An impact evaluation of Plan Indonesia's early childhood program

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ABSTRACT

OBJECTIVES: High-quality preschools are known to prepare children for success in primary school. Over half of Indonesia's children now pass through preschools whose quality and effectiveness are unknown. Our goal was to evaluate two government preschool models, namely kindergarten (TK) and the less formal health-post (PAUD), with and without capacity-building efforts of a non-governmental organization (NGO-Plan), on children's language and math skills.

METHODS: Thirteen TK and 17 PAUD Plan-supported and the same number of government-supported preschools were randomly selected from East Nusa Tenggara, Indonesia. Five children from each ($n = 292$) and five who had graduated from each and were now in first grade ($n = 241$) were randomly selected and tested on language and math measures. The Plan-supported preschools were assessed for quality. Mothers reported on their family's socio-demographic situation and their child's preventive health practices, illnesses and diet over the previous two weeks.

RESULTS: Analyses of covariance adjusting for clusters indicated that children attending Plan-supported preschools performed better overall, and especially those in TK preschools. Plan-supported TKs were observed to have higher quality than Plan-supported PAUDs. First graders who graduated from Plan-supported preschools, both TK and PAUD, achieved higher scores on language and math tests than government-supported graduates. Preventive health practices were better in the Plan group, though diet and height-for-age were poor overall.

CONCLUSIONS: Upgrades to the government preschool program are needed to raise its quality and effectiveness, specifically by introducing a mix of instructional and indoor free-choice play, resources and teacher training to support children's learning.

KEY WORDS: Preschool; classroom quality; early childhood education; LMIC; capacity building; school readiness

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Can J Public Health 2016;107(4-5):e366–e372
doi: 10.17269/CJPH.107.5557

Most South-East Asian countries, including Indonesia, reached the Millennium Development Goal regarding universal primary education, and so are developing policies to prepare children better for primary school. This commonly takes the form of setting standards and guidelines for preprimary care and education for children four to six years of age. Indonesian children in the province of East Nusa Tenggara need this kind of support before entering primary school because families are unprepared to provide an adequately healthy environment. For example, poor hygiene means that many children become sick, and their diets lack sufficient diversity for adequate growth.¹⁻³ Because of their remote location, they are worse off than the national average in their access to and use of education, media and health services.¹ The likelihood is high that children under five years of age are not reaching their mental development potential due to lack of appropriate health care, stimulation and nutrition.⁴ The current study compared two models of preprimary educational services for children and evaluated how a non-governmental organization's (NGO) support with teacher training and program improvement benefited children.

Over the past decade, different models of preprimary (called preschool) programming have been evaluated in South-East Asia,^{5,6} South Asia^{7,8} and Africa.^{9,10} Reviews of these studies and others have concluded that most preschool models demonstrate clear benefits for children on measures of school readiness.¹¹ The positive impact of preschool on children's school readiness is

remarkably robust across different social and economic contexts in low- and middle-income countries. However, maintaining those advances into primary school is more difficult and results here are mixed.^{7,10,12} To prevent fading, programs may need a higher level of quality.¹³

Indonesia currently has preprimary gross enrollment of more than 55%, with equal participation of boys and girls.¹⁴ Two evaluations have recently been conducted of preprimary programs. In the small eastern province of Belu, Save the Children found significantly higher school readiness skills among children who had attended Save's preschool than among those who did not.¹⁵ Yet, a national evaluation of government preschools in 310 villages found little effect on language or cognitive skills.¹⁶ The findings suggest that the government program needs improvement if it is to benefit children's development.

Two early education models exist in rural Indonesia: Taman Kanak-Kanak (TK) is located near a primary school and Pendidikan

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- Funding Source:** The research was funded by Plan International Australia, with support from Australian Aid. It was designed, conducted, analyzed and written entirely by the authors without influence from the funders.
- Conflict of Interest:** None to declare.

Anak Usia Dini (PAUD) is in a health post, though over the years curriculum and standards have converged.¹⁷ Plan is an international NGO working in Indonesia over many years, but particularly since 2011 helping to resource and build capacity of preschools on remote eastern islands. Plan's support has included caregiver/teacher training, purchase of books, development of low-cost learning materials, and introduction of a curriculum to support a mixed daily routine incorporating play, literacy and numeracy. A number of such preschools have been supported since 2012 and these have recently been passed back to the government which maintains its own TK and PAUD preschools.

The goal of the current evaluation was to examine the cognitive development, literacy/numeracy skills, health and growth of children who participated in Plan-supported and government-supported TK and PAUD programs – both current preschoolers and those now in first grade. The hypothesis was that students from Plan-supported preschools would perform better than those from government preschools, regardless of whether the preschools were TK or PAUD.

METHODS

Study design and participants

The design was a cross-sectional post-test-only cluster design comparing Plan preschool children with a Government group from similar rural, disadvantaged villages where Plan was not operating. Preschools were not initially randomly assigned and all children in the village attended the one available preschool. Of 35 Plan-supported preschools, 30 were randomly selected: 13 were TK and 17 PAUD. Five children were randomly selected from the 5–7 year-old class of each preschool, along with five children from nearby villages attending Government preschools. Five graduates of the same Plan preschools, now attending first grade classes in the local (Government) primary school, were randomly selected for testing along with a similar number of primary students from the neighbouring villages with Government preschools. The final preschool sample included 292 children; the final primary grade 1 sample was 241. Ethics approval was provided by McGill University, and mothers gave informed consent.

Setting

The preschools and children were located in the eastern province of Nusa Tenggara, Indonesia. The population is largely Catholic Christian and livelihoods are fishing and agriculture. Each village has a health post and primary school but only one preschool. TKs operate five days a week in a room close to the local primary school; PAUDs operate 3–4 days a week at the village health post.

Our focus was on efforts over the past two years by Plan Indonesia, with the support of local communities and funded by Plan Australia, to upgrade the TK and PAUD preschools. They worked with existing Government preschools in 13 remote districts and upgraded the curriculum, materials, and teacher training to implement a more challenging program. Plan-supported TK and PAUD teachers received several days training from Plan on how to implement the curriculum, which included early literacy, early math, and indoor free-choice play. Parenting classes are also conducted at the health post, where hygiene, nutrition and immunization are discussed. Initially the teachers also received

supervision and mentoring but this activity had been passed back to the government a year before this evaluation.

Sample size estimation and recruitment

A sample of 105 children were required in each group – Plan- and Government-supported. This allowed for the detection of a difference of 0.50 standard deviations on one primary outcome such as school readiness or primary school achievement, using an alpha of 0.05 and a power of 0.80. The required sample size is 84, multiplied by 1.60 to account for clustering with an estimated intracluster correlation (ICC) of 0.15.

The sample of preschool children was systematically selected from the 30 Plan and Government preschools by taking the class list and choosing every third or fourth child until the required five were found. Eligible children were 5.5 to 7.5 years of age. Primary school children were likewise recruited from their first grade classroom: five Plan graduates from 2014 and five graduates of Government preschools. Eligible first graders were 6.5 to 8.5 years of age. All data collection took place in March 2015, the eighth month of the school year.

Measurement

Measures included an interview with the children's mother about the child's health and nutrition, along with family demographics and economic situation. Preschoolers were directly assessed with tests of school readiness and cognitive development, while first graders were given one comprehensive test of school achievement. The quality of Plan's preschools was evaluated with a standardized observational measure. All measures were translated into Bahasa Indonesia, back-translated, pretested, and sometimes spoken in a local dialect if requested by the mother during her interview.

Health, Nutrition, and Socio-economic Situation

Mothers reported on their child's sickness in the past two weeks and on ongoing preventive health practices, such as immunization, improved water, latrine use, hand-washing with soap and water, use of iodized salt, vitamin A, iron supplements, and deworming (maximum score was 14). Based on a 24-hour food-frequency questionnaire, we derived a dietary diversity indicator of seven main food categories (maximum score was 7). The child's height was taken twice and the average used to calculate height-for-age z score (HAZ) using WHO international standards.

Family demographics and economic situation were determined with questions commonly found in the Demographic and Health surveys: household size, ages and education of parents, occupations, religion, and child's birthdate. Economic status was assessed with questions about the ownership of 11 assets (e.g., table, watch, vehicle, radio), ownership of a homestead, land for production, and animals. The number of assets was used as the economic status indicator of the family. Finally, the mother was asked if the child had ever attended TK or PAUD preschool, whether fees were paid, and the amount.

Preschool School Readiness and Cognitive Development

Children were directly assessed with a 25-item School Readiness measure, validated in relation to another measure, child's age and mother's education ($p < 0.05$). Skills assessed include knowing colours, shapes, letters, numbers, math operations and general

knowledge. A Verbal subtest score ranging from 0 to 13 and a Math score ranging from 0 to 12 were calculated.

Cognitive development was measured with two Wechsler Preschool and Primary Scales of Intelligence (WPPSI) subtests to tap verbal and non-verbal reasoning, namely Similarities and Matrix Reasoning.¹⁸ The 24 Similarities items require the formation of a verbal concept that captures the similarity of two seemingly diverse items, such as tea and milk. The 29-item Matrix Reasoning test assesses the skill at identifying a visually presented analogy or pattern. As usual, some items were modified for the context. For both, a standardized score ranging from 0 to 19 can be derived based on the child's age.

Primary 1 School Achievement

A 61-item Achievement test was created based on first grade competencies outlined by the Ministry of Education for Indonesia (Kurikulum Tingkat Satuan Pendidikan/Curriculum Education Unit) and the Wide Range Achievement Test (WRAT).¹⁹ It includes items on five subtests:

- Speaking or expressive language, with items on months and vocabulary (9 items);
- Reading letters, reading words, and reading comprehension (20 items);
- Writing letters and words (11 items);
- Oral mathematics, such as enumeration, concepts of quantity, and simple problems (9 items); and
- Written mathematics, such as writing numbers, drawing shapes, and making simple calculations (12 items).

Preschool Quality

Preschool centres supported by Plan were observed for the full morning session and rated using the Early Childhood Environment Rating Scale, Activities and Program subscales (ECERS-R) and ECERS–Extension Literacy and Math subscales (ECERS-E).^{20,21} There are 22 items, each rated on a scale from 1 to 7. The items have a clear description of what is to be observed for each rating. The descriptions were modified for a number of items based on what was reasonable to expect in terms of resources and cultural traditions. The ECERS manual was translated by Plan into Bahasa Indonesia and checked for accuracy. Government-supported preschools were considerably lower in quality; only five were observed and rated before this was discontinued as a result of most items being rated 1 or 2. Therefore we rated only Plan's TK and PAUD preschools, where sufficient variance was found to examine the correlation between quality and child outcomes.

Procedure

Eight local research assistants, all with bachelor degrees, were trained over five days to administer the measures; four were experienced from working on a similar evaluation. They practiced on an independent sample of children and preschools and attained over 90% reliability. During the month of March 2015, they visited villages in pairs to make independent ratings of preschools, interview mothers and test children.

Method of analysis

The SAS 9.3 PROC MIXED program was used to compare Group (Plan vs. Government) and Preprimary Type (TK vs. PAUD), adjusting for the intracluster correlation. First, socio-economic differences between groups were examined. Where differences were found, they were included as covariates in the analysis of children's cognitive/achievement, nutrition and health outcomes. Cohen's effect size d was calculated for statistically significant differences, using the adjusted means and pooled standard deviation (SD). Differences in the quality of Plan-supported TK and PAUD preschools were examined. There were no sex differences in achievement outcomes so boys and girls were analyzed together. A two-level hierarchical analysis, using MPlus software, provided correlations between quality clustered at the preprimary level and students' school readiness outcomes.

RESULTS

Preprimary children and program quality

Although children were not randomized to type of preprimary school, the Plan and Government samples were similar on all variables except age, and TK and PAUD samples were different in age, mother's education and household size (see Table 1). These variables were therefore included as covariates along with HAZ and assets which are commonly covaried in such studies. Monthly fees paid by parents to the preschool varied from a low of 3,000 Indonesian Rupiahs to a high of 40,000 (10,000 IDR = CAD \$1.00 = USD \$0.80). Fees varied by village cluster with some within-village household differences, and correlated highly with assets, so assets rather than fees were covaried.

Overall, children in the Plan program performed better on the School Readiness test with an effect size $d = 0.31$; this was due mainly to differences on the Verbal items, not the Math items (see Table 2). The effect was modified by preschool type such that Plan children did better only if they attended the TK, not the PAUD. The effect was maintained even after fees were covaried. Likewise, scores on the Similarities test of verbal reasoning were higher for Plan TK vs. Government TK, yet higher for Government PAUD than Plan PAUD. The only exception was that PAUD children attained higher scores on the Matrix non-verbal reasoning test, though the effect size d was 0.14 or small. Thus, capacity-building work of Plan was most evident with TK preschools.

This outcome was supported by the quality scores of Plan preschools, where Plan TK preschools revealed significantly higher quality than Plan PAUD across all four subscales (see Table 3). We observed that Government-based TKs were run like structured classes where children sat at desks and lacked indoor free play with blocks, puzzles and art; Government-based PAUD were run more like unstructured playgroups. Neither had sufficient materials to support children's learning. Plan's curriculum and training for teachers enhanced both TK and PAUD by encouraging 30 minutes of free play with low-cost challenging and varied materials, and an instructional method to teach literacy and math through hands-on activities.

The overall 22-item quality rating correlated significantly with the total readiness score (standardized estimate = 0.44, $p = 0.01$).

Table 1. Socio-demographic characteristics of preschool children by group and preschool type

Variables	Group*	Means or % (SD) for preschool type†			F or χ^2 , df = 1, 233, (p-value)‡		
		Total sample	TK	PAUD	Group	Type	Group × type
Sample size (n)	PLAN	147	87	60			
	Control	145	89	56			
Child's age (m)	PLAN	74.13 (6.1)	72.72 (5.1)	76.17 (6.8)	17.74 (<0.0001)	11.11 (0.001)	3.52 (0.06)
	Control	71.55 (5.2)	71.18 (4.6)	72.14 (6.0)			
Height/age (z)	PLAN	-1.45 (0.9)	-1.22 (1.1)	-1.68 (0.7)	8.60 (0.004)	6.13 (0.01)	2.64 (0.10)
	Control	-1.73 (0.9)	-1.67 (1.0)	-1.80 (0.6)			
Mother's education (years)	PLAN	8.05 (3.1)	8.57 (2.7)	7.50 (3.6)	0.01 (0.92)	5.40 (0.02)	0.33 (0.51)
	Control	8.20 (2.8)	8.40 (2.7)	7.75 (2.9)			
Family assets§	PLAN	7.97 (2.0)	8.16 (2.1)	7.76 (2.0)	3.29 (0.07)	2.03 (0.16)	0.09 (0.77)
	Control	8.43 (1.8)	8.51 (1.4)	8.25 (2.1)			
Household size	PLAN	5.30 (1.8)	5.68 (1.9)	4.75 (1.5)	0.61 (0.44)	8.86 (0.003)	4.13 (0.04)
	Control	5.09 (1.3)	5.16 (1.3)	4.98 (1.4)			
Fees paid for preschool (m) (thousands IDR)	PLAN	15.58 (13.3)	24.14 (13.2)	7.03 (3.4)	0.47 (0.50)	29.56 (<0.0001)	6.03 (0.01)
	Control	13.94 (9.6)	17.44 (10.1)	10.45 (5.2)			
Sex (% female)	PLAN	53.06%	48.28%	60.00%	$\chi^2 = 0.12$ (0.73)	$\chi^2 = 0.15$ (0.70)	$\chi^2 = 2.58$ (0.11)
	Control	51.03%	53.93%	46.43%			

* Plan and Government (note that Government is referred to in Tables 1, 2, 4 and 5 as "Control").

† TK = Taman Kanak-Kanak (school-based preschool); PAUD = Pendidikan Anak Usia Dini (health post-based preschool).

‡ F, p-values adjusted for clusters.

§ Family assets can range from 0 to 11.

Table 2. Preschoolers' development and health outcomes by group and preschool type

Variables (number of items) ICC§	Group*	Adjusted means (SD) for preschool type†			F, df = 1, 233; (p-value)‡		
		Total sample	TK	PAUD	Group	Type	Group × type
Verbal readiness (0–13) 0.21	PLAN	8.04 (2.8)	8.51 (2.7)	7.58 (2.7)	7.30 (0.007)	0.26 (0.61)	13.88 (0.0002)
	Control	7.02 (2.7) <i>d</i> = 0.38	6.56 (2.8) <i>d</i> = 0.73	7.49 (2.3) <i>d</i> = 0.03			
Math readiness (0–12) 0.20	PLAN	9.36 (2.5)	9.52 (2.5)	9.20 (2.8)	1.66 (0.20)	0.01 (0.91)	2.69 (0.10)
	Control	8.89 (2.7)	8.71 (2.5)	9.08 (2.5)			
Total readiness (0–25) 0.23	PLAN	17.40 (4.9)	18.03 (4.9)	16.77 (4.6)	4.88 (0.03)	0.14 (0.71)	9.28 (0.003)
	Control	15.92 (4.9) <i>d</i> = 0.31	15.27 (5.1) <i>d</i> = 0.58	16.56 (4.5) <i>d</i> = 0.04			
Similarities standardized (0–19) 0.13	PLAN	7.10 (1.9)	7.33 (1.7)	6.87 (2.0)	3.55 (0.06)	0.37 (0.54)	8.23 (0.004)
	Control	6.68 (1.9) <i>d</i> = 0.38	6.35 (1.9) <i>d</i> = 0.38	7.01 (1.7) <i>d</i> = 0.23			
Matrix standardized (0–19) 0.32	PLAN	6.64 (2.6)	6.70 (2.8)	6.57 (2.3)	0.15 (0.70)	6.64 (0.01) <i>d</i> = 0.14	3.18 (0.08)
	Control	6.30 (2.3)	5.96 (2.5)	6.64 (1.8)			
Preventive health (0–14) 0.17	PLAN	11.19 (1.6)	11.18 (1.6)	11.22 (1.5)	16.33 (<0.0001)	0.21 (0.65)	0.52 (0.47)
	Control	10.36 (1.9) <i>d</i> = 0.50	10.50 (1.9)	10.23 (1.9)			
Sick past two weeks (%) 0.23	PLAN	33.33%	22.67%	44.44%	$\chi^2 = 0.25$ (0.38)	$\chi^2 = 0.73$ (0.39)	$\chi^2 = 11.04$ (0.001)
	Control	33.08%	40.00%	17.50%			
Dietary diversity (0–7) 0.16	PLAN	3.35 (0.7)	3.30 (0.7)	3.40 (0.8)	0.45 (0.50)	1.56 (0.21)	0.17 (0.68)
	Control	3.28 (0.9)	3.19 (0.8)	3.38 (0.9)			

* Plan and Government (control).

† TK = Taman Kanak-Kanak (school-based preschool); PAUD = Pendidikan Anak Usia Dini (health post-based preschool).

‡ F, p-values adjusted for clusters and covariates age, HAZ, mother's education, family assets, household size. Effect size *d* for significant effects is calculated as the difference between adjusted means divided by the pooled standard deviation.

§ ICC refers to the intracluster correlation due to clusters of five children attending preschools together.

|| Preventive health practices are immunizations, hand-washing at two key times, improved water, latrine use, iodized salt, vitamin A drops, iron and deworming.

An examination of verbal and math scores in relation to the quality of literacy and math activities, respectively, showed that math scores were significantly correlated with math quality (standardized estimate = 0.34, $p = 0.05$) whereas verbal scores did not significantly correlate with literacy quality (standardized estimate = 0.30, $p = 0.14$).

Regarding health and nutrition, Plan preschoolers had better height-for-age and were reported to have better preventive health practices. Illness in the past two weeks, however, was reportedly lower among Plan-supported TK compared to Government TK, and lower among Government PAUD compared to Plan PAUD.

Primary first grade children

There were no age or socio-economic differences among the first grade groups (Table 4). The analyses of achievement and health variables showed strong effects for Plan-supported vs. Government preschools, with effect sizes in the moderate to large range (Table 5). There were no differences between the TK and PAUD model, except on the speaking subtest, where TK performed better than PAUD when Plan-supported and vice versa when Government-supported.

Among the health and growth variables, preventive health practices showed a Plan advantage. Despite being delivered at a health post, the PAUD program did not result in better family health practices.

Table 3. Differences in preschool qualities as measured by Early Childhood Environment Rating Scales

Subscales	TK preschools*† (n = 13)		PAUD preschools*† (n = 17)		t (p-value)
	Mean‡	SD	Mean‡	SD	
Activities	4.02	0.97	2.77	0.75	15.87 (0.0004)
Program structure	4.52	1.18	3.41	0.87	8.75 (0.006)
Literacy	4.35	0.68	3.60	0.69	8.93 (0.006)
Math	4.71	1.59	2.88	1.14	13.50 (0.001)
Overall quality	4.33	0.97	3.11	0.73	15.35 (0.005)

* Plan preschools only.

† TK = Taman Kanak-Kanak (school-based preschool); PAUD = Pendidikan Anak Usia Dini (health post-based preschool).

‡ Ratings range from 1 to 7.

DISCUSSION

The main findings reveal that children in the NGO-supported preschools fared much better than those in the government-supported preschools in school-related achievement. Their families reported better preventive health practices. Of the two models, school- and health post-based, the TK school model offered a higher quality program and children had superior school readiness skills in preschool. However, graduates of these two models performed similarly on literacy and math in first grade. The original contribution of this study is in demonstrating how building the capacity of two models of early childhood education can improve children's development and achievement not only in preschool but beyond.

The first main finding bears on the quality of preschool programs and how to upgrade them. Although it is well known that preschools enhance children's cognitive and school readiness skills,¹¹ higher quality programs benefit them more. Governments are therefore being advised to focus on quality in addition to access.^{22,23} Several published reports have discussed the upgrades that are crucial, namely having an age-appropriate curriculum and lesson plans, with training and supervision to help paraprofessional teachers implement them.^{6,8,24–26} An earlier

version of Plan's preschool program with somewhat lower quality yielded smaller preschool advantages which faded out by first grade. Plan Indonesia worked with experts and with communities to support additional capacity building through training and resources. By working within the government framework, improvements could be shared with Ministry of Education officials and among teachers themselves.

The second main finding was that Plan's input had a greater effect on the quality and outcomes of the school-based TK program and less of an effect on the health-post program. All aspects of quality were significantly higher among the TKs supported by Plan compared to the PAUDs. Children in the school-based program showed significantly higher verbal readiness skills and verbal reasoning. There are several possible reasons for the TK teachers and children benefiting more from Plan's input: these paraprofessional teachers were more likely to perceive themselves as "teachers" because they were posted in a classroom near the primary school, they made greater use of literacy resources such as Big Books, and they conducted sessions five days a week instead of three days. The PAUDs were often conducted more like playgroups where parents would come to watch and socialize. However, by first grade, children from TK and PAUD preschools performed similarly, with the Plan-supported graduates performing better than the government-supported ones. So differences between TK and PAUD models faded by first grade, but Plan versions of these two models were still superior to Government versions of TK and PAUD.

Limitations of the design raise a note of caution in interpreting these findings. The preschools were not randomly assigned to be Plan-supported or to implement the TK or PAUD model. Differences between families, largely at the pre-primary level, were statistically controlled. All Plan-supported preschools received similar support and resources, similar curriculum and materials, similar training and supervision. This is not to say that they were all uniform; communities levied their own fees and teachers had a say in what they implemented. Differences were apparent when examining quality. We compared two models which differ in a number of respects, so we were not able to test which features were responsible for differences in quality and outcomes.

Table 4. Socio-demographic variables of first grade children, by group and preschool type

Variables	Group*	Means (SD) for preschool type†			F, df = 1, 204, (p-value)‡		
		Total sample	TK	PAUD	Group	Type	Group × type
Sample size (n)	PLAN	146	76	70			
	Control	95	64	31			
Child's age (m)	PLAN	86.46 (6.6)	86.74 (6.5)	86.16 (6.7)	0.21 (0.65)	0.30 (0.58)	0.46 (0.50)
	Control	85.85 (6.7)	85.69 (6.7)	86.16 (6.9)			
Height/age (z)	PLAN	-2.09 (1.1)	-2.08 (1.3)	-2.11 (1.0)	1.28 (0.26)	0.39 (0.54)	1.05 (0.31)
	Control	-2.25 (1.1)	-2.38 (1.2)	-2.12 (0.7)			
Mother's education (years)	PLAN	8.18 (3.1)	8.53 (3.2)	7.80 (2.9)	0.82 (0.37)	3.21 (0.07)	0.01 (0.92)
	Control	7.84 (2.8)	8.16 (3.0)	7.19 (2.5)			
Family assets§	PLAN	8.13 (1.88)	8.54 (1.7)	7.69 (1.9)	1.45 (0.23)	5.81 (0.02)	0.97 (0.33)
	Control	7.86 (1.69)	8.00 (1.7)	7.58 (1.7)			
Household size	PLAN	5.22 (1.7)	5.20 (1.5)	5.24 (1.9)	1.61 (0.21)	1.67 (0.20)	1.59 (0.21)
	Control	5.38 (1.4)	5.19 (1.5)	5.77 (1.0)			
Sex (% female)	PLAN	58.90%	57.89	60.00	4.00 (0.06)	0.62 (0.43)	1.20 (0.20)
	Control	47.32%	51.56	38.71			

* Graduates of Plan and Government (control) preschools.

† TK = Taman Kanak-Kanak (school-based preschool); PAUD = Pendidikan Anak Usia Dini (Health post-based preschool).

‡ F, p-values adjusted for clusters.

§ Family assets can range from 0 to 11.

Table 5. First graders' achievement* and health, by group and previously attended preschool type

Outcome variables ICC	Group [†]	Adjusted means (SD) for preschool type [‡]			F, df = 1, 204, (p-value) [§]		
		Total sample	TK	PAUD	Group	Type	Group × type
Speaking 0.22	PLAN	65.71 (17.7)	68.08 (16.2)	63.33 (19.1)	19.33 (<0.0001)	0.35 (0.55)	7.51 (0.007)
	Control	55.29 (20.3)	51.00 (20.5)	59.58 (19.4)			
		<i>d</i> = 0.56	<i>d</i> = 0.43	<i>d</i> = 0.20			
Reading 0.22	PLAN	71.57 (38.2)	77.80 (22.3)	65.33 (34.4)	19.17 (<0.0001)	1.78 (0.18)	1.42 (0.23)
	Control	53.52 (38.2)	54.73 (37.6)	52.32 (39.2)			
		<i>d</i> = 0.72					
Writing 0.27	PLAN	66.17 (29.1)	74.60 (25.1)	57.75 (31.0)	26.03 (<0.0001)	4.06 (0.04)	2.87 (0.090)
	Control	47.42 (30.9)	49.44 (31.8)	45.40 (28.8)			
		<i>d</i> = 0.65					
Oral math 0.16	PLAN	71.65 (17.6)	70.68 (17.8)	72.62 (17.4)	24.68 (<0.0001)	0.34 (0.56)	0.00 (0.97)
	Control	59.47 (20.2)	58.60 (21.2)	60.34 (18.1)			
		<i>d</i> = 0.66					
Written math 0.14	PLAN	75.64 (24.4)	77.36 (20.3)	73.91 (28.0)	21.87 (<0.0001)	0.74 (0.39)	0.00 (0.97)
	Control	60.32 (25.3)	62.15 (26.6)	58.49 (22.1)			
		<i>d</i> = 0.63					
Total achievement 0.24	PLAN	70.56 (19.8)	74.56 (15.8)	66.56 (22.5)	35.11 (<0.0001)	1.35 (0.25)	2.05 (0.15)
	Control	55.15 (22.9)	55.33 (23.8)	54.98 (21.3)			
		<i>d</i> = 0.76					
Preventive health [¶] 0.33	PLAN	10.86 (2.0)	10.78 (3.2)	10.85 (2.9)	5.55 (0.02)	0.02 (0.89)	0.23 (0.63)
	Control	10.00 (1.7)	10.37 (2.9)	10.22 (2.5)			
		<i>d</i> = 0.47					
Sick past two weeks (%) 0.25	PLAN	24.59%	18.42%	30.00%	2.10 (0.15)	1.37 (0.24)	0.27 (0.61)
	Control	32.71%	29.69%	35.74%			
Dietary diversity 0.12	PLAN	3.12 (0.7)	3.20 (0.7)	3.04 (0.8)	0.41 (0.52)	0.13 (0.71)	3.70 (0.06)
	Control	3.19 (0.9)	3.06 (1.0)	3.31 (0.5)			

* Achievement scores have been converted to a mark out of 100.

† Graduates of Plan and Government (control) preschools.

‡ TK = Taman Kanak-Kanak (school-based preschool); PAUD = Pendidikan Anak Usia Dini (Health post-based preschool).

§ F, p-values adjusted for clusters and covariates age, HAZ, mother's education, family assets. Effect size *d* for significant effects is the difference between adjusted means divided by the pooled standard deviation.

|| ICC is the intracluster correlation.

¶ Preventive health practices are immunizations, hand-washing at two key times, safe water, latrine use, iodized salt, vitamin A drops, iron and deworming.

In conclusion, access to preprimary school is not sufficient to provide a strong foundation for child development unless accompanied by a quality program. Quality can be achieved by raising the capacity of preschool teachers to deliver an age-appropriate curriculum with sufficient local resources to implement it. To equalize opportunities, greater attention must be given to health and education services on remote rural islands.

REFERENCES

- Statistics Indonesia (Badan Pusat Statistik – BPS), National Population and Family Planning Board (BKKBN), Kementerian Kesehatan (Kemenkes – MOH), and ICF International. *Indonesia Demographic and Health Survey 2012*. Jakarta, Indonesia: BPS, BKKBN, Kemenkes, and ICF International, 2013. Available at: <https://dhsprogram.com/pubs/pdf/FR275/FR275.pdf> (Accessed February 1, 2016).
- Humphrey JH. Child undernutrition, tropical enteropathy, toilets, and handwashing. *Lancet* 2009;374:1032–35. PMID: 19766883. doi: 10.1016/S0140-6736(09)60950-8.
- Jones AD, Ickes SB, Smith LE, Mbuya MMN, Chasekwa B, Heidkamp RA, et al. World Health Organization infant and young child feeding indicators and their associations with child anthropometry: A synthesis of recent findings. *Matern Child Nutr* 2014;10:1–17. PMID: 23945347. doi: 10.1111/mcn.12070.
- Engle PL, Black MM, Behrman JR, Cabral de Mello M, Gertler PJ, Kipiriri L, et al. Strategies to avoid the loss of developmental potential among over 200 million children in the developing world. *Lancet* 2007;369:229–42. PMID: 17240290. doi: 10.1016/S0140-6736(07)60112-3.
- Rao N, Sun J, Pearson V, Pearson E, Liu H, Constan MA, et al. Is something better than nothing? An evaluation of early childhood programs in Cambodia. *Child Dev* 2012;83:864–76. PMID: 22506857. doi: 10.1111/j.1467-8624.2012.01746.x.
- Watanabe K, Flores R, Fujiwara J, Tran LTH. Early childhood development interventions and cognitive development of young children in rural Vietnam. *J Nutr* 2005;135:1918–25. PMID: 16046717.
- Aboud FE, Hossain K. The impact of preprimary school on primary school achievement in Bangladesh. *Early Child Res Q* 2011;26(2):237–46. doi: 10.1016/j.ecresq.2010.07.001.
- Moore AC, Akhter S, Aboud FE. Evaluating an improved quality preschool program in rural Bangladesh. *Int J Educ Dev* 2008;28(2):118–31. doi: 10.1016/j.ijeducdev.2007.05.003.
- Malmberg L-E, Mwaura P, Sylva K. Effects of a preschool intervention on cognitive development among East-African preschool children: A flexibly time-coded growth model. *Early Child Res Q* 2011;26(1):124–33. doi: 10.1016/j.ecresq.2010.04.003.
- Martinez S, Naudeau S, Pereira V. The Promise of Preschool in Africa: A Randomized Impact Evaluation of Early Childhood Development in Rural Mozambique. Available at: http://siteresources.worldbank.org/INTAFRICA/Resources/The_Promise_of_Preschool_in_Africa_ECD_REPORT.pdf (Accessed February 6, 2012).
- Rao N, Sun J, Chen EE, Ip P. Effectiveness of early childhood interventions in promoting cognitive development in developing countries: A systematic review and meta-analysis. *Hong Kong J Paediatr*, in press.
- Montie JE, Xiang Z, Schweinhart LJ. Preschool experience in 10 countries: Cognitive and language performance at age 7. *Early Child Res Q* 2006;21:313–31. doi: 10.1016/j.ecresq.2006.07.007.
- Barnett WS. Effectiveness of early educational interventions. *Science* 2011;333:975–78. PMID: 21852490. doi: 10.1126/science.1204534.
- UNESCO Institute of Statistics. Paris, France: UNESCO. Available at: <http://www.uis.unesco.org/DataCentre/Pages/country-profile.aspx?code=IDN®ioncode=40515> (Accessed February 1, 2016).
- Save the Children. *Improving Early Learning and Development in Indonesia with High Quality ECCD Programs*. Jakarta, Indonesia: Save the Children, 2014.
- Jung H, Hasan A. The Impact of Early Childhood Education on Early Achievement Gaps: Evidence from the Indonesia ECED Project. World Bank Policy Research Working Paper 6794, 2014. Available at: <https://openknowledge.worldbank.org/handle/10986/18340> (Accessed February 1, 2016).
- Buku Kerangka Besar Pembangunan PAUD Indonesia Periode 2011–2025. Dirjen Pendidikan anak Usia Dini. Non Formal, dan Informal, Kemendiknas Tahun 2011.
- Wechsler D. *Wechsler Preschool and Primary Scale of Intelligence (WPPSI)*, 3rd ed. San Antonio, TX: Psychological Corporation, 2002.
- Wilkinson GS. *Wide Range Achievement Test (Revised)*. Wilmington, DE: Jastak Associates, 1993.
- Harms T, Clifford RM, Cryer D. *Early Childhood Environment Rating Scale*, rev. ed. New York, NY: Teachers' College, Columbia University, 1998.
- Sylva K, Siraj-Blatchford I, Taggart B. *Assessing Quality in the Early Years: Early Childhood Environment Rating Scales-Extension (ECERS-E): Four Curricular Subscales*. London, UK: Trentham, 2003.

22. United Nations. Sustainable Development Goals, 2015. Available at: <http://www.un.org/sustainabledevelopment/education/> (Accessed February 1, 2016).
23. Denboba A, Hasan A, Wodon Q (Eds.). *Early Childhood Education and Development in Indonesia: An Assessment of Policies Using SABER*. World Bank Studies. Washington, DC: World Bank, 2015. doi: 10.1596/978-1-4648-0646-9.
24. Opel A, Ameer S, Aboud FE. The effect of preschool dialogic reading on vocabulary among rural Bangladeshi children. *Int J Educ Res* 2009;48(1):12–20. doi: 10.1016/j.ijer.2009.02.008.
25. Opel A, Zaman SS, Khanom F, Aboud FE. Evaluation of a mathematics program for preprimary children in rural Bangladesh. *Int J Educ Dev* 2012; 32:104–10. doi: 10.1016/j.ijedudev.2011.01.013.
26. Yoshikawa H, Leyva D, Snow CE, Trevino E, Barata MC, Weiland C, et al. Experimental impacts of a teacher professional development program in Chile on preschool classroom quality and child outcomes. *Dev Psychol* 2015; 51:309–22. PMID: 25706589. doi: 10.1037/a0038785.

Received: March 2, 2016

Accepted: September 9, 2016

RÉSUMÉ

OBJECTIFS : On sait que l'enseignement préscolaire de haute qualité prépare les enfants à réussir à l'école primaire. En Indonésie, plus de la moitié des enfants suivent maintenant des programmes préscolaires, mais on en ignore la qualité et l'efficacité. Nous avons cherché à évaluer l'impact de deux modèles gouvernementaux d'enseignement préscolaire, à savoir l'école maternelle (ÉM) et les services éducatifs et de garde à l'enfance moins structurés (dont l'acronyme est PAUD), avec et sans les efforts de renforcement des capacités d'une organisation non gouvernementale (Plan-ONG), sur les habiletés linguistiques et mathématiques des enfants.

MÉTHODE : Treize ÉM et 17 PAUD soutenus par le Plan et le même nombre d'établissements préscolaires soutenus uniquement par le

gouvernement ont été sélectionnés au hasard à Nusa Tenggara Est, en Indonésie. Cinq enfants fréquentant chaque établissement ($n = 292$) et cinq enfants ayant terminé le programme de chaque établissement et étant maintenant en 1^e année ($n = 241$) ont été sélectionnés au hasard, et leurs niveaux linguistiques et mathématiques ont été testés. Nous avons évalué la qualité des établissements préscolaires soutenus par le Plan. Les mères ont fourni des renseignements sur la situation sociodémographique de leur famille et sur les habitudes de santé, les maladies et le régime alimentaire de leur enfant au cours des deux semaines antérieures.

RÉSULTATS : Après ajustement liés aux grappes, des analyses de covariance ont indiqué que les enfants fréquentant les établissements préscolaires soutenus par le Plan obtenaient de meilleurs résultats dans l'ensemble, surtout dans les ÉM. Nous avons observé que les ÉM soutenues par le Plan étaient de qualité supérieure aux PAUD soutenus par le Plan. Les élèves de 1^e année ayant terminé le programme préscolaire des établissements soutenus par le Plan (ÉM et PAUD) ont obtenu des notes supérieures aux tests linguistiques et mathématiques que les élèves ayant terminé un programme préscolaire soutenu uniquement par le gouvernement. Les pratiques de santé préventives étaient meilleures dans le groupe du Plan, bien que le régime alimentaire et l'indice taille/âge soient médiocres dans l'ensemble.

CONCLUSIONS : Des améliorations au programme préscolaire gouvernemental sont nécessaires pour en hausser la qualité et l'efficacité, spécifiquement en introduisant un mélange de jeu pédagogique et de jeu libre à l'intérieur des locaux, de ressources et de formation des enseignants pour appuyer l'apprentissage des enfants.

MOTS CLÉS : enfant d'âge préscolaire; qualité des classes; éducation de la petite enfance; PFRR; renforcement des capacités; préparation à l'école