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Built to Last: Sustainability of Early Childhood Education Services in Rural Indonesia

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ABSTRACT *This paper studies the sustainability of preschools established under a large-scale project in rural Indonesia. We returned to project villages three years after the project closed to understand why some preschools were able to sustain operations while others closed. We present four key findings. First, 92 per cent of preschools from the project remained open three years after project funding ended. Second, preschools planned for sustainability by taking into account six factors: preschool quality, finance, supplementary services, market condition, household wealth, and parental involvement. Third, each of these factors predicts sustainability after project closure. Finally, interviews with former teachers show that the few preschools that closed were those that struggled to find both the financial and human resources needed to continue operating. We discuss actionable lessons for the design and sustainability of future early childhood education projects.*

1. Introduction

As the international community adopts and implements the Sustainable Development Goals (SDGs), a growing concern is whether interventions established by project funding are sustainable. Sustainability is defined as the continued use of project components to deliver their intended benefits beyond their initial funding period (Bamberger & Cheema, 1990; Scheirer & Dearing, 2011; Shediac-Rizkallah & Bone, 1998). As an illustration, between 2001 and 2013, the World Bank funded USD 3.3 billion in early childhood development through 273 projects (Sayre, Devercelli, Neuman, & Wodon, 2015). This figure jumped to roughly USD 1.1 billion per year between 2014 and 2017.¹ While investments in early childhood education have increased, we know little about whether and how these investments are sustained. A review of the literature suggests that only 36 per cent of international development projects in education include goals related to sustainability (Chapman & Moore, 2010).

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In this paper, we examine the sustainability of a large-scale early childhood development project in Indonesia. Between 2009 and 2013, the project expanded access to preschools in poor, rural villages. Villages participating in the project received block grants to establish preschools, trained teachers for these preschools, and raised community awareness about the importance of early childhood education.² We returned to these project villages in 2016 – three years after the project had ended – to assess whether preschools established under the project were sustained. We construct a unique panel data set of 245 preschools established under the project, with each preschool observed in 2010 at the beginning of the project, in 2013 at the end of the project, and in 2016 if the preschool remained open. For preschools that were closed in 2016, we visited the village and interviewed former teachers to understand the conditions leading up to their closure.

We answer four research questions. First, what is the sustainability rate of preschools established under the project? We find that 92 per cent of preschools from the project remained open three years after project funding ended. This is an important finding given that prior literature has raised concern that donor-funded projects in health and education often fail to survive after donor funding (Bossert, 1990; Meki Kombe & Herman, 2017). We also observe varying degrees of sustainability. In 2016, 35 per cent of preschools were open with at least two teachers trained under the project and 40 per cent were open with one teacher trained under the project. By documenting varying degrees of sustainability, we argue that research on sustainability should acknowledge the diverse forms that sustainability may take in different project settings.

Second, how did preschools plan for sustainability? Drawing on the canonical framework of programme sustainability (Shediac-Rizkallah & Bone, 1998), we explore how (i) project design and implementation factors, (ii) factors in the broader community environment, and (iii) factors within the organisational setting, varied across preschools in our study setting. We describe how preschools varied across six factors in our study setting: quality, finance, supplementary services, market condition, household wealth, and parental involvement.

Third, what variables predict sustainability? Using lasso to predict sustainability, we find that four factors (quality, finance, supplementary services, and market condition) are predictive of whether preschools remained open after project closure. The two factors related to the organisational setting (household wealth and parental involvement) are included as predictors when we examine higher degrees of project sustainability.

Finally, what happened to the preschools that closed after project funding ended? Interviews with former teachers suggest that the few preschools that closed were those that struggled to find both the financial and human resources they needed to continue operating.

This paper contributes to the broader literature on sustainable development by providing empirical evidence on the sustainability of an early childhood education project. Under the SDGs, the global community has committed to providing quality early childhood education for all children by 2030 (United Nations, 2015). However, the global gross enrolment ratio in pre-primary education is low at 44 per cent (UNESCO, 2015), which suggests the need for greater investments in early childhood education. As pre-primary education is generally not included in compulsory education, much of this investment will likely come from project-type interventions. As such, researchers and practitioners alike are seeking to understand whether and how project funding in early childhood education can be made into sustainable investments.

While the focus of this paper is on the sustainability of preschool services, we also discuss how our findings provide operational lessons and insights for designing other types of community-based development projects that are not guaranteed government funding.

2. Indonesia early childhood education and development project

As in most other countries, preschools in Indonesia are not part of the compulsory education system. In 2007, the gross enrolment rate in early childhood education for children ages 4–6 was only 23 per cent, with significant gaps in enrolment across wealth, geographic location, and gender (Jung

& Hasan, 2016). Government expenditure in early childhood education accounted for only 0.45 per cent of the public education budget, while 80 per cent of government expenditure went to primary and secondary education (World Bank, 2014).

Between 2009 and 2013, the Government of Indonesia invested USD 67.5 million in the Indonesia ECED Project in partnership with the World Bank. The project provided block grants to villages to establish preschools, train teachers in these preschools, and raise community awareness about the importance of early childhood education. Villages included in the project were selected on the basis of their poverty rates, population, and community interest in supporting such services. On average, the households targeted by the project were broadly representative of the rural population in Indonesia at the time.³

Under the project, villages received a package of interventions. First, a local facilitator helped raise awareness on the importance of early childhood education. Facilitators also provided training on how communities could prepare proposals for the block grants available under the project.

Second, villages received block grants to establish two preschools. Each village received USD 18,000 (77 million Rupiah) over three years. The communities generally provided the site for the preschool while the block grants were used to buy materials, pay teachers, and provide supplementary services. Preschools offer a play-based learning environment with both unstructured and structured play activities. Structured play activities generally include songs and dance, and exposure to paints, pencils and paper, and reading sessions where the teacher reads books to the children introducing them to books, letters and numbers. Preschools are intended for children ages 3 and 4 and emphasise learning through play before children are old enough to enrol in kindergarten, which is recommended at ages 5 and 6 (Brinkman et al., 2017a).⁴ Project documents suggest that the cost per child was about US\$27 per year.⁵ This estimate excludes any voluntary contributions from the villages to the project. In contrast, other early childhood programmes range in cost from US\$37 per child in India to US\$52 per child in Mexico to US\$66 per child in Brazil (Evans, Meyers, & Ilfeld, 2000), suggesting that this project was relatively low-cost.

Third, 200 hours of teacher training were provided for up to two teachers per preschool. This training was delivered in two blocks of 100 hours each. Teachers who worked in the project preschools were predominantly women from the village, often with children of their own. Some had prior work experience in health and education, while others had none (Hasan, Hyson, & Chang, 2013). Taken together, the package of interventions under the project helped finance the demand for and supply of preschools.

3. Conceptual framework & literature review

The conceptual framework for this paper builds on the canonical framework for programme sustainability in Shediac-Rizkallah and Bone (1998). In this framework (see Figure 1), three groups of factors are important for programme sustainability: (i) project design and implementation factors (six factors); (ii) factors within the organisational setting (three factors); and (iii) factors in the broader

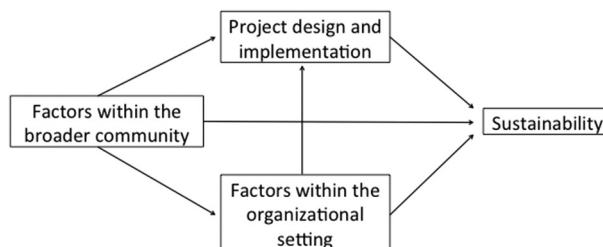


Figure 1. Factors for project sustainability.

Note: Figure from Shediac-Rizkallah and Bone (1998).

community environment (two factors). Below, we map on these 11 factors to the Indonesia ECED Project. We identify which factors are fixed for all preschools established under the project and which factors vary across preschools and over time. We are interested in examining the factors that vary across preschools and over time, as they may inform our understanding of why some preschools were sustained while others were not. For factors that vary, we weave in relevant literature to highlight the importance of these factors in our study setting.

(i) Project design and implementation factors

1. *Negotiation process*: How was the project negotiated? All of the villages included the project were subject to the same negotiation process with the government to establish preschools, receive teacher training, and raise community awareness (see [Section II](#)).
 2. *Effectiveness*: Did the community benefit from the project? Previous research shows that the project successfully raised enrolment rates and the length of enrolment in early childhood education. The project had modest, sustained impacts on child development, though this varied for children from different backgrounds (Brinkman, Hasan, Jung, Kinnell, & Pradhan, 2017b).⁶ Prior work has documented variation in quality across preschools established under the project (Brinkman et al., 2017a), which might explain some of these differences. Research from other settings has found that childcare preschools are significantly more likely to remain open when teachers have higher qualifications as measured by education and teaching experience (Kershaw, Forer, & Goelman, 2005; Lam, Klein, Freisthler, & Weiss, 2013). Together, this suggests that a key aspect of project effectiveness that varies in our study setting is preschool **quality**.
 3. *Duration*: What is the project's grant period? For all villages, the project began in 2009 and ended in 2013.
 4. *Financing*: What are the sources of funding and how are funds spent? Preschools established under the project were free to decide how to spend the block grant and they could seek out funding from other sources. As a result, **finance** is a key aspect of the project that varies across preschools established under the project. Research suggests that project financing is an important factor for sustainability. A study of childcare preschools in Canada found that preschools which received financial support from the government and paid higher wages to staff were less likely to close (Kershaw et al., 2005). The importance of finance becomes particularly salient after the project funding runs out. For example in Zambia, the withdrawal of donor support left primary schools with erratic and unstable funding with which to continue a literacy programme (Meki Kombe & Herman, 2017).
 5. *Type*: What services does the project provide? Preschools established under the project varied in terms of their **supplementary services**. In addition to the play-based educational service described in [Section II](#), some preschools provided supplementary food, vitamin, and deworming medication to children. Prior research suggests that the provision of supplementary services is associated with sustainability. For example in the health literature, rural hospitals that offer a broader range of services relative to neighbouring hospitals have significantly lower risks of closure because they are able to differentiate themselves (Succi, Lee, & Alexander, 1997).
 6. *Training*: What is the training component of the project? All villages received a facilitator who raised awareness about the importance of early childhood education and two trained teachers in each preschool.
- (ii) Factors within the organisational setting
7. *Institutional strength*: What organisation is implementing the project? The Ministry of National Education established district ECED offices, which oversaw the implementation of the project in all villages.
 8. *Integration with existing services*: Is the project integrated with other services? Villages participating in the project varied in terms of the local **market condition** for early childhood services. As noted in [Section II](#), early childhood education in Indonesia includes

preschools and kindergartens. Villages vary in terms of the availability of preschools established outside of the project and kindergartens. Understanding local market conditions is important for sustainability, as prior research shows that competition in rural markets can be an important predictor of the survival of rural hospitals in the United States (Succi et al., 1997).

9. *Project leadership*: Is the project endorsed from the top? The Ministry of National Education endorses the project from the top. Locally, the village leader who helps identify and furnish the site of the preschools endorses the project.
 - (iii) Factors in the broader community environment
10. *Socioeconomic considerations*: What is the socioeconomic environment? All villages participating in the project are poor, rural villages in Indonesia. However, there is variation in the average **wealth of households** across these participating villages. Prior research in the health-care sector, for example, highlights variation in sustainability of projects between affluent and poor communities (Shea, Basch, Wechsler, & Lantigua, 1996).
11. *Community participation*: What is the level of community participation? As part of the project design, all communities provided a site for the preschool and local volunteers to serve as teachers at the start. Once preschools were operational, there were varying degrees of **parental participation** in preschools established under the project, with some communities exhibiting more participation from parents than others. This is important as prior research shows a strong positive relationship between parental participation and the successful institutionalisation of reforms in education (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010).

Thus, we identify six measurable factors that are relevant to understanding sustainability of preschools in our study setting: quality, finance, supplementary services, market condition, household wealth, and parental participation. In our empirical analysis, we seek to understand the differences between preschools that were sustained and those that were not along these factors.

4. Data

This paper uses data on preschools located in villages that received the block grant and were part of an impact evaluation of the Indonesia ECED Project (see Pradhan et al., 2013). In each village, one preschool was selected for in-depth follow-up observation (N = 245 preschools). In Supplementary Table 1, we show that these 245 preschools selected for observation are representative of overall preschools that were established under the project in these villages.⁷ There are no significant differences in various baseline characteristics between the panel preschools and other preschools established under the project in these villages.

We have three waves of survey data for the analysis. The first survey in 2010 collected information about the conditions and operations of preschools. The second survey in 2013 (the last year of the project) collected the same information as the 2010 survey as well as additional information about how the block grants were used during the project period.

The third survey was collected in 2016, three years after the project funding ended. Prior to our field visits, we conducted phone interviews with administrators of all preschools to ascertain whether they were still open or had closed. If the preschool was still open, we visited the village and collected similar information as the 2010 and 2013 survey, focusing on the conditions and operations of the preschools.

If the preschool was closed, we visited the village and interviewed former preschool administrators and teachers to collect data on the date of closure, key reasons for closure, as well as what happened to the building, toys, and teachers after the preschool closed. The survey for closed preschools ended

with an open-ended question in order to obtain qualitative, retrospective information about the experience of administrators and teachers when the preschool closed.

5. Methodology

We address four research questions in this paper. First, what was the sustainability rate of preschools established under the project? To measure the rate of sustainability, we calculate the proportion of preschools that remained open in 2016. We further unpack this measure by calculating (1) the proportion of preschools open in 2016 with one teacher that was trained under the project and (2) the proportion of preschools open in 2016 with two or more teachers that were trained under the project.

Second, how did preschools plan for sustainability? Drawing on our conceptual framework, we examine six factors: quality, finance, supplementary services, market condition, household wealth, and parental participation. Each factor is captured by several variables and these variables are described in detail in the Appendix. For quality, we have measures of classroom observations in the preschool, education and experience of teachers, child–teacher ratio, and length of programme services. For finance, we measure the allocation of block grants, the amount of other funding received, and the fees charged to families. For supplementary services, we measure whether preschools provided supplementary food, vitamin, and deworming medication. For market conditions, we measure the number of and vicinity to other early childhood education services. We measure the average wealth of household in the village as well as the level of parental involvement in preschools.

To understand how preschools planned for sustainability, we examine the means of each variable measured in 2010 and 2013 by outcome category in 2016. Each preschool is classified into one of three possible categories of outcome: closed in 2016, open in 2016 with one trained teacher, and open in 2016 with two or more trained teachers. To examine differences in how preschools planned for sustainability, we calculate mean differences across outcome categories for each year of observation. To examine how preschools planned for sustainability over time, we calculate mean differences across years of observation. Standard errors are clustered by preschool.

Our third research question asks, which variables predict sustainability? We are interested in predicting sustainability based on variables related to quality (X_1), finance (X_2), market condition (X_3), supplementary services (X_4), household wealth (X_5) and parental involvement (X_6) measured in 2010 and 2013. Using vector notation, our linear model of interest can be expressed as:

$$\mathbf{Y} = \mathbf{X}\beta + \varepsilon$$

with outcome vector $\mathbf{Y}_{n \times 1}$, predictor matrix $\mathbf{X}_{n \times p}$, coefficient vector $\beta_{p \times 1}$, and the error vector $\varepsilon_{n \times 1}$. Here, n is the number of observations and p is the number of variables in $X_1 \dots X_6$. To select which variables best predict sustainability, we use the Least Absolute Shrinkage and Selection Operator (lasso) given that it avoids overfitting by minimising out-of-sample prediction error. The lasso is a penalised regression, which minimises:

$$\frac{1}{2N} (\mathbf{Y} - \mathbf{X}\beta)' (\mathbf{Y} - \mathbf{X}\beta) + \lambda \sum_{j=1}^p |\beta_j| \quad (1)$$

where $\lambda \sum_{j=1}^p |\beta_j|$ is the penalty term. The tuning parameter λ is selected using 10-fold cross-validation.

The data is divided into 10 equal-sized subsamples (folds). For each fold k , the model is estimated on the remaining nine folds and that result is used to make predictions for the values for fold k . The cross-validation procedure selects the λ that minimises the out-of-sample prediction error across all

10 folds. As a prediction/model selection exercise, we are interested in the non-zero coefficients β_j from minimising Equation (1).

We estimate two lasso regressions. First, we predict whether preschools remained open in 2016. Second, we subset our sample only to preschools that remained open in 2016 and then estimate whether preschools had at least two trained teachers in 2016. This second specification allows us to explore the variables that are predictors of higher degrees of sustainability, conditional on preschools that remained open.

It is important to note that the goal of using lasso for prediction/model selection is to identify (sets of) variables that correlate well with sustainability. Lasso is not intended for interpreting the estimated coefficients from the resulting model (Ahrens, Hansen, & Schaffer, 2020). We are simply looking for variables that correlate well with sustainability. As a result, we include variables measured in 2010 and 2013 because (i) we are simply interested in describing how different preschools selected different choices during the project period and (ii) we are not making any causal claims from these prediction models.⁸

Finally, what happened to the closed preschools? To answer this question, we draw on the 2016 interviews with former preschool administrators and teachers of closed preschools. We use respondent answers to the open-ended question about their experiences to understand the challenges these preschools faced after project closure.

6. Results

6.1. What is the sustainability rate of preschools established under the project?

Figure 2 presents the sustainability rate of preschools. Our main finding is that 92 per cent of preschools were still open in 2016. This is an important finding given that prior literature has raised concerns that donor-funded projects in health and education often fail to survive after donor funding (Bossert, 1990; Meki Kombe & Herman, 2017). To put this figure in context, we examine

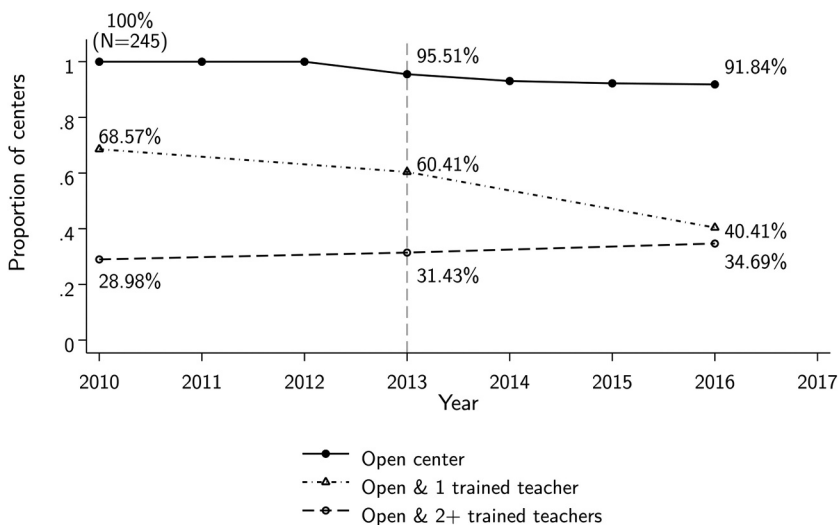


Figure 2. Status of project preschools over time.

Notes: Plot of proportion of preschools that (i) remained open, (ii) remained open with one trained teacher, and (iii) remained open with at least two trained teachers, in each year. Former preschool administrators and teachers provided the date of preschool closure. Dashed vertical line in 2013 indicates when the Indonesia ECED Project ended.

the proportion of other early childhood education services that were open between 2013 and 2016.⁹ On average, 95 per cent of other early childhood education services that were operating in 2013 were also found to be open in 2016.¹⁰ Thus, the sustainability of preschools established under the Indonesia ECED Project is remarkably similar to the sustainability of other early childhood services.

Figure 2 also shows the per cent of preschools with two teachers trained by the project (henceforth trained teachers). Given that teacher training was a key project component, we are interested in not only if preschools were open in 2016 but also the number of teachers trained under the project that remained in these preschools in 2016. At the start of the project in 2010, 29 per cent of preschools had two trained teachers.¹¹ It is worth noting that the percent of open preschools with two trained teachers *increased* between 2013 and 2016 even though the training component of the project ended in 2013. We interpret this result to be due to the fact that open preschools with two trained teachers in 2013 and 2016 were those that were particularly successful at attracting and hiring teachers from other preschools who had also been trained under the project. This view is supported by the fact that the proportion of open preschools with one trained teacher *declined* between 2010 and 2016 (shown as a dotted line in Figure 2). By documenting varying degrees of sustainability, we argue that research on sustainability should acknowledge the diverse forms that sustainability may take in different project settings.

6.2. How did preschools plan for sustainability?

Figures 3–7 summarise how preschools planned for sustainability in terms of quality, finance, supplementary services, market condition, household wealth, and parental participation. For each factor, we examine how variables varied across preschools over time.

In terms of quality (Figure 3), we find some evidence that preschools with higher degrees of sustainability are those that met the needs of families in the villages. While preschools differ in quality in terms of classroom observation scores, these differences are not statistically different (Figure 3(a)).¹² Quality differences in terms of teacher characteristics are also insignificant across types of preschools (Figure 3(b)). However, among preschools that remain open, we observe a 14–18 percentage point (p.p.) increase in teachers with a post-secondary education degree between 2013 and 2016. This increase coincides with the 24 p.p. decrease in teachers with prior teaching experience in early childhood education. Together, this suggests that preschools that remained open replaced their teachers with younger teachers who have more formal education but less experience. Importantly, sustained preschools had more students enrolled (Figure 3(c)) and provided services for more days of the week (Figure 3(d)) than those that eventually closed.

For finance (Figure 4), we find that preschools that were sustained after project closure spent resources differently and gathered more funding from other external sources compared to preschools that were not sustained. Figure 4(a) shows relatively few systematic differences in block grant allocation at the outset (2010) between preschools that remained open and those that would ultimately close. However, by 2013, open preschools (with either one or two teachers) spent significantly more on teachers by 4 and 5 p.p., respectively. This pattern is also visible over time, with sustained preschools significantly increasing the share of block grant allocation towards teachers by 2–5 p.p. between 2010 and 2013. Moreover, we find evidence that sustained preschools reallocated block grants from infrastructure spending towards teacher salaries between 2010 and 2013.

We also examine how much financial support preschools received from various sources – over and above the block grants (Figure 4(b)). Preschools that remained open received an additional 19–21 million Rupiah from government sources compared to preschools that closed. These differences are large and statistically significant. Likewise, open preschools with two or more trained teachers raised an additional 4 million Rupiah from the local community relative to closed preschools.

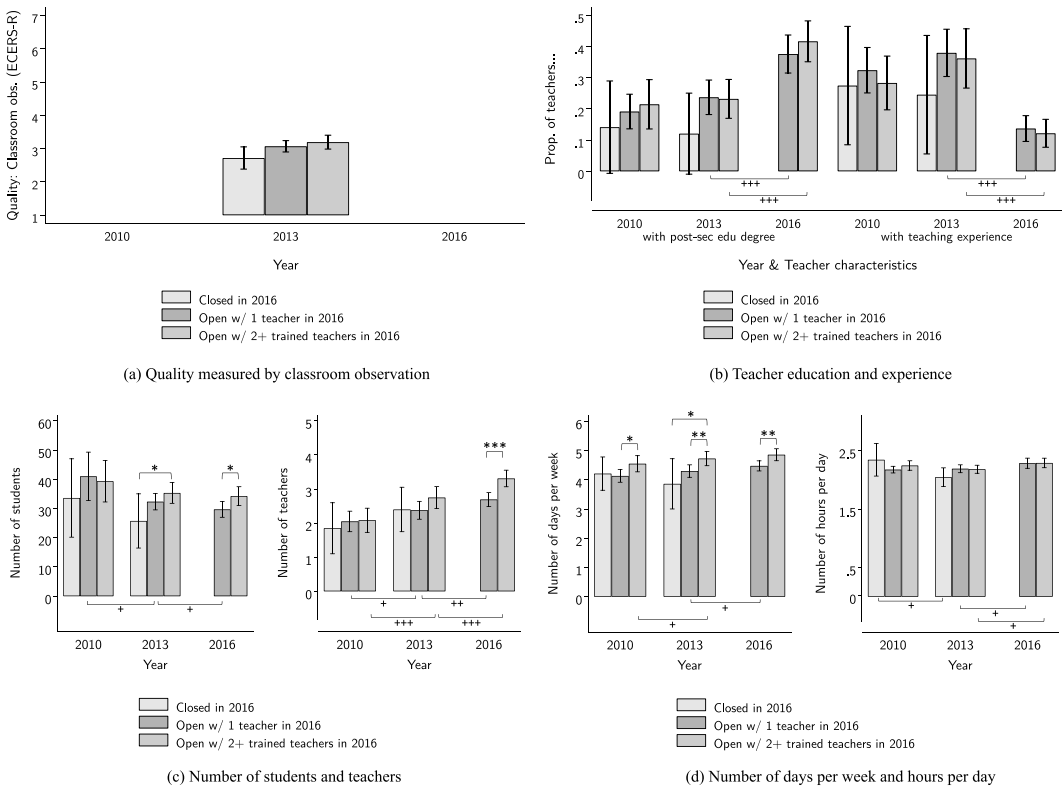
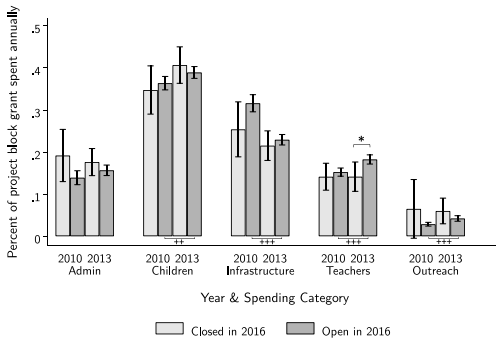


Figure 3. Quality characteristics of preschools.

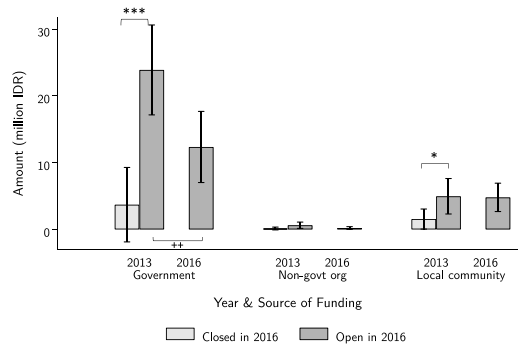
Notes: Mean and 95 per cent confidence intervals shown. Significant difference between open/closed preschools is shown in * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Significant difference between years is shown in + $p < 0.05$, ++ $p < 0.01$, +++ $p < 0.001$. Figures based on Supplementary Tables 2–4.

Some preschools were also financed through user fees. Overall, sustained preschools were significantly more likely to charge user fees (Figure 4(c)) and at higher prices (Figure 4(d)) from the outset of the project. In 2010, the percent of students enrolled with no fee were 73 per cent for preschools that would eventually close, 55 per cent for preschools that would remain open with one trained teacher, and 41 per cent for preschools that would remain open with two or more teachers. These figures are all significantly different from each other. Moreover, sustained preschools with two or more teachers significantly reduced the proportion of students attending with no fee over time, suggesting that they succeeded in charging user fees to sustain their operations as the project closed. Although sustained preschools charged higher fees, they were relatively affordable. In 2016, the average monthly fee charged was 12,756 Rupiah for open preschools with one trained teacher and 16,214 Rupiah for open preschools with two or more trained teachers. Given that rural households in Indonesia at the time reported a monthly wage of 1.7 million Rupiah (Bureau of Labor Statistics, 2016), these fees comprise only 0.7 to 0.9 per cent of the household budget.

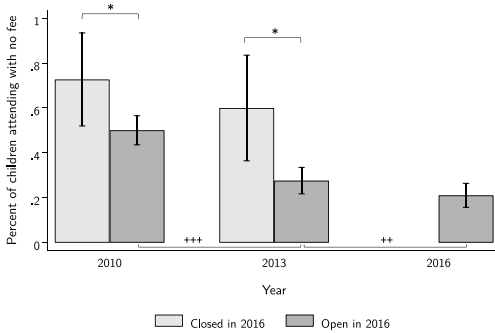
In terms of supplementary services (Figure 5), we observe considerable variation across preschools and over time. A greater share of preschools that would remain open offered weekly food programmes (41% and 55%, respectively) compared to those that closed (19%). Weekly vitamin supplements were more common in closed preschools (21%) compared to those that remained open (7%). While this declined for all types of preschools over time, there does not appear to be a statistical difference between open and closed preschools in this dimension. Deworming medication



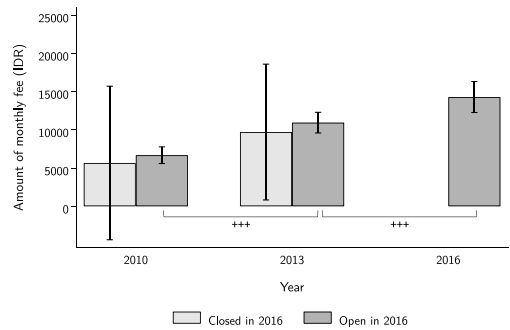
(a) Proportion of project block grant spent annually



(b) Amount received in the past three years (million IDR)



(c) Proportion of children attending with no fee



(d) Amount of monthly fee (IDR)

Figure 4. Finance characteristics of preschools.

Notes: Mean and 95 per cent confidence intervals shown. Significant difference between open/closed preschools is shown in * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Significant difference between years is shown in + $p < 0.05$, ++ $p < 0.01$, +++ $p < 0.001$. Figures based on Supplementary Tables 2–4.

was equally prevalent across preschool types (about 46%) in 2010. While this increased over time for all preschool types, there does not appear to be a difference between open and closed preschools in this dimension.

For market conditions (Figure 6), we examine the number of kindergartens and other preschools in the village per 100 children. Kindergartens in a village are complementary services to the project established preschools given the target age of students. In contrast, other preschools in the village are substitute services that directly compete for students. Figure 6(a) shows that sustained preschools (with either one trained teacher or two or more trained teachers) had significantly more kindergartens in the village than those that closed. Moreover, sustained preschools with two or more trained teachers faced significantly fewer substitute services to compete with from 2013 to 2016. Figure 6(b) shows that preschools were more likely to be sustained if they were located farther away from other preschools in the village.

Finally, Figure 7 shows the variation across preschools over time in household wealth, and parental participation. Sustained preschools are significantly more likely to be located in villages with higher average household wealth (Figure 7(a)). While parental involvement is slightly higher for preschools with one trained teacher at the outset of the project, we do not find significant differences across preschool type in later years (Figure 7(b)).

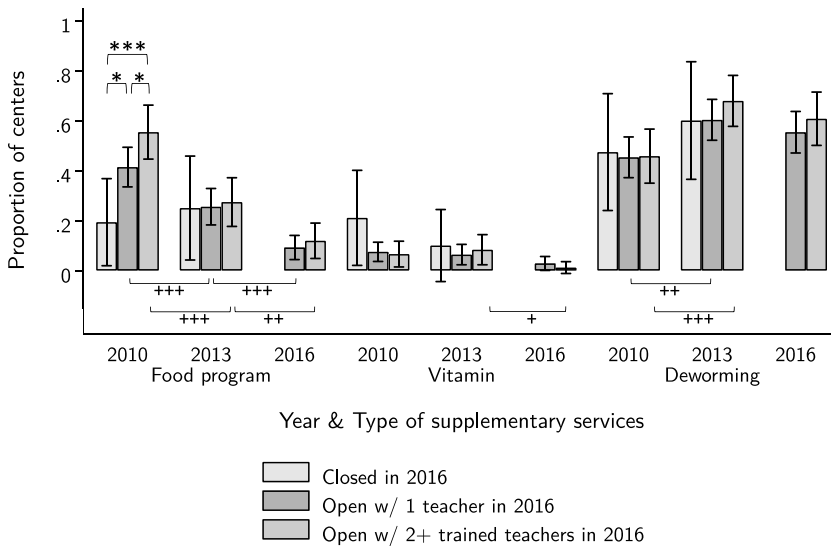


Figure 5. Supplementary services in preschools.

Notes: Mean and 95 per cent confidence intervals shown. Significant difference between open/closed preschools is shown in * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Significant difference between years is shown in + $p < 0.05$, ++ $p < 0.01$, +++ $p < 0.001$. Figures based on Supplementary Tables 2–4.

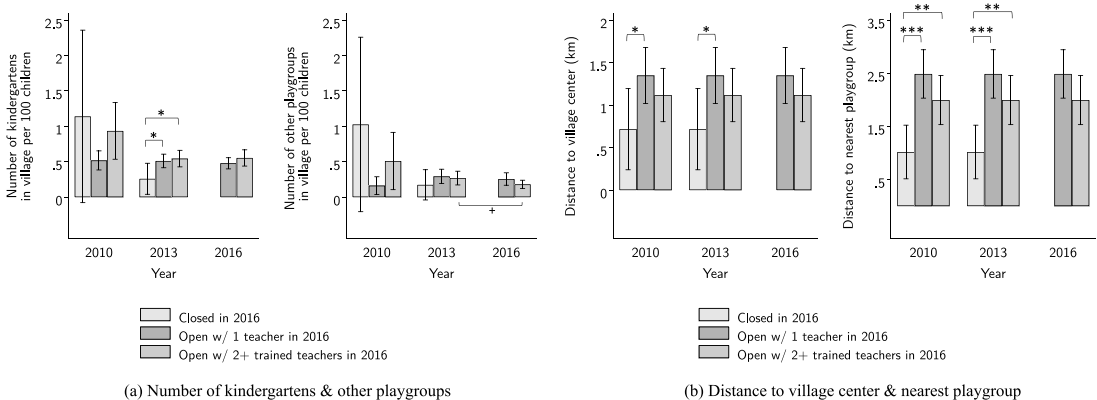


Figure 6. Market conditions of preschools.

Notes: Mean and 95 per cent confidence intervals shown. Significant difference between open/closed preschools is shown in * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Significant difference between years is shown in + $p < 0.05$, ++ $p < 0.01$, +++ $p < 0.001$. Figures based on Supplementary Tables 2–4.

6.3. What variables predict sustainability?

Given the descriptive results, we now turn our attention to estimating which variables predict sustainability. The results of the lasso regression are presented in [Tables 1](#) and [Tables 2](#). As noted in the methodology section, the purpose of prediction models using lasso is to identify sets of variables that correlate well with the outcome of interest and not intended for interpreting the

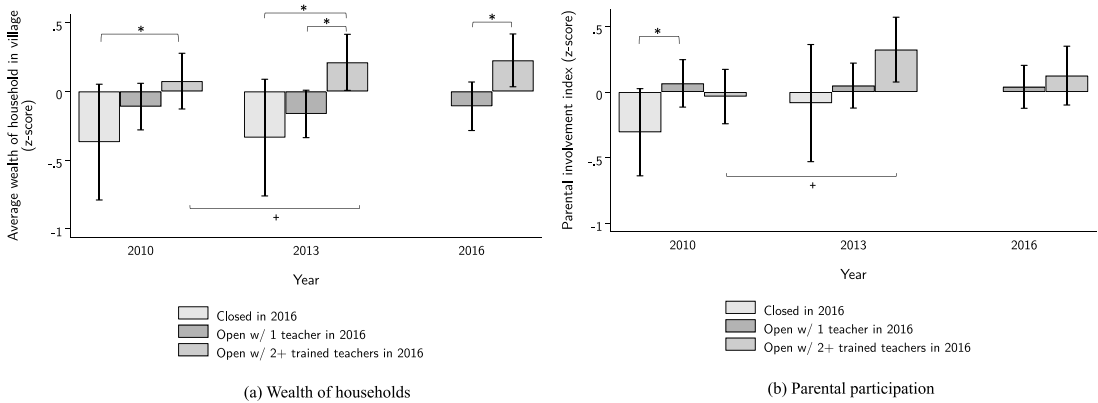


Figure 7. Household wealth and parental participation in preschools.

Note: Mean and 95 per cent confidence intervals shown. Significant difference between open/closed preschools is shown in * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Significant difference between years is shown in + $p < 0.05$, + $p < 0.01$, +++ $p < 0.001$. Figures based on Supplementary Tables 2–4.

Table 1. Predictors of whether preschools remained open in 2016

	Open in 2016 (vs. Closed in 2016)
Proportion of project block grant spent on outreach 2010	-0.95* (0.38)
Proportion of project block grant spent on teachers 2013	0.26 (0.19)
Proportion of children attending with no fee 2010	-0.07 (0.04)
Number of days of service per week 2013	0.03 (0.02)
Number of kindergartens 2010	-0.02 (0.02)
Number of kindergartens 2013	0.05* (0.02)
Distance to nearest preschool	0.02*** (0.01)
Provides weekly food programme 2010	0.08** (0.03)
Provides weekly vitamin 2010	-0.11 (0.10)
N	245

Note: Covariates in model were selected from lasso regression of 48 predictors from 2010 and 2013, which are described in the Appendix. The outcome is a binary variable of whether preschools were open in 2016 (1=Yes, 0 = No). Robust standard errors clustered by preschools. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

estimated coefficients of selected variables. Thus, the results of interest from [Tables 1](#) and [Tables 2](#) are the names of the variables selected in the final model.

For predicting whether a preschool is open in 2016 ([Table 1](#)), we find that nine variables were selected. These variables were related to finance (allocation of the block grant, the proportion of children attending with no fee), quality (the frequency of service), market conditions (number of

Table 2. Predictors of whether preschools remained open with two or more trained teachers in 2016

	Open in 2016 w/ two ⁺ trained teachers (vs. Open in 2016 w/ one trained teacher)
Prop. of project block grant spent on teachers 2010	-0.45 (0.46)
Prop. of project block grant spent on outreach 2010	1.69 (0.87)
Prop. of project block grant spent on children 2013	0.70** (0.25)
Prop. of project block grant spent on outreach 2013	-0.67 (0.55)
Proportion of children attending with no fee 2010	-0.06 (0.08)
Monthly fee (IDR) 2010	0.00 (0.00)
Monthly fee (IDR) 2013	0.00 (0.00)
Number of days of service per week 2010	0.02 (0.03)
Number of days of service per week 2013	0.03 (0.03)
Number of hours of service per day 2010	0.13 (0.09)
Number of kindergartens 2010	0.07*** (0.02)
Distance to village centre (km)	-0.02 (0.01)
Provides weekly food programme 2010	0.14* (0.07)
Provides deworming medication 2013	0.07 (0.06)
Parental involvement index (z-score) 2013	0.02 (0.03)
Average wealth of households in village (z-score) 2013	0.07* (0.03)
N	225

Note: Covariates in model were selected from lasso regression of 48 predictors from 2010 and 2013, which are described in the [Appendix](#). The outcome is a binary variable of whether preschools were open in 2016 with two trained teachers (=1) or whether preschools were open in 2016 with only one trained teacher (=0). 20 closed centres are not included in the regression. Robust standard errors clustered by preschools. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

kindergarten in village, distance to nearest preschool), and supplementary services (food and vitamin provision). When we focus only on preschools that remained open in 2016 ([Table 2](#)), we find a broader set of variables selected for predicting whether a preschool had at least two trained teachers. Importantly, variables of household wealth and parental involvement are identified as additional predictors of sustainability when the outcome is more narrowly or stringently defined as being open with two or more trained teachers.

Taken together, these results show that factors identified in the canonical framework of programme sustainability by Shediac-Rizkallah and Bone (1998) can be applied to early childhood education settings. The predictive models suggest that factors related to (i) project design and implementation (quality, finance, supplementary services) and (ii) the organisational setting (market conditions) are predictive of whether preschools remained open after project closure. Moreover, factors related to (iii) the broader community environment (household wealth and parental involvement) are additional predictors for higher degrees of sustainability.

Table 3. Summary statistics of project preschools that closed

	Mean	(S.D.)
Why did the preschool close? *		
Lack of operational funds (1 = Yes)	0.65	(0.49)
Lack of students (1 = Yes)	0.45	(0.51)
Lack of teachers (1 = Yes)	0.30	(0.47)
Could not get funding from community (1 = Yes)	0.35	(0.49)
Too many ECED preschools in same neighbourhood (1 = Yes)	0.15	(0.37)
What happened to the building?		
Building is not used by other ECED/community programme (1 = Yes)	0.80	(0.41)
Building is used by other community programme (1 = Yes)	0.10	(0.31)
Building does not exist anymore (1 = Yes)	0.00	(0.00)
Building is used by other ECED programme (1 = Yes)	0.10	(0.31)
What happened to the toys?		
Toys are still left in the building (1 = Yes)	0.45	(0.51)
Toys no longer exist or are broken (1 = Yes)	0.30	(0.47)
Toys have moved to other ECED facility (1 = Yes)	0.25	(0.44)
What happened to the teachers?		
No longer teaching	0.46	(0.36)
Teaching in other ECED preschool	0.24	(0.40)
Teaching in primary/secondary school	0.11	(0.18)
Don't know	0.08	(0.20)
Moved to other village	0.11	(0.16)

Note: Data from 2016 Indonesia ECED Survey. * Reasons for preschool closure are not mutually exclusive categories (multiple answers possible). N = 20.

6.4. What happened to the closed preschools?

While the vast majority of preschools remained open after donor funding ended, 8 per cent of preschools did not survive. In Table 3, we present results from the survey data administered in 2016 for the closed preschools. The lack of operational funds (65%) and inability to garner financial support from communities (35%) are cited key as reasons for closure. In the open-ended question at the end of the survey, former administrators explained that the lack of funding triggered a chain of events that led to the closure of their preschool: *'When the project ended, we no longer had funds to pay the teachers and replace the books and toys that were damaged. So the teachers quit. And the students left. Nobody stepped up to keep the preschool.'*

Many of the preschools that eventually closed had tried to remain open for some time, as one former teacher described: *'After the project ended, the preschool continued to operate for a year. During this time, the preschool relied on funding from the village government. The preschool held a meeting with local parents, requesting them to pay tuition fees in order to maintain the preschool. But this was not successful.'* Other administrators lamented the lack of adequate financial support from the broader community: *'Apart from the block grant, preschools received very little financial support from the village and parents but not enough to cover operational cost including to pay for teacher salary.'*

When preschools closed, the majority of preschools (80%) did not have their building space replaced by other early childhood education programmes. Nearly half the closed preschools reported that the toys were left in the building (45%) while a third reported that the toys had been lost or broken (30%). Only 25 per cent reported that the toys had been moved to a different early childhood education preschool. Responses from the open-ended question suggest that many of the buildings and toys were likely left behind because of their poor condition. A former administrator described the following: *'The preschool suffered in quality before closing. Most educational toys were broken down and the building was deteriorating.'*

In terms of teachers, 46 per cent of teachers were no longer teaching, 24 per cent of teachers were employed in other early childhood education preschools and 11 per cent were employed in primary/secondary schools. In the open-ended question, several former teachers noted that they were no longer teaching because of changes in their personal life, such as marriage, divorce, and childrearing. Former teachers also revealed that under the project, some received monthly honoraria (250,000 rupiah) that far exceeded typical wages in the villages for preschool teachers (50,000 rupiah). Once the project ended and funding depleted, preschools could no longer provide teachers with such generous compensation.

In other settings, disagreement between different stakeholders contributed to the closure of preschools. *‘There was a conflict between the board members of the village education department and the village chief. The chief did not trust the board members and decided that the preschool would only receive support from the village government for one year, not indefinitely.’* Thus, the end of the project presented an array of challenges to preschools. While 92 per cent of preschools found ways to continue providing early childhood education, the remaining 8 per cent struggled to find the financial and human support needed to sustain their programmes.

7. Discussion and conclusion

In this paper, we examined the sustainability of a large-scale early childhood development project in Indonesia. We found that the vast majority (92%) of preschools established under the project remained open three years after the development project ended. This is particularly high given evidence from comparable settings. For instance, evidence from 657 community-driven development micro-infrastructure projects built between 1999 and 2007 in Indonesia found that only 72 per cent were fully functioning when revisited between 2006 and 2008 (Bottini & Kulongoski, 2009).

We also documented variation in how preschools planned for sustainability. In terms of project design and implementation factors, preschools that were sustained provided services for more days of the week from the outset of the project. Given that these are community-based services, it is imperative that projects build in mechanisms for tracking the needs of beneficiaries and responding to those demands.

We found that sustained preschools allocated a larger share of the block grants for teacher salaries during the project period. Motivated teachers are critical for delivering high-quality education. In order to ensure that projects such as this attract the most qualified talent, it is important not only that salaries be provided but that they do not distort local market conditions. As noted earlier, some teachers under the project received payments that far exceeded local norms. Others struggled to receive any compensation at all. Neither situation is desirable and can be avoided if project design stipulates mechanisms (if not levels) of compensation.

Preschools that were sustained after project closure also received more financial support from external sources during the project period and charged user fees. An important implication that follows from our findings is that at the project design stage, we should consider local ability and willingness to pay. One possibility would be to allow preschools to pick their own fee levels and to build in a mechanism whereby eligible beneficiary households receive direct subsidies to pay these fees.

Our results also underscore the importance of factors within the organisational setting. In particular, market conditions of early childhood education need to be studied at the design stage. What services complement the project and what services may compete or substitute the project? Understanding the demand and supply of complementary and substitute services is imperative to ensuring the long-term success of investments in early childhood education.

Finally, factors in the broader community are associated with project sustainability. Consistent with prior literature, we found that preschools that were sustained after project closure were those that were located in relatively more affluent villages as measured by the average wealth of households. In

interpreting our findings, it bears noting that sustainability, while important in its own right would be rendered unappealing if their continued operation meant excluding the poorest children. In our study setting, sustained preschools charged higher fees but remained relatively affordable, which allowed for sustainability of preschools to not lead to exclusion from them.

We note a few limitations of this paper. The purpose of this paper is to document and describe factors associated with sustainability, and we do not infer causality. Moreover, the purpose of prediction models using lasso is to identify sets of variables that correlate well with the outcome of interest and not intended for interpreting the estimated coefficients of selected variables. Finally, this study focuses on the sustainability of early childhood education in rural Indonesia and may not necessarily generalise to other settings.

Beyond the empirical patterns documented in this paper, the process of having documented these patterns leads us to several additional observations. These touch on the sustainability and design of international development projects, particularly those in early childhood education. Strategies to ensure sustainability of project activities should be introduced before the end of the project, ideally during the early stages of project design and implementation. These could include training for communities on how to go about securing financial support from diverse sources and on prioritising spending on critical inputs such as teacher salaries. Such training was not included in the design of the Indonesia ECED project but could be a useful addition to future endeavours. Community awareness raising campaigns should be run for the life of the project – not only at the start as was done under the Indonesia ECED project. This will allow initiatives to take on board newly eligible beneficiaries, for instance new parents.

Another key strategy is to directly engage communities in key project design elements (such as site location) and consult with important stakeholders, who, more often than not, are the parents in early childhood education projects. These consultations will clarify the local demand for early childhood education, including the possibility of charging student fees. Engaging with other key local stakeholders such as the village health worker will help identify the need to provide additional early childhood services (that is, supplementary food programmes). With a growing focus on the importance of supporting women's participation in the labour force, it will be imperative to consider what options for work exist in these communities. This will also help project designers to assess whether the proposed services are offered at the right time and for the right duration to be of use in freeing up time for women, in particular, and households, in general. This will also help develop strong local ownership of the early childhood education service. While the Indonesia ECED project did engage with these stakeholders – it did so only at the start of the project. A recurring engagement may be more beneficial in terms of ensuring that the benefits of the project continue past its lifetime.

Moreover, future international development projects in early childhood education will greatly benefit from conducting a careful assessment of what types of early childhood programmes already exist in the local community, how these various programmes are utilised by families, and the demand and supply of each type of service in order to better understand the market conditions before project implementation. Doing so can help ensure that project-funded interventions have a higher likelihood of survival after project closure.

Notes

1. Investing in Every Child's Early Years: World Bank Contributions. Available online at: https://results.org/blog/investing_in_every_childs_early_years_world_bank_contributions/.
2. Details of the project are described in Section II of the paper.
3. Average rates of asset ownership and education levels are similar between households targeted by the project and households in the rural sub-sample of the SUSENAS, a nationally representative household survey (Hasan et al., 2013).
4. While several types of early childhood services exist in Indonesia, the two most common types of pre-primary education are preschools/preschools (*Kelompok Bermain, KB*) under the Ministry of Education and Culture, and kindergartens, which refer to both kindergarten (*Taman Kanak-kanak, TK*) under the Ministry of Education and Culture and Islamic kindergarten (*Radhatul Athfal, RA*) under the Ministry of Religious Affairs.

5. This is calculated by dividing total project costs for implementation of the community-based component (US\$54 million over 3 years) by the actual number of children (673,162 children) reported to have enrolled in the 3,000 villages where the programme operated. This information is drawn from the Implementation Status and Results (ISR) Report no. 11 of the project. This is available online at <http://documents.worldbank.org/curated/en/684441468267567691/pdf/ISR-Disclosable-P089479-12-29-2013-1388324682405.pdf>. All costs are per child per year and in 2014US\$.
6. The project helped close early achievement gaps with positive impacts concentrated among poor children (Jung & Hasan, 2016). Services established under the project met or exceeded local standards for quality. Quality was positively correlated with various child development outcomes (Brinkman et al., 2017a) and was also a factor in explaining gender gaps in cognitive and socio-emotional development (Nakajima et al., 2019).
7. In initial surveys we identified 432 preschools in these villages. Among this larger sample we find that 60 preschools had closed. See Supplementary Materials for descriptive statistics on these preschools and their reasons for closure, which are broadly similar to the 245 described in the main paper.
8. In Supplementary Table 5, we perform a sensitivity analyses by estimating our lasso regression using only 2010 variables as predictors. Our results remain largely consistent.
9. These are services that operated in these communities but were not established under this project.
10. Authors' calculations using data collected on other services in the project villages.
11. There is anecdotal evidence to explain why only 29 per cent of preschools had two trained teachers in 2010. As described in Section II, the training was provided in two blocks (each lasting 100 hours). When the 2010 survey was collected, some teachers had not yet received the second block of training. There were also issues with implementation fidelity of the teacher training component. Some preschools never had two teachers who received the training component during the project period.
12. We also collected data on student outcomes at the preschool level using the Early Development Instrument (EDI) (Janus & Offord, 2007), which measures children's school readiness and focuses on five domains: physical health and well-being, social competence, emotional maturity, language and cognitive skills, and communication and general skills. We do not include these as a measure of preschool quality as it could reflect sorting on the part of children and their families.

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Disclosure statement

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Appendix. Variable Construction

Drawing on our conceptual framework, we examine six factors: quality, finance, supplementary services, market condition, household wealth, and parental participation. Each factor is captured by several variables and these variables are described in detail below.

Factor	Variable	Description
Quality	Classroom observation	Classroom observation was measured using the Early Childhood Environment Rating Scale – Revised (ECERS-R) (Harms, Clifford, & Cryer, 2005). The ECERS-R uses classroom observations to assess the various interactions that occur between and among teachers, students, and parents. Each preschool was assessed by two raters on a 7-point Likert scale, ranging from 1 = inadequate, 3 = minimal, 5 = good, to 7 = excellent. In an effort to align the ECERS-R data with the reality of the Indonesian context, we compared ECERS-R to Indonesia's national standard and found that 28 out of 43 ECERS-R items were discussed in the national standard (Brinkman et al., 2017a). We, therefore, calculate preschool quality using only these 28 common items and report the resulting score. Classroom observation was conducted only in 2013.
	Proportion of teachers with a post-secondary degree	Each preschool reported the number of teachers with a post-secondary education degree (numerator) and the total number of teachers (denominator).
	Proportion of teachers with teaching experience	Each preschool reported the number of teachers with teaching experience (numerator) and the total number of teachers (denominator).
	Number of children	Each preschool reported the number of students enrolled.
	Number of teachers	Each preschool reported the number of teachers.
	Number of days per week	Each preschool reported the number of days of service per week.
	Number of hours per day	Each preschool reported the hours of service per day.
	Finance	Proportion of project block grant spent annually
Amount of funding received in the past three years (million IDR)		Each preschool reported the amount of funding it received (beyond the block grant) from three sources in the past three years: (i) the government, (ii) non-governmental organisations, and (iii) the local community. These variables were collected only in 2013 and 2016.
Proportion of children attending with no fee		Each preschool reported the share of children attending with no fee.
Monthly fee (IDR)		Each preschool reported the monthly fee charged to students in Indonesian rupiah.
Supplementary services	Provides weekly food programme	Each preschool reports if they provide weekly food supplements.
	Provides weekly vitamin supplement	Each preschool reports if they provide weekly vitamin supplements.

(continued)

(Continued)

Factor	Variable	Description
Market condition	Provides deworming medication	Each preschool report if they have ever provided deworming medication.
	Number of kindergarten per 100 children in village	Each village reports the total number of kindergartens (numerator) and the number of children ages 0–6 in the village (denominator).
	Number of other preschools per 100 children in village	Each village reports the total number of other preschools (numerator) and the number of children ages 0–6 in the village (denominator).
	Distance to village centre	Each village reports the distance between the project preschool and the village centre.
Household wealth	Distance to nearest preschool	Each village reports the distance between the project preschool and the nearest preschool in the village.
	Average household wealth in the village	We measure household wealth through the average wealth of households in a village. Households were asked if they owned any of the following items: radio, television, refrigerator, bicycle, motorcycle, car, mobile phone, and livestock. They were also asked about the materials used to construct the floor, walls and roof of their homes. Households were also asked if they had access to electricity in their homes and whether they received government assistance. Using principal components analysis on these items, we constructed a single index of household wealth. The score of the first principal component is normalised to have a mean 0 and standard deviation 1 in 2010.
Parent participation	Parent participation index	The parental involvement index is constructed using a principal component analysis of four items: parents are involved in activities with teachers and students in the preschool; parents are involved in cleaning the preschool; parents are involved in providing food in the preschool; and parents are involved in acquiring toys and materials in the preschool. We normalise the index to have mean 0 and standard deviation 1 in 2010.