Building capacity in health and education systems to deliver interventions that strengthen early child development

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Building capacity within health and education systems of low- and middle-income countries in order to deliver high-quality early childhood services requires coordinated efforts across sectors, effective governance, sufficient funding, an adequate workforce, reliable data systems, and continuous monitoring, evaluation, and improvement cycles; it also requires partnerships with the private sector, communities, and parents. In addition, building capacity requires leadership, innovation of strategies to fit into existing structures, evidence-based intervention models, and effective partnerships that help make interventions more culturally relevant, help finance them, and help create institutional long-term support and sustainability for them. In this article, we focus on identifying eight critical aspects of enabling systemic support for early childhood services. Every action that strengthens these critical aspects should be seen as necessary, but insufficient, steps toward a national strong governance structure for delivering a locally relevant and comprehensive early child development program that promotes children’s developmental potentials.

Keywords: governance; early child development; systems; capacity; health and education; interventions

Introduction

Decades of research shows that early childhood interventions matter for children’s life-long chance to succeed, and specifically that the early years are a period of rapid development where children are sensitive and highly responsive to interventions that may ameliorate the influence of external risk factors. We have also learned that for interventions to make a difference in children’s life quality matters and that comprehensive or combined interventions are more effective than nutrition interventions alone in supporting child development. Increased access to early childhood services, in and of itself, does not fulfill the promise of improved developmental outcomes for children. High-quality services are necessary and achieved through a combination of adequate content (e.g., the curriculum in a preschool program and the content of the home-visits), frequency, intensity, and the capacity of direct agents of change (e.g., home visitors, teachers, and health workers), among others. Further, high-quality early childhood services require attention to the setting (e.g., physical environment) for delivery and to cultural nuances that influence uptake of services. Building capacity in health and education systems in low-and middle-income countries (LMICs) to deliver high-quality early childhood services requires coordinated efforts across sectors; effective governance; sufficient financing; an adequate workforce; partnerships with the private sector, community, and parents; reliable data systems; and continuous monitoring, evaluation, and improvement cycles. Also, context matters in translating descriptive research to policy. Developmental sciences have shown that context makes a difference and renders findings from one context invalid in other contexts and flexibility may be central for local adaptations to occur and be sustainable given country-specific and local-specific constraints and characteristics.
Therefore, a prescriptive approach to early childhood health and education systems would be inadequate. Successful population-level impacts are more likely to occur in contexts that support key principles of effective early childhood care and education (ECCE), understanding that context influences integration, programming, governance, and partnerships, among other things. In this article, we focus on identifying critical aspects of enabling systemic strength and support for early childhood services.

Given that services in early childhood are usually fragmented between health and education systems, and that both health and education are integral components of a child’s early development, we tackle the concept of capacity building in early child development (ECD) as an intersectoral problem. We follow the article by Black et al. in understanding that the education sector in ECD has traditionally focused its attention on preprimary education and the transition to primary, while the health sector has focused on health and nutrition, in particular starting at birth/prenatally. Program characteristics and delivery models have bearing on the degree to which a given program is more closely aligned with the health or the education delivery systems, and that may vary from country to country. However, intersectoral integration is central to the effectiveness of programs and services to support child development, care, and education. Building capacity for an effective delivery of early childhood services in health, education, and social protection sectors, among others, requires convergence of goals and a shared understanding of child development holistically (attending to the child’s physical, cognitive, emotional, and social development, as defined in the Black et al.).

It also requires leadership, innovation of strategies that fit into existing structures, evidence-based intervention models, adequate workforces, and effective partnerships that help make interventions more culturally relevant, help finance them, and help create institutional long-term support and sustainability for them. Figure 1 illustrates the critical aspects we put forward that are developed in more detail below. The critical aspects identified draw from the various work and case studies done on capacity, governance, and intersectoral collaboration in the field of early childhood development. Similar studies on health alone have also identified some of the aspects highlighted below.

Critical aspect 1: establishing strong collaboration arrangements and/or centralized leadership

Leadership and political will are critical for program sustainability. Leadership may show in the form of a strong collaborative arrangement across sectors or as a centralized leadership facilitating such collaboration. Central leaders need to provide the overall vision for the ECD service model, and from that vision set rigorous research-based program standards, as well as define the type and age span for interventions, target populations, workforce, and financing. In addition, leadership is evidenced in effective leveraging of resources across sectors, implementation of system efficiencies, and reduction of competition for resources among programs or service providers. When supported by legislative mandates and resources, leaders have a stronger capacity to fulfill a national vision of a continuum of ECD services that may better complement each other. Key indicators of national (or local) leadership include a sustainable allocation of funding, legislation, quality standards, and the existence of a high-level ECCE council or technical committee.

One such example is the national strategy for early childhood in Colombia, known as De Cero a Siempre. Leadership from the office of the presidency

![Figure 1. Critical aspects: systems, quality, and partnerships.](http://www.deceroasiempre.gov.co/Paginas/deCeroaSiempre.aspx)
### Table 1. Critical aspects mapped to key research in systems and capacity in ECD

| Critical aspect                              | Vargas-Barón13 | Vargas-Barón18 | Britto et al.26 | Yoshikawa and Kabay24 | Britto et al.9 | Richter et al.17 |
|---------------------------------------------|----------------|---------------|-----------------|-----------------------|----------------|-----------------|
| 1. Strong collaboration arrangements and/or centralized leadership | Ensure ECD programs are designed holistically (baseline studies, supervisory systems, staff training, standards, and communication) | Integrated ECCE services unite resources and personnel from several sectors into a single program | Central issues for scalability: | Quality based on an ECD program or policy alignment with, or emergence from, the values and principles of a community or society. | Political prioritization of early childhood development and financing |
| Appropriate and flexible program objectives | Needs for high-level ECCE policy advocacy | | | | |
| Establish quality assurance systems and program standards | National-level integrated/multisectoral planning and governance | | | | |
| Public sector support | | | | | |
| Develop formal interagency agreements to achieve integrated or intersectoral programming | Policy instruments that support integration | | | | |
| Participatory policy development | Create standards, guidelines, and regulations for ECCE services and personnel | | | | |
| Develop a strong and enduring legal basis for ECD programs | | | | | |
| Prepare a policy advocacy and social communications plan and system for the program | | | | | |
| 2. Vertical alignment | Community-level ECCE development | Horizontal and vertical dimensions of governance: implications for integrated ECD | | | |
| | | | | | |
| | Roles and responsibilities at each level | Local governance structures as key lever for improving integrated ECD provision | | | |
| 3. Horizontal alignment | Develop intersectoral collaboration | Multisectoral coordination: build strong cooperative and formal relationships between ministries | Horizontal and vertical dimensions of governance: implications for integrated ECD | | |
| | | | | | |
| | Seek support from the Ministry of Planning and Finance | | | | |
| 4. Evidence-based programs and policies | Cultural perspectives in ECCE programming and evaluation | | | Delivery systems for scaling up of evidence-based interventions for early childhood development | | |

Continued
created the national strategy in 2011 and set it forward as a decree. The strategy put forth policies, programs, projects, and actions in support of ECD, with the goal of guaranteeing comprehensive services for almost 3 million low-income children ages 0–5. It also brought together all sectors involved in early childhood intervention and opened opportunities for partnerships with the private sector; and it was sustained across several years and culminated with a national ECD law, approved in August of 2016, which defined early education as a Right for all children under 6 and set implementation of the policies in the strategy. This process has been closely supported by Primero Lo Primero (PLP), a private sector alliance established to enhance ECD programs and infrastructure in Colombia by combining technical, administrative, and financial efforts of De Cero a Siempre. In the period between 2011 and 2015, this initiative increased access to ECD services from 1 to 1.9 million children. This example illustrates how programs are more likely to grow and remain when they have strong leadership, influential support, and are part of a national ECD policy or framework.

Centralized leadership does not, however, imply centralized management or provision on early childhood services; but it is necessary to overcome issues that arise from national-level fragmentation. There are various approaches to integration of services. Although India, for example, has integrated services from health, education, and child protection into a single program with unified standards of care, other countries have opted to coordinate services offered by different agencies under the jurisdiction of separate Ministries through a national ECD policy of coresponsibility. While no single approach to intersectoral integration or coordination is superior, clear national leadership regarding child development goals is critical to deliver comprehensive early childhood development and care services.

Specific actions within this critical aspect (see Table 3) are, among others, securing political commitment through partnerships and intersectoral arrangements in participatory processes, creating intersectoral collaboration arrangements (with written agreements, responsibilities, etc.), securing/
Table 2. Critical aspects mapped to additional key research in systems and capacity in ECD

| Critical Aspect | SABER-ECD Framework, World Bank\(^6\) | OECD Quality Toolbox for ECEC\(^5\) | Essential Elements Framework, NIEER\(^3\) | 2007 EFA Global Monitoring Report on ECD\(^2\) | ISSA Quality Framework\(^2\) | Scaling Up Nutrition\(^1\) |
|-----------------|--------------------------------------|------------------------------------|-------------------------------------|----------------------------------------------|-------------------------------|----------------------------------|
| The SABER framework addresses 3 policy goals & relevant policy levers for advanced EDC policy development | Identifies policy levers for implementing quality ECEC | 15 “essential elements” found to characterize high-quality public preschool reviewed for US states & localities | Focus on children under 3 |

1. **Strong collaboration arrangements and/or centralized leadership**

   **Goal 1: Enabling Environment**

   **Policy lever 1: Setting out quality goals & regulations**

   **Enabling environment**

   **Policy lever 2: Design & implementation of curriculum or standards**

   **Regulations**

   **Policy lever 3: Curricular alignment for continuous child development**

   **Support local capacity**

   **Challenge 1: Building consensus on the goals**

   *Adequate legal & regulatory framework*

   *Coordination within sectors & across institutions*

   *Adequate fiscal resources/finance systems*

   **Challenge 2: Aligning goals to stimulate quality provision**

   *Policy lever 2: Design & implementation of curriculum or standards*

   **Strong Program Practices**

   **Challenge 3: Dissemination & communication about the framework**

   **Dissemination & communication**

   **Evaluation**

   **Challenge 4: Defining goals & content**

   **Evaluation**

   **Challenge 5: Governance and Funding (an approach that promotes the seamless integration and/or alignment of services in order to best serve the child under 3 & their family)**

   **Policy Area 5: Have nutrition plans, endorsed at the highest level, with national nutrition targets and costed actions that guide collective implementation and resource allocation**

   *Regularly and transparently track budget allocations against plans and demonstrate better use of finance data through improved advocacy, planning, and impact*

   *Increase resources for nutrition from both domestic and external sources*

   *Mobilize, advocate, and communicate for impact*

   *Have aligned policies, legislation, and regulations in support of nutrition*

   *Ensure consistent and sufficient investment in capacity strengthening by governments and partners*

   *Ensure equity, equality, and non-discrimination for all, with women and girls at the center of efforts*

   *Have nutrition plans, endorsed at the highest level, with national nutrition targets and costed actions that guide collective implementation and resource allocation*

   *Have all key stakeholders, including communities, making measurable contributions to scaling up nutrition*
### Table 2. Continued

| Critical Aspect | SABER-ECD Framework, World Bank | OECD Quality Toolbox for ECEC | Essential Elements Framework, NIEER | 2007 EFA Global Monitoring Report on ECD | ISSA Quality Framework | Scaling Up Nutrition |
|----------------|---------------------------------|-------------------------------|--------------------------------------|------------------------------------------|-----------------------|---------------------|
| 3. Horizontal alignment | The SABER framework addresses 3 policy goals & relevant policy levers for advanced EDC policy development | Identifies policy levers for implementing quality ECEC | 15 "essential elements" found to characterize high-quality public preschool reviewed for US states & localities | Focus on children under 3 | Have multi-stakeholder partnerships for coordination at national levels |
| 4. Evidence-based programs & policies | Rigorous, articulated, early learning policies | 4. Adult–child ratio of at least 1:11 | 5. At least a full school day is provided to ensure adequate dosage | 6. Two (or more) adult teaching staff in each classroom | 7. Appropriate early learning standards for preschoolers | 8. Effective curriculum that has systemic support | 9. Strong supports for education of special needs children in inclusive settings | 10. Strong supports for dual language learners |
| 5. Linking programs to program outputs & outcomes | Policy lever 2: Design & implementation of curriculum or standards | Strong Program Practices | Monitoring | Have systems to analyze and use quality data for decision making, accountability, and advocacy | Implement agreed actions at scale and demonstrate impact |
| Challenge 5: Systematic evaluation & assessment | 15. Integrated systems of standards, curriculum, assessment, PD & evaluation | Policy Area 3: Curriculum |
| 6. Investing in the early childhood work force & meeting standards of care | Policy lever 3: Improving qualifications, training & working conditions | Rigorous, articulated early learning policies | Policy Area 2: Work Force |
| Challenge 1: Improving staff qualifications | 3. Well-educated (BA & ECE expertise) & well-compensated teachers (K-12 pay parity) | Strong Program Practices |
| Challenge 2: Workforce supply | 11. High-quality teaching |
| Challenge 3: Workforce retention | 14. PD to improve individual teacher performance |
| Challenge 4: Workforce development | |
| Challenge 5: Private provision | | |

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### Table 2. Continued

| Critical Aspect | 7. Continuous improvement cycles | 8. Partnerships |
|----------------|---------------------------------|----------------|
|                | Goal 3: Monitoring & Assuring quality | Policy lever 4: Engaging families & communities |
|                | -Data availability & systems to monitor ECD outcomes | Challenge 1: Lack of awareness & motivation |
|                | -Quality standards for ECD | Challenge 2: Communication & outreach |
|                | -Systems to monitor compliance with standards | |
|                | Challenge 1: Lack of data on demand & supply of ECEC places | |
|                | Challenge 2: Lack of data on workforce quality & working conditions | |
|                | Challenge 3: Lack of data on financing & costs | |
|                | Challenge 4: Lack of data on child development | |
|                | Challenge 5: Lack of data & information on the quality of ECEC services | |
|                | Challenge 6: Lack of feedback cycles | |
|                | Strong Program Practices | |
|                | 13. Data-driven decision making & independent evaluation | |
|                | | |
|                | | |
| The SABER framework addresses 3 policy goals & relevant policy levers for advanced EDC policy development | Focus on children under 3 |
| The SABER framework addresses 3 policy goals & relevant policy levers for implementing quality ECD | |
| Identifies policy levers for implementing quality ECEC | |
| 15 “essential elements” found to characterize high-quality public preschool reviewed for US states & localities | |
| | |
| 2007 EFA Global Monitoring Report on ECD | |
| | |
| ISSA Quality Framework | |
| Scaling Up Nutrition | |

aligning funding streams with initiatives (whether international, national, local, or private-partnerships), and developing integrated ECD vision, goals, and objectives that build on existing structures and services, and that include access and quality of, for example, standards, guidelines, and regulations.

**Critical aspect 2: vertical alignment—from national to local capacity building**

Many early childhood programs start small and are usually delivered by nongovernment agencies, are sometimes funded by international donors, and sometimes include local NGOs, university-based teams, or other nongovernmental institutions. Integration of these programs into existing service delivery platforms (or the creation of new delivery platforms) requires an understanding of the proposed implementation’s strengths and weaknesses, and that the platform that delivers the program locally is replicated subnationally and in other local education agencies.

In essence, the quality of the implementation program will depend on the extent to which the capacity of the pilot or local initiative is replicated in other locations and how much national (or subnational) support may be needed for this to occur. Britto *et al.* define this as “quality at the systems levels”—systems being defined as the organizational and institutional structures responsible for an ECD service. This “quality to implement” will depend on how much new interventions leverage existing services; how much the programs were scalable to start with; how roles and responsibilities across levels and sectors are clearly delineated; and whether, as capacity is strengthened nationally, it
### Table 3. Critical aspects and relevant actions

| Critical aspect | Actions |
|-----------------|---------|
| **1. Strong collaboration arrangements and/or centralized leadership** | - Secure political commitment through partnerships and intersectorial arrangements in participatory processes  
- Create intersectoral collaboration arrangements (with written agreements, responsibilities, etc.)  
- Secure/align funding streams with initiatives (whether international, national, local, and private-partnerships)  
- Develop an integrated ECD vision, goals, and objectives that build on existing structures and services, and that includes access and quality; includes creating national ECCE standards  
- Develop expectations for research and monitoring aligned with these  
- Allocate a budget for the national goals  
- Align actions and plans with legislation, if possible  
- Promote commitment based on research on ECD and research-based practices  
- Allocate a budget for the national goals  
- Align actions and plans with legislation, if possible  
- Promote commitment based on research on ECD and research-based practices |
| **2. Vertical alignment** | - Invest in national to local capacity  
- Include participation from all levels in the development of the strategy for scalability and implementation  
- Coordinate with services that are strong subnationally and locally  
- Define roles and responsibilities clearly  
- Establish interinstitutional agreements  
- Use partnerships with donors to strengthen alignment  
- Aligned communication plan |
| **3. Horizontal alignment** | - Invest in capacity across sectors  
- Align sectors under a ECCE national and subnational strategy  
- Coordinate all programs and policies under such ECCE strategy (early childhood as a continuum)  
- Build programs on the strengths of the different sectors, for example, leverage programs that have reached hard-to-reach populations.  
- Align indicators that can be used across all levels of governments and sectors  
- Promote commitment with coresponsibility  
- Use partnerships with donors to strengthen alignment  
- Aligned communication plan |
| **4. Evidence-based programs and policies** | - Identify evidence-based programs and practices  
- Understand the critical program components, dose, and intensity of services that lead to desirable outcomes  
- Assess feasibility of implementation  
- Developmentally focused curricula  
- Contextually grounded best-practices  
- Adequate in-service training  
- Sustained professional development  
- Increase access without compromising quality |
| **5. Linking programs to program outputs and outcomes** | - Clearly defined program outputs and outcomes  
- Implementation fidelity monitoring  
- Reliable measurement of indicators  
- Outcome indicators for developmental domains and periods |
| **6. Investing in the early childhood work force and meeting standards of care** | - Adequate pre-service training  
- Continuous professional development and mentoring  
- Clearly defined competences and standards of practice  
- Fair compensation and proper incentives  
- Adequate infrastructure, pedagogical resources, and materials |

*Continued*
### Table 3. Continued

| Critical aspect | Actions |
|-----------------|---------|
| 7. Continuous improvement cycles | • Determine standards and outcomes/indicators against which interventions will be monitored and evaluated  
• Create/support capacity understanding and measuring these standards and outcomes/indicators  
• Invest in evaluation, data monitoring, and data production  
• Invest in interpretation and use of data for continuous improvement  
• Invest in capacities at all levels of governments and intersectorial  
• Create mechanisms of technical assistance and/or professional development that will respond to the information produced  
• Use information to inform policies and standards  
• Link to international standards, measures on children |
| 8. Partnerships | • Create national strategies for engagements with partners (in, for example, provision, procurement, communication, data, and information)  
• External partnerships with international growing cadre of researchers, multilateral banks, and donors that support ECD  
• External and internal partnerships with donor organizations  
• Internal partnerships with research organizations (even if capacity needs to be built)  
• Internal partnerships with private sector to sustain coalitions for ECD over time  
• Partnerships with families and communities to create a long-term demand and increase local relevance of a program/intervention |

is also done locally in/with community organization and local networks on ECD. Vertical alignment includes not only the coordination, participation, and partnership across levels, but also building on and investing in capacity at all levels.25,26 Where policies may be decentralized, subnational ECCE systems with locally articulated governance structures and coordinated strategies will play a central role, together with their alignment with the national leadership.18,26

Britto et al.26 provide examples of strong local governance aligned vertically, albeit recognizing this alignment has intermediate levels sometimes missing. In Cambodia, the authors highlight the direct funding of communes where ECD services are integrated into local budget priorities, under national guidelines. A strong vertical alignment (as well as horizontal) is present in Chile Crecé Contigo, where the program is coordinated by the Ministry of Social Development which also has local representation in regional secretaries of social development.27 In Peru, the program Cuna Más operates under a voluntary partnership between the government and communities, with the local communities monitoring local operations and administering program resources.28

Actions that would fall under this critical aspect include (Table 3) investment in capacity at all levels of government and participation from all levels in the development of the strategy which would support scalability and implementation, coordination with interinstitutional agreements, and a communication plan common across levels.

### Critical aspect 3: horizontal alignment—coordination of services

Systems quality also includes the coordination and integration of systems that deliver an ECD service with other services provided for the target population. For example, a home visiting program that focuses on educational stimulation may fail if the target population is experiencing low prenatal care and high indices of malnutrition. Similarly, a child care or preschool program, even with a research-based curriculum and strong physical environment, may also fail if children are not attending because they are sick. Health and education may be natural partners in addressing early childhood risk factors, but other sectors that may be important (depending on the government structures) include social protection, sanitation, and justice, and of course, planning and finance.23

Collaboration across sectors is important not only to align support and facilitate implementation of one particular program, but also to facilitate
coordination across different policies, programs, and actions that the different sectors may be undertaking. The more integrated services are, the stronger the intersectoral collaboration will be required. Vargas-Barón argues for such collaboration to include coresponsibility for integrated program work. Shawar and Shiffman identify how a lack of well-understood and delineated responsibilities for advancing different aspects of ECD across government institutions lead to duplication and inefficiencies. Examples of coresponsibility, or intersectoral arrangements, that have been effective can be found for Chile, Cameroon, Cambodia, Colombia, India, Lesotho, Nicaragua, Rwanda, and South Africa, among others.

India’s Integrated Child Development Services (ICDS) is a cross-sectoral program that exhibits strong horizontal coordination at the national and local level. It includes nutrition, health, early stimulation, and community education. Main responsibility is under the Ministry of Women and Children, which leads a steering group comprising other relevant sectors. District collectors are responsible for horizontal coordination locally.

Actions that are relevant for horizontal coordination include aligning different sectors under a comprehensive national and subnational strategy, building programs on the strengths of the different sectors (that is, leverage programs that have proven capacity to reach hard-to-reach populations), alignment of indicators, coresponsibility, and, if donor funding is of significance at the country level, leveraging funding to reinforce alignment.

Critical aspect 4: evidence-based programs and policies

Health and education systems need to implement evidence-based programs that have shown robust effectiveness, beneficiary uptake, and feasible delivery models. To date, evidence on early childhood interventions shows that a variety of programs which integrate nurturing, stimulating care, and protection services from prepregnancy throughout early childhood can have benefits on a range of developmental outcomes, from reductions in mortality rates to increased adult earnings. Such interventions may include services that support children’s health and nutritional needs, opportunities for early learning, and responsive and developmentally stimulating interactions with adult caregivers.

Many of the programs that have demonstrated effects on child outcomes encompass aspects of nurturing care, including parenting support and social protection, care for the caregiver, and early learning opportunities provided in or out of the home environment. For example, interventions targeting the period from before conception until birth often include maternal nutrition, micronutrients, and iodine supplementation before or during pregnancy. These interventions seem to be particularly beneficial for expectant mothers at risk of deficiencies by reducing the risk of small-for-gestational-age births and stillbirths, and neural tube defects, and by increasing children’s cognitive development. Early childhood interventions targeting children from birth to 5 years of age focus on three types of services: (1) supporting child nutrition, (2) improving parenting skills and practices, (3) providing child care services, and (4) promoting learning through preschool or preprimary education. Parenting interventions have shown positive effects on children’s cognitive and language development across diverse geographic, social, and service delivery contexts. Breastfeeding, child nutrition, and micronutrient supplementation programs are also essential in contexts with high prevalence of child stunting and wasting. For example, micronutrient supplementation for children at risk of deficiencies has been shown to improve academic performance. Similarly, educationally focused child care and both formal and informal preschool programs have been shown to improve children’s cognitive and psychosocial development.

Adverse environments present cumulative risk factors for children’s health, cognitive, and social development. For instance, severe food shortage and insufficient care and stimulation are present in contexts of severe socioeconomic vulnerability. Such cumulative risk factors, that cross over different domains of child development, have prompted the implementation of integrated early childhood interventions. A well-known study in Jamaica showed that 9- to 24-month-old stunted children who received food supplements and stimulation weekly over a two-year period had higher developmental scores than those who received neither intervention nor the nutrition intervention only. Like the Jamaican
study, there are substantial examples of successful integrated early childhood intervention programs targeting families facing multiple risk factors in a variety of contexts.\textsuperscript{11–13,34} A randomized control study in postconflict Bosnia of a 5-month group psychosocial intervention conducted with mothers affected by armed conflict and their children showed improvements in maternal mental health and child weight gain.\textsuperscript{35} In Ethiopia, an emotional stimulation and responsive parenting group intervention integrated into a nutritional support pilot project showed promising weight gain benefits for severely or acutely malnourished children attending Therapeutic Feeding Units or Outpatient Therapeutic Programs, as compared to children not receiving emotional stimulation and only receiving nutrition.\textsuperscript{36}

In addition, health and education systems often struggle with trade-offs between access and quality of services. In the process of scaling up programs to improve access and provide universal services for children, the quality of programs is often compromised, and therefore the potential to improve child development is diminished if not lost. Maintaining the integrity of quality components during the scale-up process is critical. For instance, there is evidence that high-quality preschool education has consistent and positive short-term effects on early language, literacy, and math skills,\textsuperscript{4} but consistent and valid definitions of quality have been somewhat elusive.\textsuperscript{37} Thus far, evidence shows that high-quality preschool instruction requires developmentally focused curricula combined with intensive in-service training, coaching, and sustained professional development for teachers\textsuperscript{4,37} that is delivered in classrooms with small class sizes, as well as professionally prepared teachers who focus on play, one-on-one and small group interactions, and intentional instruction.\textsuperscript{38,39}

To deliver interventions that effectively promote ECD, health and education systems need to carefully identify evidence-based programs, maintain the critical program components during scale-up, and ensure that in the process of increasing access to services quality is not compromised. Jamaica's early childhood programs, for example, have maximum class sizes set at 20 (3–5 years old), with staff-to-child ratios of 1:10, child development indicators in place, structured observations in place, and teachers and assistant teachers with specialized degrees.\textsuperscript{40} The nurse–family partnership has defined steps for implementation to maintain quality that include adaptation, testing feasibility, acceptability in a pilot, running a randomized control trial if possible, and continued refinement and expansion.\textsuperscript{4} The measure of quality of a program also depends on the extent to which it improves the conditions children are exposed to, compared with the absence of such a program or intervention.\textsuperscript{1} Pérez-Escamilla \textit{et al.}\textsuperscript{41} state that the integrated ECD multisectoral programs based on programs implemented in Bangladesh, Chile, India, and South Africa owe their success to being based on scientific and economic evidence, in addition to other factors.

**Critical aspect 5: investing in the early childhood workforce and meeting standards of care**

ECD programs and policies, whether focusing on children's nutrition and health, parenting support, or children's early learning, depend on paid and unpaid, governmental and nongovernmental professionals, para-professionals, and community agents—this is known as the early childhood workforce.\textsuperscript{28,42,43} The relationship among personnel, program quality, and child outcomes has been well established in the United States and other OECD countries, and there is a growing body of evidence emerging in LMICs about the association between early childhood program characteristics and child outcomes.\textsuperscript{28,44} For instance, the number of years of education and specialized training predict the quality of teacher–child interactions and global quality ratings.\textsuperscript{39,45} Similarly, there is evidence from Colombia that in-service vocational education programs in child development and care have a positive and significant effect on children's health, cognitive, and socio-emotional development, especially for those younger than three years of age.\textsuperscript{44} To date, there is robust evidence that qualifications and training of early childhood personnel are associated with program quality and with children's cognitive outcomes.\textsuperscript{46}

Despite such evidence, the early childhood workforce frequently receives inadequate training, lack of supervision, poor wages, and suffers other adverse

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\textsuperscript{4}http://www.ucdenver.edu/academics/colleges/medical school/departments/pediatrics/research/programs/prc/research/international/Pages/international.aspx
occupational conditions that threaten its motivation and capacity to provide high-quality services to children and families.\textsuperscript{42} For example, a study of the \textit{Cuna Más} program, a daily child care and home visiting program in Peru aimed at supporting the holistic development of 6- to 36-month-old children, showed that the heavy workload of community volunteers who make weekly hour-long visits to beneficiary families work twice the number of hours stipulated by the program despite their voluntary status.\textsuperscript{28} In addition to heavy workloads and inadequate compensation, early childhood workers in developing nations also have significant resource constraints, such as insufficient infrastructure, lack of pedagogical materials, inadequate curriculum or activity guides, and lack of training. Such failure to support the workforce limits the effectiveness of early childhood programs and may diminish the potential of other related investments.\textsuperscript{47}

Early childhood workforce investments should include (1) adequate pre-service training with continuous professional development and mentoring; (2) clearly defined competences and standards of practice; (3) fair compensation and proper incentives; and (4) adequate infrastructure, pedagogical resources, and materials.\textsuperscript{43} Health and education systems can establish requirements and expectations for what early childhood workers should know as well as standards of practice that can guide their work with young children and their families. Governments at the national, regional, and local levels can coordinate and implement processes to make training paths available and enforce accreditation mechanisms. Overall, the status, pay, and benefits for the early childhood workforce are poorer than those of primary teachers, leading to low job satisfaction and high turnover.\textsuperscript{42} On-site mentoring and coaching has been shown to build teachers’ and caregivers’ skills and is a promising strategy to improve ECCE services.\textsuperscript{24} System-wide investments in the early childhood workforce should include training pathways and funding streams for continuous in-service training modalities. Finally, to enable workers to carry out their responsibilities effectively, early childhood settings need adequate and physical infrastructure, pedagogical resources, and age-appropriate materials.\textsuperscript{39} Pedagogical resources and materials are complementary to the workforce training and work.

**Critical aspect 6: linking program inputs to program outputs and outcomes**

Health and education systems with clearly defined program outputs and outcomes, and accurate measurement processes allow for reliable tracking of program outputs and measuring fidelity of program implementation. Outcome measurement is key for internal program monitoring and evaluation efforts, learning about the extent to which the program is reaching its intended goals on child development. However, without measures of whether the program components are implemented as intended, it is not possible to draw conclusions about what was or was not effective and, as described below, the precision of program improvement efforts is compromised.

Early childhood programs in LMICs historically lacked reliable and systematic outcome measurement, particularly indicators of cognitive, socio-emotional, and early learning indicators. Available data were limited to small-scale studies, and most national measurement efforts were directed to track children’s basic health and nutrition indicators (e.g., height, weight, morbidity and mortality; and incidence of acute diarrheal disease, acute respiratory disease, and similar high-risk infectious diseases).\textsuperscript{24} Accurate measurement of developmental indicators is particularly challenging due to the breadth of developmental domains (physical, cognitive, and socio-emotional) and how these domains evolve with children’s age. In recent years, significant advances in measurement methods have been made with tools for large-scale use, such as the Caregiver Reported Early Development Instrument (CREDI),\textsuperscript{48} the Early Childhood Development Index from UNICEF’s Multiple Indicator Cluster Survey,\textsuperscript{49} the Inter-American Development Bank’s Regional Project on Child Development Indicators (PRIDI),\textsuperscript{50} the Guide for Monitoring Child Development,\textsuperscript{51} and the Measuring Early Learning Quality and Outcomes project (MELQO).\textsuperscript{52} While most rigorous impact evaluation studies estimating program impact rely most often on costly copyrighted direct assessments of infant and child development, the measurement instruments mentioned above are being used in low-resourced settings globally to monitor progress on child development goals. For instance, the CREDI tools have been validated against direct child assessments in LMICs and are being used in over 17 countries.
Outcome measurement is also necessary for accurate estimates of cost–benefit, one of the most frequently used tools to gather evidence of economic returns to early childhood investment.\(^{53,54}\) Therefore, measurement of clearly defined program outcomes is integral to policy change, financing, public–private partnerships, and national scale up efforts. For example, cost–benefit estimates based on some older pre-K programs in the United States suggest that every dollar invested in prekindergarten pays off $3–$17 in individual and societal benefits.\(^{55}\) Such estimates, however, rely on accurate calculation of the program’s cost relative to the counterfactual condition, estimates of the program’s causal impact on outcomes for beneficiary children and families in the short and long term, and the price tag (economic value or market price) attached to each outcome.\(^{55}\) The economic returns for early childhood stimulation and nutritional programs have been established for few programs,\(^ {54}\) with estimated benefit–cost ratios of 6–14% estimated for increasing preschool enrollment to 25% for one year of preschool.\(^ {36}\)

**Critical aspect 7: creating continuous improvement cycles**

Central to program effectiveness is the idea that getting any program or series or initiatives right from the very start is hard. A continuous improvement approach to early childhood services requires building evidence over time about what works best for whom, and under what circumstances.\(^ {57,58}\) Such evidence might be obtained, for instance, from measuring the impact of changes to program operations and services, and testing strategies for improving participant engagement, implementing different communication and messaging about program services. Programs need to have feedback loops in place that use monitoring or evaluation practices to identify program areas for improvement. Establishing mechanisms for continuous improvement early on can provide timely information about needs for program adjustments, professional development, or technical assistance. For example, a continuous improvement system may assess whether features of early childhood services are aligned with program standards, curricula (when applicable), assessments, workforce preparation and technical assistance, and professional development that operates at local, subnational, and national levels. The adequate use of information and consequential action steps are key components of the improvement cycle. The existence of such a continuous improvement cycle may be a defining feature of a highly effective intervention program, regardless of its scale.\(^ {8,37,59,60}\)

Improvement cycles are not just about quality assurance; rather, they are about setting in place mechanisms to learn what is working and what is not, so as to support the system and make course corrections in processes, procedures, and program components with the goal of achieving as much progress in children’s development as possible. Continuous improvement is cyclical and data driven, and requires a shift from compliance with standards imposed externally to creating an organizational culture committed to ongoing quality improvement, reflection, and a shared learning environment.\(^ {61}\) Nores et al.\(^ {62}\) illustrate the use of a quality improvement cycle to inform improvements while scaling in the aeiTO program in Colombia using observations of classroom quality and other instruments to inform their improvement processes, policies, and systems. Similarly, BRAC’s success in scaling up in Bangladesh (which includes primary and preprimary) was strongly supported by monitoring and evaluation feedback loops.\(^ {63}\)

Table 3 includes a series of actions that can be part of creating a continuous improvement cycle, such as defining the standards and outcomes against which interventions will be monitored and evaluated, creating capacity to understand and measuring these, investing in data measurement and interpretation (across all system levels), and using data to inform policies and practices.

**Critical aspect 8: partnerships**

Partnerships may be another critical component of strengthening capacity to deliver ECD interventions. Although there is limited rigorous evidence on the critical elements of ECE partnerships, existing literature defines some features that are supported by successful partnerships. There is suggestive evidence that partnerships have the potential to improve quality of care, availability of comprehensive services for families, staff knowledge and skills, and staff access to professional development supports.\(^ {64}\) Stronger partnerships may help build programs that are more likely locally relevant, politically (through changes in government) and...
financially sustainable, and strongly demanded. Partnerships with families and communities may create demand and strengthen the local and cultural relevance of programs. Partnerships with the private sector may allow linking public programs to secure long-term support and build on other existing infrastructure, and partnerships with NGOs can provide programs and initiatives face validity to the extent these organizations have long-standing reputations in the country. Partnerships with universities, as well as donors, may increase the capacity of the program in terms of data monitoring, evaluation, and accountability, but also may give credibility to its content and research base origins. When donor spending surpasses country spending, the role of donor goes much beyond this. Additionally, donors are often influential spokespersons for the initiative to the public and with elected and appointed officials.

The resources that come from the partnerships can be numerous, ranging from support in data monitoring and evaluation activities, direct delivery, materials, facilities, providing information for local and cultural adaptations, advocacy, building local support, technical assistance, and professional development, among others. Black et al. highlight how, in many countries, ECD services are delivered by disjointed groups of nongovernmental organizations with limited attention to quality and little coordination. Finding ways to leverage these efforts, to increase their quality and their coordination, is central to a coordinated ECD effort.

In Bangladesh, BRAC and donors worked together to streamline donor support through a donor consortium. Bangladesh’s child development center (Shishu Bikash Kendra) is a public–private partnership focused on early screening, assessment, intervention, treatment, and management of development disorders or delays. In Colombia, aeioTU is a social enterprise that, through public–private partnerships, currently provides services in 13 cities to nearly 13,300 children, delivering high-quality early childhood services to children under the age of five. In addition, it works with other early childhood providers and professionals and the government, partnering for quality improvements.

Conclusions

Building systems’ capacity for the delivery of interventions to promote ECD is no small task. Establishing systems able to deliver strong national programs and interventions requires a coordinated, deliberate effort to build policies and programs for children on infrastructures that are already strong, and/or develop effective multisector coordination efforts to deliver integrated services. Children’s development is multidimensional, and the efforts to support their development must be so as well. Creating effective systems includes addressing governance, monitoring and evaluation, program content, and work force.

While there may be many plausible ways to achieve this, we, in this article, set forward actions that have been part of successful experiences in ECCE in Colombia, Peru, India, and Chile, among others. While national integrated leadership is central to the advancement of a national coordinated initiative, program, or strategy, subnational and local integration and alignment are also central for any plan or program to reach the targeted populations effectively and be locally and culturally relevant. Successful large-scale sustainable programs have been the result of coordination systems highly articulated horizontally and vertically. Indicators, outcomes, and measurements toward goals should be understood and used by all organizations coresponsible for the initiatives undertaken (whether it be one program or various complementary ones). With the growth of information on effectiveness and scalability in the field, programs and initiatives can draw more and more on rigorous research, increasing the potential for acceptability and effectiveness. In addition, at the core of any program’s potential is its quality and its content, and attention should be paid to not diluting quality for the sake of access, as this can lead to a waste of resources and sometimes even harm children’s development. Quality means investing in the delivery agents, those who oversee bringing any intervention and program to families or children, and in those in charge of supporting them. It also means investing in efforts to collect information on children and on the quality of the program to monitor the program and improve it over time. That information will also be used to sustain the program over time across election cycles.
A program, whether small or scaled, is sustainable to the extent that there is demand for it, there is support for it, and it is cost-effective. Part of this involves partnerships with families, communities, NGOs, donors, and others who can engage with a program or initiative, support it, evaluate it, fund it, and increase its sustainability and effectiveness over time. Every action that strengthens any of the above critical aspects should be seen as necessary but insufficient steps toward a national strong governance structure, to deliver a locally relevant and comprehensive ECD strategy that promotes children’s developmental potential.

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Competing interests

The authors declare no competing interests.

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