

What Works in Pre-Primary Education Provision

A review of evidence on achieving equitable access and quality in low- and middle-income countries

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Executive Summary

The first years of a child's life are critical to building the foundations of learning that help them succeed in school and beyond (UNICEF, 2019a). Evidence shows that investments in pre-primary education yield high personal and social returns, and that the earlier the investment, the higher the return (Heckman, 2012). Evidence from a recent study indicated that every dollar invested in pre-primary education can generate up to nine dollars in benefits for society (Muroga et al., 2020). Investments also result in positive returns by building more efficient and effective education systems (UNICEF, 2019a; UNICEF, 2020; UNICEF, the Education Commission and Lego Foundation, 2022). While the importance of quality is broadly acknowledged, less is understood on which aspects of pre-primary provision lead to improved outcomes, and how they can be effectively implemented at scale in low- and middle-income countries (LMICs) (Balladares and Kankaras, 2020; Kaul et al., 2017; Yoshikawa and Kabay, 2015).

This evidence review aims to identify the aspects of pre-primary provision that improve access, learning and development outcomes (both cognitive and socioemotional) for children aged three up to the start of primary education in LMICs. The review also highlights the moderating factors affecting the successful implementation of pre-primary education programmes, which can have implications when designing for scale.

Fifty-six primary studies, conducted in 29 countries, were analysed as part of the review. These studies were categorized into the five core components of UNICEF's Build to Last framework, which identifies the essential features of an effective, quality and equitable pre-primary education system (UNICEF, 2020), including:

1. Planning and budgeting;
2. Curriculum development and implementation;
3. Workforce development;
4. Family and community engagement; and
5. Quality assurance (UNICEF, 2020).

Some studies were categorized into several core components as the interventions within those studies targeted more than one component of the framework. The key findings of the review are highlighted below:



Planning and budgeting

Benefits of accessing pre-primary education, either through direct expansion of services or through providing families with scholarships, were greater for the most disadvantaged groups of children. This must be considered in governments' planning and budgeting efforts to ensure the needs of vulnerable groups are prioritized in service delivery plans and in the allocation of public resources.

The studies suggest that pre-schools meeting minimum quality standards were beneficial to advance children's learning and development outcomes. Settings and provider types offering better process quality services, including a developmentally appropriate pedagogical approach and activities, and nurturing teacher-child interactions, showed more positive child-level outcomes. Governments should include quality as a component of education sector planning and budgeting to identify aspects that should be developed at scale, or to identify and allocate financial resources more intentionally to improve quality.

Further research assessing the impact of nation-wide programmes, rather than only of small-scale interventions or pilots, is specifically required as this evidence can then feed into planning and budgeting decisions at scale.

Additional evidence on the costs and financing mechanisms for pre-primary education is also essential. Fewer than half of the included studies reported information on the overall cost and/or the cost per child of the interventions. Such information is needed to identify cost-effective ways to expand access to quality pre-primary education and estimate potential returns on investment that can be factored into planning and budgeting decisions.



Curriculum development and implementation

Interventions introducing a new or enriched pre-primary education curriculum had positive effects on at least one measure of children's learning and development outcomes. Studies assessing interventions with at least one year of curriculum implementation were more likely to elicit positive effects, when compared to studies assessing interventions implemented for less than one year.

Curriculum interventions had positive effects, especially if teacher training was provided throughout the programme and was aligned to the curriculum's content and pedagogical approach.

The introduction of child-centred pedagogical approaches providing play opportunities to children was more likely to have a positive impact on learning and development outcomes. This was particularly true for disadvantaged students who benefited from receiving more attention than when taught with traditional approaches.

Most curriculum interventions simultaneously focused on other core components such as workforce development and/or family and community engagement. Therefore, there is a need to more deeply investigate how the curriculum development and implementation component of interventions was designed, and to isolate the effects of curriculum interventions to better understand what aspects of the curriculum lead to improved child outcomes.



Workforce development

Workforce training interventions with a higher intensity, such as coaching programmes providing continuous support to teachers as opposed to one-off sessions, were more likely to have a positive impact on children's learning and development outcomes. However, it was difficult to isolate the impact of training alone as it was often introduced in combination with a new curriculum.

The characteristics and practices of the workforce can moderate the success of teacher training programmes. Some studies indicated that the effects of training were most positive in classrooms where teachers provided higher levels of emotional support to children. This highlights the importance of providing professional development that targets not only pedagogical knowledge, but also practices and day-to-day interactions.

Interventions expanding the workforce can have positive effects on child outcomes if the role of the additional staff is clearly established and is focused on ensuring high-quality instructional time. As such, planning for expansion of the workforce must be accompanied with clear roles for newly appointed staff.



Family and community engagement

Different approaches for family and community engagement interventions elicited positive effects in children's learning and development outcomes. These included establishing committees consisting of school and community members, conducting parent-educator meetings relating to children's progress, raising awareness of the importance of pre-primary education, and providing training to family members.

Parental and/or community training programmes with a higher intensity, with training sessions distributed throughout the programme duration (e.g., on a monthly basis), were more likely to improve child-level outcomes. Most interventions implementing training sessions organized throughout the programme duration found positive effects on at least one child learning and development outcome, as opposed to those provided only at the start of the programme.

Family socioeconomic status, and parental education and literacy levels can moderate the impact of parental training interventions on child-level outcomes. These factors should be considered during programme design and implementation to prevent widening existing learning gaps between children from wealthier and disadvantaged households.

There was a lack of studies assessing family and community engagement interventions from a gender perspective. It is necessary to strengthen the evidence base of effective practices to engage male caregivers in pre-primary education across diverse cultural contexts and understand their impact on children's learning and development outcomes.



Quality assurance

The most frequently reported quality assurance mechanisms in the studies included pre-school visits, oversight committees, observational tools, and teacher coaching and mentoring.

Most studies discussed quality assurance descriptively, rather than as a factor which has a causal or correlational impact on child-level outcomes. As such, it was not possible to identify single effects of the quality assurance mechanisms on children's learning and development outcomes, or to distinguish them from the effects of other core components.

Further research and innovative methods are necessary to examine the impact of using specific quality assurance mechanisms on child-level outcomes.

In addition to the five core components, the studies mentioned factors relating to the enabling environment of the context from which the intervention was conducted. Enabling environment factors refer to catalysts essential for advancing the development of pre-primary education systems (UNICEF, 2020). Policies and legislation and financing were the most reported factors from the enabling environment, while ministerial leadership and public demand were the least mentioned. There was no explicit mention of how these factors impacted student learning outcomes. It would be important for future research to look at the link between policy implementation and the effects on access, learning and development outcomes.

This evidence review has identified other gaps in the literature that should be addressed in further research. More studies are needed to isolate the specific effects of different pre-primary education core components on child-level learning and development outcomes. A greater focus on process quality, which is the quality of interactions experienced on a day-to-day basis at the pre-school, is essential to increase the evidence base on how different pedagogical practices and curricular approaches can have a causal or correlational impact on children's outcomes. It is also critical to integrate children with disabilities in research on quality and access for pre-primary education. Most studies included in this review did not collect data on the impact of the interventions on children with disabilities, which leaves a big gap in understanding how pre-primary systems can become more disability-inclusive and what programme interventions are suitable. Additionally, fewer studies were available from specific regions around the world, including the Middle East and North Africa, and Europe and Central Asia, which may have been due to some inclusion criteria such as language of publication, study design or outcomes assessed. Exploring what works to advance pre-primary education in those regions would also be essential.



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1. Introduction

The first years of a child's life are critical to building the foundations of learning that help them succeed in school and beyond (Kaul et al., 2017). An abundance of literature has shown that positive early learning and developmental experiences, both at home and in organized pre-primary education services,¹ are linked to benefits in cognitive and socioemotional outcomes among children (Burchinal et al., 2011; Belsky et al., 2007; Barnett, 1998). The educational, health and socioemotional outcomes of children who attend high-quality pre-primary education are typically higher than those of peers who do not attend pre-school (Elango et al., 2016). There is also a strong economic case for the provision of pre-primary education. Evidence shows that investments in pre-primary education yield high personal and social returns, and that the earlier the investment, the higher the return (Heckman, 2012). Evidence from a recent study indicated that every dollar invested in pre-primary education can generate up to nine dollars in benefits for society (Muroga et al., 2020). Investments also result in positive returns by building more efficient and effective education systems (UNICEF, 2019a; UNICEF, 2020; UNICEF, the Education Commission and Lego Foundation, 2022).

While the importance of quality is broadly acknowledged, less is understood on what aspects of pre-primary provision lead to improved outcomes, and how they can be effectively implemented at scale in low- and middle-income countries (LMICs) (Balladares and Kankaras, 2020; Kaul et al., 2017; Yoshikawa and Kabay, 2015). Most of the systematic reviews included in this report focused on synthesizing evidence from specific kinds of pedagogical interventions for early childhood, namely language programmes (Egert et al., 2016), book reading programmes (Mol et al., 2009), parental interventions (Spier et al., 2016) or use of technology in pre-schools (Burden et al., 2019; Tezer et al., 2019). A few of the included systematic reviews analysed child-level outcomes across different types, providers and settings of pre-primary education programmes in LMICs (Nores and Barnett, 2010; Rao et al., 2014; Holla et al., 2021). More research is needed to identify the types and cross-cutting components of pre-primary education provision that lead to increased and equitable learning and development outcomes. Therefore, this review aims to provide insights on effective interventions and relevant mediators to consider when designing for impact and scale. This paper provides a review of the available evidence on the effectiveness of pre-primary education interventions that aim to improve access, in addition to learning and development outcomes in LMICs. The specific research questions are:

1. What is known about the impact of pre-primary education interventions on access to education and learning and development outcomes?
2. What is known about implementation and moderating factors that determine the impact of pre-primary education?²
3. What are the remaining evidence gaps and policy implications?

1 Pre-primary education refers to organized programmes that are intentionally designed to include educational content for children usually aged three years up to the start of primary education, often around age six (UNICEF, 2020).

2 In this paper, moderating factors are defined as variables that can change the association between two variables by either strengthening the association, diminishing or negating it (Hefner, 2017).

1.1 Review scope

Table 1 outlines the inclusion criteria for this evidence review.

Table 1.

The inclusion criteria used to identify studies to be included in this evidence review

Publication date	Studies published from 2001 onwards.
Language	Studies published in English.
Population	Children aged three up to the start of primary education in LMICs (World Bank, 2022).
Intervention	Programmes that introduced, expanded or reformed pre-primary education, at the service, community or system level.
Study design	Experimental or quasi-experimental studies that allow for causal inference.
Comparison	Studies that use a comparison group which received no intervention or are part of a different or existing type of provision.
Outcomes of interest³	<p>Studies assessing the impact of pre-primary education on one or more of the following:</p> <ul style="list-style-type: none"> • Access outcomes (enrolment, dropout, attainment/completion). • Learning and development outcomes (cognitive and socioemotional skills).⁴ <p>Outcomes may have included disaggregation by gender, disability status, location (urban/rural) and/or family income.</p>

1.2 Theoretical framework for the report

Once the studies were selected for the review, they were categorized into the five core components of UNICEF's Build to Last framework for the purpose of reporting. The Build to Last framework identifies the priorities and essential features of an effective and equitable pre-primary education system (UNICEF, 2020). Given the complexity of pre-primary education provision, the framework adopts a system-wide approach that involves the participation of different stakeholders within and beyond the education sector, across national, subnational and local levels. The five core components for high-quality pre-primary education provision outlined in the framework are highlighted in Box 1 below.

³ The aim of this review was to summarize relevant evidence on the relationship between the five core components of pre-primary education – as defined by UNICEF's Build to Last framework – and children's outcomes. Access, and learning and development outcomes were prioritized as these are at the core of effective pre-primary education systems. Ensuring children's participation in quality pre-primary education services is essential to achieve optimal early childhood learning and development outcomes (UNICEF, 2020).

⁴ In this report, the authors note whether the interventions have improved the learning and/or development of children, without further specifying the domains for each (for example, expressive or receptive vocabulary). This information is provided for each study in Appendix 2 (Table 2.1).

Box 1.
Definitions of each
core component
of the Build to Last
framework



1. Planning and budgeting.

This component is considered the backbone of an effective early childhood education (ECE) system where strong and responsive plans for the equitable provision of quality pre-primary education are developed, while identifying ways to capitalize on available resources.



2. Curriculum development and implementation.

This component aims to ensure that children benefit from a developmentally appropriate curriculum and have learning and play materials available to them that can stimulate their development.



3. Workforce development.

This component aims to support the recruitment, development and retention of pre-primary teachers and other professionals into the ECE system and ensure they have essential competencies, training and support to advance children's learning and development.



4. Family and community engagement.

This component aims to ensure that families and members of the community are active members supporting the child's learning and development in various learning settings.



5. Quality assurance.

This component aims to ensure that a coherent monitoring and quality assurance framework for pre-primary education exists and is used to continuously improve the ECE system in both policy and practice.

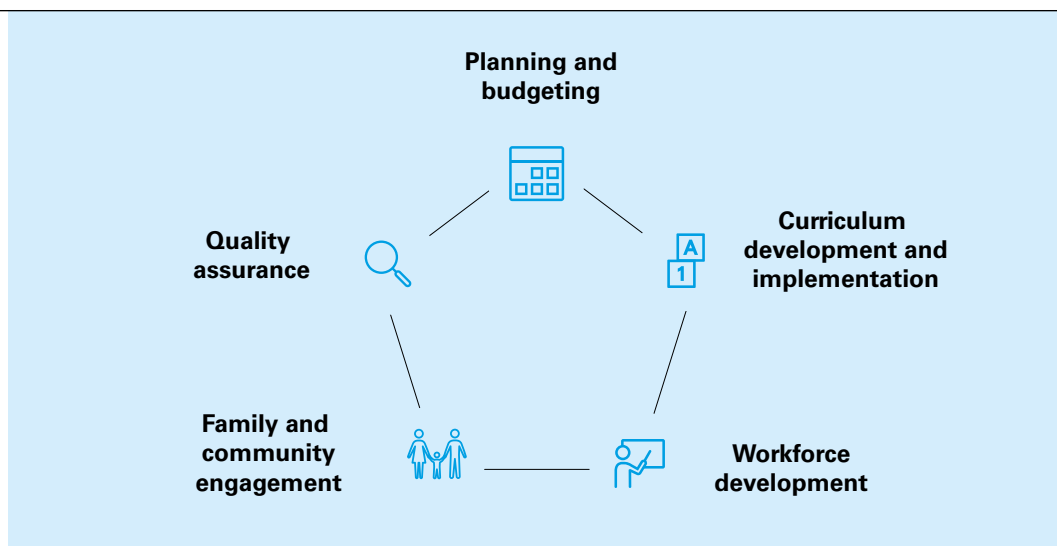
The five core components are interconnected, and the sum of work efforts across them can allow governments to advance their pre-primary education system (see *Figure 1*).

Additionally, key factors of the enabling environment required to achieve high-quality pre-primary education services are stated in the framework, including but not limited to the existence of policies and legislation specific to pre-primary education, ministerial leadership and the availability of staff with relevant expertise.⁵ The diverse nature of pre-primary education provision globally is also acknowledged, characterized by a wide variety of providers, settings, programme durations and hours of service provision.

⁵ Definitions of the enabling factors for pre-primary education systems are included in Box 2.

Figure 1.
Build to Last
framework for
pre-primary
education
(UNICEF, 2020)

Source: [Build to Last framework](#),
 UNICEF (2020)



1.3 Methodology

This review followed a multi-phased approach to research and synthesize available literature on achieving equitable access and quality learning in low- and middle-income countries. The five phases of the review are outlined below.

Phase 0: Scoping and consultation

This phase focused on consultations with early childhood education (ECE) stakeholders within UNICEF headquarters (HQ), regional offices (ROs) and country offices (COs) through the ECE Global Technical Team. A technical review group was set up consisting of experts in ECE and evidence synthesis to provide guidance and review the study protocol and outcomes.

Phase 1: Developing a review protocol

This phase consisted of developing the review protocol, which comprised the inclusion criteria and literature search strategy, in addition to methods for data extraction, critical appraisal and analysis/synthesis of the evidence (see Annex 1).

Phase 2: Searching for evidence

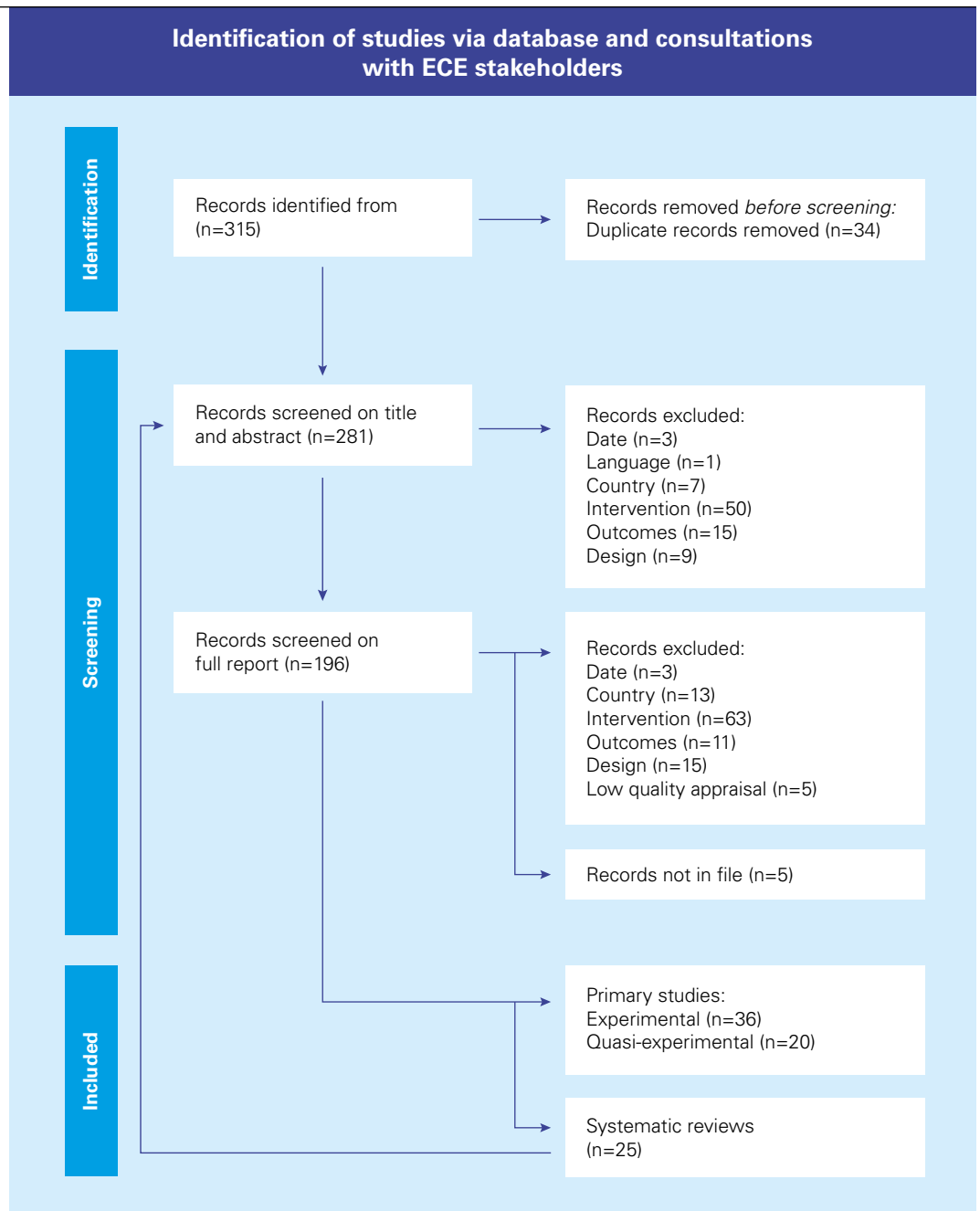
This phase implemented the search strategy outlined in the review protocol. In this evidence review, the proposed search strategy was focused on identifying primary studies on pre-primary education that were included in published systematic reviews and evidence gap maps on educational outcomes. To compensate for publication lag, this was supplemented by limited database searches for very recently published primary studies (2019-2021). More information on this process is available in Annex 1.

Phase 3: Screening, retrieval and coding

This phase consisted of retrieving primary studies and screening their title, abstract and – where needed – the full-text document for deciding on their inclusion or exclusion according to the criteria outlined in the review protocol (see Figure 2). Included studies were uploaded into EPPI-Reviewer, an evidence review platform, and coded to extract relevant data on study context, design, types and components of pre-primary programme and outcomes. At this stage, the quality of studies was also appraised, and those with low quality were excluded from the review. More information on this screening, retrieval and coding process is available in Annex 1.

Figure 2.
Identification and screening process of studies in EPPI-Reviewer

Source: Page, Matthew J. et al., 'The PRISMA 2020 statement: An updated guideline for reporting systematic reviews', *BMJ*, 372(71), March 2021, <doi: 10.1136/bmj.n71>



A sample of primary studies was double-screened at different stages. Fifteen per cent of all studies (n=29) were screened by two reviewers at the title, abstract and full report screening stages to ensure they met the inclusion criteria defined in the evidence review protocol. During this stage, discrepancies were discussed before agreeing on the final screening decisions. Once all included studies were uploaded to EPPI-Reviewer, 21 per cent (n=12) were coded by two reviewers to ensure relevant data on study context, design, types and components of pre-primary programme and outcomes was extracted consistently.

Phase 4: Conducting the narrative synthesis of studies and writing up the findings

A narrative synthesis of the data extracted from included studies was conducted and written up in a final research report in this phase. The synthesis of relevant narrative information was developed following the synthesis methodology from Popay et al. (2006) and Snilstveit et al. (2012). Included studies were first categorized into the five core components of UNICEF's Build to Last framework for the purposes of the report. Some studies were categorized into several core components of the Build to Last framework, as the interventions targeted more than one component (for example, some interventions included the introduction of a new curriculum in addition to teacher training). Relationships between these components, different pre-primary education programme providers, settings and durations were then examined to identify factors moderating intervention impact. Policy briefs were also developed to summarize the study findings and their implications on policy and/or practice. [An evidence gap map](#) was also developed to provide an overview of the existing evidence on pre-primary education interventions in LMICs, highlight the evidence gaps identified through this review and show where evidence is more abundant.

1.4 Limitations of this review

This review followed a systematic approach to synthesizing the evidence on what works in advancing pre-primary education in LMICs. However, there are a few limitations to the methodology that are worth highlighting. First, only English language literature was included. While a large amount of literature from many LMIC contexts is available in English, this approach has limited the number of studies included in the review and the insights that could have been developed if research published in other languages was included. Additionally, the focus of this review was on published literature; grey or unpublished literature was excluded from the review. This may have led to some bias in the findings, given that some evidence suggests that published and unpublished research can be systematically different (Cooper et al., 2009). Other aspects of the inclusion criteria, such as the intervention type, may have also limited the type of studies included in the review. Interventions included in the review were ones that introduced, expanded or reformed pre-primary education, which may have excluded smaller-scale studies that explored narrower early childhood interventions. This may explain the lack of studies from specific regions such as Europe and Central Asia, or the Middle East and North Africa (this is detailed further in Section 2 of the report). Finally, an important limitation is that many of the included studies assessed interventions targeting multiple components of pre-primary education systems (for example, workforce development and curriculum development and implementation simultaneously). This may have limited the analysis as, in many cases, it was not possible to isolate the effects of specific programme components.



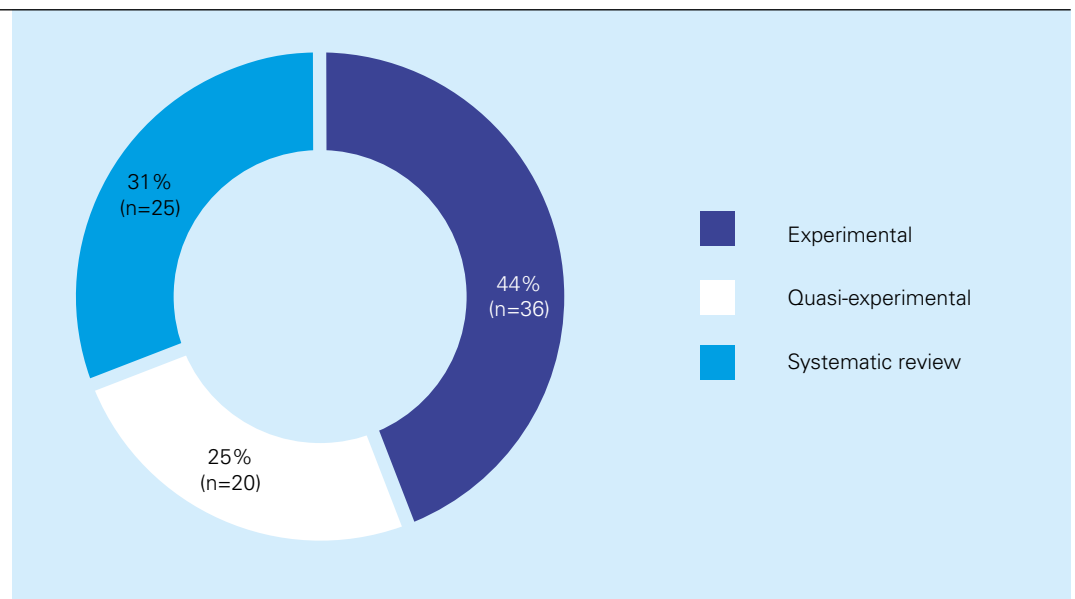
2. Features of the evidence base

2.1 Characteristics of included studies and interventions

From an initial batch of 315 studies, the title and abstract of 281 studies were screened. From this group, 196 studies initially met the inclusion criteria and the full reports were then screened. After this process, a total of 81 studies were included for coding (see Figure 2). The 81 studies included in this review were 56 primary studies and 25 systematic reviews, covering 45 unique interventions. In some instances, more than one study examined a particular intervention to report different follow-up periods or outcomes and were counted as one intervention. Studies that covered the same or similar interventions across different countries were also counted as unique interventions. The evidence was then categorized by research design into three categories: systematic reviews, quasi-experimental, and experimental research (see Figure 3).

Figure 3.
Included evidence by research design

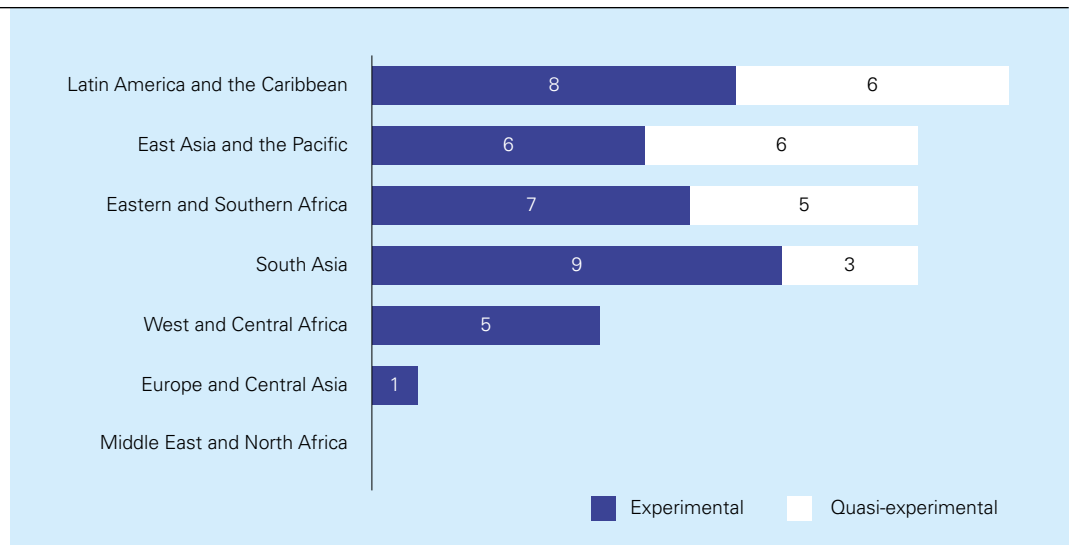
Source: UNICEF Innocenti analysis



Of the studies included in this review, most interventions were from the Latin America and the Caribbean region, followed by East Asia and the Pacific and Eastern and Southern Africa regions. There were no studies identified that focused on interventions in the Middle East and North Africa, and only one that focused on Europe and Central Asia (see Figure 4). This may be a result of the limited literature fitting the review criteria, or the limited availability of literature in the English language. Alternatively, this may suggest a gap in evidence on improving pre-primary education in these regions.

Figure 4.
Included primary
studies by region
and research design

Source: UNICEF Innocenti
 analysis



Studies were categorized according to the five core components of UNICEF's Build to Last framework. This includes planning and budgeting, curriculum development and implementation, workforce development, family and community engagement, and quality assurance. The categorization of studies to these components was not exclusive. In some instances, a single study measured the impact of an intervention targeting more than one core component of pre-primary education, and therefore these were categorized in all core components that are targeted in the intervention. These cases have been counted as separate or unique for mapping the total number of core components covered across the evidence included in this review. More detail on the number of included interventions by region and each pre-primary education core component is provided in Annex 3, Table 3.1.

In addition to the five core components, 42 out of the 56 primary studies included in the review mentioned the enabling environment factors of the context in which the intervention was conducted. Enabling environment factors refer to catalysts essential for advancing the development of pre-primary education systems (UNICEF, 2020). Studies that reported this information mostly mentioned policies and legislation (17) and financing (14) as components of the enabling environment, while ministerial leadership (8) and public demand (5) were the least mentioned (see *Box 2*). In the included studies, there was no explicit mention of how these factors impacted student learning outcomes, namely academic skills and socioemotional skills. A high number of studies (14) also made no reference to the enabling environment factors related to the implemented interventions.

Box 2.
Enabling environment factors for pre-primary education systems

UNICEF's Build to Last framework identifies four enabling environment factors for effective and equitable pre-primary education systems (UNICEF, 2020):



1. Ministerial leadership

indicates the presence of political will during the implementation of the programme and specifies that provision is done in partnership with the lead ministry and through coordination across different levels of government. Only six studies mentioned programmes were implemented by the government, without indicating the specific ministry or body responsible for it, while two specifically highlighted the role of the Ministry of Education in the development and implementation stages.



2. Policies and legislation

set the framework for the prioritization of pre-primary education in plans and budgets, as well as the enforcement of relevant standards for quality. Studies mostly mentioned the existence of national policies to promote universal access to pre-primary education, as well as other legislation declaring early childhood development as a priority.



3. Public demand

generates public support for early learning services and improves the accountability of leaders for the delivery and quality of these services.



4. Financing

ensures adequate investment in pre-primary education, leveraging a dynamic range of funds available from national, sub-national and international resources. Studies mostly mentioned financing in the context of grants or funding received from various organizations or the government.

In relation to the outcomes for measuring the impact of pre-primary education interventions, of the total number of studies reviewed, most assessed learning and development outcomes, namely cognitive and socioemotional. More detail on the number of included interventions by region and outcome measured is provided in Annex 3, Table 3.2. Studies reviewed had either positive, negative or no effects on the outcomes measured. Given that most of the included studies measured different outcomes, the same study could have positive, negative or no effects on the various outcomes simultaneously. These cases have been counted as separate or unique to map the total number of times an outcome was measured and their respective direction (see Table 2).

Most studies assessing access, or learning and development showed positive outcomes, with more positive effects observed for studies targeting access (80 per cent), compared to learning and development (55 per cent). A higher proportion of studies assessing learning and development observed negative outcomes (11 per cent), compared to those assessing

access (0 per cent). Additionally, a third of studies exploring learning and development had no effect, compared to a fifth of studies exploring access. These differences may be, in part, due to a higher likelihood of publishing studies with positive effects as opposed to those with a negative or no impact, or to differences in the quality of the studies (a slightly higher proportion of studies targeting access were rated as high quality compared to learning and development).⁶ Alternatively, access may be an easier outcome to measure or even achieve.

Table 2.
**Included interventions
 by outcome measured
 and outcome direction**

Outcome direction	Outcome measured	
	Access (Enrolment, Dropout, Completion/Attainment)	Learning and development (cognitive and socioemotional)
Positive	12 (80%)	39 (55%)
Negative	0 (0%)	8 (11%)
No effect	3 (20%)	24 (34%)
Total	15	71

2.2 Quality of included studies

Included studies were rated by the authors of this paper as either low, medium or high quality (see Annex 3 for more detail on the quality appraisal process). Thirty of the 56 included studies were considered high quality, with minimal or no issues identified in any of the five areas, while 26 studies were rated medium quality. Five other studies were rated low quality and therefore were excluded. Issues with studies that received a low or medium quality appraisal mainly centred around ethical concerns, namely the lack of available information in the studies regarding consent or ethics review boards (see Annex 3, Figure 3.1). Additionally, these studies did not provide adequate descriptions of the sample, sampling process or recruitment strategies. For the low-quality studies, there also did not appear to be sufficient effort to establish reliability and validity of data collection methods and tools, or the data analysis, and therefore were excluded from this review.

⁶ More detail on the quality of studies is presented in Section 2.2.

2.3 Description of the target intervention populations

Primary studies included in the review used various units of randomization, such as children, schools and villages. Most studies (25 primary studies) focused on children, schools (22) and villages/communities (21), while a few (6) explored households (4) and teachers (2). Households and teachers were typically used as an additional layer for the analysis, in addition to other categories from the list. No primary study used classroom as a unit of analysis.

Sample demographics, sampling and ethics procedures

Out of 56 primary studies included, most focused on either rural (22) or mixed (21) settings. Urban settings were selected in eight studies, while five studies did not state the location of the project, research, or programme. In terms of age groups, only two studies did not specify the age of participants. Almost all studies included in the review involved children between the ages of three and six at the time of intervention. Only one study included children from six months, and two studies involved children up to seven years old.⁷ Almost all studies mentioned the gender of respondents and were mixed gender studies (54). Only two studies did not specifically state the gender of participants.

Most primary studies (50) did not provide any information on participants' disability status (see *Annex 2, Table 2.1*). Out of the remaining six studies, five mentioned participants' disability as a criterion for exclusion, citing that they had been excluded owing to an inability to collect data from them. In one case, a questionnaire included a question on disability, but no other information was mentioned. Selected studies mostly mentioned that children with disabilities were excluded from data collection. There remains a gap of studies focusing on inclusive education and the best pre-primary education practices for improving learning and access outcomes for children with disabilities.

Six studies did not provide any information on the sampling methodology or recruitment process for participants. In terms of ethical procedures, almost half of the studies (27) did not state whether the participants were asked for their consent. In 16 cases, consent was requested from parents or guardians when children were interviewed. Child assent was also acquired in these instances. Only eight studies requested consent from participants and in four of them, the consent process was unclear or not enough detail was provided. Consent was not relevant for five of the studies because they included analysis of secondary administrative or survey data.

⁷ One study involved children between six months and five years old (average age of 3.6 years) as it assessed an early childhood development programme that included health and nutrition outcomes from the early years. Two studies included children up to seven years old at the time of intervention due to overage enrolment in pre-primary education.



3. Review findings



3.1 Findings on planning and budgeting

While most studies that included a planning and budgeting component found a positive impact on at least one learning and development outcome (81 per cent), a high proportion also found no effects on other measures of children’s learning and development outcomes (56 per cent).⁹

The planning and budgeting component of pre-primary education calls for careful planning processes, in addition to the budgeting and management of available financial, human and physical resources to ensure equitable access to quality pre-primary education services (UNICEF, 2020). As such, the studies included within the planning and budgeting component explore the use of different forms of implementation to achieve this goal and can be further categorized into the two sub-categories below, to identify which interventions yield positive child-level outcomes and should be prioritized within governments’ planning and budgeting efforts:

1. Interventions to increase access to pre-primary education.
2. Interventions relating to pre-school quality.

Interventions relating to increase access to pre-primary education

Ten studies are included in this sub-category. Eight of these studies relate to interventions that aimed to increase access to pre-primary education, either through the provision of scholarships, the construction of new pre-schools or by expanding government-sponsored school-based or community-based programmes (Dean and Jayachandran, 2020; Martinez et al., 2012; Martinez et al., 2017; Berkes and Bouguen, 2018; Berkes et al., 2019; Berkes and Bouguen, 2022; Brinkman et al., 2015; Hasan et al., 2021). Effects of increased access on children’s learning and development outcomes were explored in these studies. Meanwhile, one study explored the effects of access to pre-school on children’s school attainment and completion (Berlinski et al., 2008), and one study assessed the effects of expanding access to public pre-school services on private pre-school enrolment (Bastos and Straume, 2016).

One of the included studies investigated the impact of using scholarships to transfer children from public to private pre-schools in India on children’s learning and socioemotional development outcomes (Dean and Jayachandran, 2020). Half of the children in the sample were randomly assigned to receive scholarships to attend a partner private pre-school; the remaining children did not receive a scholarship and formed the comparison group. Children receiving the scholarship and attending the partner pre-school demonstrated improved learning outcomes, which partly persisted through to first grade. No effects on socioemotional skills were observed at all. Additionally, the differences in cognitive skills among children within the private partner pre-school who would have attended some type of pre-school regardless of the scholarship,¹⁰ were compared against the cognitive skills of children

8 Detailed information on the effects of the interventions on child-level outcomes are described in Annex 2.

9 Given that most studies measured different outcomes, the same study could have positive, negative or no effects on the various outcomes simultaneously.

10 Either public or private but different from the provider involved in the intervention.

who would not have attended any pre-school if they did not receive the scholarship. The comparison showed that the effects of pre-schooling on cognitive skills were mostly observed among children who received the scholarship programme, who would not have attended any pre-school programme if it were not for the intervention.

Two studies examined the impact of new pre-school classroom construction led by Save the Children (StC) in rural Mozambique from 2008 to 2010 (Martinez et al., 2012; Martinez et al., 2017). The project included financing the construction of centre-based community pre-schools in rural areas of Mozambique, and the provision of equipment, teacher training and parental training on child health and nutrition topics. The impact evaluation found that enrolment rates increased significantly in communities which received the intervention compared to communities with similar characteristics which had no access to the programme. Children were also more likely to be enrolled in pre-school at an appropriate age as a result of the intervention. Positive improvements in children's learning and development outcomes were also observed, in addition to improvements in socioemotional and behavioural outcomes. However, no positive effects on children's stunting were observed. Other positive effects of the intervention included an increased likelihood for the intervention group-children's siblings to attend schooling, improved parental practices and knowledge, and higher maternal enrolment in the workforce (Martinez et al., 2012). Children from lower income households, and those who had longer exposure to the programme, benefited more greatly than children from more advantaged households or those who were not exposed to the programme for a long period (Martinez et al., 2017).

Three studies also estimated the impact of a large pre-school construction programme in Cambodia, implemented by the World Bank and the Cambodian Ministry of Education, Youth and Sports (Berkes and Bouguen, 2018; Berkes et al., 2019; Berkes and Bouguen, 2022). First, Berkes and Bouguen (2018) explored the effect of the new formal pre-school programme on children's enrolment and learning and development outcomes and found positive improvements across these measures. The authors also used empirical techniques to compare the effects of the intervention among children who would have otherwise stayed at home if it were not for the programme, and to children who would have been enrolled in an alternative, existing childcare arrangement if it were not for the construction programme. The results show that the impacts of enrolling in the new pre-school on the learning and development outcomes of children who would have otherwise stayed at home and not attended any pre-school were high and significant. Meanwhile, the effects on children who would have enrolled in an alternative day care centre were it not for the intervention were not significant (Berkes and Bouguen, 2022). The authors explained that the quality of alternative pre-school programmes in Cambodia can differ widely across villages in terms of pedagogy, materials and infrastructure; therefore, it was difficult to draw conclusions when comparing them with formal pre-school programmes that tend to be more regulated and follow quality standards.

Berkes et al. (2019) also examined the impact of the construction programme with additional demand-side interventions, including an awareness campaign, designed to drive more demand for pre-schools, and a parenting programme that was in some cases paired with the awareness campaign. The study showed that the demand-side interventions themselves had no statistically significant impact on enrolment rates, while the construction of pre-schools did. This points to the importance of ensuring that the supply and demand for pre-primary education provision are aligned.

Two studies also explored the impact of expanding access to community-based early childhood playgroups in rural Indonesia (Brinkman et al., 2015; Hasan et al., 2021). The intervention aimed to increase parental awareness of the importance of early childhood education and provided grants for establishing new or strengthening existing pre-schools services and training for prospective teachers from the community. Establishing government-sponsored, community-based playgroups led to an increase in enrolment and longer duration of enrolment in programmes. Modest positive effects on children's learning and socioemotional development outcomes were also observed, especially among those from disadvantaged backgrounds and among children who were enrolled for a longer duration (Brinkman et al., 2015). Hasan et al. (2021) examined the long-term impact of the programme, by comparing outcomes of two cohorts of children who were exposed to the playgroup services for different periods of time. While enrolment rates and enrolment duration in pre-primary education increased for both cohorts, enrolment effects were larger for the cohort who had more time in playgroups. This cohort also had substantially higher language and mathematics test scores during the early grades of primary school and had greater outcomes at age, compared to the cohort that was exposed to the programme for a shorter amount of time (Hasan et al., 2021). Findings overall suggest that community-based pre-schools programmes, which can be implemented at a relatively low cost, can positively impact child development outcomes if minimum quality standards are guaranteed.

One study explored the impact of access to pre-school education on school attainment and completion. This study included an analysis of existing national household survey data (2001–2005) in urban Uruguay for children aged between 7 and 15 years (Berlinski, et al., 2008). A variable on the number of years children attended pre-school education was also available from the survey. The study showed that pre-school attendance had a significantly positive effect on the years of schooling completed, with children who received pre-schooling showing an advantage as early as age 12. The differences in attainment between children who attended and did not attend pre-school also increased with time, and children who did not attend pre-school were more likely to drop out of school. Additionally, the data allowed exploration of outcomes by maternal education levels and revealed that children whose mothers had lower educational attainment largely benefited from exposure to pre-schools. The authors also estimated the cost-benefit ratio of investing in pre-schools, and argued that the public provision of pre-schools is a cost-effective (with an annual rate of return of 16 per cent) and successful policy that can be implemented to promote school retention and learning outcomes.

Finally, Bastos and Straume (2016) examined existing data to explore the effects of expanding the supply of public pre-schools in Brazil. Specifically, the authors explored whether such expansion crowded out private pre-school enrolment, and whether such expansion impacted the quality and quantity of private provision. Results indicated that larger investments led to a significant expansion of local public pre-school services. This expansion did not affect the quantity or quality of private pre-school provision, or the enrolment of children in private services. The researchers suggested that this is due to potential differences between households' willingness to pay for pre-school services and hypothesized that private pre-schools adjust prices to account for free-of-charge public pre-school expansion, which may be of lower quality. It was further suggested that expansion of public pre-schools can promote higher access for children from more disadvantaged backgrounds and can serve a greater number of children with early learning opportunities, while also providing market competition and a diversity of pre-school supply for families.

Overall, studies assessing interventions to increase access to pre-primary education showed that attending pre-schools that meet minimum quality standards is beneficial for children's learning and development outcomes, including formal government-run programmes and community-based playgroups or childcare centres. Children from the most disadvantaged backgrounds benefited to a greater extent than those from more advantaged backgrounds. This included children from low-income households or whose caregivers had lower educational attainment, or those who would not have attended any pre-school programme if it were not for the intervention. Evidence showing the greater impact of pre-schooling for disadvantaged children must be considered in governments' planning and budgeting efforts to gradually expand the provision of pre-primary education services for every child, while also prioritizing the needs of the most vulnerable. This evidence also suggests the need for targeted budget allocations to direct public resources towards disadvantaged children first and ensure they have access to a minimum one-year quality pre-school programme.

Interventions relating to pre-school quality

Six studies are included in this sub-category and have different foci in terms of whether they directly addressed quality or explored it as a mediating factor for impact. One study examined the effect of interventions to increase the quality of pre-school teaching and learning through different pathways, including hiring more teachers and providing teacher training (Andrew et al., 2019). Two studies explored how enrolment in different provider types, with differing quality levels, impacted child-level learning and development outcomes (Rao et al., 2012a; Rao et al., 2012b). One study explored the provision of school meals and nutrients, and how the quality of pre-schools moderated the impact of such interventions (Black et al., 2021).¹¹ Finally, two studies in this sub-section also explored the effects of increasing access through building pre-schools or transferring children from one type of pre-school to another, and how quality may have mediated effects on children's access and learning and development outcomes (Bernal et al., 2019, Berkes et al., 2019).¹²

A study in Colombia investigated the impact of allocating additional funding to two interventions: one that dedicated the funding to hiring teaching assistants to improve quality, and the second which provided the teachers with professional development (Andrew et al., 2019). Funds directed to hiring additional teaching assistants did not advance children's learning and led to a reduction in the time teachers spent in class and on learning activities. Meanwhile, the intervention that incorporated teacher training showed positive, significant improvements in children's cognitive skills, especially for children from more disadvantaged backgrounds. The additional component of teacher training had marginal additional costs yet was able to achieve positive outcomes on child learning.

Two of the studies specifically explored the impact of attending different types of pre-schools on learning and development outcomes, and how differences in quality impact those outcomes. The first was a study by Rao et al. (2012a), which included an evaluation of child outcomes across public, community- and home-based pre-schools in Cambodia. A comparison against a control group of children who did not attend any form of pre-school was also included. Children who were enrolled in any type of pre-school in the study scored

¹¹ To assess pre-school quality, Black et al. (2021) measured structural quality aspects including the provision of appropriate play and learning materials, and the organization of the learning environment, as well as process quality aspects including teacher-child interactions and teaching practices.

¹² Studies by Bernal et al. (2019) and Berkes et al. (2019) were considered within the planning and budgeting component to identify impactful interventions targeting quality, or that may influence or be influenced by quality, that can be prioritized or addressed within ECE sector plans and budgeting. Both studies focused on elements related to the physical environment, teacher-child interactions and the characteristics of the pedagogical activities.

significantly better on learning and development outcomes, including cognitive, language and motor skills, when compared to children from the control group. There were also differences in measured child-level learning and development outcomes by pre-school type; children enrolled in public pre-schools scored significantly higher than those in either community- or home-based pre-schools. Meanwhile, scores among children attending community- or home-based pre-schools did not differ from each other (Rao et al., 2012a). The authors of the report highlighted public pre-schools in Cambodia have higher quality, defined in this study as greater access to educational resources and higher levels of teacher training, when compared to the other pre-school types, in addition to having longer programme durations.

The second study exploring the differences between pre-school provider types on child-level learning and development outcomes was conducted in rural China (Rao et al., 2012b). Differences in school readiness and foundational skills between kindergarten settings, separate pre-primary classrooms and “sitting-in” a grade one classroom were explored, in addition to a comparison against a control group of children who did not attend any form of pre-school. A comparison of children’s learning and development outcomes at the beginning and end of the school year showed that children attending any pre-school setting achieved increased scores in school readiness and foundational learning when compared to the control group. However, children enrolled in settings that offered higher-quality pre-school experiences, which were typically in kindergartens, had higher school readiness and foundational skills compared to children in other settings and those not attending any form of pre-school. The authors explained that the higher quality of kindergartens was due to structural and process aspects, including the use of developmentally appropriate educational materials, furnishing in the classroom, the use of a play-based curriculum, and teachers who had pre-primary education training that were able to implement this pedagogical approach with young children.

Quality similarly played a mediating role in other studies implemented in Colombia and Cambodia. The study in Colombia examined the impact of transferring children from home-based childcare to large public childcare centres in urban areas on child-level learning and development outcomes. Transfers had a positive impact on child nutrition; however, no positive effects on cognitive or socioemotional skills were observed (Bernal et al., 2019). The authors suggest that although larger childcare centres had better structural quality with improved infrastructure overall, age-specific classrooms and more qualified teachers, the process quality of these centres, including teacher-child interactions and pedagogical activities, did not improve (Bernal et al., 2019). Similarly in Cambodia, a study exploring the effects of a pre-school construction programme on children’s learning outcomes showed that children from the poorest families did not benefit from the programme compared to children from wealthier families, given that the programme did not improve the process quality aspects of pre-schools, namely the curricular approach used, teacher pedagogical practices and the quality of teacher-child interactions, and only improved structural aspects such as infrastructure and materials (Berkes et al., 2019).

Overall, the six studies assessing interventions relating to pre-school quality highlight that some form of pre-primary education is better than none, as benefits in learning and development outcomes were observed among children who attended some form of pre-school compared to those who did not attend any. However, it is important to note that settings and provider types offering higher-quality services showed more positive child-level learning and development outcomes. Among the different aspects of pre-school quality, studies suggest that investing in interventions targeting process quality, including teacher-child interactions

and teacher pedagogical practices, is essential to achieve a positive impact on children's outcomes. Structural quality aspects such as the organization of the physical environment and the educational materials available are also important; however, not enough to elicit improved learning and development outcomes on their own. While most studies showed that kindergartens or public pre-schools tend to be of higher quality, alternative settings such as childcare centres or community-based programmes also offered aspects of high-quality pre-schooling that can achieve positive child-level outcomes. For instance, governments should include quality as a cross-cutting component of education sector planning processes to identify aspects that should be developed at scale, or which aspects require more allocation of financial resources.

Conclusion

Studies included in the planning and budgeting component examined the impact of interventions aiming to expand equitable access to and quality in pre-primary education services. These interventions included different forms of implementation such as the construction of new pre-schools, the provision of scholarships, increasing the number of teaching assistants, or exploring the impact of pre-school quality on children's learning and development outcomes. The overarching findings from the access sub-section highlight the positive benefits of interventions that expanded access to pre-schools for the most marginalized groups. This data corroborates existing literature on the benefits of early childhood in closing the gap between children from lower and higher socioeconomic backgrounds and re-emphasizes the need to invest in the expansion of free public pre-school classrooms and account for it in education sector plans. Targeted expansion to underserved areas is especially essential, as the included studies suggested that children who would not have attended any form of pre-school would greatly benefit. Such information is essential for planning, as policymakers may need to prioritize expansion activities given limited funding and resourcing. Additionally, the quality sub-section highlights that attending pre-schools that meet minimum quality standards was beneficial in advancing children's learning and development outcomes. Settings and provider types offering higher-quality services also observed more positive child outcomes. Governments should include quality as a component of education sector planning and budgeting, to ensure sufficient resources are deployed to meet minimum quality standards, and other components of the pre-primary education system are accounted for in appropriate planning. Some of the key components constituting high-quality pre-primary education programmes, comprising structural and process quality dimensions, are analysed in the following sub-sections, namely curriculum development and implementation, workforce development, family and community engagement and quality assurance.



3.2 Findings on curriculum development and implementation

While most studies including a curriculum development and implementation component found a positive impact on at least one learning and development outcome (88 per cent), a high proportion also found no effects on other measures of learning and development (65 per cent). Given that most of the included studies measured different outcomes, the same study could have positive, negative or no effects on the various outcomes simultaneously. All interventions including this component can be broadly categorized into three areas:

1. Introduction of a new pre-primary education curriculum.
2. Introduction of new instructional materials.
3. Introduction of new pedagogical approaches in the classroom.

These areas are discussed in more detail below.

Introduction of a new pre-primary education curriculum

Of the 26 studies including a curriculum development and implementation component, 13 focused on assessing the impact of interventions introducing a new pre-primary education curriculum. From this group of studies, most explore the effectiveness of a unique intervention, covering 12 interventions overall (*see Annex 2, Table 2.1*). The characteristics of the curriculums implemented as part of these interventions vary widely in terms of their content and main aims. For instance, interventions in The Gambia, India, China and Bangladesh were focused on implementing play-based curriculums in pre-school classrooms to strengthen children's learning and development outcomes (Blimpo and Pugatch, 2017; Dillon et al., 2017; Rao et al., 2012b; Spier et al., 2020). Other programmes in the Philippines and the Solomon Islands were centred on school readiness to improve children's numeracy and literacy skills for a smooth transition to primary school (Armecin et al., 2006; Lee-Hammond and McConney, 2017).

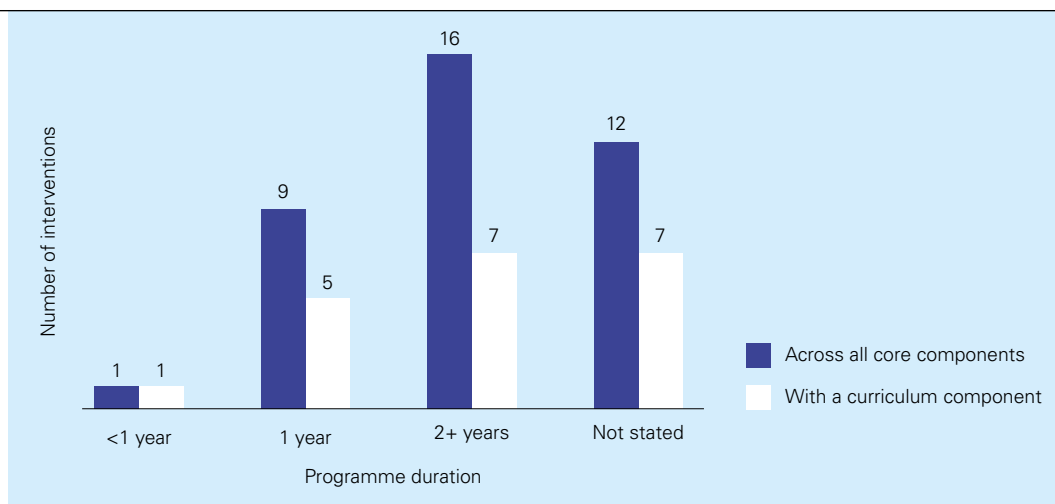
Other pre-primary education curriculums implemented across the interventions reviewed had very specific pedagogical principles underpinning them. In Thailand, a new curriculum was implemented to promote the use of a 'plan-do-review' approach encouraging children to plan, carry out and evaluate their own behaviours while receiving support through teacher scaffolding (Chujan and Kilenthong, 2019; Chujan and Kilenthong, 2020). Moreover, in Kenya, Uganda and Zanzibar, a new curriculum integrating local cultural practices and religious values was developed following active learning principles (Malmberg et al., 2011). Despite these variations in content, curricular aims and pedagogical approaches, a pre-primary education curriculum must be of a high quality in and of itself to be able to yield positive child-level outcomes. It should be designed based on evidence and best practices, both global and local (UNICEF, 2020). Additionally, there are other factors that can mediate the successful implementation of curriculums, namely duration, setting and workforce training. These factors will be discussed subsequently. Although some studies do not provide specific information on the duration of curriculum implementation, evidence suggests that this is a relevant aspect to consider for the achievement of positive effects on children's learning and development outcomes. Two studies found that the length of exposure to the curricular programme acted as a moderating factor when comparing cohorts with similar socio-demographic characteristics that participated in the programme for different durations. In Bangladesh, children from pre-schools that implemented a new pre-primary education

curriculum for four more months had higher scores in learning outcomes (expressive language and reading), compared to their counterparts who had not been exposed to the curriculum for an additional four months (Aboud et al., 2008). Similarly, children in the Philippines showed increases in cognitive and socioemotional development outcomes when they participated in the pre-primary education service, compared to children that did not receive the programme. The increases were greater among those exposed to the service for more than 12 months (Armezin et al., 2006).

This review also showed that most of the included interventions with at least one positive learning and development outcome tended to have longer programme durations (see Figure 5). There were almost twice as many positive interventions with a programme duration of two or more years compared to those lasting only one year (16 vs. 9 interventions). Yet, for interventions specifically including a component on curriculum development and implementation, there was a similar number of positive interventions with a duration of one year and of two years or more (five vs. seven interventions). Considering that many studies also included a workforce development or a family and community engagement intervention in addition to the curriculum intervention, it was not clear whether the positive effects were driven by a longer exposure to the whole pre-primary education intervention or by the pre-primary education curriculum itself. It was also difficult to ascertain the specific timeframe that elicits positive effects on learning and development outcomes from the implementation of a new pre-primary education curriculum. However, the evidence suggests that at least a year of curriculum implementation is more likely to elicit positive effects, when compared to interventions implemented for less than one year. Included studies examining how a cohort of children performed at different stages of programme implementation suggest the introduction of new curricular guidelines should be understood as a process that is likely to take a long period of time; at least one year. Armezin et al. (2006) found there was a 10 per cent increase in the prevalence of positive effects on children's cognitive and socioemotional outcomes when comparing exposure times of 4 to 12 months and 13 to 16 months to an enriched pre-primary education curriculum. Malmberg et al. (2011) also showed the positive impact of a new pre-school curriculum increased continuously from the onset up to one year and a half of implementation.

The introduction of a new curriculum implies the need for teachers and students to periodically adapt to a different or enriched pedagogical approach, to a set of adjusted learning goals and standards for different developmental domains, and to the use of new materials in the classroom (UNICEF, 2020). This process is essential for an effective curriculum implementation that can then translate into positive effects on children's learning and development outcomes. It is necessary to acknowledge that the positive effects of curriculum interventions on child-level outcomes could fade-out over time. Armezin et al. (2006) and Malmberg et al. (2011) showed the positive effects on children's cognitive and socioemotional skills are still present but tend to stabilize after a certain period: 17 and 18 months, respectively. Although interventions with longer durations were more likely to maintain positive effects over time, the shifting towards pre-primary education programmes exceeding one year can be progressive. In contexts with resource constraints, programmes providing only one school year of pre-primary education should not be discarded. It is important that children receive at least one year of pre-primary education before official primary school entry age which will allow them to gain foundational skills. If financial resources, workforce capacity, implementation and quality assurance mechanisms are guaranteed for multi-year programmes, these should, of course, be prioritized.

Figure 5.
Programme duration of interventions with positive learning and development outcomes, across all core components and those including a curriculum development and implementation component



Source: UNICEF Innocenti analysis

In addition to programme duration, the pre-primary education setting in which the new curriculum is implemented could additionally act as a moderating factor. In Cambodia, the positive impact of early childhood education programmes was higher if they were implemented in government-run pre-schools, as opposed to community-based or home-based services (Rao et al., 2012a). The authors explained that this difference was related to the lack of pedagogical training that volunteer teachers or primary caregivers have in community-based or home-based programmes, as well as to the limited infrastructure and materials available in the settings. A study in the Solomon Islands explained similar challenges for community-based pre-primary education programmes, although it did not compare them with other settings (Lee-Hammond and McConney, 2017). The authors mentioned that the implementation of community-based services usually depends on the infrastructure, staff capacity and economic resources of local communities. Moreover, many community-based pre-schools are in rural villages or remote areas where the distribution of teaching and learning materials that accompany the curriculum is limited. Therefore, the capacity of community-based centres for implementing a new curriculum effectively is lower, affecting the quality of pre-primary education provision.

Another study in rural contexts in China also highlighted the effect of the pre-primary education setting on children's learning outcomes. Higher school readiness, literacy and maths skills were reported among children receiving the service in traditional kindergartens or separate five- to six-year-old classrooms annexed to primary schools, in contrast with children 'sitting in' grade one classrooms. The authors explained that the latter pre-primary education setting followed a more academic-oriented curriculum based on a grade one syllabus that differed from the play-based curriculum from kindergartens and separate classrooms, which is supported by a greater body of evidence (Rao et al., 2012b). This suggests the importance of implementing pre-primary education interventions with age-appropriate curriculums that adapt to children's needs and stages of development, enabling them to learn through play. From the 12 unique interventions introducing a new pre-primary education curriculum included in this review, four used a play-based curriculum and found positive effects on children's cognitive skills (Blimpo and Pugatch, 2017; Dillon et al., 2017; Rao et al., 2012b; Spier et al., 2020). Although the play-based curriculum showed promising effects on child learning and development, limited detail was provided in the studies on how the play-based curriculum was implemented in the classroom and the pedagogical approaches adopted by teachers to implement it. More evidence is needed to understand how teachers interact with a play-based

curriculum and the specific activities conducted with the children, to explore to what extent these translate into positive child-level learning and development outcomes. These findings stress the need to increase the focus on process quality aspects of pre-primary education programmes. This is essential as curricular approaches, the activities that children do in the classroom, and the type of interactions that are fostered by teachers can influence child-level learning and development outcomes (UNICEF, 2020).

Of the 12 unique interventions including a new pre-primary education curriculum, seven simultaneously had a workforce development component and found positive effects on at least one child-level learning and development outcome. This trend is important because the lack of teacher training could influence the effectiveness of the implementation of a new or enriched curriculum. This is highlighted as a limitation in studies from several countries across East Africa and Bangladesh. In Kenya, Uganda and Zanzibar, the implementation of a new curriculum only had positive effects on children's school readiness in Madrasa pre-schools,¹³ as opposed to non-Madrasa ones, which the authors suggested could be associated with the training that teachers from Madrasa pre-schools receive (Malmberg et al., 2011). In Bangladesh, the authors explained that the pedagogical approach proposed by the new pre-school curriculum was difficult to implement in a short period. Teachers required more intensive support from pre-primary education technical officers to translate the new pedagogical principles into concrete actions in the classroom that could have a positive effect on children's learning outcomes (Moore et al., 2008). This points to the importance of providing continuous support to the pre-primary education workforce for curriculum implementation, rather than only when it is first introduced, to prevent fade-out and ensure positive impacts are consistent throughout the duration of the programme. Curriculum implementation and workforce training should be complementary processes to ensure alignment on the content delivered and pedagogical approach used by teachers in the classroom.

Introduction of new instructional materials

Of the 26 studies including a curriculum development and implementation component, five focused on assessing the impact of interventions introducing new instructional materials for pre-primary education. This group of studies explored five unique interventions (*see Annex 2, Table 2.1*). The characteristics of the materials introduced vary widely across studies. For instance, interventions in India, Mozambique and Tanzania used a combination of pedagogical resources in the classroom such as storybooks, pre-recorded radio and television shows, age-appropriate toys, and flash cards (Opel et al., 2009; He et al., 2009; Borzekowski and Macha, 2010; Martinez et al., 2012). Another intervention in Kenya was centred on introducing new workbooks containing activities to improve children's literacy, numeracy and socioemotional skills (Ngware et al., 2018).

It is difficult to compare the different interventions introducing new instructional materials as all of them used specific resources within a wide range of programme durations. For example, the 'Kilmani Sesame' programme in Tanzania used radio and television shows, storybooks and a guide for teachers and parents for only six weeks (Borzekowski and Macha, 2010), and in Bangladesh, a reading intervention using storybooks with illustrations was implemented for four weeks (Opel et al., 2009). In contrast, the 'Pratham Shishuvachan Pre-school Programme' in India provided storybooks, flash cards, and a child library to pre-schools throughout the

13 Madrasa pre-schools are part of the Madrasa Resource Centre Early Childhood Programme, a community-based initiative that provides pre-primary education services following an Islamic-integrated active learning pedagogical approach in East Africa. The programme values children as active agents of their own learning within a cultural context and emphasizes the importance of high-quality teacher-child interactions.

whole school year (He et al., 2009), as well as the ‘Tayari School Readiness Programme’ in Kenya in which children received workbooks with activities aligned to the national curriculum, flash cards, and counters (Ngware et al., 2018).

Despite these variations, evidence shows that the five reviewed interventions introducing new instructional materials led to positive effects on children’s learning and development outcomes. Four of them simultaneously included a workforce development component with teacher training workshops on how to use the new materials with the children (Borzekowski and Macha, 2010; He et al., 2009), or mentoring initiatives to observe teachers in their own classrooms and provide them with feedback on their pedagogical practices (Martinez et al., 2012; Ngware et al., 2018), and all of them found positive effects on at least one learning and development outcome, including cognitive and socioemotional skills. Moreover, these four interventions also included references to contextual adaptations of the materials. For instance, programmes in Tanzania, India and Mozambique ensured that all materials were translated into the local language (Borzekowski and Macha, 2010; He et al., 2009; Martinez et al., 2012). Similarly, programmes in Mozambique and Kenya ensured that the content of printed materials was aligned with local cultural traditions (Martinez et al., 2012; Ngware et al., 2018). This suggests that teacher training and contextual adaptation are important factors for an effective implementation of pre-primary education interventions introducing new instructional materials.

Introduction of new pedagogical approaches in the classroom

Another group of six studies focused on assessing interventions introducing new pedagogical approaches for pre-primary education classrooms. This group of studies explored six unique interventions introducing new instructional approaches, ways of interaction between teachers and students, and prioritization of specific skills in learning activities (*see Annex 2, Table 2.1*). For instance, in South Africa and Peru, programmes aimed to promote more horizontal relations between teachers and students using child-centred pedagogical approaches and scaffolding (van der Berg et al., 2013; Gallego et al., 2021). In Kenya and Mexico, interventions were focused on promoting the active participation of students through music, movement, and tablet-based games (Willoughby et al., 2021; Garduno, 2016). Another intervention in Kenya prioritized pedagogical activities to strengthen children’s academic skills with an emphasis on early literacy and numeracy (Bietenbeck et al., 2017). Finally, one intervention in Colombia had no specific curricular guidelines and allowed teachers to have freedom on the pedagogical approaches and content they wanted to implement in the classroom (Bernal et al., 2019).

From this wide variety of interventions, those promoting horizontal teacher-student interactions and child-centred models tended to have more promising effects on children’s learning and development outcomes. In these interventions, larger positive impacts were found in students who had lower skills at baseline, who were from low-income families or who received pre-primary education provision in under-resourced pre-schools (Gallego et al., 2021; van der Berg et al., 2013). This suggests the potential of child-centred learning to reduce existing learning gaps and education inequalities since early childhood education. Although child-centred models can have a positive impact on all young children, effects can be greater for disadvantaged students who will benefit from receiving more attention according to their specific needs through this pedagogical approach, than when taught through traditional models (Gallego et al., 2021). Moreover, this type of pedagogical approach is more likely to provide exploration and play opportunities to children, and promote their active participation, self-determination, and agency in the classroom (UNICEF, 2020). In contrast, the two interventions introducing specific music, movement, or tablet-based games to promote children’s active participation had no significant effects on their learning and development.

Both programmes had very short durations, which were not intensive enough to observe an impact. The 'Native Numbers' programme in Mexico providing tablets with maths exercises to pre-schools was implemented for only two weeks (Garduno, 2016), while the 'Red-Light Purple-Light' (RLPL) programme in Kenya promoting the use of music and movement games for self-regulation was implemented for eight weeks (Willoughby et al., 2021).

Finally, interventions prioritizing pedagogical activities to strengthen children's academic skills with an emphasis on early literacy and numeracy found positive effects on children, although these faded out or were present only if the programme was paired with other interventions. For instance, in Costa Rica, positive effects were reported only in a combined intervention. According to the authors, the classroom pedagogical component implemented on its own was not intensive enough to achieve significant gains in children's early literacy skills (Rolla et al., 2006). This, again, suggests that the length or frequency of exposure to the programme is a relevant moderating factor. Furthermore, in Tanzania, positive effects in children's cognitive development disappeared at later ages. The authors argue that this could be due to inconsistencies in the programme implementation as teachers continued using previous pedagogical approaches rather than only the newly introduced one (Bietenbeck et al., 2017). This points out the importance of teacher training for effective pedagogical interventions, which is a current gap since only two of the six reviewed interventions introducing new pedagogical approaches included a workforce development component.

Conclusion

Studies examining interventions with a curriculum development and implementation component in low- and middle-income countries demonstrate variable – but mostly positive – findings on children's learning and development outcomes. Pre-primary education curriculums implemented through these interventions vary widely in their content, aim, and length of exposure. Despite this variety, evidence suggests that longer exposure is more likely to lead to positive effects on child-level outcomes. For interventions introducing new or enriched pre-primary education curriculums, periods that exceeded a year were more likely to elicit positive effects on children's learning and development. Moreover, the introduction of child-centred pedagogical approaches for the classroom were more likely to have a greater impact on the learning and development outcomes of disadvantaged students, namely those who had lower skills from the onset of the intervention or who attended under-resourced pre-schools. Finally, the effectiveness of curriculum development and implementation interventions can be improved if a workforce development component is also included. Teachers need continuous support to adapt to new curricular guidelines and should be trained with the necessary competencies for quality curriculum implementation that can lead to positive child-level outcomes.



3.3 Findings on workforce development

While a higher share of studies including interventions with a workforce development component found a positive impact on at least one learning and development outcome (95 per cent), a high proportion also found no effects on other measures of learning and development outcomes (64 per cent). Given that most of the included studies measured different outcomes, the same study could have found positive, negative or no effects on the various outcomes measured simultaneously. This highlights the importance of exploring more deeply how the workforce components of pre-primary education interventions were designed and their relationship with subsequent outcomes.

Interventions with a workforce development component included in this review can be broadly categorized into two main areas:

1. Training and support for the existing workforce.
2. Expanding the workforce.

These are discussed in more detail below.

Training and support for the existing workforce

Of the studies that incorporated elements of workforce development, only nine examining six distinct interventions were able to isolate the specific impact of the workforce component. Of these six interventions, variable effects on child outcomes were observed. Two teacher training interventions showed positive and persistent impact on children's cognitive and socioemotional skills, both of which incorporated a coaching component. The first included monthly training sessions over a period of 16 months, followed by weekly video tutoring and on-site coaching in Colombia (Andrew et al., 2019), and the second included teacher training workshops for eight days, and six in-classroom coaching visits conducted over three terms during the course of the school year in Ghana (Pesando et al., 2018; Wolf, 2019; Wolf et al., 2019a; Wolf et al., 2019b). Two studies had mixed impacts on children's learning outcomes. The first is an intervention in Peru consisting of six overall training sessions: three sessions prior to the programme followed by three in-class training/coaching sessions, which found short-term positive effects on child outcomes (Gallego et al., 2021). The second is a two-year training programme with coaching in Chile, which showed a positive impact on teachers' classroom practices and students' socioemotional outcomes, but not on language or literacy (Yoshikawa et al., 2015). Meanwhile, two interventions found no effect of teacher training at all, both with and without the addition of coaching. These interventions included a training for a new curriculum over three sessions, totalling 21 days in The Gambia (Blimpo and Pugatch, 2017), and a five-week cascade-model training in Malawi (Özler et al., 2018). Considering that the trainings were intended to inform teachers on the newly developed curriculums, it is difficult to attribute the results of the intervention to the training or the curriculum.

The inclusion of coaching meant that training interventions with longer duration and intensity were more likely to find a positive impact on child outcomes than those with lower intensity. This is the case in all studies that included coaching, except for the one conducted in Chile (Yoshikawa et al., 2015). Authors of the included studies that saw no or heterogeneous effects on outcomes measured also referred to training intensity as a possible explanation. For example, in the Peru maths training intervention (Gallego et al., 2021), variable student outcomes in different curricular areas were observed as the intervention was interrupted

owing to teacher strikes. As such, some components of the intervention were more intensely implemented than others, and those which were more intensely implemented showed a stronger and longer impact on child outcomes in that specific curricular component (Gallego et al., 2021). In Malawi, the study authors raised the possibility that teachers' additional exposure and practice in delivering parenting sessions explained why positive impacts on child outcomes were seen only when the workforce development and family and community engagement interventions were combined (Özler et al., 2018).

Teaching practices, teacher well-being and characteristics also played a mediating role in some of the interventions' impacts on child outcomes. The impact of teacher training on teaching practices was examined in most studies that included a teacher training component. In Colombia (Andrew et al., 2019) and Ghana (Wolf, 2019; Wolf et al., 2019a; Wolf et al., 2019b), the interventions positively impacted teacher practices and child outcomes. In Ghana specifically, the persistent impact of the intervention on students' school readiness was greatest for students with teachers who provided higher levels of emotional support (Wolf et al., 2019b). As such, there were interactions between teaching practices and the programme's impact on child outcomes. The intervention also had an impact on some dimensions of teacher professional well-being, including reducing burnout and a reduction in the odds of mid-year job turnover. Meanwhile, in the Peru (Gallego et al., 2021), Chile (Yoshikawa et al., 2015) and Malawi (Özler et al., 2018) studies, improvements in classroom practices did not translate to improved child outcomes. The authors of the Chile and Malawi studies suggested that even though the trainings may contribute to moderate-to-large impacts on teachers' classroom practices, they may not always lead to a statistically significant impact on child outcomes (Yoshikawa et al., 2015; Özler et al., 2018). Meanwhile, in Peru, the impact of training and coaching was observed only among children whose teachers held university degrees. The authors found these degree-qualified teachers were also more likely to state that they had enough time to cover the materials and had a more positive approach to maths teaching than degree-qualified teachers in the control group, while the same distinction was not found among non-university qualified teachers (Gallego et al., 2021).

Finally, the impact of some of the teacher training interventions varied by child characteristics. The authors of the Chile study, which examined a relatively long training and coaching intervention, saw no impact on children's language and literacy outcomes (Yoshikawa et al., 2015). Subsequent analysis showed that there were high rates of student absenteeism from pre-school, and that the intervention had a positive impact only for children with the lowest likelihood of absenteeism (Arbour et al., 2016). In contrast, the Colombia and The Gambia studies observed positive impacts on more disadvantaged children. In Colombia, the teacher training intervention increased school readiness among the poorest children (Andrew et al., 2019), while in The Gambia, some impact (on fine motor skills) was observed among children who had the lowest baseline scores and those whose mothers were experiencing mental health issues (Blimpo and Pugatch, 2017).

Another 22 studies examined interventions which included training or support for the pre-primary workforce as one of their components. In most instances, training was provided alongside the introduction of new pre-primary programmes, through construction of new facilities or provision of grants or materials to start programmes in existing facilities. For example, in Indonesia, block grants were provided for villages to establish or support two early childhood centres (Brinkman et al., 2015; Hasan et al., 2019; Hasan et al., 2021). In addition to the grants, the project provided 200 hours of teacher training for up to two teachers per centre, delivered by a two-tiered cascade training model. In Mozambique,

communities received technical assistance and materials for the construction of up to three pre-primary classrooms, with five days of training provided for two volunteer teachers from each class (Martinez et al., 2012). Both interventions saw positive impacts on child learning and development outcomes, but as teacher training was considered a core component of the programme design, it was not possible to separate the impact of training from the grants or establishment of the pre-primary programmes.

In other instances, workforce development in the form of training and support to the existing pre-primary workforce was introduced to enhance their skills. In other cases, workforce development was implemented in conjunction with other interventions that aimed to bring changes or reforms to existing pre-primary programmes. Training was mostly introduced in combination with a new curriculum, but in most instances it was not possible to identify the impact of training alone.

Expanding the workforce

Three studies tested the impact of expanding the pre-primary education workforce, which also included volunteers or support staff. Of these, one was found to have a positive impact on children's educational outcomes (Ganimian et al., 2021), while another only had an impact when expanding the workforce was combined with teacher training (Andrew et al., 2019). Another study found a negative impact from changing from home-based to centre-based care, despite having an increased number of qualified staff (Bernal et al., 2019).

While it is difficult to draw conclusions from such a small group of studies, particularly with such different intervention designs and contexts, a notable distinction is on the clarity of expectations from additional staff. The extra facilitators introduced in India's Anganwadi centres were recruited and trained specifically to deliver pre-primary education (Ganimian et al., 2021). Meanwhile, in the Bernal et al. (2019) and the Andrew et al. (2019) interventions from Colombia, the availability of non-teaching staff was assumed to free up teaching staff time, but it was not clear whether this led to additional or higher quality instruction. Bernal et al. (2019) noted that while these interventions may have improved attendance in centres and improved structural quality, it was unclear how process quality was affected.

The lack of an impact from interventions centred around the provision of grants dedicated to the hiring of staff, in the absence of teacher training, stresses the importance of high-quality instruction (Bernal et al., 2019). How teachers spend their time also matters; Andrew et al. (2019) found a significant positive correlation between the number of learning and development activities carried out by teachers and child development outcomes. The grants intervention without training (Bernal et al., 2019) instead saw an unintended reduction in the number of learning and development activities, as teachers may not have used the additional time to increase instruction.

Conclusion

Studies assessing interventions with a workforce development component showed mixed findings on children's learning and development outcomes. Most studies focused on teacher training interventions, with a greater positive impact on child-level outcomes being observed in studies implemented for longer durations and at a higher intensity. The available information within the studies does not allow for conclusions to be drawn around the optimal duration or length of such workforce training interventions. Furthermore, few studies examined interventions that increased the workforce by including volunteers and/or support staff. The evidence suggested that increasing the number of educators alone may not be sufficient

to achieve positive child-level outcomes. Instead, it is important to clarify the role of the additional staff and prioritize high-quality instructional time. Ultimately, the learning activities that teachers implement and how they use their time can have a greater effect on children's learning and development outcomes.



3.4 Findings on family and community engagement

While a higher share of studies including interventions with a family and community engagement component found a positive impact on at least one children's learning and development outcome (93 per cent), a high proportion also found no effects on other measures of learning and development (64 per cent). Given that most of the included studies measured different outcomes, the same study could have positive, negative or no effects on the various outcomes simultaneously. Only two of these interventions exclusively targeted the family and community engagement component (Kagitcibasi et al., 2001; Vermeersch and Kremer, 2005), as most of them simultaneously included a workforce development and/or curriculum development and implementation component. Therefore, there is a need to investigate more deeply how the family and community engagement component of pre-primary education interventions was designed, as well as the relationship with the other core components.

All interventions including a family and community engagement component included in this evidence review can be broadly categorized into four areas:

1. Establishment of school-community committees.
2. Conducting parent-educator meetings.
3. Awareness raising on the importance of pre-primary education.
4. Interventions with a parental training component.

These areas are discussed in more detail below.

Establishment of school-community committees

Two studies examined interventions that consisted of establishing school-community committees, finding positive effects on enrolment and children's learning and development outcomes. An early childhood development intervention in Mozambique, which included the establishment of school-community management committees to mobilize communities for pre-school activities, reported a positive impact on primary school enrolment and on children's learning and development outcomes (Martinez et al., 2012). This programme provided initial and refresher training for teachers in child development, foundational literacy and numeracy activities, and experiential learning techniques. Similarly, an intervention in Kenya which included the formation of school-community committees to monitor the implementation of a pre-school breakfast programme, found a positive impact on children's learning outcomes only in pre-schools that had more experienced staff prior to the intervention. The authors explain that the intervention increased student-teacher ratios; therefore, only more experienced teachers were able to cope with larger classrooms (Vermeersch and Kremer, 2005). The intervention also did not include a teacher training component, which may explain this finding. These findings overall highlight the importance of pairing the family and community engagement, and workforce development components to maximize the impact of interventions on child-level outcomes (*see Annex 2, Table 2.1*).

It is difficult to draw conclusions from only two studies that involve very different interventions. However, it is important to note that both were implemented in rural communities by non-state/not-for-profit organizations. This suggests there is value in engaging organizations that are already positioned in specific contexts for the implementation of pre-primary education interventions, as their capacity to build strong relationships with communities could contribute to facilitating mobilization towards positive results.

Conducting parent-educator meetings

Two studies examined interventions that consisted of conducting parent-educator meetings to inform caregivers about their child's progress in pre-school. Reported effects on children's learning and development outcomes are heterogeneous. In Bangladesh, an intervention providing home-based and pre-school-based early childhood education services in disadvantaged areas found a positive impact on certain learning outcomes such as reading, writing and oral maths skills, but no impact on written maths skills (Aboud et al., 2008). No differences were reported across either pre-primary education settings for most of the outcomes measured. In The Gambia, the implementation of a new pre-primary education curriculum encouraging the conduction of parent-educator meetings had no effect on children's development outcomes such as fine motor skills and language (Blimpo and Pugatch, 2017) (see Annex 2, Table 2.1).

The main difference between these two studies resides in the frequency with which parent-educator meetings were conducted in pre-schools. More regular implementation of these meetings (monthly, over a year) did not lead to positive effects on children's learning and development outcomes (Blimpo and Pugatch, 2017). In contrast, having more dispersed meetings over a longer period (12 meetings over 3 years) had more promising effects on a wider range of cognitive skills (Aboud et al., 2008). Although it is difficult to draw conclusions from only two studies, this evidence points to the importance of focusing on the quality rather than on the quantity of parent-educator meetings. Factors such as the content of the meetings and the methodology used by teachers to inform parents about their child's progress in pre-school are worth considering for future programmes. Moreover, it is also necessary to develop comprehensive theories of change for these interventions that then allow the identification of which outcomes are the most relevant to be measured according to the core components targeted. In the Blimpo and Pugatch (2017) study, an exploration of socioemotional development may have shown positive impacts from the intervention. Overall, this review found that learning outcomes such as literacy and numeracy skills were more commonly assessed as opposed to studies measuring socioemotional development outcomes, which could also show an impact.

Awareness raising on the importance of pre-primary education

Four studies examined two interventions in Cambodia and Indonesia that consisted of implementing family and/or community awareness raising on the importance of pre-primary education. The interventions took different approaches to highlight the value of pre-primary education with family members. In Cambodia, a pre-school construction programme was paired with the implementation of a door-to-door intervention to reach individual families. This led to increases in learning outcomes, primarily for children from wealthier households (Berkes et al., 2019; Berkes and Bouguen, 2022). In Indonesia, a programme providing access to play-based learning environments, which included the implementation of a group awareness-raising campaign for local communities, found a significant increase in pre-school enrolment rates for children with longer exposure to the programme. A positive impact was

also observed on children's learning outcomes at endline, but it faded by mid-primary school (Hasan et al., 2019; Hasan et al., 2021) (*see Annex 2, Table 2.1*).

Although it is difficult to establish conclusions based on only two interventions and with different approaches, both found positive effects from implementing the awareness-raising campaign while providing access to new learning spaces for young children (Berkes et al., 2019; Hasan et al., 2019; Hasan et al., 2021). In Cambodia, the positive effects were observed only in villages where the awareness-raising campaign was paired with the construction of new pre-schools. The authors indicated that building learning spaces is often an important event within rural communities; therefore, it is more likely that family members are aware of the possibility of enrolling their children in pre-primary education programmes (Berkes et al., 2019). A positive impact was also found on children's learning outcomes; however, child and family characteristics acted as a moderating factor impacting the extent to which the intervention benefited children from different backgrounds. The authors in the Cambodia study noted that positive effects observed in the study were driven by children from higher-income families. The difference in outcomes between children from lower- and higher-income families increased after two years of programme implementation (Berkes et al., 2019; Berkes and Bouguen, 2022). This points to the need to further investigate the effect of the length of exposure to the programme among children of disadvantaged families. As Berkes et al. (2019) explain, this factor can act as a constraint, widening existing learning gaps over time between children from wealthier and poorer households.

Interventions with a parental training component

Thirteen studies examined eight unique interventions that consisted of conducting parental training. All the interventions provided training to groups of parents or to school management committee members. The topics addressed in the training sessions varied widely, including children's development processes, positive parenting strategies, pre-school management, educational activities to do with children at home, and reading-aloud strategies.

Overall, interventions with a parental training component had positive effects on children's learning and development outcomes, despite the variety in content (*see Annex 2, Table 2.1*). However, in many cases the effects of the programme faded over time.

In particular, four studies assessed programmes that trained parents in activities they could replicate at home with their children. These included interventions implementing a 12-day training in Malawi including practical demonstrations of activities (Özler et al., 2018), monthly training sessions throughout the school year in Bangladesh on home learning activities to strengthen children's literacy and numeracy skills (Spier et al., 2020), and monthly training sessions in Brazil on the use of read-aloud strategies (Mendelsohn et al., 2020; Weisleder et al., 2018). While the studies found a positive effect on at least one measure of child-level learning and development outcomes, in Malawi positive effects were observed at the 18-month, but not at the 36-month follow-up (Özler et al., 2018).

Nine studies focused on increasing parents' knowledge of information that is relevant for their caregiving role. Two studies explored the impact of interventions for training parents in child development processes and found a positive effect on child-level learning outcomes. This included a training programme in the Philippines to increase parents' understanding of child development (Armecin et al., 2006) and a bi-weekly training intervention for mothers in Türkiye including guided group discussions on children's development, among other topics (Kagitcibasi et al., 2001). The intervention in Türkiye found children achieved significant gains

in learning outcomes two years after the programme ended, but not after seven years. Three other studies examined interventions for training caregivers on positive parenting practices and evidenced positive effects on children's learning and development outcomes. This included monthly training meetings in Mozambique (Martinez et al., 2012; Martinez et al., 2017) and a 35-day training programme in Cambodia (Berkes et al., 2019). The training in Cambodia showed positive effects on children's learning outcomes after one year of programme exposure, but the effects faded after two years. Four other studies assessed an intervention in Ghana providing information to caregivers on several topics including their role in children's learning, the benefits of play, and the importance of parent-teacher and parent-school communication (Pesando et al., 2018; Wolf, 2019; Wolf et al., 2019a; Wolf et al., 2019b). Negative effects on children's learning and development outcomes, including literacy, numeracy and socioemotional skills, were found at the end of the programme persisting after one year.

The content of parental training interventions can moderate the persistence of positive effects over time. The authors of the study in Malawi noted the skills and activities learned were targeted to young children, but as they grew up, the content of the training could have become irrelevant for older ages (Özler et al., 2018) or other factors might have come into play such as the entry to primary school. A similar hypothesis is mentioned by the authors of the study in Cambodia, who stated that caregivers might have changed their views of their children as they grew up, distancing them from the messages conveyed in the training sessions (Berkes et al., 2019). As such, continued parenting training programmes that progressively adapt the content to children's ages could be a more effective methodology to prevent fade-out effects. In the Ghana studies, negative effects were observed on children's learning and development outcomes, including literacy, numeracy and socioemotional skills, and were found at the end of the programme persisting after one year. The authors argued that the content of the parental training could explain the negative effects found on children's learning and development outcomes. As the intervention focused on caregivers of four- to six-year-old children, they might have been less receptive to messages of stimulation through play, which are often focused on younger children. The authors also hypothesized this might have disrupted the roles caregivers typically play in their children's education (Wolf et al., 2019a). Thus, these aspects should be taken into consideration in the design of family and/or community engagement interventions to ensure parents' acceptance and responsiveness to the training programme.

The evidence also showed that the intensity of the training sessions can be an important factor in moderating the achievement of positive effects on child-level outcomes. From the eight unique interventions included in this review providing training to parents, five that provided training sessions distributed throughout the duration of the programme found positive effects on at least one learning and development outcome. It is difficult to ascertain from the information provided in the studies a minimum training timeframe and intensity that elicits positive effects; however, it is important to note that four unique interventions trained caregivers on a monthly basis. The authors of the Malawi study suggested that more frequent meetings were more likely to help parents internalize the messages from the training (Özler et al., 2018). The intervention in Ghana, which consisted of three training meetings with caregivers, found negative effects on children's learning and development outcomes. Although sessions were delivered throughout the school year, the authors argued that the intensity was not sufficient (Wolf et al., 2019a). While this may explain why no positive effects on child learning were observed, the link between intensity and negative child outcomes is less clear from a programme intensity perspective. In addition to the intensity, the moment in which the training was conducted could also be a relevant factor to consider for preventing fade-out. If

sessions are mostly provided at the beginning of a one-year or two-year intervention, parents will not have continuous exposure to information or an opportunity to practise for the rest of the programme duration.

Finally, despite the wide content variety of parental training programmes, evidence suggests that the sociodemographic characteristics of the families could have moderating effects on children's learning and development outcomes. In Türkiye, gains in children's development outcomes were higher among children receiving pre-primary education provision in pre-school environments rather than in custodial day care centres or at home (Kagitcibasi et al., 2001). The authors of this review propose these differences might be related to family socioeconomic status, as children receiving pre-primary education services in community- or home-based settings are more likely to be from disadvantaged households. Studies do not provide much information to explain these differences; therefore, this is an area that requires further investigation. The level of education of the family was another moderating characteristic mentioned by researchers of included studies. In Mozambique, the impact of the parental training intervention on pre-school enrolment rates was higher among children with more educated parents (Martinez et al., 2012). The authors of the study in Ghana also found that caregivers' literacy level affected children's learning outcomes, with negative effects among children from households with a male non-literate head that persisted one year after the programme ended (Wolf et al., 2019b). Wolf et al. (2019b) pointed out that a lower education level among families can more likely lead to misunderstandings and disagreements with the messages conveyed in the training programme. This suggests the need for further research on how to engage less educated or non-literate parents in their children's pre-primary education.

Conclusion

Interventions with a family and community engagement component used a wide variety of approaches to reach caregivers. Most of the reviewed studies were centred on assessing interventions providing training to family members. Overall, positive effects on children's learning and development outcomes were found; however, these were moderated by factors such as the intensity of the training sessions and the sociodemographic characteristics of families, namely their socioeconomic status, and the caregivers' level of education and literacy. A greater impact of the trainings was observed for children from high-income families or with more educated parents. Additionally, greater effects were found for longer programme durations. However, the positive effects of training interventions fade out if parents' exposure to the key messages is not sustained over time and if the content is not continuously adapted to children's developmental changes.



3.5 Findings on quality assurance

All interventions with a quality assurance (QA) component had some aspects of positive impact, as opposed to 86 per cent overall. Sixty-seven per cent had no effect, as opposed to 50 per cent overall. There was no uniform definition of quality assurance across the different studies, and the literature predominantly focuses on qualitative data for assessing quality assurance. The Build to Last framework defines quality assurance as an ongoing process to monitor the quality of pre-primary education systems across their different components and levels, including at the service delivery level, using a clear definition of quality, quality standards, mechanisms and tools to encourage data-driven improvements (UNICEF, 2020).

Studies included in this component focus on monitoring quality at the service delivery level and use classroom observations and visits as quality assurance mechanisms. Two studies

indicated that committees were established to manage and provide oversight to programmes to ensure quality implementation (Martinez et al., 2012; He et al., 2009). For example, in Mozambique, these committees included programme facilitators and government partners who focused on monitoring teaching practices (Martinez et al., 2012).

Routine and/or unannounced visits by programme supervisors and researchers were a common quality assurance mechanism used across studies to ensure programme implementation consistency and fidelity (Weisleder et al., 2018; Martinez et al., 2012; He et al., 2009; Black et al., 2021; Borzekowski and Macha, 2010). For example, in India, programme supervisors met instructors two times per week to ensure that training and implementation were consistent (He et al., 2009). In addition, researchers noted the use of quality monitoring observational measures and tools (based on existing validated instruments, such as the Infant/Toddler Environment Rating Scale (ITERS), the Early Childhood Environment Rating Scale (ECERS), and the Classroom Assessment Scoring System (CLASS)) to examine the influence of programme quality on child-level outcomes and families' decision to enrol children in pre-primary education programmes (Hojman and López Bóo, 2019; Black et al., 2021). For example, a study conducted in Nicaragua developed a tool based on ITERS and CLASS to measure the quality of pre-schools. The observations were done by trained supervisors for one year in the same pre-school (Hojman and López Bóo, 2019).

Further, in selected studies included in this component, teacher training and qualifications were also included as a measure of quality assurance (Blimpo and Pugatch, 2017; Weisleder et al., 2018; Martinez et al., 2012). Of note, with the implementation of a new pre-school model in Mozambique, teachers received coaching on their teaching practices during monthly visits conducted by programme facilitators. Government partners also participated in these training and joint monitoring visits to provide mentoring and coaching.

Conclusion

Studies with a QA component in low- and middle-income countries used a set of approaches to ensure programme implementation. Most of the reviewed studies indicated routine supervisory visits and observations as a key component of quality assurance and programme monitoring. Other approaches, such as oversight committees, and the use of teacher training, coaching and mentoring, were included as mechanisms to ensure programme quality. While quality assurance mechanisms are critical to ensure programme fidelity and practices are being implemented, QA approaches discussed in interventions included in this component were discussed as more descriptive and process qualities, rather than factors which have a causal or correlational impact on children's outcomes. Furthermore, some studies used observational tools and measures to determine whether pre-school interventions were deemed to be of high or low quality, and subsequently discuss whether overall programme quality was a factor affecting child outcomes. As previously noted in this report (and consistent with other pre-primary education core components), it was not possible to identify single effects of quality assurance mechanisms on child outcomes. Further research and/or innovative methods are necessary to examine the impact of specific quality assurance mechanisms on child and family outcomes, in addition to their effects on teacher performance, pedagogical practices and motivation.



4. Research recommendations

Recommendations for further research are provided within and across each of these core components. Programmatic recommendations are also included for stakeholders to strengthen programme design and implementation and ensure pre-primary education provision has an impact on children's learning and development outcomes.

4.1 Planning and budgeting

Most of the included studies assessing interventions with a planning and budgeting component focused on specific and short-term improvements for pre-primary education provision, such as infrastructure reforms to existing pre-schools or expanding access through pre-school transfers, grants and scholarships. However, planning and budgeting processes entail a greater degree of complexity including the development of evidence-based education sector plans, the identification of financial needs, the establishment of strong governance structures for effective plan implementation, and a robust monitoring and evaluation framework (UNICEF, 2020; Global Partnership for Education, IIEP and UNESCO, 2015). Future studies should therefore be focused on identifying effective governance practices and accountability structures for equitable and quality pre-primary education provision with a system-wide perspective, across different levels (national, sub-national and local) and across different providers (public, private, and non-state/not-for-profit). Further research assessing the impact of nation-wide programmes, rather than only of small-scale interventions or pilots, is specifically required as this evidence can then feed into planning and budgeting decisions at scale.

More studies investigating effective financing mechanisms for pre-primary education are also essential. Fewer than half of the included studies reported information on the overall cost and/or the cost per child of the interventions. Such information is needed to identify cost-effective ways to expand access to quality pre-primary education and estimate potential returns on investment that can be factored into planning and budgeting decisions. Studies assessing cost-effectiveness can also contribute to the identification of alternative service delivery models that have positive effects on children's learning and development, for example, community-based programmes, playgroups or day care centres.

4.2 Curriculum development and implementation

Of all the included studies assessing interventions with a curriculum development and implementation component, almost half focused on the introduction of a new pre-primary education curriculum (13 out of 26 studies). The newly introduced curriculums varied widely in terms of their content, pedagogical approach, aim and length of exposure prior to measuring child-level outcomes; therefore, more research is needed to disentangle the most effective curriculum characteristics for future implementation. Moreover, it is necessary to increase the available evidence on the challenges of curriculum implementation across different pre-

primary education settings. The professional qualifications and pedagogical experience of the workforce in home-based, community-based and pre-school-based pre-primary education programmes can broadly differ and this should be considered when designing interventions that respond to teachers' needs (UNICEF, 2019b).

Additionally, although the curriculum development and implementation component is one of the most targeted pre-primary education core components across all the interventions reviewed, most studies simultaneously focused on other components such as workforce development and/or family and community engagement. Therefore, there is a need to investigate more deeply how the curriculum development and implementation component of interventions was designed, as well as the relationship with other core components. It is critical to expand the evidence base on how teacher training programmes can contribute to improving the effectiveness of curriculum implementation, and on the impact of paired interventions to achieve sustained positive effects on children's learning and development outcomes.

Further research is also necessary to support recent advocacy efforts for the implementation of play-based curriculums in pre-primary education that provide children with opportunities to develop foundational skills while exploring, playing and exercising their agency in the classroom (UNICEF, 2020). New studies should contribute to defining the components that set apart play-based curriculums from other curriculums, and investigate the effect of this pedagogical approach on child-level outcomes in the early years. It is also critical to expand research on the potential of play-based interventions and how they contribute to school readiness for a successful transition from pre-primary to primary education.

The quality of the studies assessing interventions with a curriculum development and implementation component is also crucial. This review found that most of the studies rated as low-quality included a curriculum development and implementation component. Further research should intend to unpack whether this issue is related to the ethical considerations, sampling, data collection and/or analysis methods used, to improve the reliability and validity of the available evidence.

4.3 Workforce development

All included studies with a workforce development component (31 studies) examined interventions providing some sort of training to the pre-primary education workforce. The training programmes varied widely in terms of their duration, intensity, content and the training methodology used; therefore, it is difficult to identify the most effective characteristics for scale-up. Further quasi-experimental and experimental research is needed to compare the moderating effects of these factors on child-level learning and development outcomes, from foundational literacy and numeracy to socioemotional skills. For instance, studies can assess the impact of training programmes with and without a practical component, with general versus specific content to address pedagogical gaps or a combination of both, with different degrees of classroom coaching and/or supervision, and with and without reinforcement over time (World Bank, 2020). Furthermore, the impact of training programmes on teachers' professional well-being outcomes, namely retention rates and/or teacher burnout, could also be explored to expand the evidence base on the use of professional development opportunities for career motivation in early childhood education.

4.4 Family and community engagement

Interventions with a family and community engagement component used very different approaches, including the implementation of awareness-raising campaigns on the importance of pre-primary education, the conduction of parent-educator meetings, parent and/or community trainings, and the establishment of school-community committees. Further research should investigate how the effectiveness of these strategies on child-level outcomes is moderated by family sociodemographic characteristics, namely caregivers' literacy level and household income level, to better understand the most impactful ways of reaching caregivers from marginalized and disadvantaged contexts. For awareness-raising campaigns specifically, delivery modalities also vary widely. Although previous studies have shown that providing information to caregivers on the benefits of education can increase attendance and learning at a low cost (World Bank, 2020), more evidence is needed to understand the effectiveness of different delivery modalities (for example, door-to-door interventions, leaflets, group meetings) across diverse contexts. For parent and/or community training programmes, further research is necessary on how to engage caregivers from different backgrounds, particularly less educated and non-literate parents, to increase their acceptance and responsiveness to the training content.

Furthermore, there is a lack of studies assessing family and community engagement interventions from a gender perspective. It is necessary to strengthen the evidence base of effective practices to engage male caregivers in pre-primary education across diverse cultural contexts and understand the impact on children's learning and development outcomes, as well as in the formation of gender stereotypes. This includes testing the use of awareness-raising initiatives on the role of men in education, the implementation of parental training to improve father-child interactions at home, and strategies to make pre-schools more welcoming to men (UNICEF, 2022a).

4.5 Quality assurance

The available evidence on interventions targeting a quality assurance component is very limited. Quality assurance should be a cross-cutting component of pre-primary education systems as it can provide data for accountability, management, policy strengthening and service delivery improvement (UNICEF, 2020). Further research should focus on mapping the pre-primary education quality assurance systems currently in place in low- and middle-income countries. This includes research on the quality standards and mechanisms used across different contexts to promote service quality and facilitate improvements.

Future studies should explore quality assurance more intentionally, and not only as a secondary component of pre-primary education systems, to collect evidence on the impact of using specific quality assurance mechanisms and tools, and their correlational or causal impact on process quality, and child-level learning and development outcomes. It is also necessary to understand the connections between quality assurance data and other interrelated enabling factors that affect the development of robust pre-primary education systems, for instance, how data is used to develop a strong education policy framework, or to inform adequate financing and ongoing investment for pre-primary education.

4.6 Research recommendations across pre-primary education core components

This review identified areas for further research that are transversal to all pre-primary education core components. It is essential to conduct more studies that include children with disabilities in LMICs to expand the evidence base on effective pre-primary interventions for populations that are often underrepresented and excluded from the earliest stages of research. Furthermore, there is a lack of studies assessing interventions that target the transition from pre-primary to primary education as a core component. Exploring associations between pre-school attendance and the development of foundational numeracy and literacy competencies in later years should be a priority (UNICEF, 2022b). This is also the case for studies exploring interventions that aim to improve quality in the classroom. Further research should have a greater focus on process quality in pre-primary education – rather than only on structural quality – to expand the evidence base on how different pedagogical practices, curricular approaches and child-teacher interactions can affect child-level learning and development outcomes. Previous research has also stressed the importance of addressing this process quality gap by showing that funding for structural improvements alone does not lead to improved child outcomes and may rather lead to negative effects (World Bank, 2020).

In addition to these research areas, there are methodological improvements needed to increase the robustness and depth of the data collected in pre-primary education. More quasi-experimental and experimental studies that can isolate the specific impacts of different core components are crucial, including treatment arms with and without combinations of interventions. For instance, in many of the reviewed studies, it was not possible to differentiate the effects of workforce development programmes on child learning outcomes as these were often paired with curriculum or family and community engagement initiatives, without other comparison groups or with a control-no intervention arm only. More longitudinal studies are also required, particularly to measure the long-term effects of interventions on learning and development outcomes. From all included studies, more positive effects were reported in studies targeting access outcomes (70 per cent), compared to learning and development outcomes (56 per cent). Observing significant effects on the latter can entail a long-term process; therefore, more studies including follow-up rounds will allow an understanding of the effectiveness of pre-primary interventions over time. Additionally, studies targeting learning and development outcomes should ensure different child-level outcome areas are assessed based on the type of intervention being implemented by clearly mapping out the intended outcomes of the interventions. Measuring impact on both academic (such as literacy and numeracy) and socioemotional skills is necessary. Other outcomes, namely teacher performance, teacher pedagogical practices and teacher motivation, should also be considered as interventions might have a more direct effect on them that could then lead to improvements in child-level outcomes. This is especially relevant for programmes targeting a quality assurance component using classroom observations and monitoring visits as quality assurance mechanisms.¹⁴

¹⁴ For further information on the specific outcomes assessed in the included studies, please refer to this [evidence gap map](#). This interactive tool provides an overview of the existing evidence on pre-primary education interventions in LMICs, highlights the main evidence gaps identified through this review and shows where evidence is more abundant.

Finally, this paper identified a lack of information in the reviewed studies regarding informed consent or ethical considerations taken with participants. Almost 50 per cent of the studies did not state whether participants were asked for their consent. This issue should be addressed in further research as it is imperative to obtain consent from all participants – both adults and children – and report it clearly in every publication (UNICEF, 2021).

4.7 Recommendations for pre-primary education policy and programming across all core components

The mediating factors for impact identified through this evidence review can provide relevant guidance to strengthen pre-primary education policies and programmes and ensure equitable and smart-scaling of pre-primary education services. This is particularly important following the COVID-19 pandemic. Pre-primary education must be considered an integral part of the response efforts to rehabilitating children's learning, and the findings from this report can support in ensuring pre-primary education systems are maximized to achieve this.

The evidence review further highlighted the benefits of early learning opportunities for children. This information is essential for advocating for the provision of at least one year of free and compulsory quality pre-primary education in national education policies and sector plans. Such advocacy efforts are essential to be able to meet the Sustainable Development Goal target 4.2, which calls for providing equitable access to high-quality and free pre-primary education for at least one year by 2030 (United Nations, 2022). Findings also showed the positive impact of pre-primary education on child-level learning and development outcomes, particularly for children from marginalized and disadvantaged groups. This suggests that interventions should have targeted expansion plans and budgets to ensure pre-primary education services are reaching underserved areas. Public resources should also be prioritized for the most vulnerable children. Moreover, the evidence showed the positive impact of various modalities of pre-primary provision, including community-based programmes such as playgroups and childcare centres, on enrolment rates, enrolment duration and children's learning and socioemotional development. This points to the importance of diversifying pre-primary education implementation models. If minimum quality standards are guaranteed, Ministries of Education can evaluate the implementation of alternative models, in addition to pre-schools or kindergartens, as cost-effective strategies for service delivery, especially in rural contexts or remote areas.

Findings related to how programme duration and intensity can act as moderating factors for impact should be factored into the design stages of pre-primary education interventions and programmes. This is essential to prevent fade-out and ensure the benefits in children's learning and development outcomes persist as they transit to primary education. For example, evidence showing the positive impact of curriculum interventions implemented for at least one year, paired with programmes providing continuous support to teachers throughout the programme duration, should be considered for the development of workforce training plans when new or enriched pre-primary education curriculums are rolled out. This will allow teachers to have the necessary time to internalize the new curriculum content and adapt to new pedagogical approaches. Programme intensity as a moderating factor to prevent fade-out of effects should also be considered when designing strategies to engage families and communities. Evidence suggesting the positive impact of implementing parental training sessions distributed throughout the programme duration (e.g., on a monthly basis) on children's learning and development outcomes can be factored into targeted strategies for specific families, namely less educated caregivers or low-income families that may require more substantial support.

Finally, evidence showing the positive effects of child-centred pedagogical approaches providing play opportunities to children should be used when reviewing or updating pre-primary education curriculums. Although more research is needed to understand the specific components of play-based curriculums and how these translate into positive learning and development outcomes, Ministries of Education should ensure young children are provided with opportunities for play and free exploration according to their developmental needs. This also points to the importance of emphasizing process quality in teachers' professional development programmes to ensure high-quality instructional time. Findings from this review show that process quality aspects, such as the type of pedagogical activities that teachers carry out in the classroom and the way they spend their teaching time, will have a greater effect on children's learning and development outcomes, compared to structural aspects such as the number of staff available. Structural aspects are key to guarantee minimum quality standards for pre-primary education programmes; however, their interaction with process quality aspects is crucial for achieving a greater impact.

5. Conclusion

This paper provided a review of the available evidence on pre-primary education interventions that lead to equitable access and quality in LMICs. The review followed UNICEF's Build to Last framework (UNICEF, 2020) to categorize studies into the five core components of pre-primary education systems: planning and budgeting, curriculum development and implementation, workforce development, family and community engagement, and quality assurance. Overall, the review reaffirms the importance of pre-primary education on child learning and development outcomes. Increasing access to all children, particularly those who are more disadvantaged, is greatly beneficial to their growth and school readiness. The review highlighted a number of key factors that affect the effectiveness of pre-primary education interventions, including programme intensity, duration, and characteristics of children and their families, which must all be considered for systems to deliver pre-primary education that can ensure children's access to services, and that their learning and development benefit from the services.



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Annex 1

The methods undertaken for the search strategy, screening and coding and data extraction

Search strategy

The search strategy is comprised of three stages:

1. Relevant primary studies included in systematic reviews about education or early childhood education in low- and middle-income countries were searched from the following:
 - Systematic review databases: UNICEF MegaMap of Child Wellbeing, 3ie, Campbell Collaboration and EPPI-Centre.
 - International organizations: UNICEF, the Foreign, Commonwealth and Development Office (FCDO), and the World Bank.
2. Database search for relevant primary studies published from 2019 onwards: 3ie, JPAL, EBSCOhost, ERIC, ProQuest, Social Systems Evidence, and Google Scholar.
3. Primary studies identified by the Reference Group and UNICEF Early Childhood Education Global Technical Team.



Screening and coding

All search results were imported into EPPI-Reviewer for abstract/title and full-text screening (see Table 1.1).

Table 1.1.
The screening questions that were used to screen and code reviewed studies

Screening question	No (Exclude)	Yes (Include)	Unclear (Forward to full-text screening)
Title and Abstract Screening			
1. Date: Published after 2001?			
2. Language: Is the study in English?			
3. Population: Does the study report results for children and adolescents in a lower- and middle-income country?			
4. Explanatory variables: Does the study focus on the impacts of pre-primary education?			
5. Outcomes of interest: Does the study look at the impacts of pre-primary education on one or more of the following education outcomes?			
<ul style="list-style-type: none"> • School dropout • School enrolment • School attendance • Education attainment • Learning outcomes (e.g., literacy, numeracy) 			
6. Research design: Is the study either a:			
<ul style="list-style-type: none"> • Quantitative empirical study of experimental or quasi-experimental design that reports on primary research? • Secondary review synthesizing evidence on the effects of pre-primary education on education outcomes? This could include systematic reviews as well as non-systematic ones. 			
At full-text: Repeat Questions 3 to 6 if necessary.			
7. Is the methodology clearly reported?			

Data extraction

The codes used to extract data from included studies aimed to describe the programme or intervention using the Build to Last framework, as well as the study context. The coding categories and options are highlighted in Table 1.2 below.

Table 1.2.
The coding categories and options used for coding the reviewed studies

Coding category	Options/Data
Bibliographic data	Authors Date of study Report status (Published/In-press/Unpublished) Abstract (if available)
Geographic coverage	Country/countries
Study design (primary)	Experimental Quasi-experimental Systematic review
Study population characteristics	Sample size (N) (if available) Age range (min and max) Gender (Female, Male, Other) Location (Urban, Rural, Other) Disability Status Ethnicity/Minority Language/Caste Sampling and recruitment procedure, including consent (Free text)
Type of programme/intervention	Introduction/expansion of pre-primary programme Changes/reform to pre-primary programme Other (specify)
Programme/intervention <i>(these may be different to the pre-primary programme itself)</i>	Formal name of programme/intervention (Free text) Description of the intervention (Free text) Cost of intervention (Free text, if provided) Duration of intervention (Free text, if provided)
Pre-primary setting	Homes Schools Communities
Pre-primary provider	Public/state-run Private-for-profit Non-state/not-for-profit
Pre-primary hours of service provision	Full-day/full-week A few hours/varying days per week

Pre-primary programme duration	<1 year 1 year 2+ years
Pre-primary core function/ action area	Planning and budgeting Curriculum development and implementation Workforce development Family and community engagement Quality assurance
Pre-primary programme characteristics	Educator qualification (Free text) Educator recruitment (Free text) Child-educator ratio (Free text) Curriculum/material used (Free text) Fee for families (Free text)
Outcomes assessed	Dropout: Positive/Negative/No effect Enrolment: Positive/Negative/No effect Attendance: Positive/Negative/No effect Completion/Attainment: Positive/Negative/No effect Learning and development outcomes (cognitive and socio-emotional): Positive/Negative/No effect For each outcome: Any disaggregated results by gender, location, disability, language/ethnicity/caste (Free text) Time between intervention and outcome: <1 year/1-3 years/4+years Moderating factors on outcome (Free text)
Enabling environment (if mentioned)	Ministerial leadership Policies and legislation Public demand Financing System coherence Other moderators/enabling factor (inductive coding/free text)



Annex 2

Studies included in the review and key data extracted

All included studies from the systematic review, in addition to the key data extracted from them, have been summarized in Table 2.1.

Table 2.1.

List of primary included studies

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Aboud et al.	2008	Bangladesh	Quasi-experimental	Curriculum development and implementation Workforce development Family and community engagement	Succeed Pre-school Programme: ECE programme to increase access to high quality pre-primary education delivered by trained community volunteers using a child-centred pedagogical approach. A new curriculum was introduced combining teacher-led and child-led activities. Parent-educator meetings were also conducted to inform caregivers on their children's developmental progress.	Learning and development	Positive: Significant increases in children's reading, writing and oral maths skills. Children with longer programme exposure achieved higher scores in expressive language and reading. Negative: Negative effect on written maths skills. No effect: No significant differences between children from pre-school- and community-based services, except for written maths skills.	Policies and legislation System coherence	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Andrew et al.	2019	Colombia	Experimental	Planning and budgeting Workforce development	Grants for public pre-schools for extra staff and materials. A second treatment arm added a programme focused on pedagogical training for teachers on how to design and implement activities that promote children's development.	Learning and development	Positive (for a subgroup): Increased school readiness for poorer children when grants are combined with a teacher training component (average improvement of 0.33 SD of the control group). No effect: Grants in itself had no effect, only saw increased school readiness for poorer children when combined with a teacher training component.	Policies and legislation System coherence	Not stated	Not stated
Armezin et al.	2006	Philippines	Quasi-experimental	Curriculum development and implementation Family and community engagement	Early Childhood Development Initiative: ECD programme introducing an enriched pre-primary education curriculum and the conduction of parental group training on children's development processes.	Learning and development	Positive: Significant increases in children's development (cognitive, social, motor and language), mainly among children under four years old or who participated in the programme for more than 12 months.	Ministerial leadership System coherence	Not stated	Yes
Bastos and Straume	2016	Brazil	Quasi-experimental	Planning and budgeting	This study examined whether an expansion in the supply of public pre-school crowds out private enrolment, using data from 2000-2006.	Access (enrolment)	Positive: Results from a regression-discontinuity design reveal that larger federal transfers lead to a significant expansion of local public pre-school services. Neutral: No effects on the quantity or quality of private provision.	Financing System coherence	Not stated	Not stated
Bastos et al.	2017	Guatemala	Quasi-experimental	NA	Ambitious construction programme that increased the number of pre-primary schools from about 5,300 to 11,500 between 1998 and 2005.	Access (enrolment)	Positive: We find a positive effect on adequate progression (expected grade given age) of about 2.4 percentage points (from a mean of around 12.3% for the beneficiary group).	Policies and legislation	Yes	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Berkes and Bougen	2022	Cambodia	Experimental	Planning and budgeting Workforce development	Large pre-school construction programme from 2015-2018, examining newly built community pre-schools as compared with lower quality existing pre-schools (informal or state funded) and home care.	Access (enrolment) Learning and development	Positive: Assignment to the treatment group significantly affects enrolment by about 39 percentage points. Children in treatment villages perform about 0.05 to 0.06 SD higher in treatment than those in control villages in cognitive test scores.	Public demand Financing	Not stated	Not stated
Berkes et al.	2019	Cambodia	Experimental	Planning and budgeting Family and community engagement	Large pre-school construction programme from 2015-2018, examining newly built community pre-schools as compared with lower quality existing pre-schools (informal or state funded) and home care.	Access (enrolment) Learning and development	Positive: Positive impact on cognitive (0.04 SD) and socio-emotional development (0.9 SD) in children from wealthier families after one year of programme implementation, increasing after two years. Effect on children from the poorest families was positive but limited. No effect: No impact on pre-school enrolment.	Ministerial leadership Financing	Yes	Not stated
Berkes and Bougen	2018	Cambodia	Experimental	Planning and budgeting Workforce development Family and community engagement	Large pre-school construction programme from 2015-2018, examining newly built community pre-schools as compared with lower quality existing pre-schools (informal or state funded) and home care.	Access (enrolment) Learning and development	Positive: Without family engagement interventions, the pre-school construction programme is unlikely to reduce the initial cognitive gap between children from poorer and wealthier households. Relatively wealthier parents are more likely to enrol their children and benefit from the programme.	Policies and legislation Financing	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Berlinski et al.	2008	Uruguay	Quasi-experimental	Planning and budgeting	The study uses data from the Uruguayan Encuesta Continua de Hogares (ECH) for the years 2001–2005 to estimate the effect of early exposure to pre-primary education on school stay-on rates and levels of completed education among individuals aged 7–15.	Access (enrolment; completion/attainment)	Positive: Attending pre-school had a significant positive effect on completed years of primary and secondary education (through both a fall in grade retention rates since the early school years and a reduction in dropout rates among teenagers). The gains from attending pre-school increase as children grow older, and grade failure is reduced.	Policies and legislation	Not stated	Not stated
Berlinski et al.	2009	Argentina	Quasi-experimental	NA	The study examines returns to pre-primary education by taking advantage of a large infrastructure programme aimed at increasing school attendance for children between 3 and 5 years old.	Learning and development	Positive: One year of pre-primary school increases average third grade test scores by 8% of a mean or by 23% of an SD of the distribution of test scores. Pre-primary school attendance positively affects student's self-control in the third grade, measured by behaviours such as attention, effort, class participation, and discipline.	Policies and legislation	Not stated	Not stated
Bernal et al.	2019	Colombia	Experimental	Planning and budgeting Curriculum development and implementation Workforce development Family and community engagement	The study examined whether the offer to transfer and the actual transfer from non-parental family day care units to large childcare centres in urban areas had an impact on child cognitive and socio-emotional development, and nutrition.	Learning and development	Positive: Positive effect on nutrition outcomes. Negative: Negative impact on cognitive development. No effect: No statistically significant effect of the intervention on socio-emotional development.	Policies and legislation	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Bietenbeck et al.	2017	Kenya Tanzania	Quasi-experimental	Curriculum development and implementation	Study of the effects of pre-school attendance on children's school progression and cognitive skills , comparing the two different pedagogical approaches of Kenya (highly academic) and Tanzania (emphasizes the development of cognitive and socio-emotional skills).	Access (enrolment; dropout; completion/attainment) Learning and development	Positive (with fade-out): Children who attend pre-school outperform their peers in cognitive tests (scoring 0.10 SD higher). In Kenya, this effect disappears at early ages, while in Tanzania between 13-16 years old.	Not stated	Not stated	Not stated
Black et al.	2021	India	Experimental	Planning and budgeting Workforce development Quality assurance	School meal programme: The study examined whether a nutrient intervention, compared with a placebo, impacted health and child development outcomes and whether effects varied by pre-school quality.	Learning and development	Positive: In low-quality pre-schools, the programme increased pre-schoolers' expressive language and inhibitory control, and reduced developmental disparities. No effect: No effect on children's development outcomes due to the nutrient intervention in high quality pre-schools.	System coherence	Not stated	Yes
Blimpo and Pugatch	2017	The Gambia	Experimental	Curriculum development and implementation Workforce development Family and community engagement Quality assurance	Gambia Open and Active Learning Spaces (GOALS): Programme providing teacher training to deliver a new ECD curriculum to a subset of public centres built as annexes to primary schools (ECD Annexes). The curriculum includes the conduction of parent-educator meetings.	Learning and development	Positive: In ECD Annexes, fine motor skills of children of mothers with mental distress and children with negative baseline scores increased significantly 14 months after treatment began (0.3 – 0.4 SD). No effect: No impact on children's development outcomes (fine motor skills, language, and hearing).	Public demand System coherence	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Borzekowski and Macha	2010	Tanzania	Experimental	Curriculum development and implementation Workforce development Quality assurance	Kilmani Sesame: Six-week multimedia intervention that employs print materials, radio and television to educate pre-primary children in rural districts.	Learning and development	Positive: Significant improvements from baseline to post-intervention in literacy and numeracy skills, social and emotional development, and health and hygiene.	Public demand	Not stated	Not stated
Bouguen et al.	2018	Cambodia	Experimental	Planning and budgeting	Randomized evaluation of a pre-school construction programme. Newly built formalized pre-schools (community pre-schools) were compared against existing pre-schools (informal or state-funded pre-schools) and/or children receiving care at home.	Access (enrolment)	Negative: Overall impact of the programme on early childhood outcomes was small and not significant. For the cohort with highest programme exposure, the impact on cognitive indicators was negative; with the largest negative effects among children of poorer and less educated parents.	Ministerial leadership Financing	Yes	Not stated
Brinkman et al.	2015	Indonesia	Experimental	Planning and budgeting Workforce development	Indonesia Early Childhood Education and Development Project: Programme expanding access to low-cost, government-sponsored, community-based playgroups in rural Indonesia.	Access (enrolment) Learning and development	Positive: Raised enrolment rates and durations of enrolment for everyone, with a modest and sustained impact on children from more disadvantaged backgrounds. Negative: Intervention encouraged substitution away from other services, such as kindergartens.	Other enabling factor	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Chujan and Kilenthong	2019	Thailand	Experimental	Curriculum development and implementation	Reducing Inequality through Early Childhood Education (RIECE): ECE programme introducing a new curriculum in pre-schools based on the High Scope programme. Training for teachers was provided including an intensive workshop for curriculum implementation and in-class training.	Learning and development	Positive: Significant gains in children's development outcomes (gross and fine motor, expressive language, social skills). Greater impact in children from classrooms where the quality of curriculum implementation was better (0.66 SD). No effect: No impact on receptive language.	Not stated	Not stated	Yes
Chujan and Kilenthong	2020	Thailand	Experimental	Curriculum development and implementation Workforce development	Reducing Inequality through Early Childhood Education (RIECE): ECE programme introducing a new curriculum in pre-schools based on the High Scope programme. Training for teachers was provided including an intensive workshop for curriculum implementation and in-class training.	Learning and development	Positive: Significant increases in children's development outcomes (gross and fine motor, receptive language, expressive language and social skills) (with an effect size of roughly 0.54 SD).	Not stated	Not stated	Not stated
Cortázar	2015	Chile	Quasi-experimental	NA	The study sought to estimate the impact of Chilean public early childhood programmes on children's academic achievement.	Learning and development	Positive: Children who attended ECCE scored on average 12.8 points (0.23 SD) in maths, 10.7 points (0.19 SD) in reading and 9.4 points (0.18 SD) in social sciences higher than those who did not attend.	Policies and legislation Financing	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Dawes et al.	2020	South Africa	Quasi-experimental	NA	The study compares three playgroup and two centre-development programmes for economic quintile 1-3 children.	Learning and development	<p>Positive: Children in two playgroup programmes improved from being at risk to falling behind. Children from one community-centre programme improved from falling behind to achieving the standard. Children with higher programme exposure, regardless of programme type, performed significantly better in fine motor coordination and visual motor integration. Children who had been in their programmes for three years or more performed significantly better on gross motor, emergent literacy and language subscales.</p>	Policies and legislation Financing	Yes	Yes
Dean and Jayachandran	2020	India	Experimental	Planning and budgeting	Hippocampus Learning Centres (HLC): Randomly allocated scholarships to attend HLC, which cover 80-90% of the cost for two years, among a sample of 808 children across 71 villages.	Access (enrolment) Learning and development	<p>Positive: At the end of kindergarten, children induced to attend HLC by the scholarship score 0.8 SD higher than their peers on cognitive tests. The effect size attenuates by 60% by the end of first grade, but the persistent component is still sizeable.</p> <p>No effect: No impact on socio-emotional development.</p>	Policies and legislation Financing	Yes	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Dillon et al.	2017	India	Experimental	Curriculum development and implementation	Programme introducing a new game-based mathematics curriculum for children in poor urban pre-schools, to enhance their early numeracy and geometry skills. It encourages children to communicate using the language and symbols of primary school mathematics through social play with adults and peers.	Learning and development	Positive: Significant increases in children's numeracy skills 0-3 months after the intervention (endline 1; 0.25 SD vs control group), 6-9 months after the intervention (endline 2; 0.12 SD vs control group), and 12-15 months after the intervention (endline 3; 0.14 SD vs control group). No effect: No impact on children's executive function in any of the endlines.	Not stated	Not stated	Not stated
Gallego et al.	2021	Peru	Experimental	Curriculum development and implementation Workforce development	Mimate: Programme for pre-school teachers to use inquiry with scaffolding approach to teach maths during school hours. It includes 45-minute sessions in which the teacher splits up the children into small groups or pairs for activities focused on developing children's numerical literacy and understanding of geometric shapes.	Learning and development	Positive (with fade-out): Significant short-term impacts on maths outcomes (increase of 0.10 SD) that were larger for lower ability students and when the teacher had a university degree at the end of the programme (effect size increases by 0.15 SD). Impact disappeared one year after the programme ended (except for geometric shapes sub-test).	Financing	Yes	Not stated
Ganimian et al.	2021	India	Experimental	Workforce development	Adding pre-school staff to Anganwadi ECD centres (rural childcare centres): Staffed by one Anganwadi worker and one helper, responsible for managing all services including early childhood health, nutrition, pre-school education and administrative duties in both the centre and the broader community. The additional staff member is a facilitator to focus on pre-school education.	Learning and development	Positive: Significant increases in children's learning levels in mathematics and language test scores after 18 months (increases in 0.29 to 0.46 SD).	Policies and legislation	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Garduno	2016	Mexico	Experimental	Curriculum development and implementation	Native Numbers: Tablet-based two-week intervention for pre-school students focused on developing maths skills. Children used iPads with maths exercises that adapt to their own performance and level of ability. The application provides real-time feedback.	Learning and development	No effect: No significant impact on children's number sense and quantitative skills. However, a significant interaction was found between treatment and mothers' years of education with a higher effect in children whose mothers had fewer years of education.	Not stated	Not stated	Not stated
Gupta	2020	India	Quasi-experimental	NA	National Education Policy: Stresses the need to improve foundational literacy and numeracy skills as early as in the pre-school years.	Learning and development	Positive: There is a positive and significant premium of attending a pre-school before starting primary school. However, the entire effect is driven by children who attend private pre-schools.	Policies and legislation	Yes	Not stated
Hasan et al.	2019	Indonesia	Experimental	Planning and budgeting Workforce development Family and community engagement	Early Childhood Education and Development project: Programme providing access to play-based learning environments offering half-day services for groups of children. A combination of structured and unstructured play activities are facilitated by trained teachers. The programme also includes the implementation of community awareness raising on the importance of pre-primary education.	Access (enrolment) Learning and development	Positive: Significant increase in pre-school enrolment rates. Positive effect on children's learning development at five years old (0.23 SD better in picture matching, 0.28 SD in ordering numbers, and 0.22 SD in addition). No effect: No effect on children's development at eight year-old follow-up.	Financing	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Hasan et al.	2021	Indonesia	Quasi-experimental	Workforce development Family and community engagement	Early Childhood Education and Development project: Programme providing access to play-based learning environments offering half-day services for groups of children. A combination of structured and unstructured play activities are facilitated by trained teachers. The programme also includes the implementation of community awareness raising on the importance of pre-primary education.	Access (enrolment) Learning and development	Positive: Significant increase in pre-school enrolment rates. Positive effect on children's learning development at five years old (0.23 SD higher in language when matching pictures to words, and 0.28 SD higher in mathematics when ordering numbers). No effect: No impact on children's development at eight year-old follow-up.	Not stated	Not stated	Not stated
He et al.	2009	India	Experimental	Curriculum development and implementation Workforce development Quality assurance	Pratham Shishuvachan Pre-school Programme: ECE programme to develop children's reading and comprehension skills in preparation for primary education, in pre-schools, community-based centres and a control group. It consists of two main components: the Shishuvachan classes in which teachers use a variety of reading materials, and a child library.	Learning and development	Positive: Significant increases in children's reading skills, regardless of their parents' reading abilities and educational background (with effectiveness ranging from 0.26 and 0.7 SD). Higher gains are reported among children with lower reading skills at baseline and who received the programme in community-based settings.	Financing	Yes	Not stated
Hojman and López Bóo	2019	Nicaragua	Experimental	Curriculum development and implementation Quality assurance	Programa Urbano: Centre-based ECD programme to provide part-time childcare services for children between one and four years living in extreme poverty in urban areas.	Learning and development	Positive: Impact of 0.35 standard deviations on personal-social skills, and of 14 percentage points on mothers' work participation. Suggestive evidence that quality greatly matters for the impacts at the child level, but not at the mother level.	Not stated	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Kagıtçibasi et al.	2001	Turkey	Experimental	Family and community engagement	Turkish Early Enrichment Project (TEEP): Implementation of different ECE environments (pre-school, custodial day care centre and home) for children from two age groups (three and five years old) from low-income families, with and without training for their mothers.	Access (completion/attainment) Learning and development	Positive: Significant gains in cognitive development among children whose mothers received training, two years after the programme ended, with larger increases in children from pre-school environments. Long-term impact on children's educational outcomes. Children whose mothers received training achieved higher grades in maths and Turkish as well as a higher academic average, seven years after. No effect: No impact on children's cognitive development seven years after.	Not stated	Not stated	Not stated
Lee-Hammond and McConney	2017	Solomon Islands	Quasi-experimental	Curriculum development and implementation Workforce development	World Vision Early Childhood Development project: Community-based kindergarten programme in rural areas to enhance children's early literacy and numeracy skills.	Learning and development	Positive: Children participating in the programme outperformed the control group in literacy (letter identification, word reading, writing vocabulary, and hearing and recording sounds in words) and numeracy (number sequencing and arithmetic strategies). Differences were not related to gender or to location.	System coherence	Yes	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Majerowicz	2019	Peru	Quasi-experimental	NA	Access to Pre-school Programme: Expansion of a national pre-school programme funded by the government, in prioritized towns according to unmet demand.	Access (enrolment) Learning and development	Positive: This expansion of pre-school achieved important advances: it increased enrolment by more than 25 percentage points in one decade, closed the urban-rural pre-school enrolment gap, and led to national enrolment levels (88% in 2014). Having access to pre-school improves learning outcomes for reading, comprehension and mathematics.	Not stated	Not stated	Not stated
Malmberg et al.	2011	Kenya Zanzibar Uganda	Quasi-experimental	Curriculum development and implementation Workforce development	Madrasa Resource Centre (MRC) Early Childhood Programme: ECD programme in Madrasa and non-Madrasa pre-schools including the implementation of a new curriculum with religious content and values. It also involves the conduction of group training on pre-school management for parents in school management committees.	Learning and development	Positive: Significant increases in children's school readiness (verbal, non-verbal and numeric skills) with a larger effect in Madrasa pre-schools (0.40 SD per year more than non-Madrasa children). Impact continuously increased from the onset to halfway through pre-school but stabilized towards the end.	Public demand	Not stated	Not stated
Martinez et al.	2012	Mozambique	Experimental	Planning and budgeting Curriculum development and implementation Workforce development Family and community engagement Quality assurance	Early Childhood Development Programme: Programme financed the construction and equipment of pre-school classrooms and training of pre-school teachers. Includes the use of locally-made classroom materials and the implementation of structured activities, as well as the establishment of school-community management committees and the conduction of group meetings to raise awareness of positive and harmful parenting practices.	Access (enrolment) Learning and development	Positive: Significant increases in primary education enrolment and at the appropriate age, regardless of economic status of households. Positive impact on children's development (problem solving skills, fine motor coordination and communication).	Financing	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Martinez et al.	2017	Mozambique	Experimental	Planning and budgeting Workforce development Family and community engagement	Early Childhood Development Programme: Programme financed the construction and equipment of pre-school classrooms and training of pre-school teachers. Includes the use of locally-made classroom materials and the implementation of structured activities, as well as the establishment of school-community management committees and the conduction of group meetings to raise awareness of positive and harmful parenting practices.	Access (enrolment) Learning and development	Positive: Significant increase in pre-school enrolment after two years of programme implementation. Positive impact on children's development (communication, receptive vocabulary, fine motor skills, problem solving and socio-emotional development) two years after programme implementation (0.33 SD higher). Larger gains in children from vulnerable families.	Other enabling factor	Yes	Not stated
McCoy et al.	2017	Zambia	Quasi-experimental	NA	The study explores the relations between ECCE participation and an extended range of developmental domains .	Learning and development	Positive: Significant and positive associations were found between all ECCE programme types and all domains of development. Effect sizes for three to five hours of care were statistically significantly stronger than effect sizes for six or more hours of care for receptive vocabulary, non-verbal reasoning, fine motor, executive function, and task orientation skills.	System coherence	Yes	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Mendelsohn et al.	2020	Brazil	Experimental	Family and community engagement	Universidade do Bebê: Book-reading intervention that included the conduction of group parent training on reading aloud strategies for children. These strategies were presented to parents, followed by a discussion on their reading experiences with their children at home, a real-time opportunity to practise with them, and the development of their own reading-at-home plan.	Learning and development	Positive: Significant increases in intelligence quotient (IQ) for children of low- and high-literacy parents, 6 – 9 months later. No effect: No significant impact on children's receptive vocabulary and working memory.	Not stated	Yes	Yes
Moore et al.	2008	Bangladesh	Quasi-experimental	Curriculum development and implementation Workforce development	Curriculum change in pre-schools to reinforce literacy skills in preparation for primary school. It gave more prominence to the development of language and literacy skills, by including more free verbal expression activities in the daily schedule.	Learning and development	Positive: Greater improvements in school readiness among children who experienced the curriculum change (effect size between 0.4 and 0.8 SD). No effect: No significant impact on children's vocabulary.	Not stated	Yes	Not stated
Ngware et al.	2018	Kenya	Experimental	Curriculum development and implementation Workforce development	Tayari School Readiness Programme: Aimed to improve children's literacy, numeracy, and psychosocial skills by promoting effective service delivery models. Children received workbooks containing activities that were aligned to the national curriculum. Teachers received guides with lesson plans aligned to the workbooks, as well as training on the use of instructional resources.	Learning and development	Positive: Pre-schools receiving a combination of teacher training and new instructional materials reported higher gains in children's school readiness, in contrast with schools that only received teacher training (overall improvement of mean scores between 0.31 and 0.34 SD).	Not stated	Yes	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Opel et al.	2009	Bangladesh	Experimental	Curriculum development and implementation	Dialogic reading intervention using books in Bangla language to enhance children's expressive vocabulary.	Learning and development	Positive: Increases in mean vocabulary scores among children who participated in the programme (Cohen standardized effect $d = 0.98$). Control children remained at the same level.	Financing	Yes	Not stated
Özler et al.	2018	Malawi	Experimental	Workforce development Family and community engagement	Protecting ECD Project: Designed to test strategies to improve quality and stability of community-based childcare centres (CBCCs). One treatment arm included the conduction of group parent training.	Learning and development	Positive: Children whose caregivers received parental training sessions had higher scores in language (0.19 SD) and socio-emotional development (0.25 SD) at 18-month follow-up, than children whose teachers were trained but whose caregivers were not. No effect: Parental training had no effect on child-level outcomes at 36-month follow-up.	Financing	Not stated	Not stated
Pesando et al.	2018	Ghana	Experimental	Workforce development Family and community engagement	Quality Pre-school for Ghana (QP4G) project: Aimed to build capacity and support for implementation of the 2004 kindergarten (KG) curriculum and to enhance the quality of KG education. The goal was to develop and evaluate a scalable model of transformational teacher training to provide high-quality ECE services to children, and to test the benefits of engaging parents in pre-primary education.	Learning and development	Positive: The number of children's books at home is positively associated with executive function. Negative: The number of activities parents do with the child at home is negatively associated with all children's learning outcomes (early numeracy, early literacy, executive function and socio-emotional skills).	Not stated	Not stated	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Rao et al.	2012a	Cambodia	Quasi-experimental	Planning and budgeting Curriculum development and implementation	Analysis of the effectiveness of different ECE programmes on children's development: home-based, community-based and government-run services.	Learning and development	Positive: Significant improvements in children's development outcomes associated with pre-school attendance, with higher gains among children from government-run pre-schools.	Not stated	Not stated	Not stated
Rao et al.	2012b	China	Quasi-experimental	Planning and budgeting Curriculum development and implementation Workforce development	Analysis of the impact of attending different ECE programmes on children's early academic achievement: kindergartens, separate classrooms for 5–6-year-old children within primary schools, and 'sitting-in' experiences in which teachers allow pre-school children to observe Grade 1 classes as a form of preparation for schooling.	Learning and development	Positive: Higher school readiness, literacy, and maths skills among children from kindergartens and separate pre-school classrooms. Children from kindergartens report higher gains. No effect: No significant differences in literacy skills between children from the 'sitting-in' experience and children without any ECE experience.	Other enabling factor	Yes	Not stated
Rogers et al.	2019	Vietnam	Quasi-experimental	NA	The study estimates the impact of years spent in ECE on cognitive outcomes in adolescence using data from the Young Lives project.	Learning and development	Positive: Years in pre-school have a statistically significant effect on vocabulary scores. However, the coefficients are small, indicating an increase of less than one percentage point per year of pre-school education. No effect: Years in pre-school have insignificant effects on maths scores.	Ministerial leadership Policies and legislation	Yes	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Spier et al.	2020	Bangladesh	Experimental	Curriculum development and implementation Workforce development Family and community engagement	Bangladesh Early Years Pre-school Programme: ECE programme that provides an additional year of pre-school to four-year-old children, who will then progress to the five-year-old class in government pre-schools. It includes the use of a new play-based curriculum and the conduction of group parent training sessions on nurturing home environments for children's learning.	Learning and development	Positive: Significant increases in early literacy, and numeracy and socio-emotional development scores at midline (after one year) (0.44 SD, 0.57 SD and 0.68 SD respectively) and endline (after two years), with larger effects for girls than boys.	Ministerial leadership	Not stated	Yes
van der Berg et al.	2013	South Africa	Quasi-experimental	Curriculum development and implementation	Grade R: Introduction of Grade R (reception year) before entry to primary school with a new pedagogical approach aligned with early childhood development pedagogical practices, rather than being a preparatory version of Grade 1.	Learning and development	Positive: Quality implementation of Grade R leads to significant increases in children's maths skills, even in schools with less resources (effect size of 0.025 SD).	Not stated	Not stated	Not stated
Vermeersch and Kremer	2005	Kenya	Experimental	Family and community engagement	School breakfast programme including the establishment of school-community committees composed of an elected group of parents to supervise daily implementation.	Learning and development	Positive: Positive impact on children's learning, only among children from pre-schools where teachers were relatively experienced prior to the intervention (test scores are approximately 0.4 of an SD higher per SD of teacher experience).	Not stated	Yes	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Weisleder et al.	2018	Brazil	Experimental	Curriculum development and implementation Family and community engagement Quality assurance	Universidade do Bebê: Book-reading intervention that included the conduction of group parent training on reading aloud strategies for children. These strategies were presented to parents, followed by a discussion on their reading experiences with their children at home, a real-time opportunity to practise with them, and the development of their own reading-at-home plan.	Learning and development	Positive: Significant increases in child-level cognitive outcomes: receptive vocabulary (Cohen's $d = 0.33$), working memory (Cohen's $d = 0.46$) and IQ (Cohen's $d = 0.33$) at the end of the school year. No effect: No impact on expressive vocabulary, phonological short-term memory, or socio-emotional competence at the end of the school year.	Ministerial leadership	Not stated	Not stated
Willoughby et al.	2021	Kenya	Experimental	Curriculum development and implementation	Red-Light Purple-Light (RLPL) games: Programme testing the efficacy of games for improving executive function skills in pre-primary classrooms.	Learning and development	No effect: No significant impact on children's executive function skills.	Policies and legislation Other enabling factor	Not stated	Not stated
Wolf	2019	Ghana	Experimental	Workforce development Family and community engagement	Quality Pre-school for Ghana (QP4G) project: Aimed to build capacity and support for implementation of the 2004 kindergarten (KG) curriculum and to enhance the quality of KG education. The goal was to develop and evaluate a scalable model of transformational teacher training to provide high-quality ECE services to children, and to test the benefits of engaging parents in pre-primary education via an awareness raising campaign.	Learning and development	Positive: Marginally statistically persistent impact on children's literacy after two years. Largest in classrooms with higher levels of emotional support. No effect: No impact on children's early numeracy, literacy, and socio-emotional development after one year of programme implementation. Negative: Negative impact on numeracy after three years. Largest in classrooms with lower levels of emotional support.	Public demand System coherence	Yes	Not stated

Author	Year	Country	Study design	Pre-primary education core component	Intervention	Outcome(s) of interest assessed	Impact	Information provided on enabling environment factors	Information provided on ethnicity/race/language of participants	Information provided on disability status of participants
Wolf et al.	2019a	Ghana	Experimental	Workforce development Family and community engagement	Quality Pre-school for Ghana (QP4G) project: Aimed to build capacity and support for implementation of the 2004 kindergarten (KG) curriculum and to enhance the quality of KG education. The goal was to develop and evaluate a scalable model of transformational teacher training to provide high-quality ECE services to children, and to test the benefits of engaging parents in pre-primary education via an awareness raising campaign.	Learning and development	Positive: Training increased children's school readiness in three domains: early numeracy, early literacy, and socio-emotional skills at the end of the school year. Negative: Negative impact on children's early numeracy, literacy, and socioemotional development at the end of the school year. No effect: Awareness raising campaign for parents had no impact on any of the development outcomes measured.	Policies and legislation	Not stated	Not stated
Wolf et al.	2019b	Ghana	Experimental	Workforce development Family and community engagement	Quality Pre-school for Ghana (QP4G) project: Aimed to build capacity and support for implementation of the 2004 kindergarten (KG) curriculum and to enhance the quality of KG education. The goal was to develop and evaluate a scalable model of transformational teacher training to provide high-quality ECE services to children, and to test the benefits of engaging parents in pre-primary education via an awareness raising campaign.	Learning and development	Positive: Marginally statistically significant persistent impact on children's overall school readiness, socio-emotional development, and executive function after one year. Negative: Persistent negative effect on children's early literacy, numeracy, and socio-emotional development, one year after the programme ended. Negative impact concentrated in children from households with a male non-literate head.	Ministerial leadership Policies and legislation Other enabling factor	Yes	Not stated



Annex 3

Additional features of the evidence base

Characteristics of included studies and interventions

The component to which the highest number of interventions corresponded was curriculum development and implementation, conducted primarily in Eastern and Southern Africa, and in South Asia, followed by workforce development, with most studies conducted in South Asia, East Asia and the Pacific, and Eastern and Southern Africa, and family and community engagement, with most studies conducted in Eastern and Southern Africa. Meanwhile, there was a limited number of studies related to quality assurance (see Table 3.1).

Table 3.1.
Included interventions by region and pre-primary education core component

Region	Core component					NA ¹⁵
	Planning and budgeting	Curriculum development and implementation	Workforce development	Family and community engagement	Quality assurance	
East Asia and the Pacific	2	5	5	2	0	1
Europe and Central Asia	0	0	0	1	0	0
Latin America and the Caribbean	4	5	4	2	1	4
Middle East and North Africa	0	0	0	0	0	0
South Asia	2	6	6	2	2	1
Eastern and Southern Africa	1	7	5	3	2	2
Western and Central Africa	0	1	2	2	1	0
Total	9	24	22	12	6	8

Most of the interventions aiming to achieve an impact on cognitive and socioemotional outcomes were conducted in Eastern and Southern Africa, Latin America and the Caribbean, and South Asia. In contrast, the number of interventions that targeted access outcomes such as enrolment, dropout and/or completion/attainment was very low. It is important to note, however, that the assessment of outcomes in reviewed studies was not exclusive. In some instances, a single study measured both access and learning and development outcomes. These cases were counted as unique for mapping the total number of outcomes covered

¹⁵ Not applicable (NA): This category included interventions that did not target any specified core component of pre-primary education systems. The focus was primarily centred around increasing attendance to pre-primary education.

across the interventions reviewed (see Table 3.2). Additionally, a small number of studies measured other outcomes such as child nutrition indicators (height-for-age, weight-for-age, anaemia), pre-school attendance rates, teacher well-being, teacher-child interactions, and primary caregiver-child interactions.

Table 3.2.
Included interventions
by region and outcome
measured

Region	Outcome measured		
	Access (enrolment, dropout, completion/attainment)	Learning and development (cognitive and socioemotional)	Other
East Asia and the Pacific	2	8	1
Europe and Central Asia	1	1	0
Latin America and the Caribbean	5	10	5
Middle East and North Africa	0	0	0
South Asia	1	10	3
Eastern and Southern Africa	4	11	2
Western and Central Africa	0	2	0
Total	13	42	11

Quality of included studies

To identify the quality of the studies included, the authors of this paper rated each study based on an assessment guided by the following five questions:¹⁶

1. Are there ethical concerns about the way the study was done?
2. Is there an adequate description of the sample used in the study and how the sample was identified and recruited?
3. Have sufficient attempts been made to establish the reliability and validity of data collection methods and tools?
4. Have sufficient attempts been made to establish the reliability and validity of data analysis?
5. To what extent are the research design and methods employed able to rule out any other sources of error/bias which would lead to alternative explanations for the findings of the study?

Depending on the authors' responses to the questions above, the studies were given one of three quality ratings: high, medium or low. Studies rated as low or medium quality are those that did not get favourable responses to several of the questions listed above. The process to categorize the studies as either low or medium was then based on the authors' interpretation

¹⁶ The five questions used for the critical quality appraisal of the included studies are adapted from the "Quality of the study" section of the EPPI-Centre Guidelines for extracting data and quality assessing primary studies in educational research Version 0.9.7 (EPPI-Centre, 2003). Additionally, study design-specific considerations of risk of error/bias were based on Joanna Briggs Institute's critical appraisal checklists for randomized controlled trials, quasi-experimental studies, and systematic reviews (Aromataris and Munn, 2020).

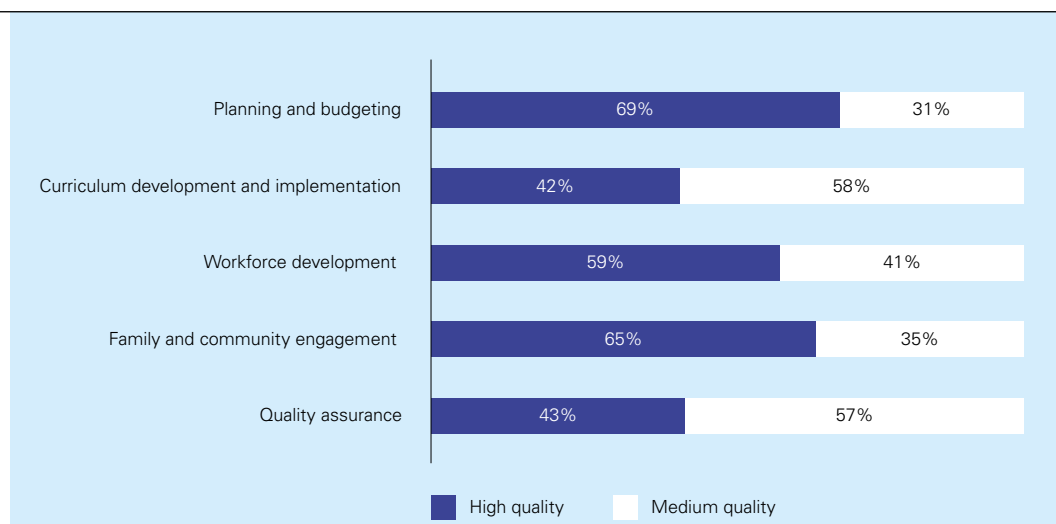
and discussion of the studies' limitations relative to the scores on the five questions, as there were no benchmark scores for low-, medium- and high-quality studies.

Studies were also categorized into the core component the intervention was tackling (for example, curriculum development and implementation or workforce development). More than half of the included studies (33) assessed interventions targeting multiple components, hence the quality ratings by intervention area shown in Figure 3.1 reflect a larger number of items assessed and include studies with multiple components in more than one area. The largest proportion of studies that were rated as high quality were studies with interventions targeting planning and budgeting (69 per cent), followed by family and community engagement (65 per cent) (see Figure 3.1). Meanwhile, the largest proportion of studies with a medium-quality rating were those with interventions on curriculum development and implementation, at 58 per cent, followed by quality assurance (57 per cent).

Looking at the quality of the studies based on the outcome measured, it is observed that the highest proportion of studies rated as high quality are those measuring access (60 per cent), compared to those measuring learning and development (53 per cent) or other outcomes (57 per cent).

Figure 3.1.
Proportion of studies
rated as high or
medium quality by
core component

Source: UNICEF Innocenti
 analysis



Description of the target intervention population

There is also a gap in knowledge on ethnic, racial, caste and linguistic diversity in the samples of primary studies, as 36 out of 56 studies did not mention this information in the report. Of the 20 studies that did mention such information, it was mostly about the adaptation and translation of instruments into different languages to ensure inclusivity and reaching a wider sample. Background information on the ethnic, racial and religious background of participants was provided in only six studies. In addition, four studies reported languages spoken in the country and in some cases the main language of instruction in the pre-schools.

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UNICEF works in the world's toughest places to reach the most disadvantaged children and adolescents — and to protect the rights of every child, everywhere. Across 190 countries and territories, we do whatever it takes to help children survive, thrive and fulfil their potential, from early childhood through adolescence. And we never give up.

UNICEF Innocenti – Global Office of Research and Foresight tackles the questions of greatest importance for children, both current and emerging. It drives change through research and foresight on a wide range of child rights issues, sparking global discourse and actively engaging young people in its work.

UNICEF Innocenti equips thought leaders and decision-makers with the evidence they need to build a better, safer world for children. The office undertakes research on unresolved and emerging issues, using primary and secondary data that represents the voices of children and families themselves. It uses foresight to set the agenda for children, including horizon scanning, trends analysis and scenario development. The office produces a diverse and dynamic library of high-level reports, analyses and policy papers, and provides a platform for debate and advocacy on a wide range of child rights issues.

UNICEF Innocenti provides, for every child, answers to their most pressing concerns.

for every child, answers