



Understanding Systems Thinking Approaches from an Early Childhood Development Perspective: Promoting Equity and Sustainability at Scale A Narrative Review

ECDAN Knowledge Fellows
program project

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Abbreviations

ChCC	Chile Crece Contigo
CHW	community health workers
COVID-19	Coronavirus
ECD	early childhood development
ECDAN	Early Childhood Development Action Network
HVRS	Home Visit Rating Scale
ICRIER	Indian Council for Research on International Economic Relations
IYCF	infant and young child feeding
MC	Mobile Creches



1. Introduction

Investing in Early Childhood Development (ECD) has the potential to yield significant economic and social benefits. However, ECD systems worldwide currently face challenges, particularly in providing equitable access for marginalized children. The COVID-19 pandemic has further highlighted these issues, potentially impacting children's well-being and learning outcomes. To address these challenges, new approaches are required that consider the complex and dynamic nature of ECD, with a focus on promoting equity and sustainability. Employing systems thinking is one promising approach that considers sociocultural and temporal variables, recognizing the need for a resilient infrastructure to support ECD ecosystem.

This narrative review supplements a recent mixed methods evidence review of the role of systems thinking funded by Porticus Philanthropic Entity and undertaken by the ECDAN, the Harvard T.H. Chan School of Public Health, and the Murdoch Children's Research Institute. The report aims to describe complex systems initiatives implemented at scale in diverse settings. While a detailed complex adaptive systems analysis of these initiatives is beyond the scope of the report, initial descriptive analysis highlighting key features related to the implementation of complex systems initiatives and high-level reflections of cross-cutting elements are discussed.

1.1 Methodology

The methodology employed for this narrative review involved published and grey literature review supplemented by expert advice from the ECDAN steering group and other experts in ECD on complex systems initiatives implemented at scale in diverse settings.

A total of 40 potential initiatives were initially considered based on background literature related to systems thinking and the recent ECDAN evidence review. From this initial pool of initiatives, a smaller number were selected for further analysis based on a set of dimensions, including the scale and scope of the initiative, the types of initiatives included, the target population, and other relevant factors. These dimensions were chosen to provide a diverse and representative sample of complex systems initiatives in ECD.

Data extraction criteria were established, to facilitate structured description of key initiative elements and initial thematic analysis of the initiatives from a complex systems perspective. In the descriptive analysis, particular emphasis was placed on broad learnings related to how systems thinking approaches have been applied to promote ECD at scale and the implications of findings for applying systems thinking in ECD moving forward.

1.2 Inclusion and Exclusion Criteria

Inclusion and Exclusion criteria were established in consultation with ECD experts within ECDAN networks and were designed to provide a focused sample that would provide illustrative examples of the application of systems thinking with ECD programming at scale. ECD systems initiatives in this narrative review were selected based on a set of inclusion and exclusion criteria.



Table 1: Inclusion and Exclusion Criteria for ECD System Initiatives

Inclusion criteria	Exclusion criteria
Large-scale ECD initiatives	Small-scale ECD initiatives
Multi-sectoral and multi-component initiatives	Single intervention initiatives
Embedded within an existing ECD initiative	Not focused on promoting ECD
Aim to improve one or more areas of ECD system	Not multi-component or multi-system level
Emphasize interrelationships and collaboration among stakeholders	Implemented without a systems approach
Implemented at multiple levels and with multiple components	Small-scale implementation
Promote equity and sustainability in ECD initiatives	
Promote core components of nurturing care framework	

These criteria were applied during the screening process, where relevant grey literature on ECD systems initiatives was explored, in discussion with ECD experts and only screened for inclusion based on the criteria. Only initiatives that met all the inclusion criteria were selected for further analysis and inclusion in the review. Since the search strategy was designed to be informal and exploratory to identify illustrative examples, rather than exhaustive ones. As such, not all initiatives other than meeting these criteria were included in this review.

1.3 Roadmap

This narrative review complements a previous evidence review that employed mixed methods to examine the role of systems thinking in early childhood development (ECD).

This narrative review aims to describe complex systems initiatives implemented at scale in diverse settings and offer high-level reflections on cross-cutting themes. The review comprises a methodology section, inclusion and exclusion criteria, examples of ECD initiatives that illustrate the application and promotion of systems thinking, emerging insights, limitations, and a conclusion. Although the initiatives discussed in the review are not global in scope, they are significant at the country level as they involve multiple sectors, stakeholders, and resources within a specific country, a significant number of children and families.

The review identifies five ECD initiatives that demonstrate the application and promotion of systems thinking in ECD, which have been implemented in Chile (Creche Contigo), India (Mobile Creches), Southeast Asia (Alive and Thrive), Brazil (Criança Feliz), and Peru (Cuna Mas).

The insights gleaned from the review suggest that a problem-driven approach is crucial in the design of ECD initiatives, a systems approach is required for scaling ECD initiatives, data should be utilized to inform decisions, stakeholder engagement and partnerships should be promoted, and long-term perspective should be adopted to establish resilient and sustainable ECD systems.



2. Background and Context

Early childhood development (ECD) is crucial for shaping the future trajectory of children's lives. By investing in ECD programs, significant economic and social returns can be realized, such as improved health, nutrition, responsive caregiving, safety, security, and educational outcomes for children. However, despite increased global investments in ECD, significant inequities persist, particularly in low and middle-income countries among the poorest and most marginalized children, who are the least likely to access quality ECD services.¹⁸ These disparities result from challenges related to equity and sustainability, including inadequate funding and poor coordination among individual components, leading to unfulfilled developmental potential for children across countries.

Existing global frameworks and targets, such as the Sustainable Development Goals, the Global Strategy for Women's, Children's, and Adolescents' Health (2016-2030), and the Nurturing Care Framework, emphasize the importance of ensuring children reach their developmental potential through multiple components, including health, nutrition, responsive caregiving, safety and security, and early learning.³

Figure 1: The ecological model of nurturing care environments that influence ECD



Source: Black, M. M., Walker, S. P., Fernald, L. C., Andersen, C. T., DiGirolamo, A. M., Lu, C., ... & Devercelli, A. E. (2017). Early childhood development coming of age: science through the life course. *The Lancet*, 389(10064), 77-90.)

However, traditional approaches to ECD have been limited by a narrow focus on individual factors such as nutrition, health, and education, without considering the broader social and environmental contexts in which children grow and develop. The COVID-19 pandemic has further exacerbated these challenges, potentially resulting in lasting negative impacts on children's well-being and learning.

To overcome these challenges and promote equity and sustainability in ECD, a new approach is needed that moves beyond a reductionist, linear approach to one that recognizes the complex, dynamic, and interactive nature of the systems in which children live and develop. Research has identified several key barriers and enablers to scaling up ECD programs, including inadequate funding, poor coordination, lack of political will, and limited capacity.

Addressing these challenges requires a systemic approach that provides a useful perspective in understanding the complexity of early childhood development and the interconnected factors that influence it.¹⁹

ECD is a comprehensive and integrated system that involves multiple stakeholders, including children, families, ECD practitioners, and researchers. Addressing the long-standing challenges related to equity and sustainability requires a comprehensive approach, especially in the wake of the COVID-19 pandemic and other major system disruptions. While many countries recognize the importance of the early years, issues related to quality, equity, and sustainability still need to be addressed. Therefore, a new strategy is required to meet existing and emerging challenges in ECD globally.

The central problem facing the ECD field is how to build systems that can support large-scale, quality ECD service provisions equitably and promote systems resilience to accelerate progress in regaining lost ground for children. This is where systems thinking comes in as a promising approach for addressing the complex array of global ECD issues.

Systems thinking involves multiple levels of influence, feedback loops, and emergent properties that arise from interactions among different components of the system. It moves beyond a holistic approach to child development to approaches that explicitly frame solutions in the context of understanding the interdependent and interconnected relationships between various components of a system. This interconnectedness means that a problem in one component of the system can have an impact on other components and, therefore, requires a comprehensive and integrated approach.^{19,20}

Figure 2. Integrated ECD systems



A pressing issue gaining attention in the global ECD ecosystems is the lack of access to high-quality early care and education settings and consistent attendance for children, which is often due to complex existing systems and services. To address this, systems thinking can be applied to identify and implement potential solutions that span beyond the ECD system.

For example, families living far from their preferred early care and education setting may face transportation barriers or safety concerns that prevent their children from attending. In such cases, community members could collaborate to request free transportation, or responsible adults or older youth could be paid to accompany smaller children. Similarly, parents of children with asthma may keep them home on days with high air pollution, and

village leaders could work with local and regional governments to provide asthma treatment education for parents and teachers and distribute masks for children to use on high-pollution days.

Systems thinking can help identify and address barriers across other sectors and systems that reduce the effectiveness and uptake of ECD initiatives and services. Through cross-system

collaboration, ECD leaders can improve the likelihood of positive impacts on children, families, and communities. Ultimately, a systems lens in ECD is essential to build and scale equitable early childhood systems that can help young children reach their full potential.

3. Concepts of Systems Thinking

The study of ECD involves a complex web of interconnected systems that work together to influence the growth and well-being of young children. Each of these systems encompasses a variety of components, such as healthcare, education, and social services, which are intricately linked and interdependent. These components are intricately linked and interdependent, making it challenging to understand and address the complex nature of ECD. Therefore, it is essential to approach ECD problems from a system thinking perspective, which requires a holistic approach that considers the relationships between the different subsystems and components that make up the ECD system. Using systems thinking as a tool for analyzing and improving the quality of ECD programs and services can lead to more effective strategies for promoting positive outcomes for young children. To facilitate a better understanding of the key concepts and terminology associated with systems thinking, researchers, practitioners, and policymakers need to comprehend the fundamental principles of systems thinking.

Table 2. Systems thinking terms.

Concept	Definition
Systems	A group of interacting, interrelated, and interdependent components that form a complex and unified whole.
Complex Systems	Complex systems are composed of numerous interconnected variables that operate as a cohesive entity, exhibiting emergent properties that arise from their collective interactions and behavior over time.
Systems Thinking	Systems thinking is a comprehensive and interdisciplinary approach to conceptualizing real-world phenomena as systems. Its main objective is to enhance comprehension of a system as a whole, including its constituent parts and the interdependent relationships between them. This approach recognizes that the context in which a system exists is dynamic and subject to change over time.
Applied Systems Thinking	Using a range of methods and tools from multiple disciplines to better understand and intervene in complex systems.
Complex Systems Initiatives on ECD	Interventions involving multiple interacting components, stakeholders, and outcomes, requiring careful planning and management and consideration of the target population's context and needs.

Definitions

Systems - A system is a complex and unified whole made up of interrelated and interdependent components that work together to achieve a common purpose or goal.⁶ In the context of early childhood development (ECD), a system can refer to the interconnected



components that support the development and well-being of young children, including policies, programs, and services, as well as the various stakeholders involved in their delivery.

Systems thinking - Systems thinking is an interdisciplinary and all-encompassing approach that aims to comprehend complex phenomena as systems.⁵ This method highlights the interconnectedness of the components within a system and acknowledges that the system's context is dynamic and subject to change over time. In the context of ECD systems, a systems thinking approach recognizes that ECD systems are open and intricate structures that necessitate system-wide principles and sectoral alignment.

The building blocks of an ECD system, such as policies, programs, and services, cannot form a system independently.⁶ Rather, it is the multiple relationships and interactions among these building blocks that make them a system. Therefore, a holistic systems approach is critical for effective planning and management of ECD systems, reducing the risk of unintended negative consequences.

Integration is pivotal in achieving system-wide coherence in ECD systems. Creating unifying principles that run through the system vertically brings us closer to achieving the overarching goal. The ECD system's components must work together in a dynamic architecture of interactions and synergies. Adopting a holistic systems approach reduces unintended negative consequences and enhances planning and management by promoting a comprehensive understanding of the system's interdependent parts and the interrelationships among them.

Applied Systems Thinking - Applied systems thinking involves using a range of methods and tools to better understand the behavior of complex systems and intervene effectively in these contexts.⁵ Systems thinking approaches draw on a range of disciplines and perspectives, including engineering, mathematics, biology, ecology, and sociology, to develop a more comprehensive understanding of systems and their behaviors.

Applied systems thinking also involves recognizing the limitations of our understanding of complex systems and the uncertainties that are inherent in these contexts. This requires a willingness to experiment, adapt, and learn from failures as well as successes. Applied systems thinking draws on a range of qualitative and quantitative methods and tools to better understand complex systems and design effective interventions that lead to more sustainable and effective outcomes.

Complex Systems Initiatives in ECD - A complex initiative is a type of initiative that involves several interacting components. The delivery and reception of the intervention requires a significant number and level of difficulty of behaviors, and the intervention targets multiple groups or organizational levels. Often there are many focal outcomes, and these can be adapted depending on the nature of the intervention. Complex interventions may need to be adapted or tailored to fit the specific context and needs of the target population.

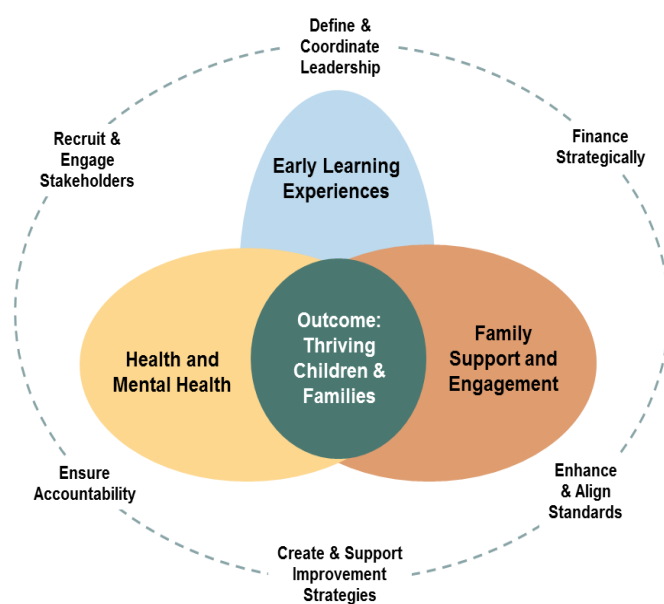
In the context of early childhood development (ECD) systems, complex initiatives refer to interventions that target multiple groups or organizational level and require a significant number and level of difficulty of behaviors for delivery and reception.⁶ Such initiatives may involve introducing transformational solutions and changes to improve child development outcomes on a large scale in an equitable and sustainable manner.



These interventions may be embedded in the existing ECD system, which has multiple components and stakeholders. Effective implementation of complex interventions in ECD systems requires a comprehensive understanding of the system's interdependent parts and the interrelationships among them, as well as careful consideration of the context and needs of the target population. Specifically, an early childhood systems intervention might focus on one or more of the following five areas:

- **Context:** Improving the political context that surrounds the system, so it produces the policy and funding changes needed to create and sustain it.
- **Components:** Establishing high-performance programs and services that produce results for children and families.
- **Connections:** Creating strong linkages across system components that further improve results for children and families.
- **Infrastructure:** Developing the support systems needed to function effectively and with quality.
- **Scale:** Ensuring a comprehensive system is available to as many people as possible.

Figure 3. Tool for applied systems thinking in ECD.



The complexity and interconnectedness of ECD challenges are often underestimated. Addressing these challenges requires ECD systems initiatives to introduce transformative solutions and changes that can improve child development outcomes on a large scale while ensuring equity and sustainability. Such initiatives are embedded in existing ECD systems that are comprised of multiple components and stakeholders.

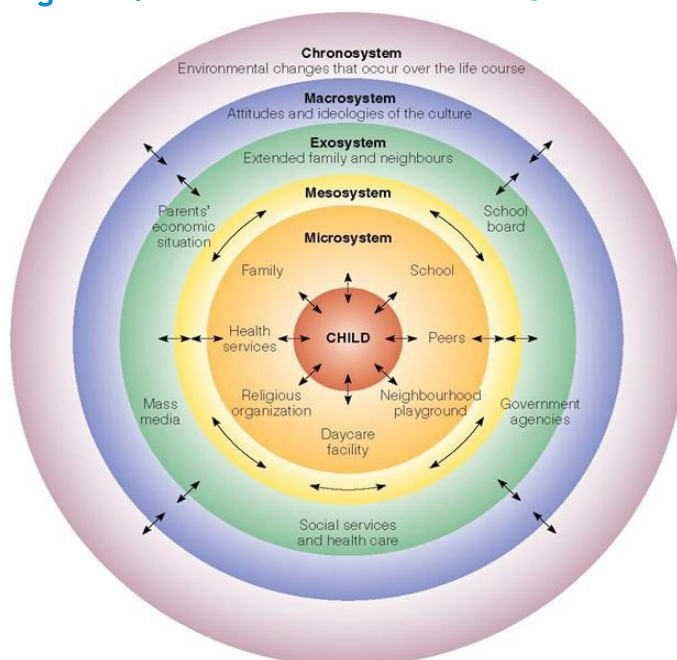
4. Understanding Various Levels of Influence on ECD: An Ecological Systems Perspective

Bronfenbrenner's ecological systems theory offers a comprehensive model for comprehending the multiple internal and external factors that impact a child's growth and development.¹⁴ The theory highlights the significance of acknowledging and understanding the various levels of influence on a child's development, ranging from their immediate surroundings to more extensive cultural and societal factors.²⁸ The process of early childhood development is intricate, and this theory provides an effective framework for understanding its complexity.⁸

The ecological systems theory consists of five levels or systems within the child's environment, which include:

- **Microsystem:** The child's immediate environment, including the family, school, and neighborhood, plays a significant role in shaping their development.
- **Mesosystem:** The relationship between the different components of the microsystem, such as the family and school, can also have an impact on the child's development.
- **Exosystem:** This includes the broader social systems that indirectly influence the child's development, such as the parent's workplace or community resources.
- **Macrosystem:** The larger cultural context that shapes the other systems, including social norms, values, and beliefs.
- **Chronosystem:** Changes that occur over time, such as transitions from one developmental stage to another or changes in the family structure, can also have an impact on the child's development.

Figure 4: Levels of influence on ECD



It is crucial to understand the interplay between these systems, as each plays a critical role in shaping a child's development. These systems are not independent but rather interact with and influence one another. The ecological systems theory highlights the importance of interventions that target multiple levels of influence simultaneously.¹²

However, complex systems initiatives take a holistic approach by identifying leverage points that can be used to influence the system as a whole. These initiatives recognize that individual components of a system are interdependent, and changes made in one area of the system may have unintended consequences in other areas. Such initiatives are necessary for creating lasting change in the system as a whole.

Therefore, the ecological systems theory provides a valuable framework for understanding the multiple systems that influence early childhood development and emphasizes the importance of considering the connections and inter-relationships between factors within and between different levels of influence. Complex systems initiatives that take a holistic approach are necessary for creating lasting change in the system as a whole. By recognizing the complexity of the systems that influence early childhood development, we can develop more effective interventions that promote optimal development for young children.

5. Applying Systems Thinking in ECD

The complex nature of ECD requires a new way of thinking and working that considers the interconnected components involving multiple factors that can impact a child's development, including health, nutrition, education, and family and community support. Collaborative partnerships between stakeholders can ensure that resources are used effectively and that there is a shared vision for ECD programs. This can lead to initiatives that provide comprehensive access to quality healthcare, nutrition, and education.

Initiatives that engage multiple stakeholders, such as parents, healthcare providers, educators, and policymakers, are crucial in addressing the complex and interconnected nature of ECD. However, effective implementation of these initiatives requires a system-thinking approach. Systems thinking allows practitioners and policymakers to identify and address complex factors that contribute to poor developmental outcomes in young children.

A study by Feriver et al. exemplifies the potential of systems thinking in ECD. The study aimed to develop systems thinking skills in preschool children from Turkey and Germany by designing an intervention program that focused on promoting skills such as identifying relationships, recognizing patterns, and understanding feedback loops.⁹ The culturally sensitive program activities were tailored to each country's specific context.

The researchers found that the intervention program significantly improved the systems thinking skills of the children, especially in the Turkish group. This study underscores the importance of tailoring intervention programs to the local context to develop systems thinking skills in young children. By fostering systems thinking skills in young children, practitioners and policymakers can better identify and address complex factors that contribute to poor developmental outcomes in early childhood.



Figure 5: Applying Systems Thinking in Early Childhood Development: A Puzzle Piece Network



The importance of a comprehensive and integrated approach to evaluating ECD systems is emphasized in the literature. This approach considers the various factors that impact the quality of ECD programs, such as governance, financing, workforce development, curriculum, and assessment. Engaging diverse stakeholders, including parents, educators, policymakers, and researchers, is essential in ensuring that a variety of perspectives are considered during the evaluation process.²³ Therefore, a systems thinking approach can enable evaluators to comprehend how different factors interact with each other and how they contribute to program outcomes. This approach engages stakeholders throughout the process, uses a theory of change to guide the evaluation, and employs multiple sources of data to inform decision-making.¹³

Despite the potential benefits of a systems thinking approach, there is a scarcity of documented evidence and its potential to promote an equitable and sustainable ECD ecosystem. Therefore, the aim of the narrative review is to examine existing literature and identify illustrative examples of systems thinking in ECD. The review will synthesize the available evidence and provide guidance on how practitioners and policymakers can effectively use the systems thinking approach for ECD. The goal is to provide insights into how a systems thinking approach can be effectively used to promote equity and sustainability for ECD and to identify best practices that support the optimal development of young children and their families.

6. Framework of Analysis Methods and Reporting

The methodology employed for this narrative review involved a combination of published and grey literature review supplemented by expert advice from the ECDAN Steering Committee and other experts in ECD on complex systems initiatives implemented at scale in diverse settings. The aim was to identify illustrative examples of the application of systems thinking

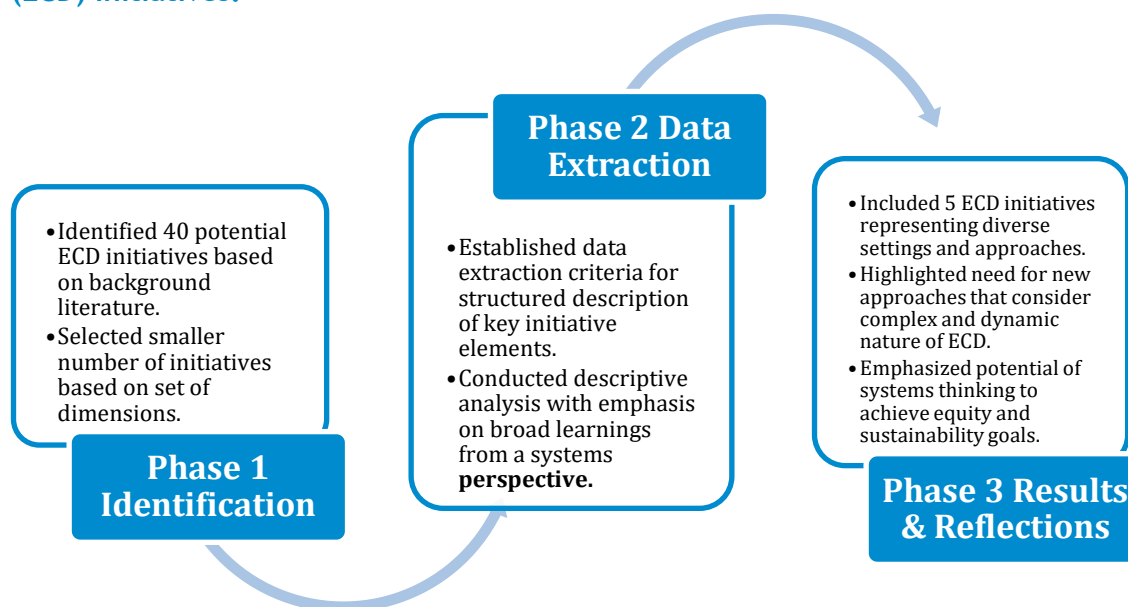
in ECD programming at scale and gain a deeper understanding of how systems thinking can be effectively applied in ECD to promote equity and sustainability.

Initially, a systematic search of online resources, including academic databases and grey literature sources, was conducted to identify potential ECD systems initiatives. A total of 40 potential initiatives were initially considered based on background literature related to systems thinking and the recent ECDAN evidence review. From this initial pool of initiatives, a smaller number were selected for further analysis based on a set of dimensions, including the scale and scope of the initiative, the types of initiatives included, the target population, and other relevant factors. These dimensions were chosen to provide a diverse and representative sample of complex systems initiatives in ECD.

Inclusion and exclusion criteria were established in consultation with ECD experts within ECDAN networks and were designed to provide a focused sample that would provide illustrative examples of the application of systems thinking with ECD programming at scale. The inclusion criteria required initiatives to be large-scale, multi-sectoral, and multi-component, embedded within an existing ECD initiative, aim to improve one or more areas of ECD systems, emphasize interrelationships and collaboration among stakeholders, be implemented at multiple levels and with multiple components, and promote equity and sustainability in ECD initiatives.

The exclusion criteria required initiatives to be small-scale, single intervention initiatives, not focused on promoting ECD, not multi-component or multi-system level, implemented without a systems approach, and small-scale implementation. These criteria were applied during the screening process, where relevant grey literature on ECD systems initiatives was explored, in discussion with ECD experts and only screened for inclusion based on the criteria. Only initiatives that met all the inclusion criteria were selected for further analysis and inclusion in the review.

Figure 6: Three-Phase Process for Identifying and Analyzing Early Childhood Development (ECD) Initiatives.



From the 40 potential initiatives, a sample size of 5 ECD initiatives was selected as illustrative examples of the application of systems thinking in ECD programming at scale. After identifying the ECD initiatives, a detailed thematic analysis was conducted from a complex systems perspective. Logic models were used to guide the analysis and identify the key components of each initiative, as well as map out the relationships between them. The aim was to gain a deeper understanding of how each initiative was designed to work, and how systems thinking was applied to promote equity and sustainability in ECD.

It is important to note that although logic models are typically used for outcome measurement, they were adapted to analyze complex systems initiatives that apply systems thinking approaches. No interviews were conducted for data collection, and the methodology focused on a desk review of relevant resources.

The illustrative examples of systems thinking approaches in ECD that were identified include Chile Crece Contigo, Mobile Creches, Alive and Thrive, Criança Feliz, and Cuna Mas. Further detailed descriptions of how these initiatives illustrate the application of systems thinking can be found in this review.

7. Illustrative Case Examples

7.1 Chile Crece Contigo

Program Description



Chile Crece Contigo (ChCC) is a comprehensive program aimed at promoting the healthy development of vulnerable children in Chile. The program was launched in 2007 and is a government-led initiative that integrates health, education, and social protection services to provide a range of services. The program's main goal is to reduce inequalities and promote child rights by providing access to high-quality services.

The program's design is based on the ecological model, which recognizes the complex interrelationships between different factors that influence child development at different levels. It includes universal health check-ups and home visits for families with children aged 0-4 years, targeted interventions for vulnerable children and families, parent education programs, and childcare services. The initiative also promotes the use of information and communication technologies to improve service delivery and monitoring.

Delivery Approach

ChCC's delivery approach involves a combination of face-to-face and remote services, including home visits, group meetings, and online platforms. Home visits are conducted by trained family health teams that include a pediatrician, a nurse, a nutritionist, and a social worker. These teams provide regular check-ups and assessments to monitor child development and provide guidance and support to parents.

In addition, ChCC works with a network of public and private partners, including the National Service for Minors and the National Kindergarten Board and the National Early Childhood



Education Board, to provide a range of services, including childcare centers, early stimulation programs, and parent education courses.

ChCC also utilizes an online platform called "Mi Registro," which allows families to access information about their children's health, education, and social protection services and provide feedback and suggestions for improvement.

Scaling Approach

ChCC's scaling approach involves a combination of government funding, public-private partnerships, and community participation. The program is funded by the government of Chile and supported by a range of public and private partners, including universities, research centers, and civil society organizations. Community participation is promoted through the establishment of local "Chile Crece Contigo" committees, which bring together representatives from different sectors and organizations to coordinate and monitor service delivery at the local level.

How does Chile Crece Contigo illustrate application of systems thinking?

ChCC takes a systems approach to Early Childhood Development (ECD) by involving various stakeholders such as health, education, and social protection services and recognizing the complex interrelationships between different factors that influence child development. The program emphasizes the role of parents and caregivers in promoting child development and works to ensure that they have access to information and support through parent education programs and home visits. In partnership with communities and families, the program promotes comprehensive support for children's health, education, and social protection services. It also uses information and communication technologies to improve service delivery and monitoring, while tracking progress across sectors and identifying areas needing additional support through its monitoring and evaluation framework.

Lessons Learned

The implementation of ChCC has taught several valuable lessons, including the importance of political will and commitment, strong intersectoral coordination and collaboration, evidence-based policy development and implementation, and engaging and empowering families and communities. The program has also faced challenges, including sustained funding, reaching vulnerable populations, and the need for continuous evaluation and improvement.

7.2 Mobile Creches

Program Description

Mobile Creches (MC) is a nonprofit organization that provides comprehensive daycare services, which include education, health, and nutrition services, to children of migrant workers at construction sites, brick kilns, and other hazardous work locations in India. The organization was founded in 1969 and has been working to improve the lives of migrant children and their families for over 50 years. The key objectives of mobile creches are to provide affordable, accessible, and quality childcare services to children of migrant workers, and to promote their overall development and wellbeing.



The main activities of mobile creches include providing a safe and secure environment for children, promoting their cognitive and physical development, and supporting their social and emotional well-being.

Delivery Approach

Mobile creches operate through vans that are fitted with toys, books, and other learning materials. The vans also have facilities for cooking, washing, and sanitation. Trained caregivers provide age-appropriate care and education to the children, including activities such as storytelling, music, and play.

Mobile creches provide full-day care for children while their parents are at work. The creches operate for six days a week and for 12 hours a day. The program has a team of trained caregivers who provide care and education to the children. The program also has a supervisor who manages the operations of the mobile creches.

Scaling Approach

The Mobile Creches program has scaled up its operations over the years by identifying areas with a high concentration of migrant workers and setting up mobile creches in those areas. The program also involves community mobilization to create awareness about the mobile creches. The program collaborates with local NGOs and government agencies to expand its reach. To replicate the model in other locations, the program partners with government agencies and private sector organizations to expand their reach.

The HDFC Policy Development Advisory Group (2022) recommends a public-private partnership model for scaling up mobile creches where the government provides land and funding, and private organizations operate and manage the creches.

How does MC illustrate application of systems thinking?

Mobile Creches applies a systems approach by addressing the complex and interconnected factors that affect the wellbeing of children of migrant workers. The Indian Council for Research on International Economic Relations (ICRIER) found that mobile creches improved children's health and nutrition, cognitive and language development, and social and emotional skills.¹⁶ It also provided support to parents by enabling them to work without worrying about their children's safety and wellbeing. Additionally, mobile creches work in partnership with government agencies and private organizations to address systemic issues such as inadequate housing, healthcare, and social protection for migrant workers and their families. Moreover, The HDFC Policy development advisory group conducted a study on women and creches in 2022. The study highlighted the importance of mobile creches in providing childcare services to children of migrant workers. The study also emphasized the need for policies that support the expansion of mobile creches in India.

Lessons Learned

The program has demonstrated the importance of a public-private partnership model for scaling up, where the government provides funding and land, and private organizations manage the creches. Involving community members and local NGOs in the program design and implementation is also crucial. A recent study highlighted the importance of mobile creches



in providing childcare services to children of migrant workers and emphasized the need for policies that support their expansion in India.

7.3 Alive and Thrive



Program Description

Alive & Thrive is a global nutrition initiative that aims to improve infant and young child feeding (IYCF) practices and reduce malnutrition rates in developing countries. The program was launched in 2009 and is funded by the Bill & Melinda Gates Foundation. The initiative operates in six countries, including Bangladesh, Ethiopia, Vietnam, and others.

The program's design is based on four key objectives, including improving maternal and child nutrition, increasing exclusive breastfeeding, improving complementary feeding, and reducing stunting. To achieve these objectives, Alive & Thrive's approach is based on a comprehensive package of interventions that target various levels, including the individual, family, community, and policy level. The program's interventions are based on the Social Ecological Model, which recognizes that multiple factors at various levels influence IYCF behaviors.

The main activities of Alive & Thrive include behavior change communication, social mobilization, advocacy, capacity building, and strategic partnerships. The program uses a mix of communication channels, including mass media, interpersonal communication, and community mobilization, to promote optimal IYCF practices. The program also works with policymakers to create an enabling environment for IYCF and collaborates with other organizations to leverage resources and reach a larger population.

Delivery Approach

The program's delivery approach is based on a combination of strategies that target different levels, including community-based interventions, health facility-based interventions, and policy-level interventions. Community-based interventions include community mobilization, interpersonal communication, and group counselling sessions. Health facility-based interventions involve training health workers to provide counselling and support for optimal IYCF practices. Policy-level interventions focus on creating an enabling environment for IYCF through policy change, advocacy, and strategic partnerships.

Scaling Approach

Alive & Thrive's approach to scaling is based on a phased implementation approach that involves piloting, refining, and scaling up successful interventions. The program uses a rigorous monitoring and evaluation system to assess the effectiveness of interventions and adapt them to local contexts. The program's scaling approach also involves partnerships with government agencies, civil society organizations, and the private sector to reach a larger population.

How does Alive & Thrive illustrate application of systems thinking?

Alive & Thrive is a program that promotes optimal infant and young child feeding practices through a systems approach that recognizes the interdependence of various components of the system. In Vietnam, where childhood stunting and wasting were prevalent, the program



implemented a multi-pronged intervention that included health worker training, social franchising, monitoring tools, and mass media activities. The intervention was implemented across 40 communes in 10 districts in 4 provinces and was evaluated through a cluster-randomized, non-blinded evaluation design. The evaluation demonstrated that child feeding and growth improved in both intensive and non-intensive areas, with differential impacts noted related to key feeding practices. The program's success is attributed to its focus on building capacity at all levels and working with multiple stakeholders to create a sustainable and scalable system for infant and young child feeding.

Lessons Learned

The program's implementation demonstrates the effectiveness of behavior change communication approaches in improving infant and young child feeding practices. The program's lessons learned emphasize the importance of addressing the broader social, economic, and political determinants of malnutrition and the need for sustained investments in nutrition programs.

7.4 Criança Feliz



Program Description

Criança Feliz or Happy Child is a home visiting program aimed at promoting early childhood development in Brazil. The program was launched in 2016 and is implemented by the Brazilian Ministry of Citizenship. The program targets pregnant women and families with children aged up to three years who are at risk of social vulnerability. The program is designed to be delivered through home visits by trained community health workers, who provide support and guidance to parents on topics such as child development, nutrition, and early learning.

The program aims to promote early childhood development, improve parenting skills, and reduce the impact of social and economic disadvantage on children's development.

The program's main activities include home visits, where community health workers (CHWs) provide guidance and support to parents, and group activities, such as playgroups and parenting classes. The program also provides access to health and social services, such as immunizations and assistance with accessing social programs.

Delivery Approach

The delivery approach of Criança Feliz is a home-based, family-centered intervention that involves regular visits by CHWs. The program is delivered through a mix of home visits and group activities. The home visits are the primary mode of delivery, and the program aims to provide a minimum of one home visit per month. The group activities are optional, and parents can choose to participate based on their preferences.

Scaling Approach

The scaling approach of Criança Feliz is based on the principles of implementation science, with a focus on improving the quality and efficiency of service delivery. The program has been scaled up through a combination of national and local efforts. At the national level, the program has been incorporated into the Brazilian federal government's social protection policies. At the local level, the program has been implemented in partnership with municipalities and community-based organizations.



How does Criança Feliz illustrate the application of systems thinking?

The program uses a comprehensive implementation strategy that engages multiple stakeholders, including families, caregivers, health professionals, and community organizations. Home visits by trained professionals provide individualized support and guidance to families on various aspects of child development. The program also uses data to inform program adaptation and improvement, which allows for continuous monitoring and evaluation of the program's effectiveness.

Furthermore, it emphasizes the importance of community engagement and participatory decision-making in program implementation, which helps ensure that local needs and priorities are considered.

Lessons Learned

The program's success is attributed to its long-term funding and support from multiple levels of government and international organizations. The use of comprehensive implementation strategies and engagement of multiple stakeholders has contributed to successful program scaling up. A recent randomized study found that the program had a positive impact on child development outcomes and maternal mental health, further supporting the effectiveness of the program.

7.5 Cuna Mas

Program Description

Cuna Mas is a large-scale, home-visiting program in Peru that aims to improve early childhood development outcomes and promote health and nutrition among children aged 0-36 months living in poverty. The program was launched in 2012, and its design is based on a "systems approach" that involves multiple components, including recruitment and training of home visitors, regular supervision and monitoring, provision of materials and resources, and engagement with the broader community.



The key objectives of Cuna Mas are to improve children's cognitive, language, and socio-emotional development; reduce malnutrition and anemia; promote maternal and child health; and support families in providing a nurturing environment for their children.

The initiatives main activities include:

- Weekly home visits: Home visitors provide counselling on health, nutrition, and child development to caregivers, as well as educational materials and toys to support children's learning and development.
- Group sessions for caregivers: These sessions provide a forum for caregivers to share experiences, ask questions, and receive additional information and support from home visitors.
- Community outreach activities: Cuna Mas engages with the broader community through activities such as health fairs, community meetings, and advocacy efforts.

Delivery Approach

Cuna Mas uses a comprehensive approach to delivering its home-visiting program in Peru, with home visitors selected from the same communities they serve, offering weekly home visits to



caregivers and their children aged 0-36 months. Quality assurance is monitored using a supervisor checklist and the Home Visit Rating Scale (HVRS), while community outreach activities are used to promote a culture of health and nutrition and encourage community involvement in supporting early childhood development.

Scaling Approach

Cuna Mas has implemented a scaling approach that involves a phased implementation, with a focus on quality improvement and rigorous monitoring and evaluation. The program has gradually expanded from a pilot phase to a nationwide implementation, with a focus on serving the most vulnerable communities.

To ensure effective scaling, Cuna Mas has implemented several strategies, including strengthening the capacity of the workforce, improving the quality of home visits, engaging with community stakeholders, and leveraging technology to enhance program management and monitoring.

How does Cuna Mas illustrate the application of systems thinking?

The Cuna Mas home visiting program in Peru employs a systems approach, which involves multiple components that work together to achieve a common goal. These components include home visitors, supervisors, training programs, monitoring and evaluation systems, and partnerships with other organizations. The program uses a participatory approach, which involves engaging caregivers and community members in program design and implementation. Lessons learned from the program include the importance of ongoing training and support for home visitors, the need for effective monitoring and evaluation systems, and the value of partnerships with other organizations to leverage resources and reach more families.

Lessons Learned

The implementation of Cuna Mas demonstrates the importance of investing in workforce development and supervision, the need for flexible and adaptive programming, and the value of engaging caregivers and communities in program design and implementation. Additionally, Cuna Mas has demonstrated the potential for large-scale, community-based interventions to improve early childhood development outcomes and promote health and nutrition in resource-constrained settings.

Moreover, investing in workforce development and supervision, the need for flexible and adaptive programming, and the value of engaging caregivers and communities in program design and implementation.

8. Emerging Insights on ECD Systems Initiatives

These insights were derived from a review of 5 ECD initiatives and a comparison of the selected initiatives. As a result, several cross-cutting insights emerged from the identified five ECD initiatives implemented in Chile (Creche Contigo), India (Mobile Creches), Southeast Asia (Alive and Thrive), Brazil (Criança Feliz), and Peru (Cuna Mas). These insights include:



- 1. Lead with the problem, rather than a preconceived solution:** It is essential to take a problem-driven approach while designing ECD initiatives. The six initiatives analyzed in this review emphasized the importance of identifying and addressing the existing challenges and advancing local priorities. For example, the Criança Feliz initiative in Brazil began by identifying the need to improve maternal and child health outcomes in vulnerable communities.
- 2. Transition from a project or program to a systems mindset:** It is crucial to ground the process of scaling ECD initiatives in a systems approach. Scaling efforts should not only focus on the technical aspects of the initiative or the institutions delivering it but on the system as a whole. The Alive & Thrive initiative in Southeast Asia took a systems approach to scaling up interventions to improve infant and young child feeding practices, working with multiple stakeholders including policymakers, healthcare providers, and community members.
- 3. Put together a winning coalition:** Collaboration and partnership among diverse actors are crucial for the success of ECD systems initiatives. A "winning coalition" should be composed of individuals and organizations with different skills, expertise, and perspectives who can work together to drive change and achieve common goals. The Crece Contigo initiative in Chile brought together a diverse coalition of stakeholders, including government agencies, universities, and community organizations, to improve access to quality early childhood education and care.
- 4. Flexibility and adaptability:** The initiatives highlighted the importance of flexibility and adaptability in responding to the diverse needs and contexts of children and families. For instance, The Criança Feliz program in Brazil provided home visits by trained professionals to families living in rural areas who may have limited access to quality ECD services.
- 5. Use of technology:** Technology can be utilized to reach children and families in remote or underserved areas. The Mobile Creches initiative in India utilized mobile vans equipped with educational and health resources to bring services directly to families living in slums and other informal settlements.
- 6. Importance of Monitoring, Evaluation, and Learning:** Monitoring, evaluation, and learning approaches are crucial for successful ECD systems initiatives. These programs should have processes in place to monitor, evaluate, and learn quickly, adapting as needed when things are going well or not well. For example, the Cuna Mas initiative in Peru has implemented a comprehensive monitoring and evaluation system that tracks program implementation and impact and provides regular feedback to improve program delivery and outcomes.
- 7. Focus on equity and inclusion:** ECD systems initiatives should prioritize reaching and serving children and families who are most in need, including those who face social, economic, or geographic barriers to accessing quality ECD services. This requires a focus on equity and inclusion in program design and implementation, as well as intentional efforts to address systemic barriers and inequalities. For example, the



Mobile Creches program in India provided early childhood education and care services to children of migrant construction workers who often face social and economic barriers to accessing quality ECD services.

8. **Invest in workforce development:** The quality of ECD services is strongly influenced by the skills, knowledge, and attitudes of the workforce that provides them. Therefore, ECD systems initiatives should prioritize workforce development and capacity building, including training, mentoring, and ongoing professional development opportunities. The Crece Contigo program in Chile provided ongoing professional development opportunities to teachers and caregivers to enhance their skills and knowledge in providing quality ECD services.
9. **Engage families as partners:** Engaging families as partners in the ECD system can enhance program quality, increase family engagement and support, and promote positive child development outcomes. ECD systems initiatives should prioritize family engagement and involvement in program design, implementation, and evaluation, and seek to build meaningful partnerships with families and communities. The Cuna Mas program in Peru engaged community health workers and volunteers to provide home-based ECD services and involve families in their child's learning and development.
10. **Foster innovation and experimentation:** ECD systems initiatives should encourage innovation and experimentation in program design and delivery and be willing to take risks and try new approaches to address complex and evolving challenges. This may involve piloting new interventions, testing new technologies, or exploring alternative financing mechanisms, among other strategies. For example, the Alive and Thrive program in Southeast Asia used innovative approaches such as social and behavior change communication to promote optimal infant and young child feeding practices.

9. Limitations of the Narrative Review

The primary limitation of this narrative review lies in its scope and methods for comparative analysis. It does not provide a comprehensive evaluation of the impact of complex systems initiatives on multiple levels of the ECD system. Instead, it offers a descriptive analysis of the key features of such initiatives and high-level reflections of cross-cutting elements. While it provides valuable insights into the application of systems thinking in ECD programs at scale, it mainly focuses on successful examples of systems thinking approaches. Further research is needed on initiatives to better understand the challenges and limitations of employing a systems approach in this field.

Despite these limitations, the report highlights the critical role of systems thinking in promoting equity and sustainability in ECD programs. It emphasizes the need for ongoing efforts to document and evaluate the impact of these initiatives.



10. Next Steps for Systems Research For ECD

The insights gained from the review of ECD initiatives that illustrate the application and promotion of systems thinking have highlighted the need to strengthen the evidence base to improve outcomes for children and families. This can be achieved through identifying research gaps and conducting rigorous studies in low- and middle-income countries. While the cross-cutting insights presented in the previous section provide a solid framework for effective ECD systems, there is still much to learn about how to establish and maintain high-quality programs. To continue advancing the field, future research should prioritize the following areas:

- 1. Continue to generate evidence on what works:** Prospectively evaluate early childhood development (ECD) initiatives using a systems approach, it is essential to have a strong evidence base on what works. This requires conducting systematic reviews and meta-analyses to evaluate the impact and effectiveness of ECD initiatives that use a systems approach. By synthesizing the findings from multiple studies, policymakers and practitioners can gain a better understanding of the most effective strategies for scaling ECD systems initiatives.
- 2. Develop tools and frameworks:** Improve the effectiveness of ECD systems initiatives by developing tools and frameworks to support their design, implementation, and evaluation, such as standardized methods for monitoring and evaluation and guidelines for stakeholder engagement.
- 3. Explore emerging technologies:** Utilize emerging technologies such as artificial intelligence and machine learning to support the design and delivery of ECD systems initiatives and improve program outcomes.
- 4. Enhance collaboration and co-design:** Enhance collaboration between stakeholders by identifying barriers and facilitators to cross-sectoral collaboration, conducting interviews or focus groups with stakeholders, and learning from successful examples. This will enable the development and implementation of integrated interventions that address multiple aspects of child development and are evaluated for their impact and implementation using a mixed-methods approach, ultimately improving outcomes for children and families.



11. Conclusion

In conclusion, investing in high-quality early childhood development (ECD) systems initiatives is crucial for promoting positive child development outcomes and achieving long-term social and economic benefits. The cross-cutting insights presented in this article emphasize the importance of a problem-driven approach, a systems mindset, collaboration, flexibility, technology, monitoring and evaluation, equity and inclusion, workforce development, family engagement, and innovation in designing and implementing effective ECD systems initiatives. Nevertheless, building and sustaining high-quality ECD systems requires further research and evidence generation. Future research efforts should prioritize systematic reviews, evaluating the effectiveness of different approaches, assessing impact and outcomes, developing tools and frameworks, exploring emerging technologies, enhancing collaboration, and promoting integration.

To create a brighter future for children, families, and communities worldwide, there is a critical need to prioritize ECD systems initiatives that address the complex and interconnected nature of early childhood development. This includes understanding what complex initiatives work in what settings, as well as identifying barriers and facilitators to cross-sectoral collaboration and improving collaboration efforts among stakeholders. By enhancing collaboration and co-designing integrated interventions, ECD systems initiatives can create long-lasting change and better address the needs of young children and their families.



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Appendix - Comparison table: Five ECD initiatives implemented as complex systems interventions at scale.

Initiative Name	Country	Type of Initiative	Levels	Components focused on	System Approach	How it Promotes Systems Thinking	Specific Implementation	References
Chile Crece Contigo	Chile	National program to expand access to ECD services	National, Municipal, Family, Child	Health, Education, Social Protection, Early Learning, Family Support	Uses a multi-sectoral approach to ECD, involving health, education, and social protection systems	Focuses on intersectoral coordination and collaboration, and emphasizes the importance of addressing social determinants of ECD	Provides training for ECD professionals, promotes community engagement, and provides financial incentives to ECD centers.	Torres et al., 2018 Molina Milman et al., 2018
Mobile Creches	India	Non-governmental organization providing ECD services to migrant workers	Community, Family, Child	Health, Early Learning, Play, Nutrition, Parenting	Uses a mobile model to provide ECD services to children in underserved communities	Emphasizes the importance of cultural sensitivity and community engagement in providing ECD services	Provides a mobile van equipped with ECD materials and trained staff to provide ECD services in migrant communities	HDFC Policy development advisory group, 2022 ICRIER, 2014 Gomes et al., 2021
Alive & Thrive	Southeast Asia	Global initiative to improve infant and young child feeding	Global, National, Subnational, Family, Child	Health, Agriculture, Education, Communication, Behavior	Uses a systems approach to improve policies and programs related to infant and young child feeding	Emphasizes the importance of addressing multiple sectors, including health, agriculture, and education, in promoting optimal feeding practices	Advocates for policy change and provides technical assistance to countries to improve infant and young child feeding programs	Sanghvi et al., 2016 Nguyen et al., 2017 Frongillo, 2020

Initiative Name	Country	Type of Initiative	Levels	Components focused on	System Approach	How it Promotes Systems Thinking	Specific Implementation	References
Criança Feliz	Brazil	National program providing ECD services to vulnerable families	National, Municipal, Family, Child	Health, Education, Social Protection, Family, Caregiver	Uses a multi-sectoral approach to ECD, involving health, education, and social protection systems	Emphasizes the importance of addressing social determinants of ECD, such as poverty and violence	Provides home visits by trained professionals to provide ECD services and support to vulnerable families	Buccini et al, 2021 Santos et al, 2022 Brentani et al, 2020
Cuna Mas	Peru	National program providing ECD services to vulnerable families	National, Subnational, Community, Family, Child	Health, Nutrition, Early Learning, Parenting, Family Support	Uses a community-based approach to provide ECD services to families in underserved communities	Emphasizes the importance of community engagement and participation in providing ECD services	Provides home visits by trained professionals, as well as ECD centers and playgroups for children in underserved communities	Rubio-Codina et al, 2019 Josephson et al, 2017 Araujo et al, 2021



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