequately resourced to support a quality national early childhood education system.

References

- Bader, C., Bieri, S., Wiesmann, U., & Heinemann, A. (2017). Is Economic Growth Increasing Disparities? A Multidimensional Analysis of Poverty in the Lao PDR between 2003 and 2013. *The Journal of Development Studies*, 53(12), 2067-2085. doi:10.1080/00220388.2016.1251587
- Daelmans, B., Darmstadt, G. L., Lombardi, J., Black, M. M., Britto, P. R., Lye, S., . . . Richter, L. M. (2017). Early childhood development: the foundation of sustainable development. *Lancet*, 389(10064), 9-11. doi:10.1016/s0140-6736(16)31659-2
- Engle, P. L., Fernald, L. C. H., Alderman, H., Behrman, J., O'Gara, C., Yousafzai, A., . . . Iltus, S. (2011). Strategies for reducing inequalities and improving developmental outcomes for young children in low-income and middle-income countries. *Lancet*, 378(9799), 1339-1353. doi:10.1016/S0140-6736(11)60889-1
- Heckman, J. J. (2006). Skill Formation and the Economics of Investing in Disadvantaged Children. *Science*, 312(5782), 1900. doi:10.1126/science.1128898
- Hertzman, C., & Boyce, T. (2010). How experience gets under the skin to create gradients in developmental health. *Annu Rev Public Health*, 31, 329-347. doi:10.1146/annurev.publhealth.012809.103538
- Permanent Mission of the Lao People's Democratic Republic to the United Nations. (2021, February 26). *Lao PDR is recommended to graduate in 2026 from the Least Developed Country Category with an extended preparatory period*. <https://www.un.int/lao/news/lao-pdr-recommended-graduate-2026-least-developed-country-category-extended-preparatory-period>
- Razzaque MA, Tateno Y. Asia-Pacific Least Developed Countries: A Review of Implementation of the Istanbul Programme of Action and Way Forward. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific; 2021.
- United Nations (2015). *Transforming our world: The 2030 agenda for sustainable development*. New York City: United Nations
- Warr, P., Rasphone, S., & Menon, J. (2015). Two Decades of Rising Inequality and Declining Poverty in the Lao People's Democratic Republic. *SSRN Electronic Journal*. doi:10.2139/ssrn.2709320
- World Bank. (2014). *Lao People's Democratic Republic - Early Childhood Education Project*. Washington DC: World Bank Group

Appendices

Appendix 1. Measurement tools

Two tools were used to measure children's development as described below. Further details about the items in instruments and their use in Laos to date can be found in the midline snapshot reports published online.

- The **early Human Capability Index (eHCI)** was used to assess children's abilities through caretaker report. The eHCI was designed to measure the holistic development of young children at a population level and has been utilised in many countries with proven reliability and validity ([The Early Human Capability Index \(eHCI\) \(telethonkids.org.au\)](http://telethonkids.org.au)). The 56-item Laos version of the eHCI captures children's abilities across seven domains including verbal communication, cultural knowledge, social and emotional skills, perseverance, approaches to learning, reading, writing and numeracy. Items are dichotomous with yes/no response options. Scores on each domain as well as an overall development score were derived, ranging from 0 to 1, where 1 represents better development.
- The **Measurement of Development and Early Learning (MODEL)** was used to directly assess children's skills and capabilities. The MODEL was designed to facilitate population-level measurement of the development and learning of children aged 3-7 years and has previously been used in other developing countries such as Bangladesh and Mongolia ([MELQO Portal | ECD Measure](#)). The Laos version of the MODEL comprised 18 tasks and measured children's abilities in three domains: numeracy skills and numerical concepts, literacy skills and familiarity with print, and executive function. A trained enumerator used the MODEL instrument to assess each child one-on-one. For some tasks in the MODEL that involved multiple questions, an average score was derived ranging from 0 to 1, where 1 was the best score. For other tasks a single score was given, where 0 represented non-completion of the task and 1 represented completion of the task.

Finally, the **Measuring Early Learning Environment (MELE)** was used to measure quality of ECE environments. The MELE was designed to measure a range of constructs related to the quality of early learning environments and to identify areas in which support might be beneficial, such as providing teachers with more training and support for interacting with young children, or ensuring that classrooms are equipped with high-quality, age-appropriate learning materials for all children. The MELE has undergone field testing in various developing countries including Colombia, Nicaragua, and Tanzania ([MELQO Portal | ECD Measure](#)). The MELE was adapted for use in Laos and first implemented during the project's endline data collection. The tool measured four aspects of classroom quality

considered important to children's experiences of early learning environments: learning activities; classroom interactions and approaches to learning; classroom arrangement, space, and materials; and facilities and safety. The MELE was administered by trained enumerators who conducted classroom observations over a two-hour period and used a rubric to score the classroom's quality on each of the four MELE domains. Scores on each quality domain ranged from 0 to 1, with 1 representing high quality.

Appendix 2. Fieldwork procedures

Indochina Research Limited (IRL), an experienced local research organisation, undertook data collection. The data collection team consisted of a survey director who was responsible for overall design and implementation of the project, a project manager who developed the operational plan and oversaw quality control, a fieldwork manager who facilitated training of team leaders and enumerators, a database manager, three quality control supervisors, 20 enumerator team leaders, 20 team assistants, and 80 enumerators who administered the questionnaires.

Training of the fieldwork team was conducted in two stages in January to February 2020. First, the fieldwork manager, team leaders, and team assistants were trained to ensure they all had a thorough understanding of the research instruments and fieldwork protocols. Following this, enumerator training, facilitated by the fieldwork manager, was conducted over a period of 10 days. Training involved discussion of data collection objectives, the fieldwork and logistic plan, comprehensive explanation of the questionnaires, and practice trials of administering the questionnaires in the field where tailored feedback was given. After completion of the training, enumerators were assessed, and the 80 most competent enumerators were selected to be involved in endline data collection.

The Ministry of Education and Sports (MoES) in Lao PDR sent authorisation letters to target provinces and districts in advance, to notify them of the project and data collection activities. IRL staff coordinated with provincial education officers and district officials to develop a logistical plan for data collection in all target villages. Based on this plan, district officials coordinated with village heads regarding the date of data collection in each village, who in turn notified target households.

Each fieldwork team consisted of a team leader, assistant, and four enumerators. For Cohort 1, data collection sought to include as many children from midline as possible. For Cohort 2, the same process as the baseline collection was used in which 20 children from each village were randomly selected from village lists held and maintained by the Village Head. In villages with less than 20 children, all children within the eligible age range were assessed. The eHCI was conducted with caretakers, and the MODEL was conducted with children in a one-on-one format either while the child was at home or at school. Whilst caretakers or teachers were often present during the MODEL questionnaire, they were asked not to guide children in their responses. Enumerators framed the MODEL questionnaire as a game to make children feel more comfortable with the assessment. Classroom observations using the MELE were conducted in CCDG, MAT and Pre-Primary classrooms.

Numerous quality control measures were implemented as part of the endline data collection. Team leaders randomly observed 10% of each enumerator's assessments, and randomly checked 30% of each enumerator's completed instruments to ensure accuracy. All completed questionnaires were uploaded to the server from the tablets on a daily basis, which allowed the quality control team in

IRL's offices to continuously examine the data for quality and report any discrepancies back to the fieldwork team so that issues could quickly be addressed.

Fieldwork took place throughout February and March 2020. On the 17th of March there was an announcement to close pre-primary and primary schools across the country due to the COVID-19 pandemic. At this stage, data collection had not yet been complete. IRL negotiated with district officials to continue data collection, particularly in CCDG and MAT communities, operating under careful instructions to maintain safety. As a result, all target schools were reached. Overall, data were collected in 378 villages (two villages were subdivided during the study period) across 14 districts in the five project provinces in Northern Laos. A total of 11,793 households, 13,909 caretakers, and 14,045 children participated in data collection. Observations were conducted in a total of 177 classrooms.

Lao PDR Reading Readiness Program

Final Impact Report

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Most instruments/measures used for this impact evaluation were the same as those for the Early Childhood Education Program Impact Evaluations with adaptation considering the age of the children and the intent of the program (i.e., specifically focused on pre-literacy and literacy skills). These adaptations were made with technical advice provided by Dr Souhila Messaoud-Galusi. Initial training materials and external independent supervision and quality control was provided by Prof Brinkman, Ms Alanna Sincovich and Ms Ms Thanapha Naovalath. Mr Benjamin Lam has undertaken the analyses within this report with support from Sincovich and Brinkman. Prof Brinkman wrote this report with support from Mr Lam.

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Abbreviations

ECE Early Childhood Education

eHCI early Human Capability Index

EMIS Education Management Information System

GPE Global Practice for Education

KG Kindergarten

MELE Measuring Early Learning Environment

MODEL Measurement of Development and Early Learning

MoES Ministry of Education and Sport

PDR People's Democratic Republic

PP Pre-Primary

RIES Research Institute for Educational Science

RRP Reading Readiness Program

SD Standard Deviation

SDG Sustainable Development Goals

Executive summary

Introduction

The Reading Readiness Project aimed to improve children's learning and development through an intervention designed to complement existing teaching curriculum in kindergarten and pre-primary classrooms. The intervention enhanced children's exposure to Laotian language, aiming to improve skills in early language and literacy; vocabulary, print knowledge, phonological awareness, writing and narrative skills through a classroom based, 32-week program that involved repeated readings of eight commercial grade storybooks.

Method

The study was a clustered randomised control trial utilising the Early Human Capability Index (eHCI) and the Measurement of Development and Early Learning (MODEL) instruments to measure child development outcomes comparing control and intervention groups. There were significant implementation issues resulting from the COVID 19 pandemic, procurement, and fieldwork interruptions, as such the original sample was supplemented by the addition of a separate cohort being utilised to help capture the intervention effect.

Results summary

Amongst both cohorts, minimal impact was observed between control and intervention, likely due to the problems in program implementation. Nonetheless, limited improvement in listening comprehension and sound discrimination were observed. The largest improvements were found within sub-group analysis of ethnicity, socio-economic position, and parenting style. Children from disadvantaged environments were more likely to show improvement with the RRP intervention.

Key learnings and recommendations

Even with significant implementation issues likely inhibiting the true effect of the RRP, the resultant improvement for children from disadvantaged backgrounds justifies continued expansion of similar programs across Lao PDR. Due to the high linguistic and ethnic diversity within the country, a significant portion of children do not speak Lao as their primary language and are thus at a disadvantage for the rest of their schooling career. Programs such as the RRP will be vital to ensure these children receive the necessary foundational skills to be successful in the future.

Introduction

Background and Objectives

Improving access to quality education is essential for promoting children's learning and development, reducing poverty, and promoting shared economic prosperity in Lao People's Democratic Republic (PDR). Despite significant progress over the past decade, primary school enrolment rates as well as dropout rates in early grades are high. Further, for those children who stay in school, learning outcomes at the end of primary education are low. The Government of Lao PDR has recognised quality education for all as fundamental in promoting better learning outcomes for children. The Second Global Partnership for Education Project (GPE II), financed by a grant totalling US\$ 16.8 million, aimed to improve pre-primary and primary education quality in Lao PDR (1). Specifically, the project aimed to provide additional funding at the school, district, and provincial levels, as well as support early literacy through improved teaching practices, instructional resources, and analytical products. The project included three components:

- **Component One:** Strengthening school-based management, by funding complementary School Block Grants at the school level, operating costs at district and provincial levels, and building capacity at all levels to manage these resources effectively.
- **Component Two:** Improving reading outcomes and assessment capacity, through the development, piloting and evaluation of a new approach to reading instruction for children in kindergarten and pre-primary classes (children aged 5 years).
- **Component Three:** Project Management and Monitoring and Evaluation

The Reading Readiness Program (RRP) formed the second component of GPEII and it is the impact of this program that is the subject of this report. The RRP was implemented across five provinces in Northern Lao PDR: Phongsaly, Oudomxay, Houaphanh, Sayaboury, and Bolikhamxay). The program targeted 127 pre-primary teachers in 120 schools (within 120 villages) across the five provinces to undergo training and receive materials to allow them to teach reading readiness content.

Methods

Trial Design

The impact evaluation was designed as a pragmatic, clustered (by school) randomised control trial. The trial was pragmatic in the sense that it was delivered by existing teachers within existing pre-primary and kindergarten classes within the standard education service system in Lao PDR. As the intervention was targeted at teachers a school based clustered trial design was employed to reduce the risk of contamination. Schools were allocated 1:1 to the intervention and control arms.

Participants

Primary schools were considered eligible for the intervention if they were located within 5 provinces in northern Lao PDR (Phongsaly, Oudomxay, Houaphanh, Sayaboury, and Bolikhamxay) *and* if they had 20 or more children aged 5 *and* if they had a pre-primary or a kindergarten class *and* if they were not already part of the Early Childhood Education Impact Evaluation operating at the same time in three of the same provinces. Originally the intention was for the Reading Readiness program to follow on from the Early Childhood Education program (i.e., children would progress from the ECE program into the RRP program), however due to delays in the endline for the ECE impact evaluation it was deemed necessary to keep the impact evaluations separated so impact could be correctly attributed to the two separate programs.

Administrative data was provided by the Government from their Education Management Information System to coordinate randomisation. The spreadsheet included province, district, village and school code, and number of children by class (Pre-Primary, Kindergarten, Grade1, Grade 2 etc). The data set was used to select all eligible primary schools.

At a school level, class lists were used to randomly select 20 children aged 5 years of age attending either a pre-primary or kindergarten class. More information on the data collection, including sample size calculations, randomisation schedules, and fieldwork considerations are available in the annex.

Intervention details - Reading Readiness Program

The RRP pilot was designed to complement the existing curriculum in kindergarten and pre-primary classrooms, targeting the development of skills in five areas of early language and literacy; vocabulary, print knowledge, phonological awareness, writing and narrative skills. These skills are aligned to curriculum in the kindergarten, pre-primary and primary grades, and together, they form the foundation children need to build later academic proficiency.

Implementation of the RRP involved approximately 50 minutes of instructional time per week over a 32-week period. The program is implemented using two whole-class teacher-led book-reading sessions per week. In total, eight commercial-grade storybooks are used throughout the program so that the same books are read multiple times. Repeated reading of these books provides the opportunity to deepen children's understanding of key content in the books, including story structure, vocabulary words, and background concepts. The program enables ongoing monitoring via a simple checklist through which the teacher can monitor individual children's progress towards key objectives. The RRP is further supported by literacy coaches who visit and support teachers once a month. Coaching sessions are unstructured and not focused simply on assessing fidelity of implementation. Rather, the coaching component was designed to help teachers implement lessons with their students, model specific teaching strategies (e.g., open-ended questions, scaffolding), and debrief to reflect and identify next instructional steps.

The RRP program was enhanced between 2019 and 2020, with changes in the teaching content linked to different story books. Further there was a greater emphasis on teachers supporting children from non-Lao speaking backgrounds and/or have hearing or sight difficulties. Teachers were originally trained in the RRP in August 2019 and then received refresher training in August 2020. Part of the RRP included coaches which were to visit and observe teachers practices and then provide professional development and support. Resources (story books, teacher guides etc) were updated in early 2020 but not received in the schools until December 2020.

Outcomes and Measures

The impact evaluation employed four measures to assess effects of the program for both children and teachers. Information on children's early literacy skills were measured using two tools adapted for use within the Lao PDR context, providing both a caregiver report as well as a direct assessment a of children's reading readiness.

- The **early Human Capability Index (eHCI)** assessed children's development via primary caregiver report. The eHCI includes approximately 60 items, is quick and simple to complete, and captures the holistic development of children aged 2-6 years including communication skills, cultural knowledge, social and emotional skills, perseverance, approaches to learning, literacy, and numeracy skills. The tool has been used for population monitoring and program evaluation in more than 10 diverse country contexts (2-4) and was locally adapted for use in Lao PDR as part of the Early Childhood Education Project Impact Evaluation. As the RRP is focused on improving children's literacy skills, findings presented in this report are focused on the two literacy domains measured by the eHCI; reading and writing. Domain scores range from 0 to 1, with higher scores indicating better development.
- The **Measurement of Development and Early Learning (MODEL)**, developed by the Measuring Early Learning Quality & Outcomes (MELQO) initiative (5), was used to directly assess children's abilities. Designed to measure the development and learning of children aged 3-7 years, an enumerator used the tool to assess each child on a number of interactive tasks, measuring their early literacy, numeracy, and executive function. The MODEL also underwent local adaptation processes as part of the Early Childhood Education Project. Results presented in this report are focused on aspects of children's literacy skills assessed including familiarity with print, initial sound discrimination, initial sound identification, letter identification, and listening comprehension. Domain scores range from 0 to 1, with higher scores indicating better development.

Data collection also sought to capture teacher characteristics that are important in the context of implementing and then determining the effectiveness of a new program. Two scales that were adapted from previously conducted research were used to measure Teacher Self-Efficacy (6) and Teacher Openness to Change (7).

Trial Implementation and Implementation Challenges

Being a pragmatic clustered trial and the nature of the intervention it was not possible to blind those schools allocated to the intervention after the randomisation process (which was blinded). Further the funding available to the program meant 127 schools were to actually receive the intervention. Those schools not allocated to the 160 assigned to the impact evaluation were provided to the government along with the list of 80 schools allocated to the intervention arm. The government then commenced implementation in the 80 schools plus an additional 47 schools.

Data collection was contracted by the government to Indochina Research Pty Ltd. Baseline data collection was planned to begin from July 2019, with the original implementation of RRP lasting for 32 weeks (a full school year) until May 2020 when endline data was to occur. Unfortunately, due to significant procurement delays, baseline data collection didn't commence until 2-3 months after the program had actually commenced. Teachers were trained prior to school commencing (in July/August) and then the new school year started in September 2019. Baseline data collection actually occurred from November to December 2019. Endline data collection was to occur in April-May 2020, however school shutdowns due to the COVID19 pandemic meant data collection could not occur.

Impact of COVID

The impacts attributed to the COVID-19 pandemic included students reduced exposure to the program and major changes in the schedule for data collection. Schools were closed in March 2020 and travel within Lao was restricted. Students were exposed for approximately 22 weeks to the RRP (instead of at least 32 as originally planned). Further, endline data collection in April-May 2020 had to be cancelled. Note that the Laotian school year runs from September through to May with 33 weeks of teaching.

Due to both the impact of school closures because of the COVID 19 pandemic and enhancements made to the RRP program (detailed below), it was decided to enrol a second (new) cohort of students into the trial. As such, students entering Pre-primary/Kindergarten in the new school year in September 2020 would be entered into the study within the same randomised schools. Funding extensions for the program implementation and the research were negotiated, however data completion and initial reporting of trial results could only be extended to June 2021. As such, plans were made to conduct the baseline for cohort 2 in September 2020 and endline data collection in May 2021. At the same time as baseline for Cohort 1, the endline for cohort 2 was to be conducted (with these students moving into Grade 1).

Unfortunately, the variations in the terms of the contract between the government and Indochina Research were considered large (i.e., although the same study design and the same schools, essentially recruiting a second cohort meant an increase in costs, as well as an extension of time). An argument had to be mounted within the government to vary the existing contract rather than tendering a new contract (tendering processes often take more than 9 months in Lao). Although successful in gaining agreement for a contract variation (rather than a new tender), these procurement negotiations meant that the endline for Cohort 1 and the "baseline" for Cohort 2 did not commence until December 2020. At this stage "baseline" for cohort 2 was essentially considered irrelevant, but any further changes to the contract risked further delays in any fieldwork being undertaken at all. As such, cohort 1 captured from November 2019 (baseline) to December 2020 (endline), and cohort 2 captured from December 2020 (baseline) to April-May 2021 (endline).

As the Laotian school year only lasts for 33 weeks of the year from early September to late May, expectation of successful implementation within the first cohort was low as for much of that time the children would not have been in class due to COVID restrictions. Similarly, the time frame from cohort 2 baseline to endline was short (5 months), which did not allow us to measure the full completion of the program.

For further context, it's important to note that the "rainy season" from April to August is time where many rural and remote villages in the north of Lao are completely cut off due to roads and bridges being impassable. Thus, data collection can not occur during these months, further restricting the range of options available for the conduct of baseline and endline.

The following figure compares the planned schedule of the impact evaluation, compared to the actual schedule.

Planned versus actual project implementation schedule

PLANED

2019 cohort	RRP Implemented (7-8 months exposure)									
Data collection	Baseline								Endline	
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
	2019					2020				

ACTUAL

2019 cohort	RRP Implemented							School closure (COVID 19 lockdown)			School holidays		>> Children transition to year 1										
Data collection				Baseline														Endline					
2020 cohort													RRP (version 2) implemented										
Data collection																		Baseline				Endline	
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
	2019					2020												2021					

Results

Sample

Cohort 1

Data was successfully collected from 120 schools with 2 schools replaced from the “back-up” lists. One, as the teacher was on maternity leave and the class wasn’t operating and second, as there were only 12 children in the class. For baseline cohort 1:

- 2,270 household surveys conducted
- 2,284 primary caregiver surveys conducted
- 2,387 child direct assessments were completed
- 184 kindergarten and pre-primary teachers interviewed and
- 139 kindergarten and pre-primary classrooms were observed

Out of 120 communities, 55 required local translators to help the survey administration. These communities were mainly of Hmong background. Note that more children were assessed than household and caretaker surveys completed. In these circumstances consent from the family to be included in the study could not be assumed. As such these students were excluded from the analyses.

In many schools the number of 5 year old students in a pre-primary class or kindergarten did not reach the 20 children as indicated by the EMIS. Further it was indicated early that the 20 “back-up” list was not going to be enough for replacements. As such, Indochina Research included children aged 4 attending the Pre-Primary or Kindergarten class in the data collection. (Note that children aged 4 are officially ineligible to attend PP or the final year of Kindergarten – however at a local level this criterion is often ignored allowing parents to work in the fields while their children attend school – these children do not always participate fully in class activities depending on the teacher’s class management).

At endline, all 120 schools were followed up. At the child level, of the original sample, 2,162 students were able to be followed. Loss to follow-up was mainly due to children having moved from the village, attending a different school, or the child had died or was very sick.

Cohort 2

Baseline for cohort 2 achieved:

- 2,038 household surveys conducted
- 2,117 primary caregiver surveys conducted
- 2,207 child direct assessments were completed
- 212 kindergarten and pre-primary teachers interviewed (previous teachers plus any new teachers) and
- 139 kindergarten and pre-primary classrooms were observed

At endline all students were successfully followed up, however many surveys and direct assessments were done in the home rather than the school as many students had either dropped out of school and were working in the field with their family or were scared to attend school as due to COVID Protocols the Police accompanied Indochina Research to observe their COVID 19 safety practices in the schools.

Eleven teachers could not be followed up as they were on maternity leave, had left the village or had chosen not to run their class due to COVID 19 fears.

Baseline Child and caregiver level demographics

Demographics at the child level at baseline show an even split between male and female, with a majority of the children being 5 years old. Note that the age of cohort 2 baseline was older than cohort 1 as it was conducted later in the school year. This has implications for comparisons of results as in general children will do better on all the developmental and learning outcomes as they age and are in school for longer (independent of the RRP). Also due to the intervention operating for at least 3 months prior to baseline the impact of the program is likely to be underestimated. Child ethnicity was largely non-Lao-Tai.

Table 20: Baseline child demographics

		Cohort 1		Cohort 2	
		N	%	N	%
Child gender	Female	934	49.6	880	51.4
	Male	951	51.4	833	48.6
Child age	4 years	404	21.4	95	5.6
	5 years	1,481	78.6	1,618	94.4
Child ethnicity	Lao-Tai	950	51.1	934	57.4
	Khmun	279	15.0	227	14.0
	Hmong	402	21.6	321	19.7
	Other	228	12.3	145	8.9

Table 21: Baseline Caregiver demographics

		Cohort 1		Cohort 2	
Primary Caregiver		N	%	N	%
Relationship to Child	Mother	1,411	72.8	1,169	65.9
	Father	281	14.5	407	23
	Grandparent	206	10.6	157	8.9
	Uncle/Aunt	30	1.6	34	1.9
	Sibling	10	0.5	6	0.3

Highest level of education	No formal schooling	460	24.0	297	17.4
	Primary School	567	29.6	587	34.4
	Secondary School	413	21.6	322	18.9
	High School	181	9.5	164	9.6
	Vocational Training	190	9.9	228	13.4
	Bachelor Degree	96	5.0	100	5.9
	Master/PhD	4	0.2	3	0.2
Employment Status	Yes	1,614	84.2	1,484	87
	Primary Caretaker	263	13.7	190	11.1
	Retired	3	0.2	6	0.4
	Unemployed	34	1.8	24	1.4
Literacy	Can read well	1,257	64.9	1,244	70.2
		Mean	SD	Mean	SD
Age	Years	33.6	10.0	33.5	9.2

Caregivers were predominantly the biological mother or father of the child and although at least 65% could read over 50% had either no school at all or only primary education.

Baseline Teacher level demographics and characteristics

A core part of the GPE II investment was not just to improve children's development and learning, but to also improve the infrastructure and practices of the system. As such, the ability for teachers to adapt and apply new techniques was paramount to the successful implementation of the RRP. Intervention group teachers were surveyed at all time points to measure their openness to change and self-efficacy as well as basic demographic information. At baseline a total of 184 teachers at RRP schools were surveyed. An overwhelming majority were female, all had at least some form of vocational training. Most spoke Lao as their primary language. Years of teaching experience was highly variable. Openness to change and Self Efficacy were relatively high.

Table 22: Baseline teacher demographics

		N	%
Teacher gender	Female	183	99.5
	Male	1	0.5
Highest level of education	Vocational training	72	39.1
	Diploma	107	58.2
	Bachelor degree or higher	5	2.7
Mother Tongue	Lao	120	65.2
	Tai	8	4.4
	Keummu	17	9.2
	Arka	1	0.5
	Mhong	8	4.4
	Other	30	16.3
		Mean	SD
Years of teaching experience	KG/PP	8.1	5.8
Openness to change	0-1 score	0.7	0.1
Self Efficacy	0-1 score	0.7	0.1

Analytical approach to the two samples

Due to the unforeseen study implementation problems students in Cohort 2 had considerably less exposure to the RRP than Cohort 1 (, however Cohort 1 also had problems with overlapping school years and COVID-19 lockdowns impacting school learning. Further, as those that were implementing the program believed that there had been significant enhancements to the program the two cohorts were not pooled but analysed separately.

Longitudinal data was modelled using hierarchical linear mixed models with random effects on hierarchies of school and child adjusting for data wave, age, gender, and ethnicity with an identity covariance structure due to the single follow-up design.

Furthermore, Teacher survey data was collected at all three collection timepoints allowing the longitudinal assessment of teacher self-efficacy and openness to change throughout the entire study timeline.

Cohort 1 Baseline to Endline

This first table simply shows the scores at baseline on the primary outcome variable for the whole samples (i.e., not separated by the intervention or non intervention grouping). This table is presented to identify that the baseline scores for cohort 2 were generally higher than for cohort 1. Noting that all scores range from 0 through to 1 (with 1 being the best and maximum score) the most pronounced difference was on the letter identification outcome with an average score of 0.3 at baseline for Cohort 1 and 0.8 for baseline Cohort 3. As mentioned above this may already be considered an impact of the RRP program considering the program had commenced 3 months prior to baseline, however scores were higher at baseline in both the intervention and control communities perhaps also indicating some sort of cohort effect. This is further discussed in some of the following sections.

Table 23: Baseline primary outcome values for cohort 1 and 2

		Cohort 1		Cohort 2	
		Mean	SD	Mean	SD
Directly assessed early literacy development	Print Familiarity	0.3	0.2	0.3	0.2
	Sound Discrimination	0.04	0.1	0.07	0.2
	Sound Identification	0.1	0.2	0.2	0.3
	Letter Identification	0.3	0.3	0.8	0.2
	Listening Comprehension	0.3	0.3	0.4	0.4
Caregiver reported early literacy development	Reading	0.5	0.3	0.5	0.3
	Writing	0.5	0.3	0.6	0.3

Table 5 below shows the mean change in the direct assessment outcomes and the parent response eHCI scores from control to intervention and from baseline to endline modelled using hierarchical mixed models. As we are following the same children from baseline to endline the expected growth from baseline to endline is present in the results and quantified by mean difference from Baseline to Endline. Between the RRP intervention and control we see that there is small effect of the intervention for Listening Comprehension (Mean increase of 0.05, 95% CI 0.003 to 0.1), Sound Discrimination (0.03, 95% CI 0.0004 to 0.05), Print Familiarity (0.05, 95% CI 0.02 to 0.09). If we look at the mean bar graphs showing the same outcomes between data waves and interventions in figure 1 we do note that there is a tendency toward RRP having higher scores at endline however aside from these three measures the model is unable to detect these difference in a majority of the outcomes after adjusting for baseline covariates and demographic information.

Table 24: Mean change in the primary outcome variables from baseline to endline with the control arm of the intervention as the reference Cohort 1

Listening Comprehension, n=3,399			
Control	ref	Baseline	ref
RRP	0.05 (0.003 to 0.1)	Endline	0.2 (0.1 to 0.2)
Letter Identification, n=3,006*			
Control	ref	Baseline	ref
RRP	0.03 (-0.03 to 0.08)	Endline	0.4 (0.4 to 0.5)
Sound Discrimination, n=3,399			
Control	ref	Baseline	ref
RRP	0.03 (0.0004 to 0.05)	Endline	0.07 (0.05 to 0.10)
Sound Identification, n=2,905*			
Control	ref	Baseline	ref
RRP	0.04 (-0.001 to 0.08)	Endline	0.3 (0.2 to 0.3)
Print Familiarity, n=3,399			
Control	ref	Baseline	ref
RRP	0.05 (0.02 to 0.09)	Endline	0.1 (0.09 to 0.1)
Writing, n=3,399			
Control	ref	Baseline	ref

RRP	0.02 (-0.02 to 0.07)	Endline	0.3 (0.3 to 0.3)
Reading, n=3,399			
Control	ref	Baseline	ref
RRP	0.02 (-0.03 to 0.06)	Endline	0.3 (0.2 to 0.3)

*Sample size differ due to missing responses

Cohort 2 Baseline to Endline

Cohort 2 was modelled using the same methods as in Cohort 1. Again, we see the expected gains from baseline to endline in the Direct Assessment (DA) and eHCI measures, however we note that the increase is significantly smaller than that in Cohort 1 likely due to the timeframe of Cohort 2 exposure being half that of Cohort 1. Within figure 3 we see that the increases in eHCI and DA domains over time are evident, however the impact of RRP is not obvious. Within all measures we do see an increase in mean scores for the RRP group at endline, however we also observe a baseline imbalance generally favouring the RRP intervention. As the randomisation of RRP implementation in Cohort 1 and Cohort 2 are the same this imbalance is likely partially explained by the pre-existing randomisation within the community and the students longer exposure time to RRP prior to baseline. The eHCI domain of writing had a slight opposite effect where baseline was reasonably balanced but the RRP group had small gains at endline. Models of the outcomes showed point estimates favouring the intervention however only Print Familiarity saw a meaningful increase of 0.07 points (95%CI 0.04 to 0.1) with the RRP program. This was slightly higher than the increase seen in cohort 1 and in a shorter amount of time.

Table 25: Mean change in the primary outcome variables from baseline to endline with the control arm of the intervention as the reference Cohort 2

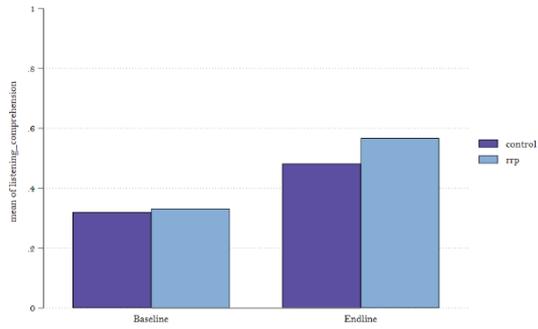
Listening Comprehension, n=3,008			
Control	ref	Baseline	ref
RRP	0.01 (-0.04 to 0.06)	Endline	0.09 (0.07 to 0.1)
Letter Identification, n=1,675			
Control	ref	Baseline	ref
RRP	0.002 (-0.03 to 0.04)	Endline	0.05 (0.04 to 0.06)
Sound Discrimination, n=3,008			
Control	ref	Baseline	ref
RRP	0.007 (-0.01 to 0.03)	Endline	0.02 (0.002 to 0.03)
Sound Identification, n=3,008			
Control	ref	Baseline	ref
RRP	0.05 (-0.005 to 0.10)	Endline	0.05 (0.03 to 0.08)
Print Familiarity, n=3,008			
Control	ref	Baseline	ref
RRP	0.07 (0.04 to 0.1)	Endline	0.02 (0.003 to 0.04)
Writing, n=3,008			
Control	ref	Baseline	ref

RRP	0.02 (-0.03 to 0.07)	Endline	0.06 (0.04 to 0.08)
Reading, n=3,008			
Control	ref	Baseline	ref
RRP	-0.002 (-0.06 to 0.05)	Endline	0.07 (0.05 to 0.09)

*Sample size differ due to missing responses

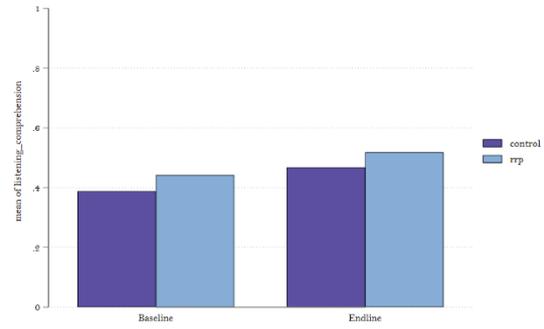
Cohort 1

Listening Comprehension by Data Wave

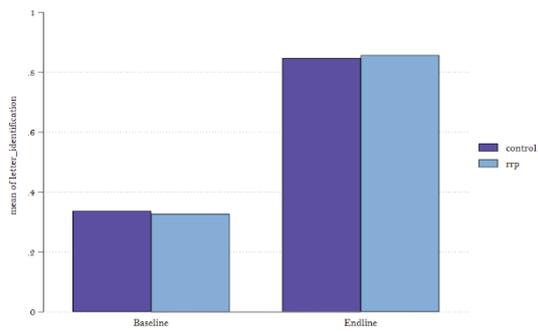


Cohort 2

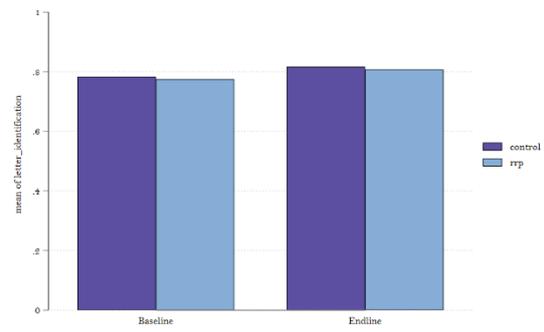
Listening Comprehension by Data Wave



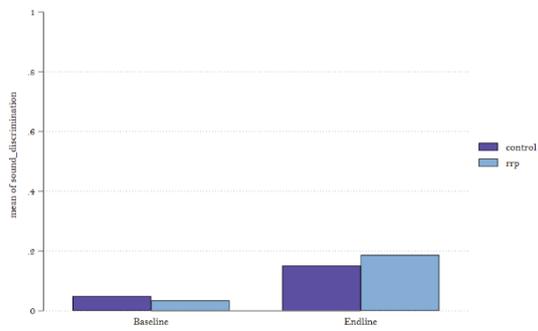
Letter Identification by Data Wave



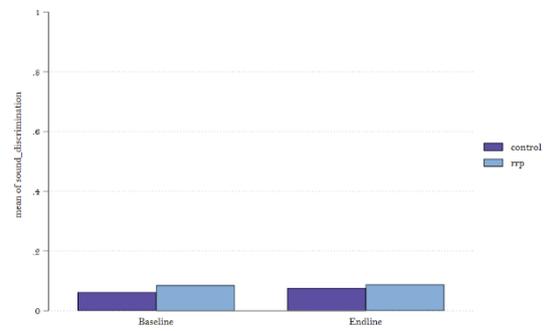
Letter Identification by Data Wave



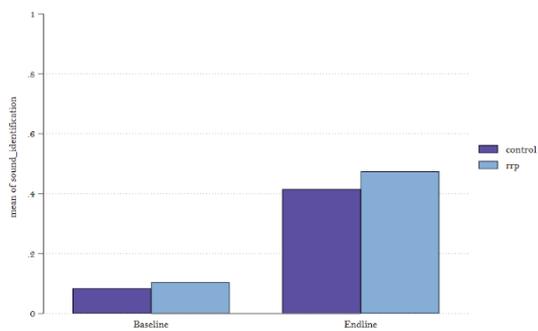
Sound Discrimination by Data Wave



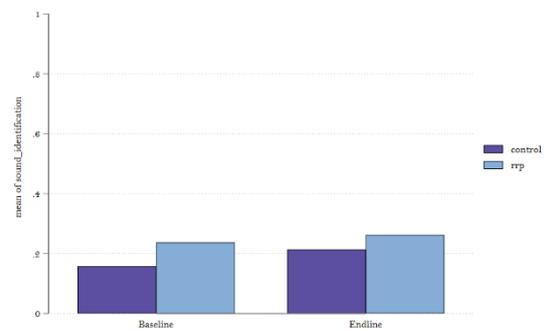
Sound Discrimination by Data Wave



Sound Identification by Data Wave



Sound Identification by Data Wave



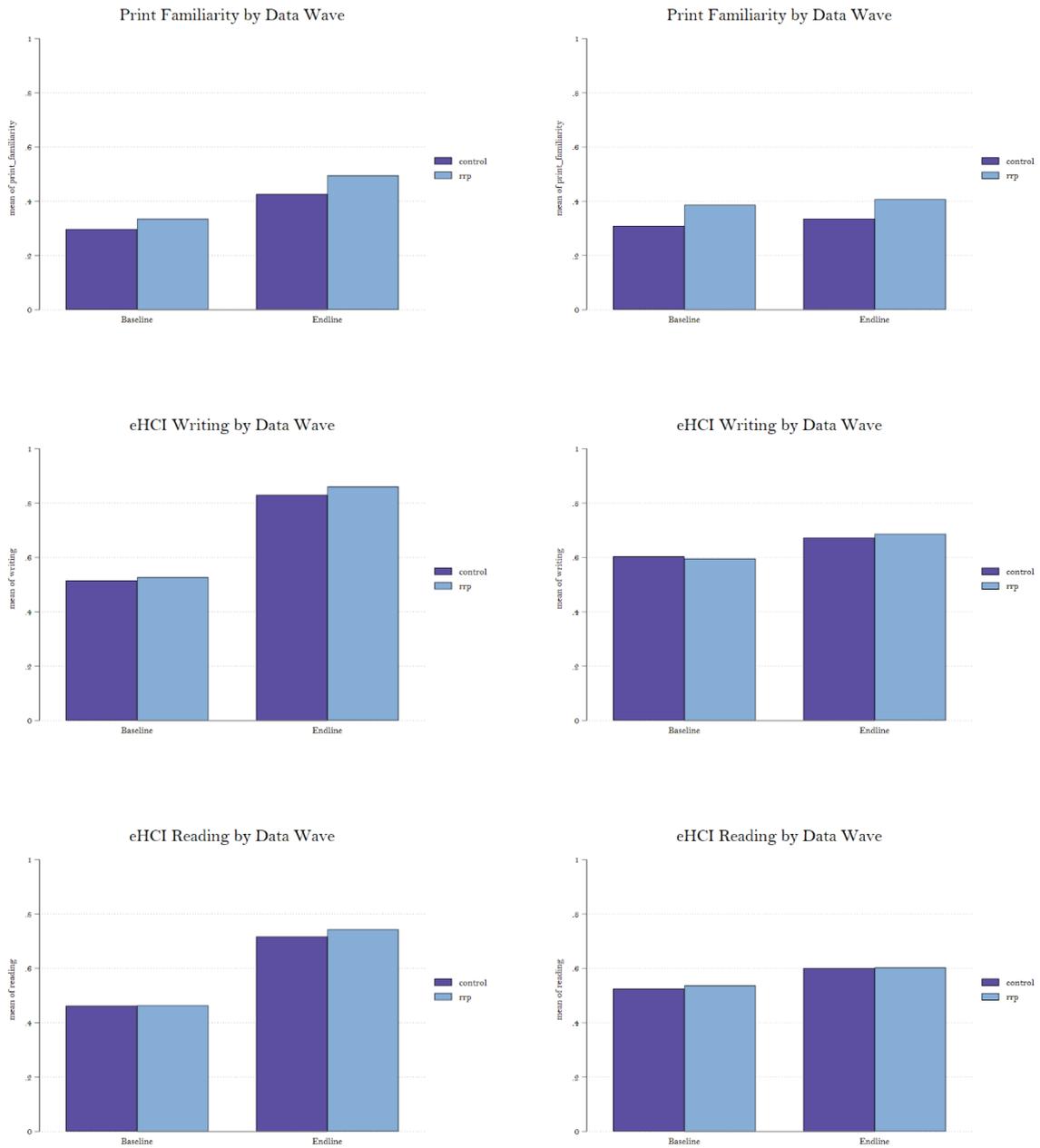


Figure 21: Comparison of means from baseline to endline by intervention arm. Graphs presented for Cohort 1 and 2. (graphs follow over 2 pages)

Overall, we see an improvement in all outcomes from baseline to midline, however only small additional benefit is gained by being in an RRP classroom for listening comprehension and sound discrimination.

Sub-group analyses (Gender, Caregivers, Ethnicity, Language)

A consistent theme within the Lao PDR context is the impact of ethnicity and language on educational outcomes. Laos is an ethnically diverse country and within our own sample only slightly more than half of the children (51% Cohort 1, 57% Cohort 2) were identified as ethnically Lao by their parents. This reflects the targeting of the program to northern Lao. The policy of the Lao PDR government is that school should be taught in the countries primary language Lao-Tai and thus the language of instruction even in early childhood education settings is Lao-Tai. As such, all materials and lessons of the RRP were focused on improving Laotian literacy, with a particular focus on supporting children of ethnic diversity.

In the previous sections we found that the strongest effect of the RRP was seen in listening comprehension and sound discrimination within Cohort 1. We now further investigate these improvements by ethnic background. The graph below (Figure 2) compares four categories of ethnicity, at baseline and endline between control and RRP intervention. Encouragingly we see that for ethnic groups other than Lao-Tai there is a strong increase in mean listening comprehension scores for RRP recipients. This pattern is reflected in other outcome measures within cohort 1 where ethnic groups other than Lao-Tai do better with the RRP program. This is a very positive result which indicates that the RRP has efficacy in preparing non-native Lao-Tai speakers for school where schooling will predominantly be in Laotian.

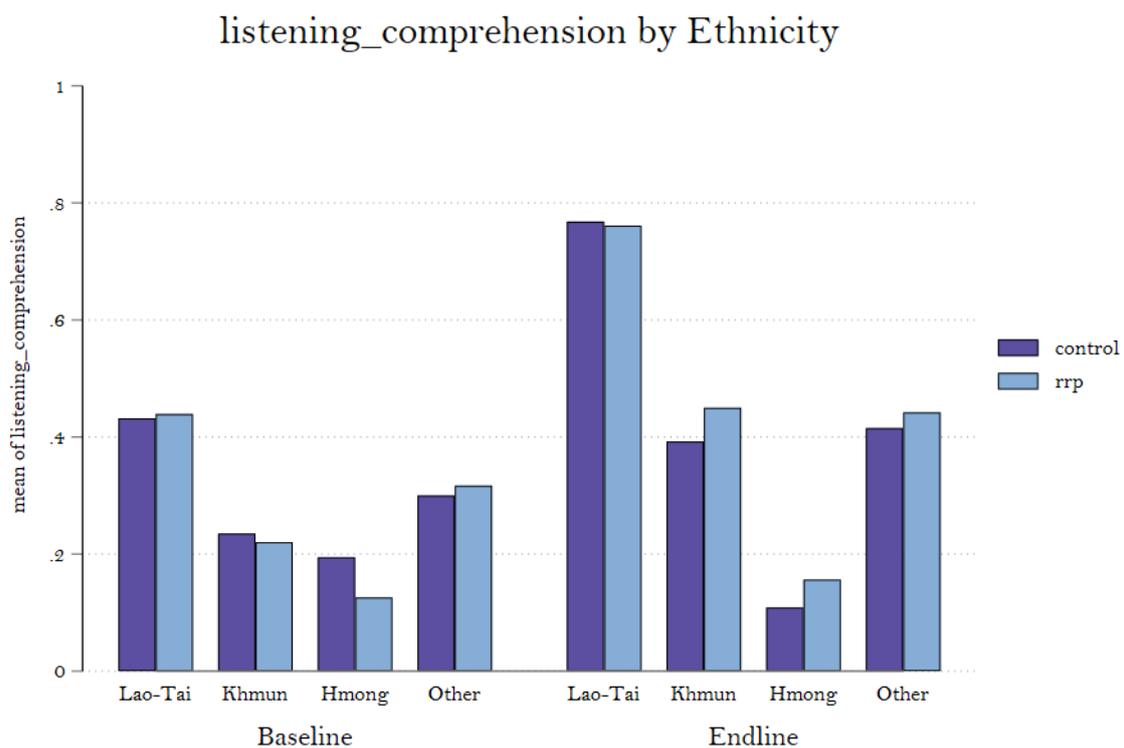


Figure 22: Changes in listening comprehension by ethnic background for Cohort 1

In previous reports of the Lao PDR Early Childhood Education Impact Evaluation, the link between ethnicity and Socio-economic Position (SEP) was made where in general, non-Lao-Tai ethnicities tended to sit lower on SEP scales. This is a highly complex mechanism in which ethnicity and SEP are intertwined by many mediating factors. This effect remained consistent within this study with the Khmun and Hmong ethnicities consistently being in a much larger range of SEP indices whilst also

maintaining lower mean and maxima. SES indices were constructed using Principal Component Analysis (PCA) based on household survey items including number of household assets (car, motorbike, radio, etc), literacy levels, overcrowding, housing materials (walls, roofs, etc), amenities (running water, toilets), and other similar indirect measures (8). The PCA generated indices are then further quantized into quintiles to create distinct categories of SEP level. Within both cohorts the household survey was only administered at baseline thus we must make the reasonable assumption that SEP does not vary over time, intrinsically it would be unlikely to vary by much over the short time span of the study.

Thus, when making inference on socio-economics, inherently the discussion shifts also to ethnicity, language, and other demographically diverse subgroups that in general have greater capacity and necessity for improvement.

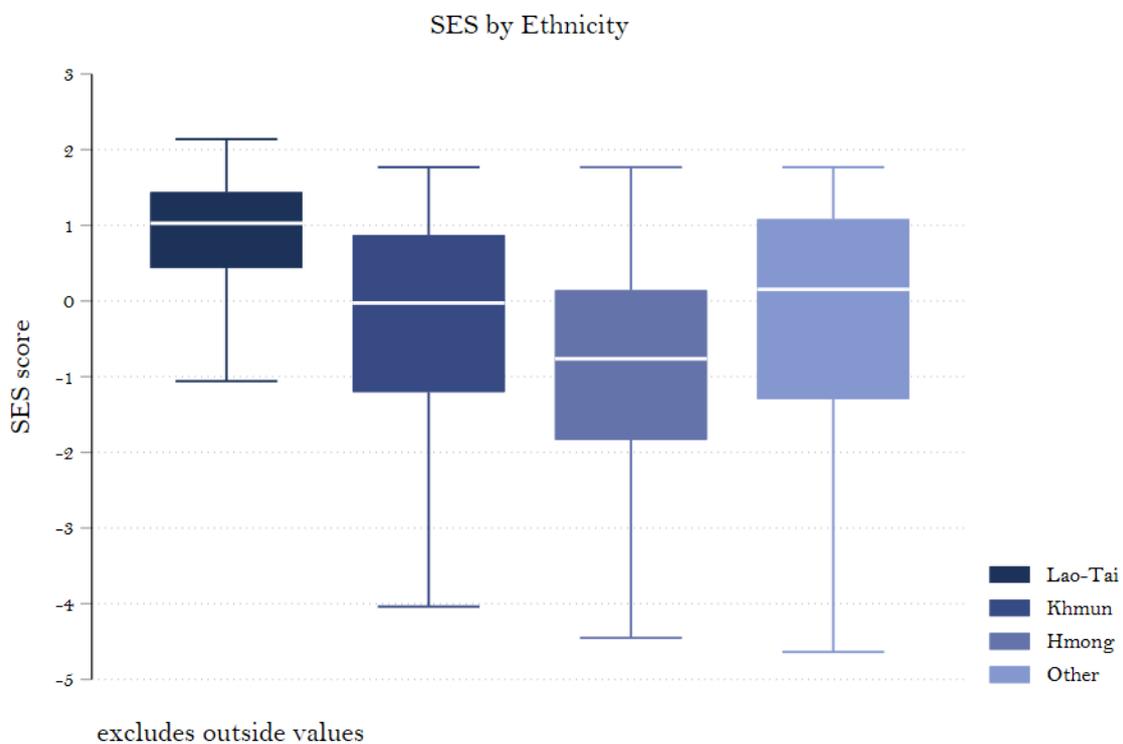


Figure 23: Socio-Economic Position/Status by Ethnic background

The strongest effects of socio-economic position/status can be seen with measures of letter identification and listening comprehension direct assessments within Cohort 1. Other measures did show similar trends but were not as robust. Within the letter identification task, we see that at baseline the contrast from low SES to high SES was quite profound. By endline we see that both RRP and control have an effect however the RRP has had more of an effect on children living in the poorest SES quintiles (quintile 1 and 2).



Figure 24: Improvements in Letter Identification for RRP compared to control communities by Socioeconomic Position for Cohort 1

These same findings are more pronounced for the listening comprehension outcome, whereby within endline, the effect of RRP is much more obvious for quintiles 1-4 and has no effect within quintile 5. These improvements are highly indicative of the RRP being a good tool for decreasing inequality and gaps of literacy development for at-risk subgroups but has little to weak effect on children who are already relatively well off.

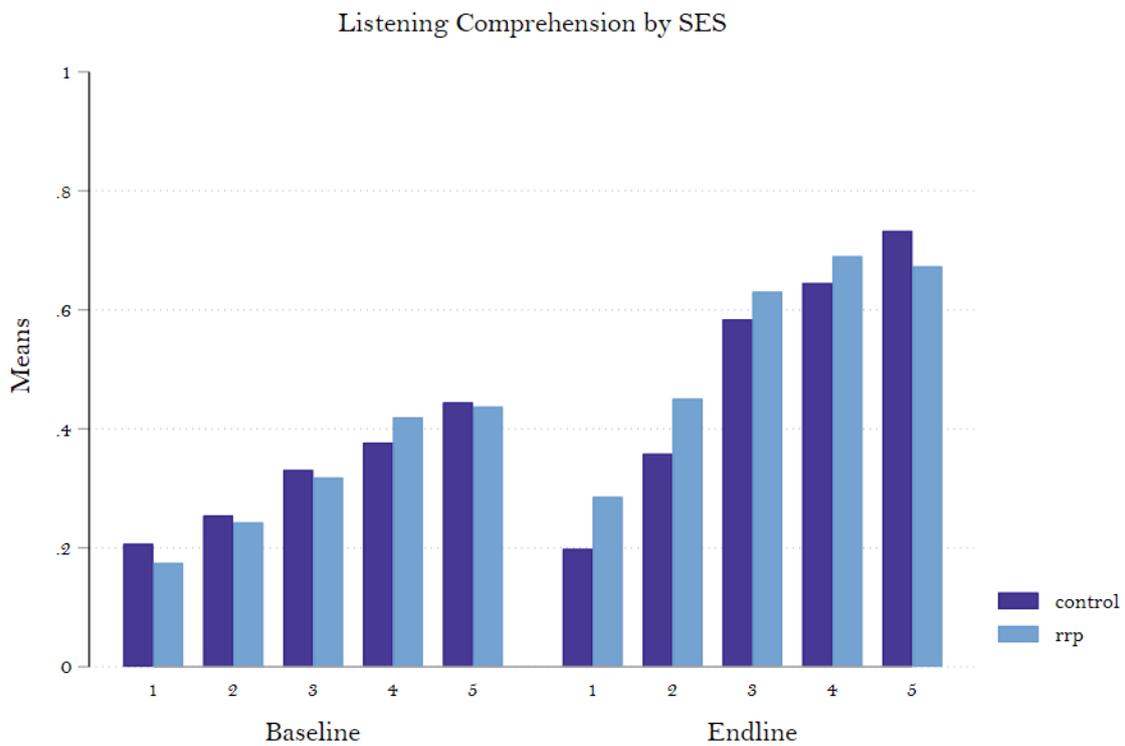


Figure 25: Improvements in Listening Comprehension for RRP compared to control communities by Socioeconomic Position for Cohort 1

Within the reported study outcomes of RRP we have noted that the mean effects of the program at endline were weak, however when we dive into deeper layers, the effect of the program becomes much more evident. We focus further on similar sub-group analyses below.

Outcomes for those children exposed to the RRP did not seem to differ by gender across both cohorts aside from listening comprehension in cohort 1. As we see below the RRP seemed to have a stronger effect for males at endline than for females. This contrasts with most other outcome measures where females generally did better than males in control and intervention groups.

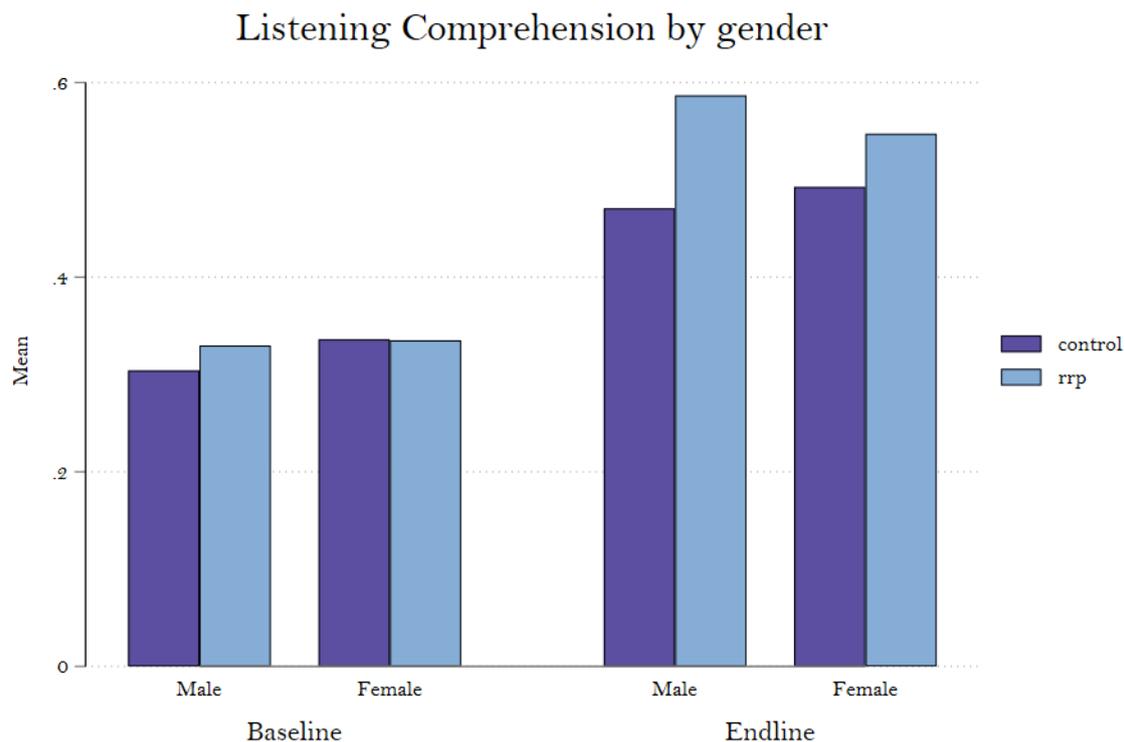


Figure 26: Improvements in Listening comprehension for RRP compared to control communities by gender for Cohort 1

Previously within the baseline snapshot reports we showed that unsurprisingly caregiver’s literacy had a direct positive relationship with the child’s literacy skills. We further explore whether these caregiver skills are transferred into better outcomes at endline between RRP intervention and control. Within the graph below we can see that at baseline, children with caregivers who could read well scored significantly better than children with parents who could not read. At endline we see that this imbalance still exists, however the RRP has successfully accelerated the development of listening comprehension skills for children with illiterate caregivers. This effect seems to exist within all developmental outcomes in cohort 1 and to a lesser extent, cohort 2. As we can see in figure x, direct assessed Sound Discrimination and Identification show these gains plainly. In particular, children whose primary caregiver is illiterate ‘catch up’ to those with literate caregivers with the RRP intervention within measures of Sound Identification.

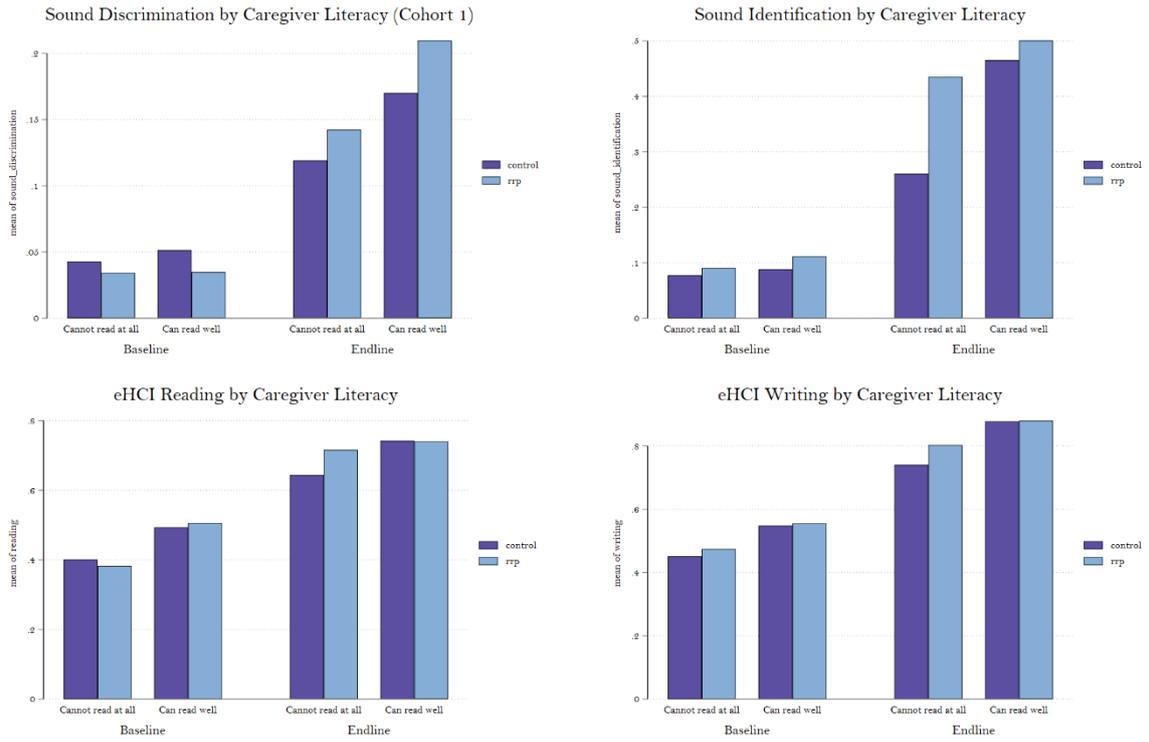


Figure 27: Improvements in various outcomes for RRP compared to control by caregiver literacy for Cohort 1

We also looked at caregivers' interactions with their children at home. These were collected as survey items that measured the number of times the caregiver did certain activities with their children in the previous week. This information was only collected at the baseline timepoint in each cohort, so assessment of how parenting practices changed during the year of COVID-19 disruptions could not be analysed. Nonetheless, we assess if children with parents with a more 'uninvolved' parenting style benefited more from the intervention. Caregivers were asked a set of questions on the number of times per week they interacted with their children including reading, telling stories, drawing, listening to music, playing toys/games, helping with housework, and doing outdoor play activities (sports). Below we see the number of times per week the caregiver reads books and tells stories (not from a book) to their child per week on the outcome of Sound Identification and Sound Discrimination at endline respectively. Both the control and RRP groups show a linear increase in mean outcome scores as the frequency of activity increases, however we see there is significant benefit for the RRP program particularly for children whose parents did not actively tell stories or read books to them.

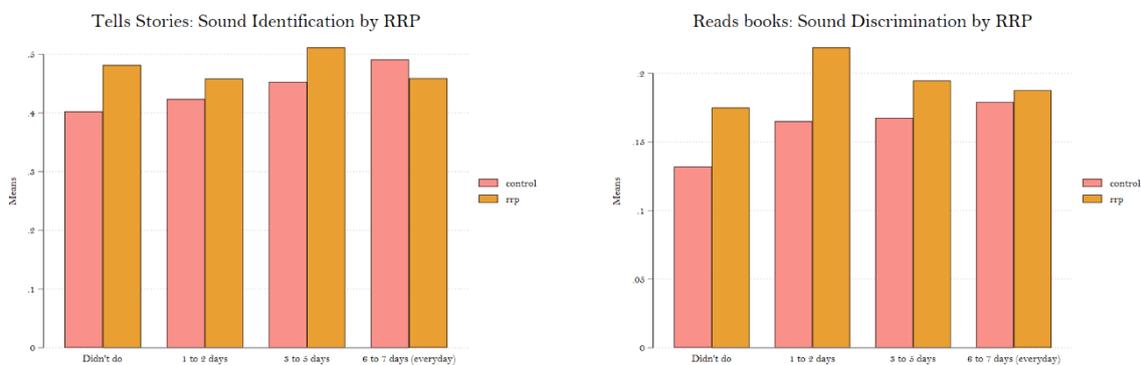


Figure 28: Improvements on Sound Identification and Sound Discrimination by trial arm by caregiver practices (Cohort 1)

From the same measures listed above a score was computed from the total number of unique interactions in the previous week. In figure x below, we see that in the measure of listening comprehension, children in the RRP group with zero caregiver interactions in the previous week score on average double the score of children with the same caregiver interactions in the control group. Within this measure the effect of RRP is sustained throughout all levels of caregiver interaction however the contrast is most obvious within the most 'in need'. This effect generalises to other measures to a lesser extent, but the general pattern remains constant, the most vulnerable children benefit the most from the reading readiness program.

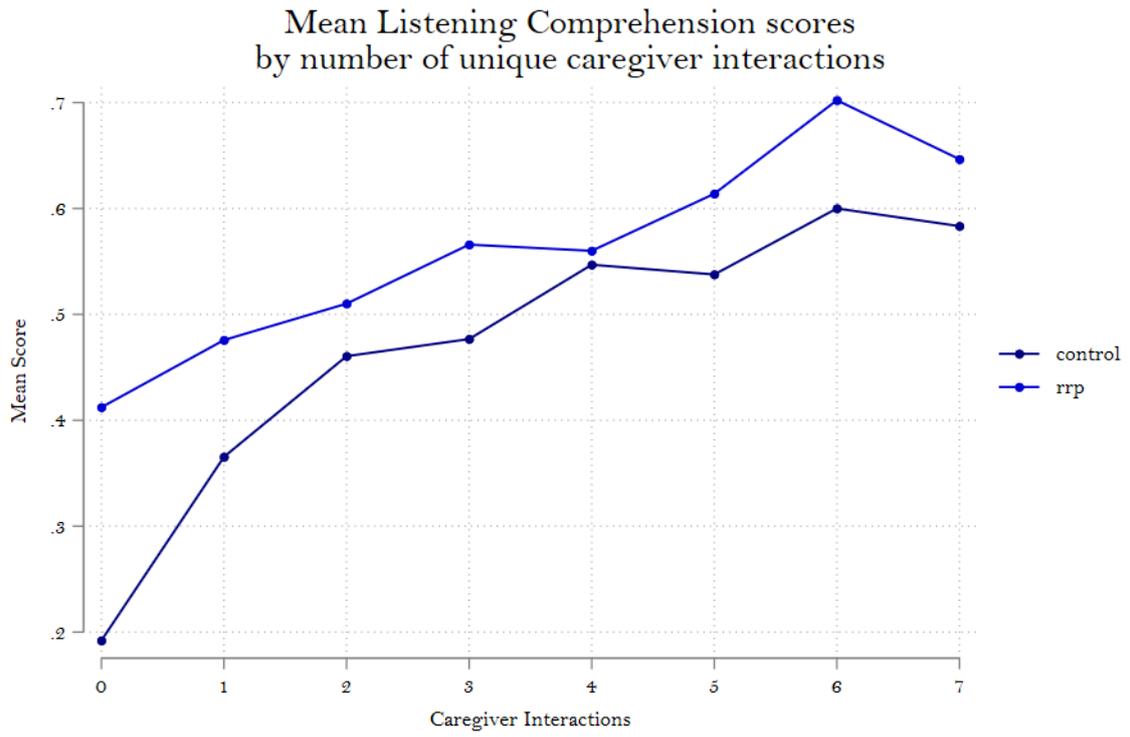


Figure 29: The relationship between caregiver interactions and Listening Comprehension by intervention arm (cohort 1)

Teacher Self-Efficacy and Openness to change

Both teacher Self-Efficacy and Openness to Change are measured longitudinally across all three time points. Figures below show the mean scores for each data wave across intervention and control teachers, and ‘spaghetti plots’ that track each individual teacher throughout. The first thing to note is that Openness to change and Self-Efficacy both decrease significantly from baseline to midline. Unfortunately, teacher surveys did not include any more than basic demographics thus there is a lack of data to explain this phenomenon. However, we theorize that the pandemic was especially difficult for teachers in Lao especially in the remote northern regions where the study was primarily conducted. With country wide lockdowns in place schools were closed for at least two and a half months. Furthermore, the RRP had no impact on teachers’ self-efficacy or openness to change measures suggesting that teachers did not feel empowered by the program or did not feel that it had significant impact for their students.

Within the baseline snapshots we found a clear relationship between teacher’s self-efficacy and openness to change and their student’s early literacy skills. Thus, this drop observed in both measures between baseline and endline in both the intervention and control schools may need further investigation as the program continues to be rolled out at scale.

Table 26: Correlations between teacher readiness to teach and children’s early literacy

	1	2	3	4	5	6	7	8	9
Teacher characteristics									
1. Self-efficacy	-								
2. Openness to change	.12**	-							
Children’s early literacy									
3. Caregiver-report literacy	.12**	-.07**	-						
4. Familiarity with print	.09**	-.11**	.15**	-					
5. Initial sound discrimination	-.01	-.02	.01	.15**	-				
6. Initial sound identification	.05*	-.05	.11**	.07**	.09**	-			
7. Word discrimination	.15**	-.06*	.08**	.13**	.04	.16**	-		
8. Letter name knowledge	.19**	-.07**	.33**	.24**	.08**	.24**	.23**	-	
9. Listening comprehension	.18**	-.05*	.17**	.31**	.14**	.19**	.27**	.37**	-

Note. Correlations of .20 deemed small, .30 medium, and .50 large. * $p < .05$, ** $p < .001$.

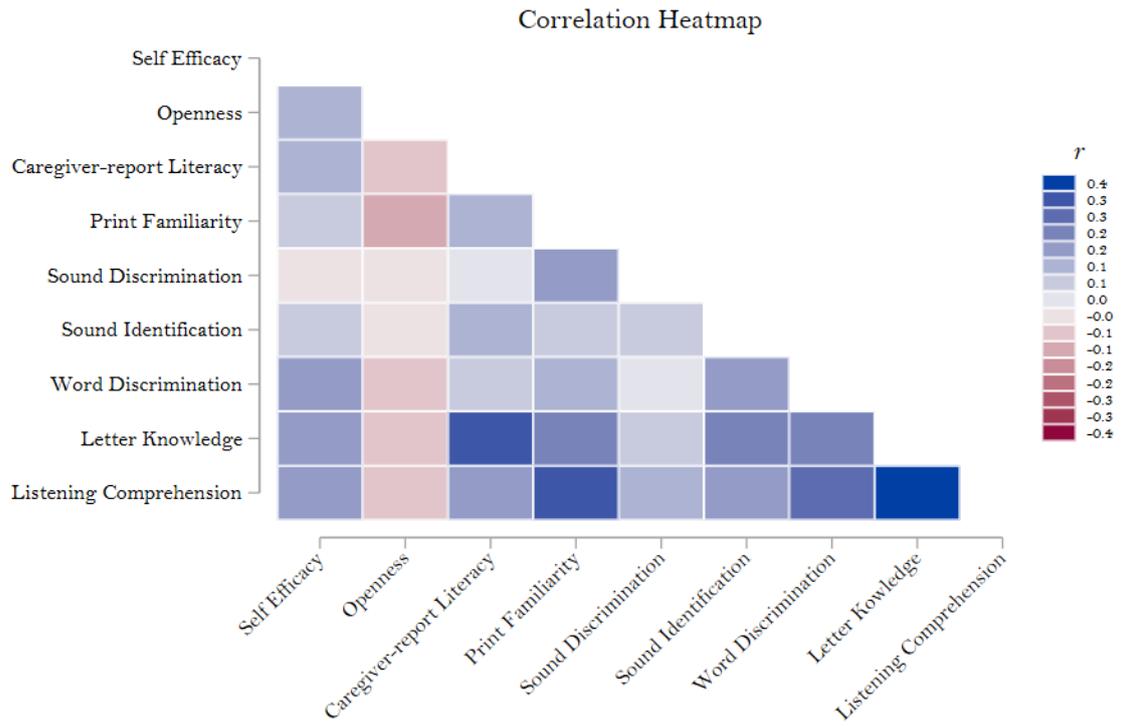


Figure 30: Correlation heat map between teachers self efficacy and openness to change and child outcomes at baseline (cohort 1)

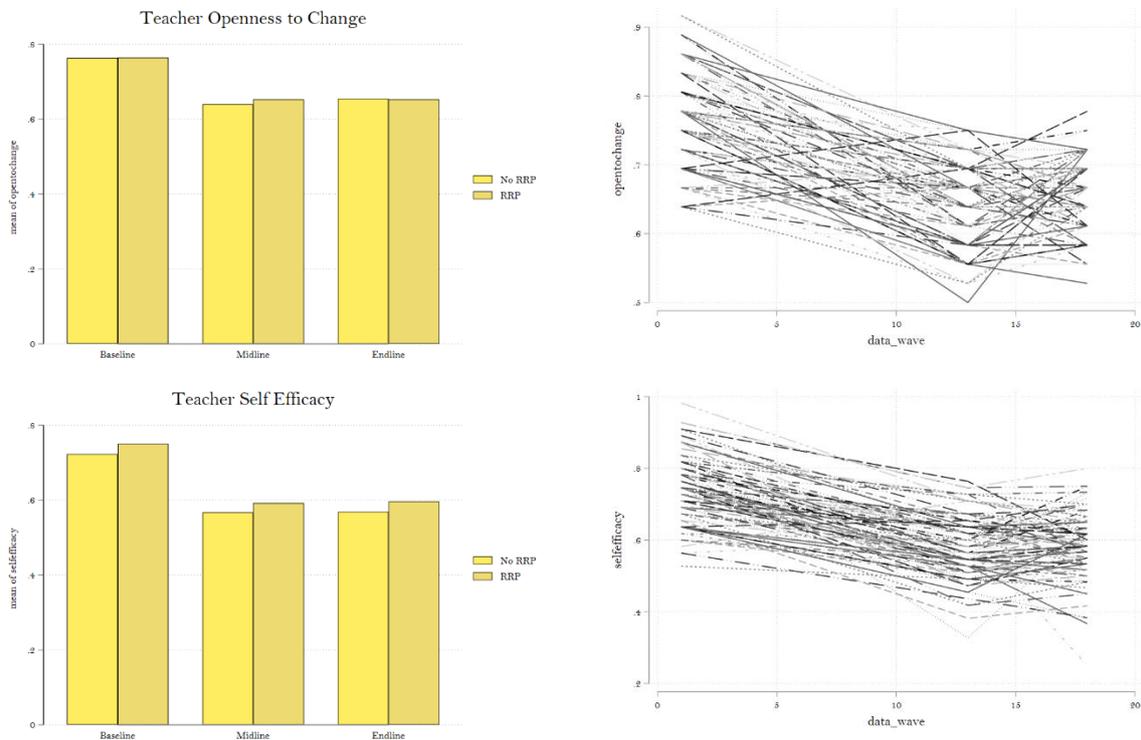


Figure 31: Changes in teachers self efficacy and openness to change over time by trial arm

An important note from teacher feedback

Teachers were asked a series of questions (if they were in the intervention or control arms of the study). Initially they were asked if they implemented the RRP and if so, whether they adhered to the program and taught the materials during the previous year, however results were surprising:

1. Within the teachers interviewed at schools randomised to the control arm, 45% indicated that they taught the RRP in the previous year
2. Within the teachers interviewed at schools randomised to the intervention, only 1 indicated not teaching the RRP materials in the previous year.

Thus, according to feedback from the teachers, almost all of those who should have been teaching the RRP were, and nearly half of teachers who should not be teaching RRP were teaching or at least thought they were teaching the program. We considered several possibilities as to why this was the case. First, we considered the possibility that there was question misspecification where teachers were naturally answering incorrectly, however 45% was a considerable number of control teachers unlikely to constitute completely of inaccurate responses. Second, we considered the potential of spill over contamination of intervention knowledge between the randomised and control groups. Given the number of teachers and schools involved it would not be inconceivable that information of the intervention was spread from control schoolteachers to intervention teachers through WhatsApp and other methods of communication currently used between teachers in Lao. Further district officials could have passed information to other schools in their areas. However, operational records and communication with various members of the MoES and local World Bank staff indicated that non-intervention schools would not have had access to the training, or the resources associated with the program. However, potentially the structure and approach of the program could have been emulated with similar texts.

Ultimately, no realistic randomised control trial can account for and prevent the many factors that can lead to trial mal-adherence, and within this report we accept this reality and use an intent-to-treat approach where the prime motive is to analyse each participant as they were randomised regardless of outside interactions.

Conclusions

In conclusion, significant implementation issues undermined our ability to detect impact of the Reading Readiness Program. In addition to the COVID 19 pandemic related disruptions, such as school closures and fieldwork interruptions, procurement delays meant that for both cohort 1 and cohort 2 baseline data collection could not occur prior the program starting. Exposure to the program prior to baseline data collection was more pronounced for cohort 2. As such, most of the results presented within this report are on the basis of Cohort 1 where students in the intervention arm (i.e., in a RRP class) were on average exposed to the program for 22 weeks.

Despite these limitation's, the RRP showed positive impact on various outcomes and in particular for student's listening comprehension and sound discrimination. Of greatest significance were the results found through sub-group analyses. Overall, children from households with low literacy, ethnically diverse background, poorer socio-economic resources or with less involved parenting styles benefited the most from the RRP. These results support the scale-up of the RRP, particularly in schools located within ethnically diverse communities and with high poverty levels.

It is likely that the results presented in this report may underestimate the actual impact of the RRP. We believe this to be the case for the following reasons: (1) potential of the Hawthorne effect (2) potential of contamination of the RRP teaching strategy across to control communities through either teacher-to-teacher correspondence or district/provincial level government staff and (3) we were only able to measure the impact of a shorter exposure time to the RRP than a full school year as planned.

As the program is expanded to other provinces across Lao PDR, it will be important to monitor teacher feedback as well as student level outcomes. Due to the implementation challenges, we were unable to determine if the enhancements made to the RRP program in 2020 had any greater benefit to students or not.

References

1. World Bank. Lao People's Democratic Republic Second Global Partnership for Education Project (P149130) - Project Appraisal Document. Project Appraisal Document. 2015.
2. Sincovich A, Gregory T, Zanon C, Santos DD, Lynch J, Brinkman S. Measuring early childhood development in multiple contexts: The factor structure and reliability of the early Human Capability Index in seven low and middle income countries. *BMC Pediatrics*. 2019;19(471).
3. Sincovich A, Gregory T, Zanon C, Santos DD, Lynch J, Brinkman SA. Measuring early child development in low and middle income countries: Investigating the validity of the early Human Capability Index. *SSM - Population Health*. 2020;11:100613.
4. Zhao J, Brinkman SA, Zhang Y, Song Y, Lu C, Young ME, et al. Measuring early childhood development with The Early Human Capability Index (eHCI): a reliability and validity study in China. *BMC Pediatrics*. 2020;20(323).
5. UNESCO, UNICEF, Brookings Institution, World Bank. MELQO Overview: Measuring Early Learning and Quality Outcomes. 2017.
6. Guo Y, Piasta SB, Justice LM, Kaderavek JN. Relations among preschool teachers' self-efficacy, classroom quality, and children's language and literacy gains. *Teaching and Teacher Education*. 2010;26(4):1094-103.
7. Vannatta RA, Fordham N. Teacher Dispositions as Predictors of Classroom Technology Use. *Journal of Research on Technology in Education*. 2004;36(3):253-71.
8. Vyas S, Kumaranayake L. Constructing socio-economic status indices: how to use principal component analysis. *Health Policy Plan*. 2006;21(6):459-68.

Annex

Sample Size

Power calculations were based on an average group size of 20 students per school cluster, and an intra-cluster correlation (ICC) of 0.2 to account for the effect of the clustered design. Attrition was expected to be low on the basis of previous impact evaluations conducted in Lao, with a conservative inflator of 10%. At the cluster level all schools were expected to participate on the basis of a government decree. Alpha was set to 0.05 with 80% power to detect a small to medium effect of 0.24. The primary outcome was the eHCI literacy domain which ranged from 0 through to 1. Thus, the expectation was that we would see a mean difference between intervention and control schools of at least 0.24. This estimation was deemed feasible, on the basis of the Early Childhood Education program which at the time had seen a larger impact between baseline and midline on this same outcome. On the basis of these calculation 120 clusters (schools) in total (i.e., 60 in the intervention arm and 60 in the non-intervention arm) were required with a total of 2,400 students.

The Randomisation

Schools within targeted districts were randomised to either receive the Reading Readiness Program or not. An excel spreadsheet with a list of 440 school codes (previously selected for eligibility) without any further details was used for the randomisation process. As such the randomisation process was blinded in that the school codes are meaningless without linkage to identifiers. Randomisation was performed by Brinkman by adding a column of randomly generated numbers with a range of 1-440. Schools were then sorted on the basis of the randomly generated numbers. The first 80 schools were allocated to the intervention and next 80 were allocated to the control arm. Of these, the first 60 were the target schools with the following 20 as “back-ups” within both arms. Back-up were considered necessary just in case there weren’t 20 eligible children within the school. Previous experience with data from the Lao Education Management Information System was that the actual numbers of children in schools was often inflated. There was no stratification or blocking in the randomisation/allocation.

Fieldwork implementation details

Indochina Research staff were trained over a period of two weeks prior to baseline cohort 1, endline cohort 1/baseline cohort 2 and again prior to endline cohort 2. These trainings including a real field practice in a non-study site. Enumerators had to pass various tests before being confirmed as a suitable enumerator for fieldwork. These tests were mainly centred around the reliable and consistent conduct of the child direct assessments, and moderation of the classroom quality observation instrument. (refer to outcomes and measurement section above). Where possible enumerators who had undertaken the fieldwork for the Early Childhood Education Impact Evaluation baseline and midline data collections were prioritised due to their experience with the same measures. Immediately after training, fieldwork teams (with one supervisor and 5 enumerators each) were allocated and dispatched to districts to commence data collection. For baseline cohort one there were 8 teams, for endline cohort 1/baseline cohort 2 there were 16 teams and endline cohort 2 there were 14 teams.

Indochina Research was responsible for supplying and preparing tablets for data entry in the field. The tablets were programmed to minimize as many errors or inconsistencies as possible during fieldwork. The data entry program and data base was created to allow for easy hierarchical merges between district, village, household, and individual respondent data. The program included suitable identifiers

so that students could be linked to teachers and schools; and teachers could be linked to schools. Codes used to identify province, district, sub district and villages were consistent with the EMIS.

Prior to each data collection, the central government wrote official letters to school principals and heads of the Village Education Development Committees to both announce and require participation in the study. Provincial and District Education staff were also informed of the study, with District staff specifically asked to support Indochina Research with the data collection. In practice, this meant that at least one district education staff member chaperoned and observed the activities of the data collection, often with payments made by Indochina Research to district staff and village officials to facilitate the cultural expectations and norms of visiting rural and remote villages. Due to the pragmatic nature of the RCT and protocols such as government oversight of the data collection we can-not rule out the likelihood of the “Hawthorne effect”. Although teachers were not to be present when their students were assessed, the direct assessments were mostly conducted on the school site and with district level education staff chaperoning Indochina Research throughout the fieldwork, it would not be inconceivable that some teachers, both in the intervention and control communities might have taught to the test. Further, all instruments had to be approved by the government prior to Indochina Research being approved to commence fieldwork.

At the school level, class lists were provided to Indochina Research who then randomly selected 20 eligible students (aged 5 years and attending a pre-primary or kindergarten class). Rarely was there more than one pre-primary or kindergarten class in a school. Noting that schools were selected for participation (not classes or teachers), where this was the case, all teachers within the school teaching either Pre-primary or Kindergarten were trained in the RRP program (if they were in a school selected for the intervention). As such, in the rare cases of more than one class, the random selection was made for all eligible children (ignoring class). Note a primary school either had a Pre-Primary or a Kindergarten, never were both forms of ECE in the one school.

For those students randomly selected, either parents/caregivers were requested by the school Principal to attend the school and participate in the study. For those parents that couldn't attend the school (for example, due to work commitments) then household visits were made at a time convenient for them. Parents consented their child and their own participation in the study. Household surveys were generally completed with the Household Head or senior member of the family, the Caregiver interview was conducted with the primary caregiver of the child (generally the mother). The child direct assessment was conducted either at the school in a designated area away from classes, teachers and other students or in the child's home. The classroom observation was undertaken over a 2 hour period, generally the morning session. Teachers were interviewed generally over their lunch break or after school hours.