Chapter 24

Identifying an Essential Package for Early Child Development: Economic Analysis

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INTRODUCTION

The eight other volumes in this third edition of *Disease Control Priorities* focus on health; this volume complements their focus by examining the synergies between health and education outcomes. Most of the chapters in this volume focus on children ages five years and older and on adolescents. This chapter deals with children younger than age five years, serving as a counterpart to the detailed analysis of young child health in volume 2 (Black and others 2016).

The importance and effectiveness of interventions to enrich early child development (ECD) are discussed in chapter 19 of this volume (Black, Gove, and Merseth 2017). Surveys of the literature for low- and middle-income countries (LMICs) include Engle and others (2007), Engle and others (2011), and Nores and Barnett (2010).

Recent literature has begun to consider the synergies in delivering interventions focusing on nutrition or health in conjunction with child development. Surveys have examined whether codelivery enhances outcomes, reduces costs, and increases cost-effectiveness or benefit-cost ratios (Batura and others 2014; Grantham-McGregor and others 2014).

This chapter examines the costs and benefit-cost ratios of interventions that incorporate responsive stimulation to achieve better child outcomes. The purpose is to develop and cost an essential package of ECD interventions appropriate across LMICs that will complement health and nutritional interventions.

We use the term *responsive stimulation* when discussing ECD interventions that highlight the importance of positive interactions between children and caregivers. Other terms are used in the literature, including *parenting*, *caregiving,* and *psychosocial stimulation*; these terms imply a unidirectional concept, rather than the bidirectional concept that underlies many theories of child development.

The most appropriate interventions vary according to children's ages. Children younger than age three years spend much of their time with parents, family members, or caregivers. Infants and young children need care and adult attention, and the ratio of children per adult needs to be low, making group settings less feasible and more costly. Between age three years and the age of school entry, children are more likely to be in a group setting outside of the home for at least part of the day; 54 percent of this age group worldwide is enrolled in preschool (UNESCO 2015). This practice is dictated in part by economics—the ratio of children per adult supervisor can be higher—and by children's developmental needs as they begin to interact more with peers.

The main public services with which children younger than age three years interact are those for health, nutrition, and social protection. Young children can benefit from community-based interventions (Singla, Kumbakumba, and Aboud 2015), but these interventions do not generally have national coverage. Delivering interventions for responsive stimulation in coordination

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with health and nutrition services for these younger children may be an effective approach in this age group.

After age three years, it is more appropriate to integrate health and nutrition interventions into preschools and schools because children have few regularly scheduled health visits unless they are ill. Accordingly, our discussion of the economics of ECD is divided into the two age groups: children younger than age three years and children ages three to five years.

Factors other than age also affect the best way to deliver interventions. The likelihood that children participate in preschool depends on income. Enrollment in preschool is lower in poorer countries and higher in richer ones; within countries, enrollment is higher in families in the highest wealth quintile compared with other quintiles (UNESCO 2015). Enrollment in group settings is likely to be higher in urban areas than in areas of lower population density. This means that program design has potential impacts on equity—urban and rural areas and countries at different income levels may need different services.

This chapter focuses on responsive stimulation interventions delivered through health and nutrition services for young children when they are usually accompanied by family members and preschool experiences for children ages three to five or six years. We do not discuss day care arrangements for younger children at length because they tend to be more informal and not necessarily of high quality, at least for Latin America and the Caribbean (Berlinski and Schady 2015). Because of the degree of dispersion, high required staff-to-child ratios, and problems in monitoring (Leroy, Gadsden, and Guijarro 2012), day care is not an easy modality by which to deliver interventions to improve responsive stimulation. We also do not cover interventions specifically intended to address the mental health of caregivers; mental health is the subject of volume 4 (Patel and others 2015).

We first briefly discuss the methods used for the literature search and the results on costs per child and benefit-cost ratios of interventions. We use this information to develop and cost an essential package and to derive some brief conclusions. Definitions of age-specific groupings and age-specific terminology used in this volume can be found in chapter 1 (Bundy and others 2017).

METHODS

We began with a systematic search of the published literature. The original searches of the literature for this volume undertaken in July 2014 and January 2015 did not yield any cost-effectiveness or benefit-cost studies for preschool children (Horton and Wu 2016), most likely because the search terms were not specific enough. A second, more specific, search was undertaken in July 2015 with additional search terms (annex 24A) that yielded three relevant articles, two of which contained benefit-cost or unit cost information. Other articles were obtained through consultation with experts, searches of bibliographies of relevant articles, and searches of gray literature.

In all, 11 articles that provide economic estimates were identified. One contained information on benefit-cost ratios only, three on unit cost only, and seven on both. These articles cover a broad range of LMICs, although coverage of Latin America and the Caribbean was the most in-depth (five studies). One study was found for multiple countries in the Middle East, two for Turkey, one for Mozambique, and one for Pakistan, and one covers a broad range of LMICs. Although South-East Asia has large preschool programs and center-based care programs, no articles providing economic estimates were found for that region.

The 11 identified studies of the economics of ECD cover regions similar to those addressed in the larger literature on effectiveness of ECD discussed in chapter 19 in this volume (Black, Gove, and Merseth 2017). A survey and meta-analysis of the effectiveness literature outside Canada and the United States was undertaken by Nores and Barnett (2010). They restricted their coverage to experimental studies and to quasi-experimental studies with stronger designs, identifying 28 studies in 13 countries (4 in Latin America and the Caribbean, 4 in Asia, 3 in Western Europe, and 1 each in Mauritius and Turkey). Four of the programs identified in Nores and Barnett's (2010) survey are also covered in the economic literature—the interventions in Bolivia, Jamaica, Turkey, and Uruguay that are discussed in the next two sections. It is a noticeable omission that no effectiveness and benefit-cost studies are available for Sub-Saharan Africa.

Our survey of cost and benefit-cost is therefore likely to be fairly representative of the larger literature on effectiveness, and there is overlap of actual programs covered. We know quite a lot about the few programs that have been the subject of well-designed research studies. These programs may be more effective than the average, but because they are more intensive, they may cost more. The same would be true for the United States, where the Perry Preschool Project, Head Start, and the Abecedarian Project were intensively studied, with long-term follow-up. Other programs that have not been studied may be less costly, but they may also be less effective and less cost-effective. However, the objective should be to try to replicate good-quality, effective programs.

The literature on both effectiveness and economic aspects also has a regional bias. Studies focus more on

middle-income countries; in particular, we know very little about cost and effectiveness in Sub-Saharan Africa, where coverage is lowest and expansion of coverage is most needed.

BENEFIT-COST RATIOS OF EARLY CHILD DEVELOPMENT INTERVENTIONS

Children Younger than Age Three Years

Recent studies have examined the effectiveness of combined health, nutrition, and early childhood interventions in LMICs for children, typically younger than age three years (Grantham-McGregor and others 2014; Nores and Barnett 2010). Table 24.1 presents our benefit-cost findings based on our literature search.

Two randomized controlled trials for Pakistan and the Caribbean had positive economic evaluations. The benefit-cost ratio for an intervention in Antigua, Jamaica, and St. Lucia that developed videos and showed them to parents waiting in health centers, followed by group discussion, was 5.3 (Walker and others 2015). In Pakistan, a randomized controlled trial compared nutrition alone, responsive stimulation alone, and the two combined against a control receiving usual care (Gowani and others 2014). The combined option had the best outcome and cost less than the other two interventions. The lower costs were unrepresentative of an intervention at scale because they were due to two vacant supervisor positions, and the research study may have helped compensate for the absence of usual levels of supervision.

López Boo, Palloni, and Urzua (2014) estimated a benefit-cost ratio of 1.5 for an intervention in Nicaragua that combined responsive stimulation and a nutrition intervention of multiple micronutrient powders for children younger than age three years. However, the entire benefit is based on reduction of anemia, which is likely to be predominantly due to the nutrition intervention; it does not take into account any cognitive benefits

Table 24.1 Benefit-Cost Ratios of Early Child Development Interventions

Study	Country or region	Comments	Benefit-cost ratio (d = discount rate)
Ages zero to two years			
Berlinski and Schady 2015	Latin America	Home visits; modeled costs and returns, using 3 percent discount rate. Outcomes: child cognitive skills; mother's employment.	3.6 (Guatemala) 2.6 (Colombia) 3.5 (Chile)
Walker and others 2015	Jamaica, St. Lucia, Antigua	Details not yet published; summary results cited in Berlinski and Schady 2015.[a]	5.3
Gowani and others 2014	Pakistan	Parenting intervention took advantage of spare capacity (home visits without intervention were "too short"); combined intervention was less costly because two regular supervisory posts vacant; likely not replicable in nonresearch setting.[a]	Not calculated, but combined nutrition and parenting very favorable
López Boo, Palloni, and Urzua 2014	Nicaragua	Benefit-cost ratio is for combined effect of Sprinkles[b] and early child development, but effect calculated on the basis of anemia (likely to be primarily effect of Sprinkles).[a]	1.5
Ages three to five years: Preschool programs			
Behrman, Cheng, and Todd 2004	Bolivia	Range depends on assumptions about gain in earnings from increased educational attainment, and cost of education.[a]	2.28–3.66 (d = 3%) 1.37–2.48 (d = 5%)
Berlinski and Schady 2015	Latin America	Modeled benefits (child cognitive skills hence future earnings, and mother's employment) compared to preschool costs.	5.1 (Guatemala) 3.4 (Colombia) 4.3 (Chile)
Berlinski, Galiani, and Manacorda 2008	Uruguay	Modeled benefits of increased school grade completion, net of cost of preschool and additional school cost.	19.1 (d = 3%) 3.2 (d = 10%)

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Table 24.1 Benefit-Cost Ratios of Early Child Development Interventions (continued)

Study	Country or region	Comments	Benefit-cost ratio (d = discount rate)
Engle and others 2011	73 low- and middle-income countries	Modeled change in wages due to increased school attainment, associated with increased preschool participation. Includes additional preschool cost but not school cost.	14.3–17.6 (d = 3%) 6.4–7.8 (d = 6%)
Kaytaz 2004	Turkey	Considers cost of preschool education plus forgone earnings of students staying longer in school. Range depends on assumptions on share continuing to tertiary education.[a]	2.18–3.43 (d = 6%) 1.12–1.69 (d = 10%)

Note: For details of interventions, see table 24.2. Berlinski and Schady (2015) also model the benefit-cost ratio of day care provision to children ages zero to five years as 1.2 (Guatemala), 1.1 (Colombia), and 1.5 (Chile), also using a modeling exercise and discount rate of 3 percent. Psacharopoulos (2015) provides benefit-cost estimates of 3:1 for preschool in the Philippines citing Patrinos (2007), and 77:1 in Kenya, citing Orazem, Glewwe, and Patrinos (2009). Patrinos (2007) cites Glewwe, Jacoby, and King (2001), which is a study of the return to nutrition interventions in preschools in the Philippines; and Orazem, Glewwe, and Patrinos (2009) cite Vermeersch and Kremer (2004), which is a study of the return to school meals in Kenya. We have not included these estimates.

a. Measured outcomes are described in table 24.2.

b. Sprinkles is a brand of multiple micronutrient powders.

resulting from responsive stimulation. Finally, one study for Latin America and the Caribbean models the effect of a home visiting program that educates mothers in child development (Berlinski and Schady 2015); however, this program is not combined with a nutrition or health intervention. Benefit-cost ratios for the three countries ranged from 2.6 to 3.6. There may be other benefit-cost studies of home visiting programs in LMICs that we did not survey given that our search focused on combined programs that included health interventions. More economic studies of combined interventions would be helpful.

Children Ages Three to Five Years

There is a larger literature on preschool programs than on programs for younger children (table 24.1). Benefit-cost ratios of preschool for five countries—Bolivia, Chile, Colombia, Turkey, and Uruguay—generally exceeded 3 (using a discount rate of 3 percent or higher); in Uruguay, the benefit-cost ratio was 19.1, using a discount rate of 3 percent. Benefit-cost ratios for preschool ages remained generally greater than 1 for discount rates up to 10 percent. A cross-country study generated a benefit-cost ratio of 14.3–17.6, but it did not incorporate the requisite additional costs of greater school enrollment (Engle and others 2011).

A nutritional add-on to preschool—a breakfast of porridge—generated an extraordinarily high benefit-cost ratio of 77 in Kenya (Psacharopoulos 2015, citing Orazem, Glewwe, and Patrinos 2009, who in turn use Vermeersch and Kramer 2004). However, the underlying empirical study does not appear to have been published, and it is not clear that Psacharopoulos (2015) accounted for the cost of the breakfast in the calculations.

The benefit-cost ratios estimated for LMICs are slightly lower than those estimated for well-known preschool studies in the United States, which ranged from 2.7 to 7.2 for three programs (Temple and Reynolds 2007). One difference is that the type of longitudinal studies available in the United States has not been conducted in LMICs; Gertler and others (2014), one of the first, is a 20-year follow-up to a seminal intervention in Jamaica. For LMICs, there are estimates of the benefits in cognitive achievement, school attainment, and wages. There are few data, however, on some of the substantial costs avoided by quality preschool programs in the United States, such as the costs of crime. LMIC estimates probably underestimate the benefits of ECD interventions; Gertler and others (2014) found large effects on wages for Jamaica that were associated with increases in international migration for the treated group.

Comparing across all programs irrespective of child age, the benefit-cost ratio of integrated programs tends to be higher than that of stand-alone programs. This outcome may be due in part to lower marginal costs of the intervention, as well as possible synergies in outcomes. This inference relies on four studies (Gowani and others 2014; López Boo, Palloni, and Urzua 2014; Walker and others 2015; and a subsequent interpretation by Psacharopoulos 2015 of Vermeersch and Kremer 2004). Because two of these are not or not yet published (Walker and others 2015; Vermeersch and Kremer 2004), and the study designs of the other two have unique features, additional studies are needed to confirm this tendency.

UNIT COST OF INTERVENTIONS

Unit cost data are presented in table 24.2. There are some inconsistencies in the data, for example, Araujo, López Boo, and Puyana (2013) reported financial costs that do not take account of volunteers, donations, and parental contributions. Programs for younger children are more heterogeneous in structure. They vary from day care (Araujo, López Boo, and Puyana 2013; Behrman, Cheng, and Todd 2004), to programs to educate mothers of children ages five and six years in groups (Chang and others 2015; Sirali, Bernal, and Naudeau 2015), to home visits (Gowani and others 2014; van Ravens and Aggio 2008). What is covered in the costs for preschool programs is more uniform because the programs are somewhat more standardized, but preschool programs also vary in intensity, for example, hours per week and ratio of children to teachers.

Costs are updated to 2012 U.S. dollars to permit comparisons, and comparing costs as a percentage of per capita gross national income (GNI) is also useful. Berlinski and Schady (2015) and van Ravens and Aggio (2008) model costs, arguing that the salary of an ECD educator has approximately a constant relation to the salary of a primary teacher; that primary teachers' salaries have a predictable relationship to GNI; and that the educator-to-child ratio is fairly predictable, depending on child age (very high for day care, lower for preschool, and lower still for group education programs for parents and caregivers).

Table 24.2 Unit Costs of Early Child Development Interventions

Study	Country or region	Intervention and outcomes measured	Cost in study	Unit	Currency (year)	Annual cost per child in 2012 US$	Annual cost per child as share of GNI (percent)
Ages zero to two years							
Araujo, López Boo, and Puyana 2013	Latin America and the Caribbean	Financial costs for four parenting programs across Latin America and the Caribbean, ranging from US$13 to US$599 per child; median = Mexico and Ecuador. No outcome measured.	188 (median)	Child per year	US$	220	2.2 for median countries
Walker and others 2015	Antigua, Jamaica, and St. Lucia	Parents were shown a video on responsive stimulation at routine health visits, engaged in group discussion, and received small books and puzzles to use at home. Outcome: parenting scale, Griffith Mental Development Scale, Communicative Development Index.	100	Child over 15-month period	2012 US$	100[a]	2.0
Gowani and others 2014	Pakistan	Lady Health Workers (who provide health and nutrition advice in home visits) were trained to also give responsive stimulation; also monthly group meetings held with mothers; 2x2 factorial design. Outcomes: cognition, motor, language scores.	4	Child per month, birth to 24 months	2012 US$	48	3.8
López Boo, Palloni, and Urzua 2014	Nicaragua	PAININ program provided three-hour care per day in centers (with ECD and Sprinkles[b]) in urban areas; home parenting visits twice a week in rural areas by volunteer mothers. Outcomes: anemia, hemoglobin, verbal and numeric memory.	37	Child per year	2012 US$	37	2.1
van Ravens and Aggio 2008	Middle East	Home visiting: develop formula that cost per child is 16/(total fertility rate), as % of per capita GDP; range of costs US$13–US$1,393 for 19 countries. No outcomes.	85 in median country (Jordan)	Child per year	2006 US$	117	2.3

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Table 24.2 Unit Costs of Early Child Development Interventions (continued)

Study	Country or region	Intervention and outcomes measured	Cost in study	Unit	Currency (year)	Annual cost per child in 2012 US$	Annual cost per child as share of GNI (percent)
Ages three to five years							
Araujo, López Boo, and Puyana 2013	Latin America and the Caribbean	Financial costs from 28 child care programs, ranging from US$257 to US$3,264 per child; median = Mexico and Ecuador. No outcomes measured.	836 median	Child per year	2010 US$	977	10 for median countries
Behrman, Cheng, and Todd 2004	Bolivia	PIDI: provides day care to children ages 6–72 months in poor, largely urban areas; 40 percent of cost is food. Outcomes: motor, language, psychosocial skills; nutritional status.	43	Child per month	1996 US$	600	26.0
Berlinski, Galiani, and Manacorda 2008	Uruguay	Government-provided preschool for ages four to five years. Outcomes: subsequent school attainment.	1,164.80 (US$129.10)	Child per year	1997 Uruguayan pesos	198	1.4
Kaytaz 2004	Turkey	Preschool. Outcomes: subsequent school attainment.	886,424,000 (US$552)	Child per year	2002 Turkish liras	1,245	11.5
Martinez, Naudeau, and Pereira 2012; Sirali, Bernal, and Naudeau 2015	Mozambique	Preschool for three and a quarter hours per day; cost in pilot phase (Martinez, Naudeau, and Pereira 2012) was only half of cost in scale up (Sirali, Bernal, and Naudeau 2015). Outcomes: subsequent enrollment in primary school; scores on various development tests; spillover to older sibling school enrollment and parents' work time.	25 (pilot); 50 scale up	Child per year	2010[c] US$ 2012[c] US$	50 (at scale-up)	9.4
Sirali, Bernal, and Naudeau 2015	Turkey	MOCEP 25-week training program for mothers and children ages five to six years; lectures and discussions once per week, kits for use at home, home visits by trainers. No outcomes discussed.	40	Participant (25 weeks)	2010 US$	90[a]	0.8
van Ravens and Aggio 2008	Middle East	Preschool: develop formula that cost per child is 12.5 percent of per capita GDP; range of costs US$54–US$3,482 for 19 countries. No outcomes discussed.	239 median country Jordan	Child per year	2006 US$	330	6.5 for median country

Note: ECD = early child development; GDP = gross domestic product; GNI = gross national income; MOCEP = Mother and Child Education Program; PAININ = Comprehensive Childcare Program; PIDI = Programa de Atención Integral a la Niñez Nicaragüense, Proyecto Integral de Desarollo Infantil.

a. Cost is for duration of program per child; duration is not exactly one year.

b. Sprinkles are a brand of multiple micronutrient powders.

c. Original authors do not specify dates; these are estimated by current authors.

Berlinski and Schady (2015) explained that the cost of preschool programs varies systematically with process quality. More intensive supervision adds about 10 percent to the cost of preschool programs, while structural quality—quality of buildings, higher pay for teachers, smaller class sizes—can add up to 300 percent to the basic cost of preschool programs. The data are insufficient to examine the benefit-cost ratio variations of basic, improved process quality, and improved structural quality programs, although Berlinski and Schady (2015) argued that the benefit-cost ratio of enhancing process quality is likely higher than that of enhancing structural quality. This is, however, a contested literature, because trained teachers who can improve process quality may not stay long in low-quality school environments, such as those with dilapidated buildings. Vermeer and others (2016) undertook an international meta-analysis and commented on how

different factors affect a measure of program quality that can be measured by observers, and in turn is known to correlate with longer-term outcomes.

Children Younger than Age Three Years

The cost of integrating a component on responsive stimulation with regular visits for nutrition and health is more modest than that of establishing either a day care or a preschool program. Table 24.2 provides unit cost data for five programs for younger children that primarily seek to benefit mothers and children in their homes or in community-based day care with volunteer mothers.

Programs for younger children vary considerably in their format, and annual costs per child range from about 0.8 percent of per capita GNI for financial costs of day care and home visit programs in Latin America and the Caribbean, as well as a mother-child education program in Turkey, to 3.8 percent of per capita GNI for a home visit program in Pakistan. The median share of per capita GNI is 2.2 percent. Programs tend to cost more per child in absolute amount as country income increases because salaries increase, and where the educators are paid rather than serve as volunteers. Home visit programs cost more than programs in which groups of mothers attend centers for parenting education. However, center-based programs may simply transfer the costs of attendance to families rather than trainers, and these programs may reduce participation by those in poorer households or those living in more remote locations.

Children Ages Three to Five Years

Preschool programs are more costly than programs involving educating mothers or caregivers. The annual costs per child range from 1.4 percent of per capita GNI in Uruguay to 26 percent in Bolivia. However, the very lowest and highest costs are probably outliers. The Uruguay program is in an upper-middle-income country and provides a half-day program, which may reduce costs, while the program cost in Bolivia is 16 percent of per capita GNI if cost of food is excluded. The median cost is approximately 10 percent of per capita GNI. This amount is roughly consistent with a formula developed by van Ravens and Aggio (2008), who used salaries and staff-to-child ratios and estimated the cost to be 12.5 percent of gross domestic product (GDP). Preschool programs are consistently more costly than group parenting education because of the higher staff-to-child ratio that is necessary.

Parenting programs are less common in this age group, but one program summarized in the table for children ages three to five years provides group parental education for mothers of older children (Sirali, Bernal, and Naudeau 2015), the Mother and Child Education Program in Turkey. This program has been widely disseminated to other countries.

THE ESSENTIAL PACKAGE AND ITS COST

Assumptions

Parenting programs are more likely to be oriented to children younger than age three years and to entail the participation of mothers. The Mother and Child Education Program delivered to mothers of older children is somewhat unusual in this respect (Sirali, Bernal, and Naudeau 2015). Some parenting programs are delivered to groups of mothers (see table 24.2 for examples for the Caribbean and Turkey); others are delivered primarily through home visits (see table 24.2 for examples from the Middle East and Latin America and the Caribbean); and hybrid programs use both group and home visit components (see table 24.2 for one program in Pakistan). Preschool programs typically focus on ages three to five years, although they may include younger children.

The cost of ECD programs is driven primarily by salary costs. Costs depend on several factors, including the ratio of educators to children, country GNI because salaries tend to increase with country income, and the specific design of individual programs.

Program type has a substantial impact on cost because there are systematic differences in the ratio of staff to children and families. Parenting programs provided to groups can have higher child-to-staff ratios than those involving home visiting; the lowest ratios observed are for preschool programs, where teachers educate children rather than parents. The ratios might be approximately 50 to 1, 25 to 1, and 12 to 1, respectively (estimate based on Araujo, López Boo, and Puyana 2013; Gowani and others 2014; and van Ravens and Aggio 2008). Based on these staffing ratios, we estimate that home visiting programs might cost about twice as much per child as group parenting programs, while preschool programs might cost about four times as much per child as group parenting programs. All three types of programs—parenting programs, home visiting programs, and preschool programs—may vary in effectiveness.

Similarly, we can estimate that the per capita income of lower-middle-income countries is about three times that of low-income countries, and that of upper-middle-income countries is about nine times that of low-income countries, using the World Bank definitions. Table 24.2 includes information from one low-income country, Mozambique.

We developed the following estimates for costs per child per year in 2012 U.S. dollars, based on table 24.2, also using the ratios discussed:

- **Group parenting programs**: US$30–US$35 per child in lower-middle-income countries and US$90–US$100 per child in upper-middle-income countries
- **Home visiting programs**: US$60–US$70 per child in lower-middle-income countries and US$200 per child in upper-middle-income countries
- **Preschool programs**: US$300 per child in lower-middle-income countries and US$600 per child in upper-middle-income countries.

We have no data for low-income countries in Sub-Saharan Africa, other than one preschool program that cost US$50 per child per year for a three hour per day program once the program moved beyond the pilot phase.

These estimates are roughly consistent with the country data (table 24.2) and the staffing ratios presented. Costs for individual countries will vary with per capita GNI and program design. It is always possible to make programs cheaper by, for example, reducing intensity or using volunteers, but doing so can be detrimental to effectiveness. We assume that programs delivered to mothers need to be delivered once per lifetime of children, whereas children may participate in preschool programs for two or three years until they begin formal schooling. The cost of US$30–US$35 for a group parenting program per child born is modest compared with the larger investment in health per child born. Routine immunization alone with six or more vaccines now costs US$46.50 per fully immunized child (Brenzel, Young, and Walker 2015; see Black and others 2016).

Evidence from programs (table 24.1) suggests that the benefit-cost ratio of a well-designed and well-implemented program is in the range of 2–5, using a modest 3 percent to 5 percent social discount rate. Although some benefit-cost estimates are higher than these, they may be from studies that underestimate the full program cost.

Recommendations for an Essential Package

Based on considerations of cost, our subjective assessment of feasibility, and benefit-cost, we recommend the following.

Essential Package

Countries should aim to cover all first-time parents (at a minimum) and all births (preferably) with a group parenting program that is integrated into the provision of health services. This program could be conventional (in person) or could take advantage of innovative methods, such as videos combined with facilitated group discussion. Parenting programs could be integrated into existing home visiting programs that provide health services, in which case the program could be offered instead of or in combination with group delivery. The programs should be provided in one year of the child's first three years, preferably as early as possible to have the greatest impact.

Countries might also choose to implement the program differently in different regions, providing group sessions in more densely populated areas and home visits to more remote households and to poorer households. Costs will increase as the proportion receiving home visits increases, but equity and impact will also increase.

Programs must have a certain intensity to have an impact. In the Caribbean pilot (Walker and others 2015), mothers participated in group discussions five times over approximately 15 months; each session took about 25 minutes of the mother's time (a combination of viewing a video and participating in a group discussion, with one-on-one reinforcement during the visit with the nurse). In Pakistan, mothers received home visits of approximately 30 minutes about once a month, and the pilot program followed children in their first two years of life (Gowani and others 2014). In Latin American programs, parents generally met with community workers for slightly more than an hour a week for 10 months of the year over a two-year period (Araujo, López Boo, and Puyana 2013). A group program in Uganda for both parents that entailed 12 sessions is discussed in chapter 19 in this volume (Black, Gove, and Merseth 2017); the content of the parenting programs is also important. Programs that do not have sufficient quality and intensity will not be effective.

Preschool Programs

Evidence suggests that children are more ready for school cognitively, socially, and emotionally if they have preschool education; this is particularly important for children from more vulnerable households. The estimated cost per child is US$300 per child per year in lower-middle-income countries and US$600 per child per year in upper-middle-income countries. We assume that governments would subsidize or pay the full cost of this education for vulnerable households but require parental contribution or full payment for more affluent households. This approach is more common in upper-middle-income countries.

When estimating preschool costs, van Ravens and Aggio (2008) assume a half-day program and use a ratio of 20 children per teacher. UNICEF (2008) recommends 15 hours per week and a 15:1 maximum ratio, but even

many countries in Europe do not achieve this goal, and this objective would certainly imply higher costs than provided here.

CONCLUSIONS

Codelivery of health, nutrition, and responsive stimulation programs can benefit child development and be cost-effective. For children younger than age three years, codelivery is best achieved by integrating responsive stimulation elements into existing health and nutrition programs. For children ages three to five years, codelivery can be achieved by integrating health and nutrition interventions into preschool programs.

For children younger than age three years, group parenting programs cost about US$30–US$35 per year in lower-middle-income countries, and about twice that if home visiting is included. Some home visiting is likely to be required to reach some populations and improve equity. The benefit-cost ratio for existing programs ranges from about 2:1 to about 5:1. Group parenting programs need facilitators but can also incorporate media, such as videos.

Preschool programs cost about US$300 per child in lower-middle-income countries, and the benefit-cost estimates for existing programs similarly range from about 2:1 to 5:1 (higher benefit-cost ratios have been obtained, but typically where costs are underestimated). Countries can usually afford to subsidize preschool for only selected groups, such as poor households and marginalized groups.

Programs for individual children and families need to be complemented by appropriate national policies for child development. National policies include policies proscribing child abuse and facilitating behavior change communication to support positive parenting behaviors.

Evidence on cost and cost-effectiveness is quite modest, and we rely heavily on a relatively few longitudinal studies of high-quality programs. Some researchers have used innovative methods, such as using national data retrospectively (for example, Berlinski, Galiani, and Manacorda 2008) or linking across national datasets. It would also not be too difficult or costly to augment the cost and cost-effectiveness literature by collecting cost data for existing studies of effectiveness.

Evidence on cost and cost-effectiveness is presently insufficient for low-income countries in Sub-Saharan Africa. Although children in this region likely will benefit from ECD programs, well-evaluated pilot programs are required to identify program designs that will work well in this context and that are scalable.

For all of these interventions, program quality is extremely important. Good training and supervision are critical. If ECD is seen as a low-cost add-on to existing health and nutrition programs, and current staff is overburdened by yet more tasks, the outcomes are likely to be of low quality. Well-designed and well-supervised interventions can affordably improve the likelihood that vulnerable children will be better able to reach their full potential.

ANNEX

The annex to this chapter is as follows. It is available at http://www.dcp-3.org/CAHD.

- Annex 24A. Literature Search Terms and Methods

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NOTE

World Bank Income Classifications as of July 2014 are as follows, based on estimates of gross national income (GNI) per capita for 2013:

- Low-income countries (LICs) = US$1,045 or less
- Middle-income countries (MICs) are subdivided:
  a) lower-middle-income = US$1,046 to US$4,125
  b) upper-middle-income (UMICs) = US$4,126 to US$12,745
- High-income countries (HICs) = US$12,746 or more.

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