Early Childhood Development And The Next 1000 Days 1

The next 1000 days: building on early investments for the health and development of young children

Catherine E Draper, Aisha K Yousafzai, Dana C McCoy, Jorge Cuartas, Jelena Obradović, Sunil Bhopal, Jane Fisher, Joshua Jeong, Sonja Klingberg, Kate Milner, Lauren Pisani, Aditi Roy, Jonathan Seiden, Christopher R Sudfeld, Stephanie V Wrottesley, Günther Fink, Milagros Nores, Mark S Tremblay, Anthony D Okely

Following the first 1000 days of life that span from conception to two years of age, the next 1000 days of a child's life from 2–5 years of age offer a window of opportunity to promote nurturing and caring environments, establish healthy behaviours, and build on early gains to sustain or improve trajectories of healthy development. This Series paper, the first of a two-paper Series on early childhood development and the next 1000 days, focuses on the transition to the next 1000 days of the life course, describes why this developmental period matters, identifies the environments of care, risks, and protective factors that shape children's development, estimates the number of children who receive adequate nurturing care, and examines whether current interventions are meeting children's needs. Paper 2 focuses on the cost of inaction and the implications of not investing in the next 1000 days. In low-income and middle-income countries (LMICs), only 62 million children aged 3 and 4 years (25·4%) currently receive adequate nurturing care during the next 1000 days, leaving 181·9 million children exposed to risks that jeopardise their healthy development. Inputs across nurturing care dimensions of health, nutrition, protection, responsive care, and learning vary substantially across countries. In LMICs, although 86·2% of children have a healthy weight in this period, less than one in three children have access to developmental stimulation or are protected from physical punishment, and only 38·8% have access to early childhood care and education services. Intervention research in LMICs in the next 1000 days is scarce. The continuity of developmentally appropriate nurturing care, coordination across health, education, and protection sectors, and the implementation of interventions to support caregivers and improve the quality of education and care remain top priorities in this period. These sectors play key roles in promoting quality early care and education for this age group, which will help maximise developmental potential and opportunities of children globally and help progress towards the achievement of the Sustainable Development Goals.

Introduction

Early childhood development has received substantial attention in three previous *Lancet* Series published in 2007,[1–3] 2011,[4,5] and 2017.[6–8] The 2017 Series reported that 250 million children in low-income and middle-income countries (LMICs) were at risk of not meeting their developmental potential.[6] Although the first 1000 days (conception to two years of age) has been widely recognised in global research, policy, and practice, it is timely to consider the evidence, opportunities, and imperatives for the next 1000 days. The previous *Lancet* series recognised that building a strong foundation for healthy development begins in the first 1000 days of life and requires support as children transition into the next 1000 days. The next 1000 days refers to the period between 2 and 5 years of age, which includes the preschool and preprimary years. This period in the life course marks a substantial growth of skills and provides a sensitive window of opportunity to mitigate environmental risks, promote protective factors, and establish healthy developmental and behavioural trajectories. The next 1000 days offer chances to recalibrate children's developmental trajectories in areas where opportunities were lost in the first 1000 days, and to sustain and build upon gains achieved in the first 1000 days.

The next 1000 days refers to the period between a child's second and fifth birthdays, intending to cover the preprimary years and recognising that when children begin Grade 1 primary will differ around the world. We acknowledge that the next 1000 days lacks precision in terms of an exact time frame, in the way that the first 1000 days encompasses pregnancy and the first 2 years of life. However, like the first 1000 days, the notion of the next 1000 days is intended to draw attention to this stage of the life course, building on the investments of the first 1000 days. We expect that the simplicity of the term and the ease with which it can be remembered and translated across multiple languages and settings is more salient than the precision of the period.

In this Series paper, the first of a two paper Series on health and development in the next 1000 days, evidence is presented for why the transition to the next 1000 days matter—the environments of care, risks, and protective factors that shape young children's development in this period are described; and the nurturing care inputs young children currently receive globally are analysed. Finally, a mapping review of interventions implemented globally to promote development in the next 1000 days is presented to understand whether interventions are meeting the needs of children in this period.

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This is the first in a **Series** of two papers on early childhood development and the next 1000 days

South African Medical Research Council, Developmental Pathways for Health Research Unit, University of the Witwatersrand, Johannesburg, South Africa (C E Draper PhD, S Klingberg PhD, S V Wrottesley PhD); **Department of Global Health and Population, Harvard T H Chan School of Public Health, Boston, MA, USA** (Prof A K Yousafzai PhD, J Jeong ScD, C R Sudfeld ScD); **Department of Paediatrics and Child Health, Aga Khan University, Karachi, Pakistan** (Prof A K Yousafzai); **Graduate School of Education, Harvard University, Cambridge, MA, USA** (D C McCoy PhD, J Cuartas PhD, J Seiden EdM); **Department of Applied Psychology, New York University, New York, NY, USA** (J Cuartas); **Centro de Estudios Sobre Seguridad y Drogas, Universidad de los Andes, Bogota, Colombia** (J Cuartas); **Graduate School of Education, Stanford University, Stanford, CA, USA** (Prof J Obradović PhD); **Population Health Sciences Institute, Newcastle University, Newcastle, UK** (S Bhopal PhD); **Department of Population Health, London School of Hygiene & Tropical Medicine, London, UK** (S Bhopal); **Born in Bradford, Bradford Institute for Health Research, Bradford, UK** (S Bhopal); **School of Public Health and Preventive Medicine, Monash University, Melbourne, VIC, Australia** (Prof J Fisher PhD); **Neurodisability and**

Rehabilitation Research Group, Murdoch Children's Research Institute, Department of Paediatrics, University of Melbourne, Melbourne, VIC, Australia (K Milner PhD); **Save the Children US, Fairfield, CT, USA** (L Pisani PhD); **Centre for Chronic Disease Control, Centre for Health Analytics Research and Trends, Ashoka University, Sonipat, India** (A Roy PhD); **Department of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Allschwil, Switzerland** (Prof G Fink PhD); **University of Basel, Basel, Switzerland** (Prof G Fink); **National Institute for Early Education Research, Rutgers Graduate School of Education, New Brunswick, NJ, USA** (M Nores PhD); **Children's Hospital of Eastern Ontario Research Institute, Ottawa, ON, Canada** (Prof M S Tremblay PhD); **Department of Pediatrics, University of Ottawa, ON, Canada** (Prof M S Tremblay); **School of Health and Society, University of Wollongong, Wollongong, NSW, Australia** (Prof A D Okely EdD)

Correspondence to: Dr Catherine E Draper, South African Medical Research Council, Developmental Pathways for Health Research Unit, University of the Witwatersrand, Johannesburg 2000, South Africa
catherine.draper@wits.ac.za

Key messages

- Building on the foundation of the first 1000 days, the next 1000 days (from 2–5 years of age) is a crucial window of opportunity to extend nurturing care for contributing to optimal health, growth, and developmental trajectories.
- Environmental risks to health, nutrition, and development persist, including physical punishment of the child, suboptimal diets, poor caregiver mental health, exposure to pollution, and climate change.
- An estimated 8% of children younger than 5 years have a developmental disability and require targeted additional support to optimise health, wellbeing, and prevent further disadvantage.
- Protections that shape development in the next 1000 days expand from home, clinic, and community settings to include ECCE settings, but multisectoral strategies to promote and protect development are limited, especially in LMICs.
- ECCE for children in the next 1000 days is a key component of support for their learning and development, but less than 30% of children aged 3 and 4 years participate in ECCE in LMICs.
- Only 29·9% of children in LMICs receive adequate nurturing care in the next 1000 days. Poorer children, children in rural areas, and boys are less likely to receive adequate care.
- Children in LMICs who have received early learning support and responsive care are approximately two years ahead in their development, compared to children not receiving these supports.
- Interventions promoting healthy development in the next 1000 days are predominantly delivered in high-income countries; only 5% of published interventions have been implemented in LMICs.
- Despite their vulnerability, young children in LMICs are not adequately reached by a holistic set of interventions to promote development in the next 1000 days.
- Key interventions that are available (such as ECCE) warrant attention to quality, equity, and inclusion to ensure all children are reached and receiving programmes that support their development and learning, as well as an enabling policy environment that improves investment in ECCE systems and fosters demand for services.

ECCE=early childhood care and education. LMICs=low-income and middle-income countries.

Paper 2[9] addresses key strategies for supporting children's development in the next 1000 days, with particular focus on the effectiveness of global interventions, the cost of interventions against the cost of inaction in the next 1000 days, and concludes the Series with recommendations on how to best support and bolster children's healthy development in this period.

Why the next 1000 days matter

Substantial scientific advances have been made to establish how the first 1000 days of a child's life are a sensitive period for physical, neural, cognitive, and social-emotional development, and apply this knowledge to inform early childhood programmes and policies.[6,7] However, exposure to poverty-related and other risk factors can undermine children's development in the next 1000 days, a period of heightened neural maturation supporting continued and rapid growth of motor, language, and interactive abilities, as well as the expansion of skills such as self-regulation and executive functioning.[10] Young children's health, growth, and development differ across the next 1000 days, and these continue to be shaped by the quality of nurturing care. Nurturing care is defined as an enabling environment that fosters the provision of care across five dimensions: health, nutrition, responsive caregiving, safety and security, and early learning.[7] Figure 1 shows how these dimensions relate to salient developmental outcomes and inputs in the next 1000 days.

We adopt a comprehensive, multisectoral, and multilevel life course perspective[11] to emphasise that both enabling environments and development are cumulative and continuous.[12] Figure 2 shows how development across key domains of functioning during the next 1000 days can build on the early foundation of the first 1000 days to set children on optimal trajectories into middle childhood and adolescence. It also identifies various sectors that need to be better integrated across the lifespan to support development of individuals and thus of communities and nations. The first and next 1000 days must be considered as two continuous periods that build a strong foundation for lifelong wellbeing, relationships, and achievement, through increasing learning opportunities and attenuating the negative effect of adversities.[12]

With respect to health, nutrition, and growth, the next 1000 days are a window of opportunity to reduce early risks undermining physical development; to promote dietary diversity, growth, and healthy habits;[13] and try to overcome early deficiencies. Since improvements in health and growth in the next 1000 days might not transfer to developmentally salient skills in this period,[14] it is crucial to interrogate how the child's diet, illnesses, growth faltering, and psychosocial stress influence cognitive, motor, and language skills.[14] The next 1000 days mark a time of rapid development of

fundamental motor skills, increased independence in movement and physical exploration, and an expansion and refinement of cognitive, language, and social-emotional skills. Between 24 and 36 months, basic developmental skills emerge (eg, expressive language, coordinated movements, and emotional development) followed by a refinement of these skills as children transition into the period between 36 months and 59 months (eg, communicating more clearly in sentences with people outside of the most significant familial caregivers, coordinated movements, or expressing a wider range of emotions). It is important to identify culturally-relevant stimulating activities and safe play spaces that foster fine and gross motor skills, movement behaviours, cognitive, language and social-emotional skills, and physical play in this period.

The next 1000 days offer opportunities to strengthen nurturing bonds with primary caregivers, as well as form new caregiving relationships through addressing the effects of early psychosocial adversity on brain networks involved in social information processing[15] and early caregiver–child attachment security.[16] Children's increased agency and capacity to regulate their own attention, behaviours, and emotions during this period call for caregiving programmes and policies that promote culturally responsive and developmentally supportive non-violent discipline and socialisation practices,[17] while also addressing caregivers' mental health and child protection needs. Since primary caregivers' inputs do not fully explain the development of children's skills during this time of increased social interactions,[18] novel assessments of stimulating experiences, including studying the role of larger family dynamics (eg, fathers, siblings, grandparents) and the broader community, are needed.[19–21] To advance the study of how peer and sibling interactions influence development in the next 1000 days across various settings, scalable and ecologically valid assessments of social-emotional skills and play behaviours in this age group are crucial.[22]

The next 1000 days also marks a period of growing neurobehavioural capacity for information processing, executive functions, cognitive and language skills, and increasing exposure to environmental stimulation that enable more complex forms of communication, reasoning, and learning. These skills have implications for lifelong trajectories of health, learning, and wellbeing.[23] Although early childhood care and education (ECCE) settings take on increased salience and provide important opportunities for learning and interactions, the ECCE experience is variable both across and within countries. ECCE settings encompass a wide range of services such as formal and informal childcare[24] and community-based programmes[25] that can cater differently for younger and older children in this age group. Research is needed to identify effective ECCE pedagogies and complementary family nurturing inputs that promote play-based learning, acquisition of early literacy and numeracy skills, and school readiness. This work needs to consider both variability in development of skills and independence during this period, including cross-cultural differences, and address developmental delays and learning differences. Providing nurturing care in this period will support achieving the Sustainable Development Goals (SDGs),[11] especially goal 4.2, which aims to ensure quality early childhood development, care, and education for all children. Although the Nurturing Care Framework is universal,[26] children with the greatest vulnerabilities, including those with disabilities, need additional targeted supports to prevent further disadvantage. In summary, the next 1000 days require continuity of nurturing care and stimulation at home but afford new opportunities for promoting and supporting developmental outcomes in both ECCE and community environments that can be strengthened by supportive policies and systems (figure 3).

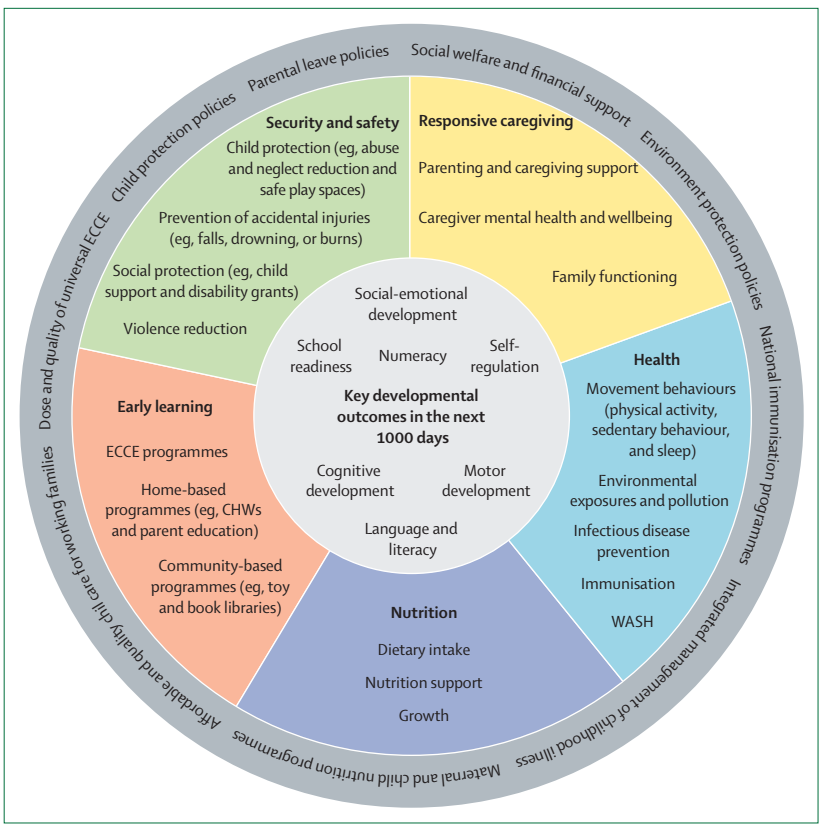

Figure 1: **Developmental outcomes and inputs of nurturing care in the next 1000 days**
Developmental domains in the next 1000 days are presented in the central circle, from which key developmental outcomes are derived; the dimensions of the Nurturing Care Framework are in the next layer, with components relevant to the next 1000 days; the outermost layer presents relevant policies. CHWs=community health workers. ECCE=early childhood care and education. WASH=water, sanitation, and hygiene.

Environments that shape young children's development

A close examination of the environments of nurturing care, which shape child outcomes in the next 1000 days, is necessary to inform intervention and policy efforts. In

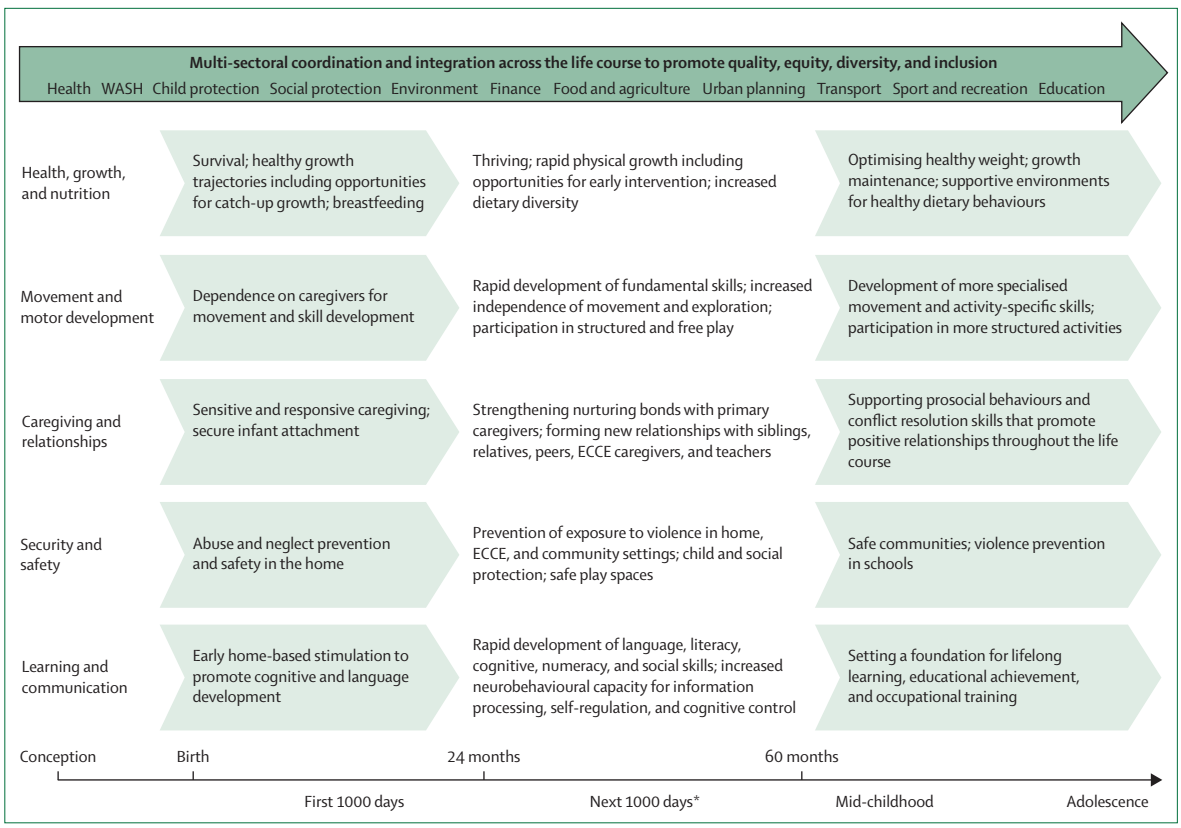

Figure 2: **The next 1000 days within the life course**
ECCE=early childhood care and education. WASH=water, sanitation, and hygiene. *The next 1000 days refers to the period between a child's second and fifth birthday, intending to cover the pre-primary years (generally before a child is expected to begin their first year of primary school, which may vary from setting to setting). However, like the first 1000 days, the notion of the next 1000 days is intended to draw attention to this stage of the life course, building on the foundational investments of the first 1000 days.

See **Online** for appendix

this period of life, children are increasingly exposed to environments outside of the home, and ECCE settings influence and shape development in addition to home and family relationships and the child's biological wellbeing.[27] Bronfenbrenner's social ecological model of human development[28] provides a framework for understanding how child development is influenced by these various environments. Sameroff has built on this social ecological perspective to propose dynamic, multilevel biopsychosocial systems that provide a more unified understanding of development over time.[29] Both frameworks accommodate the influence of the socioeconomic environment in which children develop, given that poverty, food insecurity, and other material deficits and insecurities contribute to inequalities in stimulation, ECCE, and supportive environments.[4,30] Thus, the adequacy and quality of nurturing care inputs provided to support early development will be influenced by the access families have to resources (eg, financial and food security) to invest in their young children and by the available policies that can impede or facilitate access to these resources.

This section summarises our reviews of published research on risks and protections, informed by the Nurturing Care Framework (NCF), in children's immediate biological, family, and ECCE environments during the next 1000 days, focusing on LMICs (appendix pp 2–21). Although reviews for each area took different approaches based on the state of evidence, availability of previously published reviews, and disaggregation of data for the period of the next 1000 days (eg, general literature review for climate change and young children given the dearth of evidence, original systematic review and meta-analysis for mental health of caregivers and young children's social-emotional development, and a review of reviews on quality of ECCE), all reviews examined peer-reviewed articles from LMICs with at least one early childhood development, behaviour, or mental health outcome.

These reviews show the importance of leveraging opportunities in the next 1000 days to optimise nurturing care inputs to achieve benefits in early childhood development alongside child health, nutrition, and protection. Several cross-cutting implications emerged: packaging multiple nurturing care inputs to mitigate risks and promote protection is important (eg, family care packages that combine mental wellbeing, violence prevention and parenting support), but requires further

Developmental domains and nurturing care dimensions	Family	ECCE services and community context	Policy and systems
Health	• Promotion of developmentally appropriate self-care (eg, handwashing and dental hygiene). • Use of physical and mental health care services. • Regular daytime and night-time sleep.	• Annual screenings (growth, anaemia, vision, hearing, developmental milestones, dental) and immunisations in ECCE programmes, community health services, primary health care, and home visits.	• Universal health care and free preventive services. • Free screening and interventions for developmental delays and disabilities. • Protective laws and regulations to increase safety, reduce toxins, and minimise commercial harm.
Nutrition	• Regular meals. • Balanced nutritional intake and dietary adequacy.	• Free meals and dietary supplements in ECCE programmes. • Community-based food assistance.	• Nutrition education (hand washing, undernutrition, and obesity). • Financial food subsidies for families.
Fundamental movement and motor skills and fine motor skills	• Safe home spaces for physical exploration and active play. • Promotion of developmentally appropriate skills (eg, buttoning, tying shoes, brushing teeth). • Inclusion in activities and chores that promote hand strength, coordination, and balance (eg, beading, cooking, drawing, carrying). • Encouragement of healthy movement behaviours (physical activity and managing screen time).	• Access to play structures, equipment, and materials coupled with the ECCE staff. • Training to effectively use the resources in scaffolding free play, physical games, and building and crafting activities. • Access to age-appropriate and safe play structures and areas in the community. • Infrastructure to support safe walking and active travel.	• Incentives for planning, building, and maintaining child-friendly and safe outdoor spaces, including for active travel. • Protective laws and regulations to increase inclusion and reduce opportunity gaps for children with physical disabilities. • Guidance and services to support healthy movement behaviours.
Language and literacy skills	• Child-directed speech and responsive conversations. • Opportunities to practice expression of one's thoughts and experiences. • Inclusion in family-based storytelling, singing, read aloud activities, and narrative rituals. • Access to age-appropriate books and materials for drawing and writing at home.	• Access to play-based activities and developmentally appropriate curricula, books, and materials for drawing and writing coupled with the ECCE staff training to effectively use the resources to promote vocabulary, narrative skills, letter knowledge, and phonological and print awareness. • Dissemination of culturally relevant print materials and exposure to stimulating creative activities, such as singing, storytelling, and dramatisation via community-based organisations.	• Universal access to high quality ECCE programmes. • Policies to reduce inequity in attendance in ECCE programmes based on gender, disability status, socioeconomic status, etc. • Programmes and practices (eg, teacher education and curricula development) that promote equity in child outcomes. • Media programmes and educational technology that scaffold early literacy and numeracy skills (eg, *Sesame Street*) • Policies and programmes that support caregivers' literacy, continued education, and skill building.
Cognitive and numeracy skills	• Promotion of understanding of physical properties (eg, colour), contrasts (eg, relative speed), quantities (eg, amounts), number knowledge, counting, and time in everyday activities (eg, sorting) and discussions. • Practising executive function skills through age-appropriate multistep activities, chores, games, and rituals.	• Access to play-based activities and developmentally appropriate curricula, games, puzzles, and manipulative materials coupled with ECCE staff training (and support from community-based organisations where available) to effectively use the resources to promote number sense, symbolic representation, spatial awareness, understanding of measurement, estimation, and patterns. • Use of child-directed pedagogical approaches that promote children's executive functions and problem-solving skills.	• Funding for community-based organisations that offer programming and disseminate learning materials for young children.
Social-emotional skills	• Sensitive and responsive caregiving behaviours that address the child's social and emotional needs and promotes self-regulation of emotions and behaviours. • Age-appropriate behavioural expectations and non-violent supportive discipline practices. • Family-system interventions that explicitly include male caregivers, multigenerational households, and siblings. • Caregiving behaviours that promote the child's identity, sense of belonging, and agency.	• Access to play-based activities and developmentally appropriate curricula, positive behavioural support systems, and classroom management strategies coupled with ECCE staff training to effectively promote emotional understanding and regulation, prosocial behaviours, conflict resolution, empathy, inclusion, and a sense of belonging. • Smaller student to teacher ratios. • Community opportunities to participate in group-based activities with peers. • Community supports for caregivers' and children's mental health and safety.	• Policies and programmes that support family financial and residential stability. • Policies and programmes that ensure child and caregiver protection from abuse, neglect, and domestic violence. • Mental health education and supports for caregivers and children. • Policies and funding that support ECCE workforce's development, remuneration, retention, and stress reduction.

Figure 3: **Opportunities to promote and support salient developmental outcomes in the next 1000 days**
ECCE=early childhood care and education.

evidence on effectiveness; strengthening multisectoral partnerships across health and nutrition, education, child protection, and social protection and welfare, with particular attention to ECCE settings, is imperative in the next 1000 days; identifying features of quality to strengthen protective environments necessitates shifting attention from dose alone to dose and quality of service provision; and measurement of nurturing care environments specific to the next 1000 days to assess programme progress, equity, and inclusion is essential. In addition to the immediate nurturing care environments, the panel summarises the urgent need to study the effects of pollution and climate change on early childhood development. These risks have been heightened during the COVID-19 pandemic with disruptions to child health and ECCE services, rising numbers of malnourished children, increased mental health challenges among already disadvantaged caregivers, and increased violence against women and children. The pandemic also shed light on the need for affordable quality childcare services. The World Bank defines childcare services as "any service with the primary objective of caring for children while parents are working while ensuring children are safe and have opportunities to learn and develop positive relationships with caregivers and peers".[68] Although there is an increase in access to ECCE more generally, and an emerging need for childcare for the very youngest children (infancy through the first three years of life) is recognised, there is limited research from LMICs and there are few evidence-informed policies that could yield benefits for children's outcomes, families' economic security, and gender equity.[69] These gaps further underscore the urgent need for developmentally supportive policies (eg, paid parental leave) and services (eg, affordable high-quality childcare services) as well as multisectoral coordination with sectors such as social protection that more directly address poverty alleviation and food security to ensure families can invest in their children and optimise early nurturing care inputs.[70–74]

Biological environment

Health

Despite the health sector playing a central role in reaching children during the first 1000 days due to more frequent interactions between health services and children and their caregivers, routine interactions with health services are less frequent after 2 years of age.[75,76] Most children in the next 1000 days primarily interact with health services when sick or injured, and in LMICs, families with children in this age group might miss recommended preventive guidance and screening. Although access to health care has improved in many settings,[77,78] the accessibility and quality of care varies substantially between and within countries.[79]

Several health risks persist beyond the first 1000 days (eg, cerebral palsy, in-utero and birth-related conditions) and new health conditions and risks emerge in the next 1000 days (including infection and injury), which contribute to developmental difficulties for children. However, evidence on the effects of specific illnesses and injuries in children from LMICs during this period is scarce.[80] For example, there are mixed findings and limited literature on the effect of viral meningitis on early childhood development.[81] The negative effect on years lived with disability and disability-adjusted life-years from illnesses including malaria, pneumonia, diarrhoeal disease, and iron deficiency is captured by Global Burden of Disease estimates, but evidence on their effect on early childhood development is lacking in the literature. Some illnesses (eg, haemophilia, cystic fibrosis) do not appear to be associated with impaired later development, but there are clearer deficits with other conditions including severe end-stage renal disease and liver disease,[82] sickle cell disease,[83] and epilepsy.[84] The extent to which development is related to the effect of childhood chronic illness in general, the specifics of any one disease, or factors related to treatment and management is unclear. For example, diarrhoeal disease and lack of access to water, sanitation, and hygiene (WASH) are negatively associated with child growth and motor and cognitive impairment,[85] and evidence for mass-deworming[86] and WASH interventions[87] to improve early childhood development is mixed. The effects of physical health-related factors on early childhood development are likely to exert themselves via complex pathways in association with other environmental factors, which require further analysis. The negative effect of injury, including burns,[88] falls, head injury, drowning,[89] and poisoning are clear, especially when these result in physical disability or death.

Developmental delays and disabilities

Many children with developmental delays and disabilities live in LMICs. Evidence indicates that globally, 7·5% of children under five years of age have a disability.[90] In these contexts, estimates of the prevalence of developmental delay and disability among young children historically rely on extrapolation from high-income countries (HICs) or survey data with limitations for informing contextualised interventions and policies. The Global Research on Developmental Disabilities Collaborators, using the Global Burden of Diseases data, estimated that 8·4% (7·7–9·1) or 52·9 million (95% confidence interval [CI] 48·7–57·3) of children younger than 5 years have developmental disabilities.[91] A similar median pooled prevalence for any neurodevelopmental disorder in young children (7·6%, 7·5–7·7%) has been reported.[92] The Global Research on Developmental Disabilities Collaborators further estimated that 11·2% of children aged between 1 and 4 years have epilepsy, intellectual disability, vision or hearing loss, or a combination.[93] The prevalence of disability in young children in LMICs is potentially

Panel: Emerging evidence on pollution, climate change, and early childhood development in the next 1000 days

UNICEF recently estimated that every child regardless of country of residence is facing at least one major climate and environment-related hazard with nearly half of the world's children living in extremely high-risk conditions.[31] Here we focus on a few crucial climate and pollution-related health hazards facing children. Research employing multidisciplinary integrated assessments and advanced statistical methodologies are required to quantify the full impact of pollution and climate change on developmental outcomes in the next 1000 days. Greater collaboration is needed between climate science and early childhood communities.

Pollution

Air pollution

Over 90% of the world's population live in an area where the annual average ambient fine particulate matter concentration (ie, the density of particles measuring less than 2·5 micrometers [$PM_{2·5}$]), a critical air pollutant associated with a wide range of adverse health effects, exceeds the WHO's reference standard.[32] Moreover, cooking and heating with polluting fossil fuel contributes to household as well as ambient air pollution in most low-income and middle-income countries (LMICs).[33]

A range of investigations, mostly from high-income countires (HICs), show associations between air pollution and early childhood development outcomes, although evidence specifically for children in the next 1000 days is limited. Birth cohort studies show associations between prenatal and concurrent exposure to air pollution and child cognitive, attention, and behavioural outcomes across childhood. These associations are likely modified by early-life stress, material deprivation, race, and child sex.[34–40] Although identifying the crucial periods and effects of short *vs* long-term exposure to pollutants on early childhood development-related outcomes are active areas of research, a recent study suggests greater impairment in neurodevelopment at age 2 years was associated with early postnatal $PM_{2·5}$ exposure.[39] Concurrent exposure to air pollution in the next 1000 days has been associated with delays in child psychomotor, communication, and socioemotional development.[41,42] Systematic reviews report associations between childhood exposure to $PM_{2·5}$ and other air pollutants, and cognitive functions and attention-deficit hyperactivity disorder.[43,44] Studies from some LMICs also show weak associations between household air pollution and cognition, and slower developmental trajectories.[45–47] More evidence is required from LMICs on air pollution and early childhood development outcomes in the next 1000 days.

Second-hand tobacco smoke

Prenatal exposure to tobacco smoke, without active maternal smoking, is associated with poor neurodevelopmental outcomes including increased hyperactivity and externalising behavioural problems across childhood.[48,49] Collectively, studies suggest that environmental tobacco smoke and maternal smoking during pregnancy are associated with decreased cognition and executive functions, and these associations are exacerbated by maternal hardship.[50–52] In contrast, studies of childhood exposure to second-hand tobacco smoke are rare, often focused on respiratory outcomes, and are methodologically challenging to conduct. Although a systematic review that included studies with a relevant population (children aged 2–5 years) reports associations of childhood exposure to second-hand tobacco smoke with poor cognitive performances, a few reports also associate child exposure to second-hand tobacco smoke with preschool behavioural outcomes after controlling for maternal smoking during pregnancy.[53,54]

Water pollution

Aligned with *The* Lancet *Commission on Pollution and Health* published in 2017, two types of water pollution were considered: unsafe water sources and poor sanitary conditions of the physical environment.[55] Evidence on the effects of unsafe water and poor sanitary conditions on early childhood development is scarce. Yet, the problem of drinking water polluted with microbial and chemical contaminants across LMICs is widely known. A systematic review of five studies, including one randomised controlled trial, showed that access to household, community, or facility-based sanitation, and sanitation marketing interventions, improved cognitive ability in children (aged 3 months to 14 years).[56] However, the review acknowledged poor quality of available evidence. Pathways linking poor sanitation and early childhood development are complex, with microbial ingestion leading to infections, repeated illnesses, and poor nutritional outcomes, which are known biological risk factors for poor developmental outcomes.[57]

Chemical and heavy metal pollution

The WHO's *International Program on Chemical Safety* identified ten chemicals and metals of major public health concern. Although overall toxicity of certain chemicals on children's health and development has been studied,[4,58] many of the over 185 000 chemicals available remain mostly untested in humans. Among heavy metals, child neurodevelopmental deficits due to exposure to lead and methylmercury are well documented, resulting in a global ban on the use of leaded gasoline;[59] however, exposure to lead in particular persists in many countries.[60,61] Similarly, direct or indirect exposure to pesticides, which are known neurotoxins, pose threats to young children both in agrarian and non-agrarian communities, particularly in LMICs where unregulated use is rampant.[62]

Research on pollutants and early childhood development is predominantly focused on populations in HICs, and more research is needed in LMICs settings where environmental pollution is a critical threat to public health, especially during crucial developmental periods including the next 1000 days.

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Climate crisis

Globally, climate change is leading to increased temperatures, changes in precipitation patterns, and rising sea levels.[63] These changes provoke extreme events such as increased number and intensity of heatwaves, tropical cyclones, extreme precipitation, and droughts. Young children are especially vulnerable to climate change effects, particularly in LMICs where climate change is expected to have the largest effect and where potential mitigation strategies are already compromised.[64] Children exhibit greater sensitivity to climate risks and threats due to their biological modalities and dependence on their caregivers, compromising adaptive capacity.[65] Model-based data, primary data, or both are urgently required to understand the associations between short-term and long-term exposure to climate-related stressors on several domains of early childhood development outcomes, co-exposure to pollution, and moderating factors that can be targeted for interventions to minimise the adverse effects.[66] Despite lacking much-needed evidence, it is postulated that climate change can potentially affect early childhood development through multiple direct and indirect pathways:[67] infrastructure damage and reduced household income and productivity directly and indirectly affecting children's access to early childhood care and education, influencing caregiving ability and caregivers' interactions with young children; increased food insecurity or poor nutrition, and increased mortality and morbidity heightening biological and psychosocial risks; climate change negatively impacting caregivers' mental health, in turn compromising nurturing care (appendix p 21); and adversely affecting active play opportunities, outdoor time and connectedness to nature, and healthy sleep hygiene.

underestimated because, for example, 55% of children with cerebral palsy without comorbid intellectual disability have been excluded.[91,94] Barriers to diagnosis of autism spectrum disorder and attention deficit hyperactivity disorder in LMICs could also contribute to underestimation.[94,95] Crucially, UNICEF estimates on the prevalence of disability in children aged 2–17 years suggest that, when data focus more specifically on functioning, 5% of children have difficulties in domains such as communication and behaviour, regardless of specific diagnoses.[96] Improved data related to prevalence, unmet needs, and contextually appropriate early childhood intervention strategies are needed to enhance inclusion of children with disabilities in early childhood development strategies in the next 1000 days. Children with developmental delays and disabilities have poorer health and reduced access to health, education, and protection services.[97] They are more likely to experience trauma, abuse and neglect than typically developing peers and are differentially vulnerable to risks.[98–103] Consequently, young children with developmental delays and disabilities require targeted, often multisectoral (eg health, education, social protection), supports through inclusive interventions to reduce the potential for further disadvantage.[26]

Early childhood intervention (in both the first and next 1000 days) is based on evidence that providing a range of supports and services to young children with developmental delays and disabilities can improve their long-term developmental trajectory and reduce their risk of secondary health, psychosocial, and educational sequelae. Some children with developmental delays and disabilities in the next 1000 days of life have clearly identifiable risk factors for developmental difficulties in earlier life. Perhaps one of the best researched examples are children who are preterm or very low birthweight or have other neonatal insults.[96] Where these children have been identified in the first 1000 days, ensuring continuity of targeted health services and additional early childhood intervention into mid-childhood is crucial. More broadly, developmental surveillance for all children is important, including ongoing identification of and intervention for delays and impairments as well as identification and management of comorbid health and emotional-behavioural conditions. Education services can also support early recognition of learning difficulties, social communication, and emotional behavioural disorders, which might be less readily identified in the first 1000 days. Caring for a child with a disability can compromise the caregiver's physical and mental health; therefore, caregiver support is an essential component in the provision of nurturing care for children with developmental delay and disability in the next 1000 days.[104–107]

Nutrition

Globally, micronutrient deficiencies, anaemia, and undernutrition have persisted among children younger than five years of age alongside an increase in child overweight and obesity,[108–110] which has led to an increasing double burden of malnutrition in many LMICs.[111] Although health services are primarily responsible for nutrition interventions in the first 1000 days, ECCE services might offer an efficient platform to implement nutrition interventions at scale during the next 1000 days.[8] Nutrition interventions that have evaluated developmental outcomes during the next 1000 days have primarily been micronutrient supplementation and parenting and home-visitation interventions that include various integrated nutrition counselling, supplementation, and growth monitoring components.[112–114]

Suboptimal breastfeeding and linear growth faltering in the first 1000 days are associated with poorer developmental outcomes;[115] however, evidence on the associations of a child's diet, nutritional status, and catch-up growth

with developmental outcomes during the next 1000 days is less conclusive.[116,117] The effect of child micronutrient supplementation on developmental outcomes is limited, with most evidence from trials evaluating the effect of supplementation during the first 1000 days of life.[118–120] Randomised trials of iron supplementation,[118,121,122] zinc supplementation,[118,123] or other single nutrient interventions[119,120,124] in children have shown no or small effects on development outcomes, but greater beneficial effects might be possible for multiple micronutrient supplements.[119,120,125,126] Combined macronutrient and micronutrient interventions during the complementary feeding period could produce greater beneficial effects on early childhood development outcomes in undernourished populations.[119,127] However, evidence is lacking for children in the next 1000 days with more robust evaluations needed of the effect of food supplementation in existing ECCE programmes on children's development, in addition to nutrition and growth (eg, Integrated Child Development Services, India). There is very limited evidence on the effect of integrated ECCE and preschool feeding programmes on nutrition, early childhood development, and schooling outcomes.[126,128–130] There is also no clear evidence on obesity as a risk factor for suboptimal early childhood development,[131,132] although negative psychosocial effects of obesity on children have been documented.[133,134] The few studies of integrated ECCE services and school meals, which varied in terms of quality and quantity of nutrition provided, have reported mixed results on child growth and developmental outcomes.[135–139]

Overall, more research is needed to determine the effect of nutrition interventions integrated with ECCE services on development outcomes in the next 1000 days as well as the potential for ECCE multisectoral partnerships with health, agriculture, and other sectors that support nutrition. These can inform effective and feasible integration of nutrition supplementation in ECCE services (eg, quality and adequacy of nutrition supplementation, training of ECCE workers, monitoring of nutrition inputs, and strengthening family and ECCE partnerships) without unintended negative consequences on either children's development and learning, or their nutrition and growth. Due to the importance of nutrition in health and growth of children[108] and the potential relation with obesity and non-communicable diseases in adulthood,[140,141] good nutrition should remain a priority for children during the next 1000 days.

Family environment

Parenting

Parents shape their children's development through the quality of nurturing care provided.[7] As children acquire additional skills during the next 1000 days, parents expand and use more complex caregiving behaviours (eg, verbal scaffolding, positive discipline, and promoting peer relationships and socialisation) to respond to their children's progressive abilities and needs.[142,143] Despite a few interventions targeting sensitive and stimulating caregiving in the first 1000 days of a child's life showing sustained effects on skills and behaviours during the next 1000 days,[144,145] longitudinal follow-ups during this period are rare, and intervention effects tend to be diminished,[146] with only one study from Jamaica that has tracked children into adulthood.[147,148] Scarce research in this area exists, but shows that the quality of home stimulation and caregivers' behaviours, cognitive skills, and caregiving knowledge contribute to child outcomes during the next 1000 days over and above indices of economic advantage.[149–152] These data highlight the importance of continuity of parenting support, tailored to specific developmental periods, throughout the life course. Parenting interventions typically focus on promoting nurturing parenting practices and supporting children's development, learning, and behaviours. They are generally of short duration, delivered in groups, and are mostly targeted towards mothers or primary female caregivers. In contrast to parenting interventions delivered in the first 1000 days, few interventions are delivered by health providers in the next 1000 days.[153] Interventions can lead to improvements in parenting practices[154–161] and parent–child interactions.[155,160,161] Benefits to children include reductions in child behavioural problems,[154,159,160] improvements in cognitive and language development,[155,157,161] and improvements in working memory.[161] Parents play an important role in supporting their children in the next 1000 days including supporting successful transition to ECCE services. There is some evidence from LMICs, for example from Malawi, that packaging a parenting intervention with an ECCE quality improvement intervention is beneficial,[157] which is also observed from meta-analyses of parenting integrated with ECCE in the US.[162] Aligning parent and teacher expectations can optimise this approach.[163,164]

In LMICs, there are fewer parenting interventions for the next 1000 days compared with the previous period.[7] Interventions tend to be child-focused, with less attention to the enabling environment of care as recommended in the NCF (eg, resource availability, social protection, and safety nets), the needs of caregivers (eg, mental health support), the engagement of other caregivers in addition to mothers, and child and family friendly policies (eg, affordable, accessible, and quality childcare, child benefits, and banning of physical punishment of children).[8] These warrant greater attention.

Violence in children's environments

Violence against children, including psychosocial neglect and deprivation (eg, some forms of institutionalisation), psychological aggression, physical maltreatment, sexual abuse, witnessing parental intimate partner violence, direct and indirect exposure to community violence, or geopolitical crises and civil conflict[165] is prevalent around the world.[166,167] During the

next 1000 days children are at risk of experiencing deprivation and other forms of violence that are also common in this period, and are at higher risk of experiencing physical maltreatment in the form of physical punishment.[168] Violence can be particularly detrimental in these early years due to the rapid and context-dependent development of the brain and key skills, including executive function and self-regulation.[10]

All forms of violence are associated with adverse child outcomes. Neglect and early deprivation are associated with delayed physical growth;[169,170] impaired language,[171–173] cognition,[174] executive function,[175,176] and social-emotional[177–182] skills; and higher internalising and externalising symptoms throughout the lifespan.[183–189] Physical maltreatment, including physical punishment in the next 1000 days,[166,190] is associated with problems in social-emotional development,[191–193] emotion regulation,[194] increased aggression and behaviour problems,[195–200] slower cognitive growth,—and increased mental health problems.[201–203] Children exposed to intimate partner violence have a higher morbidity rate,[204–209] worse nutritional status,[210,211] and mortality[212–215] compared to unexposed children. Exposure to geopolitical crises is linked to delayed physical growth and worse nutritional status,[216–219] mental health disorders and trauma symptoms,[220–225] and a higher probability of mortality before five years of age.[226–228]

The timing of exposure to violence affects health and developmental outcomes.[173,181,187,229] Early intervention to guarantee children's safety and protection is fundamental to promoting resilience and positive adaptation and there is evidence to show that parenting programmes with a focus on prevention of violence are an effective strategy to reduce violence against children, although more research is needed from LMIC settings.[230,231] Further research is also needed in two related areas. First, while institutionalisation, physical punishment, and civil conflict might be more predictive of behaviour and health problems for boys than girls,[186,195,217,232] further research is needed to understand specific gender differences. Second, although children are more likely to experience physical punishment in the home, more experimental evidence on the effectiveness of parenting interventions aimed at reducing physical punishment in LMICs is needed.[230,233] Identifying effective interventions to reduce all forms of violence against children and to promote resilience is more urgent than ever, considering that children's exposure and vulnerability to violence has increased during the COVID-19 pandemic.[234,235]

Mental health of parents and the social-emotional development of children

Children's social-emotional development is indicated by capacities to express and manage emotions and to develop affiliations,[236] and is shaped by the social-emotional qualities of relationships with adult caregivers and primary caregivers' mental health in the next 1000 days. A systematic review[237] found exposure to maternal mental disorders (postnatal) is most frequently assessed, with the most common exposure being depression, although studies have also assessed maternal anxiety, other common mental disorders, and stress. Child outcomes assessed include internalising and externalising problems, emotionality and temperament, and personal-social skills. The timing of exposure to maternal mental health problems and child social-emotional development has been specifically examined during pregnancy and the postpartum period, mostly finding that early exposure to maternal depression, anxiety, stress, and mood symptoms results in a significant association with higher rates of later childhood emotional and behavioural problems.

Experience of parental mental disorders, predominantly maternal depression, is frequently associated with adverse child social-emotional development, including negative associations between prenatal and postnatal depression experienced by either parent and child social-emotional development.[238–252] Stress experienced by either parent[238,253–258] and parental anxiety[259] are negatively associated with this outcome. Common mental disorders experienced by mothers and grandmothers is negatively associated with emotion regulation and prosocial behaviours in children,[260–263] although parental anxiety and depression and child social-emotional development are not consistently associated.[249] Evidence suggests that maternal depression, anxiety, or stress during pregnancy or the postpartum year are associated with higher rates of later child emotional and behavioural problems.[243,244,246,247,252,257,259] Mediating factors (eg, negative parenting, parental conflicts, harsh discipline, intimate partner violence), which could be modifiable, can have adverse effects on children's social-emotional development.[238,239,242,253–256,259,263] In contrast, parental warmth and understanding are protective.[242] Severity and persistence of the mental disorder, low socioeconomic position, lack of social and partner support, and intimate partner violence increase the risk of adverse child outcomes.[240,244,246,248,251,252]

Evidence shows there is a disproportionate focus on the mental health of mothers, with only one investigation on the effect of paternal mental disorders;[258] therefore, more research on paternal mental health is needed. Little is known about potentially beneficial interventions to promote caregivers' mental health in the next 1000 days, and establishing whether assistance for caregiver mental health problems, with or without education, improves children's social-emotional development is needed. In addition, a growing body of research has shown that besides other contextual adversities like poverty and violence, racism and ethnic-based and gender-based discrimination can affect children's mental health and developmental trajectories.[264,265] Studies from HIC settings report maternal perception and exposure to racism is associated with detrimental effects on child outcomes, including mental health, as well as parenting practices and caregiver–child relationships.[266–268] However, more research

is needed to understand the specific developmental and health consequences of racism and discrimination in the next 1000 days, with conceptual frameworks that include a recognition of the effects of colonisation, and more policy efforts are warranted to protect children from racism and discrimination and its detrimental effects.

Father involvement

Approximately 70% of children co-reside with their fathers;[269] however, the global fatherhood literature has focused on expectant fathers or fathers of infants during the first 1000 days and with respect to maternal, newborn, and child health and nutrition.[270,271] In households where fathers are present, their traditional roles are typically characterised as financial providers and decision makers who may positively influence child outcomes through supporting their partners.[271,272] Fathers also directly influence early childhood development through dyadic father–child relationships, particularly in the first 1000 days,[273,274] but continuity during the next 1000 days remains important. Studies suggest that fathers may even be more willing to care for older children during the next 1000 days than infancy, when cultural and gender norms shape care as primarily women's responsibilities.[275,276] Also, frequency of paternal harsh discipline markedly increases during the next 1000 days, highlighting a time-sensitive window for engaging fathers in violence prevention.[277] Fathers' roles as decision makers and their aspirations for children's early education also manifests during the next 1000 days.[278]

Few parenting interventions in LMICs have included fathers to promote nurturing care during the next 1000 days. Parenting interventions in Colombia and among Syrian refugees in Lebanon and Jordan found that participating fathers reported reduced intimate partner violence, physical punishment, and parental mental health problems,[279] as well as improvements in mental health and parenting behaviours, and reductions in parenting stress and children's behavioural problems.[280] Despite these examples of father-inclusive interventions during the next 1000 days, gaps remain. For example, few interventions in LMICs have actively engaged fathers in ECCE.[278,281] In addition, evidence from HICs has supported associations between fathers' healthy lifestyle behaviours and diets and children's healthy behaviours and nutrition outcomes,[282–284] but there is a dearth of father-inclusive interventions for promoting healthy behaviours in young children in LMICs.

Early childhood care and education environments

Global rates of ECCE participation are rising, with 157 million (54%) preprimary age children in 196 countries enrolled before the COVID-19 pandemic.[285] Loss of ECCE opportunities during the pandemic has exacerbated an already challenging situation in ECCE access in the short and possibly longer term.[285] Participation in ECCE is associated with positive short-term developmental and physical benefits for children.[5,7,286–302] Generally larger effects on children's cognitive skills relative to social-emotional or health and nutritional outcomes are reported.[7,297,298] Although long-term effects are more mixed, durable positive effects on schooling outcomes (eg, academic achievement) have been found,[297,299,300,302] including positive effects on criminal behaviour, early pregnancy, and earnings into adulthood.[302] In general, larger effects are observed for children from low-income or disadvantaged households,[5,299,300,302] although equal benefits have been found for girls and boys.[299]

Formal ECCE services that include structured curricula, learning materials, and well-compensated staff tend to outperform programmes that do not.[5,289] Relatedly, programme quality features (eg, high-quality learning materials, positive and warm classroom environment, developmentally-appropriate and interactive instructional methods) are key determinants of ECCE effects.[5,7,287,289,302] Although ECCE quality improvement interventions generally benefit child outcomes,[5,294] the specific features most strongly tied to child development across LMICs have not been systematically reviewed. There is also a need for better measures of ECCE programme quality and pedagogical practices that reliably translate into gains in school readiness.[157,303] Children's duration of participation in ECCE is positively associated with developmental outcomes, but it is likely that dose and quality are interdependent (eg, regular attendance might only be beneficial in the context of high-quality programming).[294] Although most ECCE evidence focuses on older children participating in centre-based models, more research is needed on access and quality of group-based childcare services that reach the very youngest children. Additionally, there is evidence of the positive effects of *Sesame Street*, a culturally tailored educational television programme.[296] Although not a replacement for high-quality centre-based programming, this evidence highlights the potential of technology-based ECCE content in the absence of or as a supplement to face-to-face opportunities. Collectively, these findings suggest the need for research exploring the quality features and dose of ECCE in LMICs, to support equitable and sustained effects at scale.

Estimates of young children's access to nurturing care and development in the next 1000 days

The biological and environmental contributors to nurturing care, that in turn shape developmental outcomes, are multidimensional. This section summarises analyses estimating children's access to nurturing care, and the implications of access on children's developmental outcomes in the next 1000 days.[304] First, to estimate children's access to care, we used multiple imputation, and predictive modelling approaches were applied to nationally representative data from

426 349 children aged 3 and 4 years in 104 LMICs participating in UNICEF's Multiple Indicator Cluster Surveys (MICS) or the Demographic and Health Surveys.[305] Detailed methods for these analyses are provided elsewhere.[304] Based on the SDG targets and best available data, receiving minimally adequate nurturing care was defined as access to at least one of two supports in each of the five dimensions of nurturing care (table).[7] Although this definition of minimally adequate care is somewhat arbitrary and likely does not fully capture the level of care needed by children to reach their developmental potential, it still allows us to identify key gaps in children's current environments.[306]

It is estimated that only 25·4% (90% credible interval [CrI] 21·2–29·4) of 3 and 4-year-olds in LMICs are receiving minimally adequate nurturing care (table), leaving nearly three quarters of children (181·9 million, 172·2–192·3) behind. The percentage of children receiving adequate nurturing care varied substantially across 10 selected indicators, ranging from 86·2% (84·2–88·2) of children having a healthy weight, 71·9% (66·7–75·5) of children not having indicators of neglect or inadequate care, and 67·3% (64·4–70·3) of children not being, to just 29·3% (21·5–39·6) of children participating in ECCE, 29·7% (25·6–34·9) having received stimulation from a non-maternal caregiver (father, other adult relative), and 32·3% (28·3–36·7) not having had physical punishment.

Access to nurturing care varied systematically across regions, with 68·0% (56·9–76·6) of children receiving adequate care in LMICs in Europe and central Asia, compared to only 7·9% (6·8–9·2) of children in sub-Saharan Africa (figure 4). Similar disparities existed by country income status, with 50·8% (38·3–60·7) of children receiving adequate care in upper-middle-income countries compared to just 5·6% (4·8–6·4) in low-income countries (figure 4). In a subset of 54 countries with available child-level data, children from households in the top 20% of the within-country wealth distribution were more than 30% more likely, on average, to receive minimally adequate nurturing care than those from the bottom quintile. Gaps were smaller, but still apparent, by urbanicity and gender—children from urban areas were more than 14% more likely, on average, to receive

	Definition	Estimated percentage of children (90% CrI)	Estimated number of children, millions (90% CrI)
Responsive care (SDG target 4.2)			
Adequate maternal stimulation	Mother engaged child in at least four of six activities (eg, reading and playing) in the past 3 days	32·9% (28·7–38·5)	80·2 (70·1–93·9)
Adequate stimulation from other caregivers	Father, other caregiver, or both, engaged child in at least four of six activities (eg, reading and playing) in the past 3 days	29·7% (25·6–34·9)	72·4 (62·4–85·0)
At least one indicator met	..	48·2% (42·9–54·2)	117·7 (104·6–132·2)
Early learning (SDG target 4.2.2)			
Early childhood care and education participation	Child attends an organised learning or early educational programme	29·3% (21·5–39·6)	71·5 (52·5–96·6)
Learning materials in the home	Child's household has at least one book and at least one toy	33·2% (27·5–38·3)	81·0 (67·1–93·5)
At least one indicator met	..	43·8% (36·5–50·5)	106·8 (89·0–123·3)
Safety and security (SDG target 16.2.1)			
Absence of physical punishment	Child not exposed to any of six physical forms of punishment (eg, spanking) in the past month	32·3% (28·3–36·7)	78·7 (68·9–89·5)
Absence of neglect or inadequate care	Child not left alone or unattended or in the care of another child in the past week	71·9% (66·7–75·5)	175·4 (162·6–184·1)
At least one indicator met	..	78·1% (74·0–81·7)	190·5 (180·5–199·3)
Nutrition (SDG targets 2.2.1 and 2.2.2)			
Absence of stunting (2.2.1)	Child has height-for-age Z score of ≥–2	67·3% (64·4–70·3)	164·1 (157·1–171·5)
Healthy weight (absence of wasting or overweight; 2.2.2)	Child has weight-for-height Z score of ≥–2 and ≤2	86·2% (84·2–88·2)	210·3 (205·4–215·1)
At least one indicator met	..	80·8% (78·5–83·4)	232·2 (232·2–234·4)
Health (SDG target 6.1.1)			
Adequate water, sanitation, and hygiene	Child's home has an improved drinking water source and an improved sanitation facility	58·3% (54·8–61·8)	142·3 (133·7–150·8)
Absence of infection	Child was not sometimes too sick to play	61·4% (54·5–66·3)	149·7 (133–161·7)
At least one indicator met	..	95·2% (94·3–96·1)	197·1 (191·4–203·3)
Overall minimally adequate nurturing care			
Access to at least one indicator in each of the five dimensions of nurturing care	..	25·4% (21·2–29·4)	62·0 (51·6–71·7)

See McCoy et al (2022)[304] for details of data and methods used. CrI=credible interval. SDG=Sustainable Development Goals.

Table: **Estimates of the percentage and number of children with access to indicators of nurturing care in the next 1000 days**

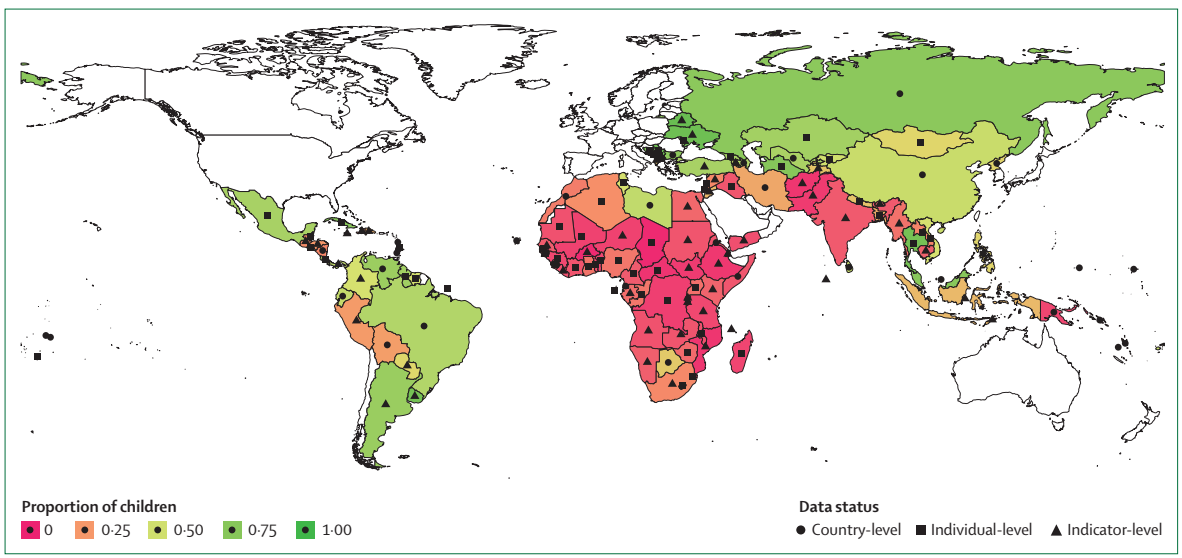

Figure 4: **Estimates of the proportion of children receiving adequate nurturing care, by country**
Data status shows missing data at the country, individual, and indicator levels. For details of data and methods used, see McCoy et al (2022).[304]

minimally adequate care than those from rural areas, and girls less than 2% more likely, on average, to receive minimally adequate care than boys.

Next, using data from a convenience sample of 18 373 children aged between 3 and 7 years (51·0% girls) from 25 LMICs in Save the Children's International Development and Early Learning Assessment (IDELA) database (appendix p 22),[307–310] positive associations were identified between indicators of early learning and responsive care (ie, access to ECCE, presence of learning materials in the home, high stimulation from mothers or others) and multiple child outcomes (ie, literacy, motor skills, numeracy, and social-emotional development). Considering the holistic total IDELA score, this analysis found that by age 5 years, children who had received support in both early learning and responsive care were 0·87 standard deviations ahead of their peers who lived without these supports (figure 5)—a difference equivalent to approximately two years of developmental progress. The strongest associations emerged for access to ECCE and presence of learning materials in the home, supporting the idea that children require stimulating early learning environments for optimal development in the next 1000 days.[311,312] However, the strength of the associations between different indicators of nurturing care and developmental domains varied considerably, reinforcing the unique role that particular dimensions of care might play in shaping different developmental skills, and that some dimensions remain to be explored fully.

These findings highlight the inequities across settings, family circumstances and nurturing care dimensions, and support the multidimensionality of nurturing care and children's development in the next 1000 days. Work is needed to monitor these developmental inputs and

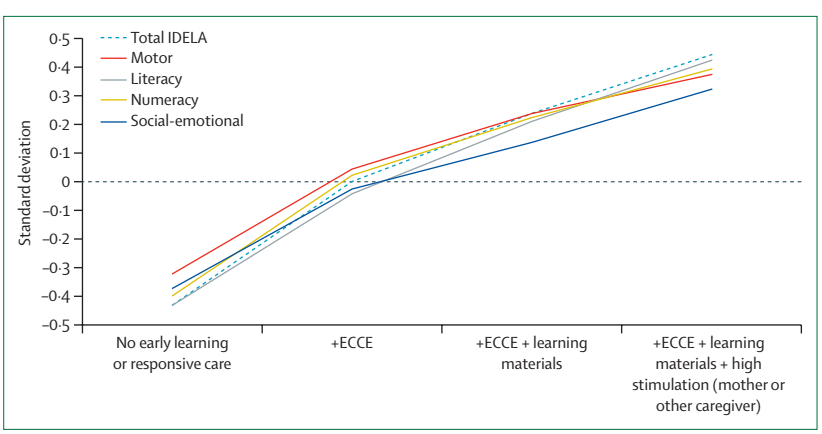

Figure 5: **Associations between selected nurturing care dimensions and child development**
ECCE=early childhood care and education. IDELA=International Development and Early Learning Assessment.

outputs on a global scale, including in HICs as well as for relevant subpopulations (eg, children living with disabilities). Instruments such as UNICEF's new Early Childhood Development Index 2030, which aligns more completely with the next 1000 days period of development compared with either the older version of the MICS or IDELA, will support such efforts, being incorporated into future rounds of the MICS and under consideration as the indicator for SDG 4.2.1 (ie, the proportion of children aged 24–59 months who are developmentally on track in health, learning, and psychosocial wellbeing, by sex). In addition, more emphasis on the depth, breadth, harmonisation, validation, and cultural relevance of measures of nurturing care is warranted, particularly in the areas of responsive caregiving and the quality of ECCE environments. When collecting data on early childhood development for national monitoring or research purposes, inclusion of measures that capture

the status of relevant nurturing care indicators as well as child development outcomes is paramount to understanding what levels and kinds of supports are needed for children living in different contexts. Although population level measures such as the MICS are useful in tracking national and global progress in child and care outcomes, in turn informing policy and programme investments, these data should be supplemented by ethnographic qualitative and observational studies, since population level measures are less capable of capturing mechanisms of change within or across cultures.[313] Such studies can provide valuable information on cultural variability across settings that support the content development of interventions and inform improvements in how we measure nurturing care outcomes. For example, Mesman and colleagues[314] explored responsive care in different LMIC settings, concluding that maternal responsiveness was observed, but the expression of responsiveness varied by context and cultural beliefs.

Interventions promoting development in the next 1000 days: a mapping review

This final section turns attention to the global landscape of interventions to protect, preserve and promote healthy development during this sensitive period, and presents findings from a mapping review[315] of published literature on the evaluation of developmental interventions (n=593, January, 1990–July, 2020, with typically developing children [ie, those without identified developmental delay, disability, or disorder]) in the next 1000 days. The aim of this review was to map published interventions that promote key developmental outcomes in the next 1000 days (figure 1), to identify possible gaps in intervention efforts and related research (particularly in LMICs), and highlight imperatives for addressing inequities in children not receiving adequate nurturing care to optimise development in the next 1000 days. Details of the review methodology are available in the appendix (pp 23–26) and published elsewhere.[315]

The number of published interventions increased substantially from 2010 (79% published from 2010 onwards). Across the full period, the number of published interventions was largely driven by research in high-income westernised countries (as previously defined by WHO;[316] 70%, n=416) with 44% (n=258) of all interventions from the USA. Only 5% (n=32) of interventions were conducted in LMICs, although 49% of the total number of interventions targeted low-income or vulnerable populations in all countries; only five interventions targeted children in emergency and humanitarian settings. There have been some published interventions from LMICs in the years subsequent to the period covered in the review (eg, Ghana,[317] Rwanda,[318] Peru,[319] and South Africa[320]), but the gap in research remains, and has been highlighted in child development research more generally.[321] The uneven geographical distribution of these interventions (figure 6) shows the gaps between children benefiting from interventions to promote development (mostly in HICs), and those who are exposed to inadequate nurturing care (mostly in LMICs). Many interventions (80%) took place in ECCE settings (70% in LMICs). ECCE curricula and activities, teacher training and support, and other forms of ECCE delivery (eg, intervention delivered by specialists) were the main mode of intervention delivery (72%). Children's literacy and language outcomes were the target of 27% of interventions, and 25% of interventions targeted early childhood development more holistically (eg, school readiness) or multiple developmental domains (eg, literacy and numeracy).

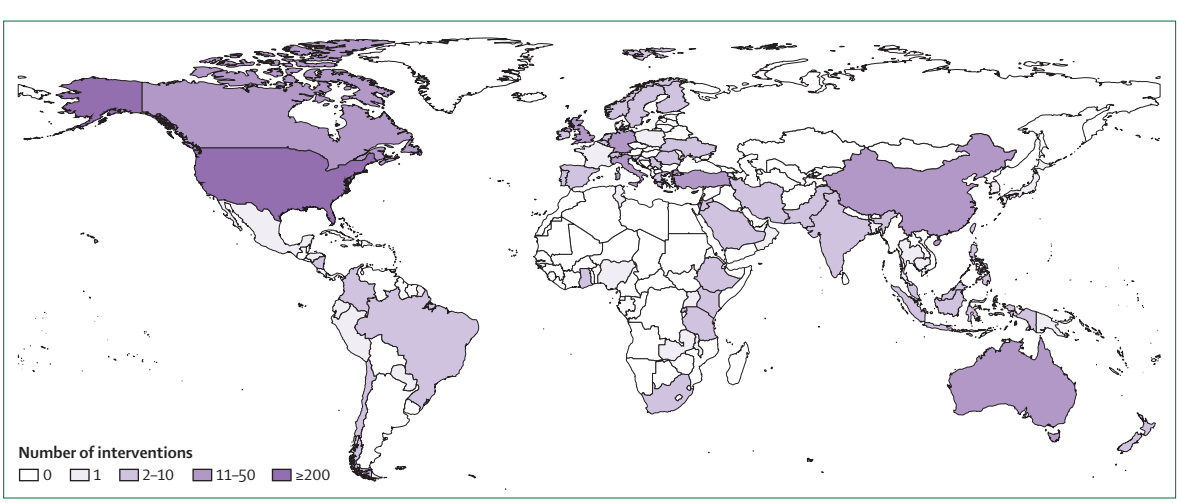

Figure 6: **Number of published interventions promoting healthy development during the next 1000 days, by country**
No country had more than 50 interventions published except for the USA, which was the only country to have more than 200 interventions published.

These findings highlight the mismatch between the global regions where interventions are most needed and the areas where interventions are being implemented, evaluated, and published. Based on these review findings, and data presented on protective environments, gaps need to be addressed in terms of parenting, family mental health, violence prevention, and nutrition interventions to promote and support development in this age group. These findings suggest that ECCE settings can offer a protective environment for promoting child development and highlight the substantial shift from positioning interventions within health platforms in the first 1000 days. This shift is accompanied by a shift in stakeholders from the health to education sector, which contributes to a disconnect in policy and practice, and might not integrate well with social protection. These shifts point to the importance of transition from the first to the next 1000 days, in terms of systems and interventions, as well as developmental outcomes and risks. Despite calls for integrated systems of care and education,[6,322] the potential for multisector support in the next 1000 days has yet to be achieved, as seen by the low number (8%) of multicomponent interventions. It would be valuable for future reviews of interventions to promote development in the next 1000 days to not only evaluate the effectiveness of interventions, but to also evaluate the quality of studies and explain in depth the mechanisms of change in interventions.

Conclusion

A range of inputs and outputs are essential to capture the multidimensionality of development in the next 1000 days, and to understand the cumulative and continuous nature of this development from a life-course perspective. It is noteworthy that some areas of evidence are more limited than others, as shown by the range of review methodologies undertaken on environments of care based on the availability of evidence. However, all inputs in the early childhood period require more disaggregation of findings salient to the next 1000 days. Attention is warranted on how to effectively leverage partnerships across health, nutrition, ECCE, and protection platforms, informed by relevant data in key areas including: multidimensional and nationally representative child outcome data (ie, data that break down development into subdomains and recognise the differentiation in skills happening in this period); data on vulnerable subpopulations (eg, children with disabilities, children in humanitarian response settings); and data on culturally and contextually specific early childhood development skills (eg, self-discipline). Opportunities to leverage ECCE to promote development across multiple dimensions could include ECCE plus parenting, school feeding, or health screening for vision, hearing, or growth. Nuanced data on the environments that support children are needed, including: the quality of children's early learning environments, and the quantity, quality and responsiveness of interactions in children's ECCE settings and at home; behaviours, mental health, and beliefs of caregivers (including educators, fathers, and other adult caregivers); and community-level processes, such as social support for caregiving. A key consideration is how these environments might be drivers of inequalities in specific settings. For example, while improving access to ECCE is essential, the quality of ECCE must be considered so that the most vulnerable children are not provided with the lowest quality ECCE programmes. The environmental effects of climate change, or periodic pandemics, and the extent to which they could disproportionately disadvantage early childhood development in LMICs, are important emerging policy areas that will require further research in coming years.

Contributors

CED conceptualised and coordinated the series with inputs from the Series Steering Committee members (AKY, GF, MN, ADO, MST). CED and AKY conceptualised this paper in consultation with the Series Steering Committee members (GF, MN, ADO, MST) and advisory group. JO led the review on why the next 1000 days matter, SB led the review on health, KM led the review on developmental delays and disability, CRS led the review on nutrition, AKY led the review on parenting, JF led the review on mental health, JC led the review on violence, JJ led the review on fatherhood, DCM led the review on ECCE, and AR led the review on pollution and climate change. DCM, JC, LP, and JS analysed data on nurturing care inputs and child development. CED, SK, and SVW led the mapping review of interventions. All authors contributed to key messages and critically reviewed drafts of the manuscript. CED and AKY prepared the final draft of the manuscript for the Series, which all authors approved. CED and AKY had final responsibility for the decision to submit for publication.

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