Measuring the cost of investing in early childhood interventions and applications of a standardized costing tool

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In this paper we analyze the need for consistent and accurate cost data on early childhood development (ECD) interventions as a basis for increasing and improving the effectiveness of current spending on ECD. We establish the key components necessary in a costing model and present a new standardized costing tool intended for use across a broad range of stakeholders and contexts. Learnings from piloting the tool in Bangladesh, Malawi, Mali, Mexico, and Mozambique are shared. Providing a standardized methodology for costing ECD is an important contribution to the field and has the potential to improve both the volume and effectiveness of ECD financing.

Keywords: early childhood development; early childhood education; costs; quality; financing

Introduction

Ensuring that high-quality early childhood development (ECD) services are universally available will underpin the sustainable development goals for health, education, and employment. With an estimated 250 million children under age 5 in low- and middle-income countries at risk of poor developmental outcomes,1 the need for effective early childhood interventions is particularly urgent. Standardized and accurate cost data are critical for the provision of quality ECD services at scale, in order to make the case for more and better investments.

While a considerable amount of cost data on ECD has been collected, particularly in high-income countries, the availability of unit cost data varies widely between intervention types (Table 1). For example, the availability of data on unit costs on programs such as maternal education, parental leave, and childcare and child protection services is low; more data can be found on access to safe water, immunizations, and deworming; services with the most widely available data include exclusive breastfeeding, skilled attendance at delivery, and primary education.2 In addition to the problem of a paucity of data for particular interventions, for the cost figures that do exist there is often little information on what the programs are doing in practice or the quality of the services, both of which will have an important effect on the price. Finally, because the models being used to calculate costs may differ in terms of their components; for example, one estimate may include upfront capital costs, while another does not, comparisons are difficult to make.

There is considerable demand for more comprehensive cost data on ECD. A systematic review of the impact of early childhood interventions by the Independent Evaluation Group of the World Bank noted that very few evaluations report cost analysis, and suggested that cost assessments be included in future evaluations.3 In the 2014 Ann. N.Y. Acad. Sci. special issue on integrating nutrition and ECD interventions,4 Menon et al. identified the need for costing studies to improve understanding of implementation in nutrition interventions. One area flagged for further research concerned how to cost-effectively improve the coverage of existing interventions. These studies underline the need for standardized costing research across the spectrum of early childhood interventions. The costing...
Table 1. Availability of ECD cost data

| Basic service                                      | Availability of unit cost data | Unit cost estimates                                                                 | Source, see Ref. 5                        |
|---------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------|------------------------------------------|
| Access to health care                             | Low                           | –                                                                                   |                                          |
| Maternal education                                | Low                           | –                                                                                   |                                          |
| Planning for family size and spacing              | Low                           | –                                                                                   |                                          |
| Social assistance transfer programs               | Low                           | –                                                                                   |                                          |
| Prevention and treatment of parental depression   | Low                           | –                                                                                   |                                          |
| Parental leave and adequate childcare             | Low                           | –                                                                                   |                                          |
| Child protection services                         | Low                           | –                                                                                   |                                          |
| Continuity to primary                             | Low                           | –                                                                                   |                                          |
| Adequate nutritious and safe diet                 | Medium                        | $5–15 per child per year (not including food)                                       | Mason et al., 1999                      |
| Access to safe water                              | Medium                        | $2.26 per month per household for rural water supply intervention                   | Whittington et al., 2008                |
| Birth registration                                | Medium                        | $0.23–0.83 per event of civil registration                                          | AbouZahr et al., 2007                   |
| Deworming                                         | Medium                        | $0.5 for preschoolers                                                               | Horton et al., 2008                     |
| Education about early stimulation, growth, and development | Medium | $58–900 per child for parenting program in Caribbean countries                      | van Spijk et al., 2010                  |
| Immunizations                                     | Medium                        | > $30 per live birth; includes cost of scaling up vaccine coverage                  | WHO et al., 2009                        |
| Adequate sanitation                               | High                          | $26–60 per capita for pit latrine (for rural areas); $52–160 per capita for septic tanks or similar | Evans et al., 2004                      |
| Antenatal care                                     | High                          | $19 for developing countries (Africa, $23; Asia, $17; Latin America and the Caribbean, $22) | Singh et al., 2013                      |
| Exclusive breastfeeding                            | High                          | $3.52–16.65, depending on WHO subregion                                              | Bhutta et al., 2013                     |
| Iron and folic acid supplementation for pregnant mothers | High                     | $4.91–6.41, depending on WHO subregion                                              | Bhutta et al., 2013                     |
| Micronutrient supplementation and fortification   | High                          | $0.06 for salt iodization for all WHO subregions; $0.52–2.85 for vitamin A supplementation for all WHO subregions | Bhutta et al., 2013                     |
| Prevention and treatment of acute malnutrition    | High                          | $138.72–250.85 for management of severe acute malnutrition                          | Bhutta et al., 2013                     |
| Skilled attendance at delivery                    | High                          | $47 for developing countries (Africa, $41; Asia, $41; Latin America and the Caribbean, $67) | Singh et al., 2013                      |
| Therapeutic zinc supplements for diarrhea          | High                          | $3.57–5.9, depending on WHO subregion                                              | Bhutta et al., 2013                     |
| Preprimary education                              | High                          | See Table 2                                                                      | See Table 2                             |
| Counseling on adequate diet for pregnant mothers  | High                          | Cost may be included in cost of antenatal visits                                    |                                          |
Table 1. Continued

| Basic service | Availability of unit cost data | Unit cost estimates | Source |
|---------------|-------------------------------|---------------------|--------|
| Handwashing   | Cost may be included in cost of parenting and social support networks and community education about growth and development | Low, limited systematic or context-specific data available or efforts under way; medium, some cost estimates available; high, regional estimates available. Source: Putcha and van der Gaag. |

of ECD services should be distinguished from ECD financing: costing focuses on the inputs necessary to deliver services, rather than the amounts that flow to service providers. Furthermore, within costing, ex post cost calculations which examine existing programs or delivery systems differ from ex-ante estimations or projections of the cost of delivering a service. Both are important and useful for different purposes.

**Components of ECD costing**

In contrast to primary education, which has a more standardized structure, ECD programs are extremely varied. ECD interventions span the full spectrum of services targeting children and their families from conception to transition to primary school, incorporating the nutrition, health, water and sanitation, education, social protection, and governance sectors. The specific services provided within similar types of ECD programs can vary widely, which has an impact on the costs—for example, if a program provides children with meals, this will likely alter the unit cost compared to similar programs. These differences pose a great challenge for comparability between ECD program costs.

Collecting cost data has the potential to serve several purposes. First, it is essential that advocates for ECD are able to provide cost data to make their case for increased investments: even when convinced of the benefits of ECD, policymakers will likely want to know: how much will it cost me? Cost data can also be used for basic accountability purposes, providing information about total expenditures, as well as where money is being spent within a program. Further, it can be used to perform cost-effectiveness analysis, to compare different programs with the same goals, and to aid decision-making on investments. In addition, it can be used for cost–benefit analysis, to compare the cost to the private and public benefits of the investment, and to help make the case for further investment in ECD. Finally, it can be used for budgeting and simulation, to allow decision-makers to estimate the financial implications of scaling-up ECD services.

A review of earlier costing efforts establishes a basic framework for the necessary components for a costing model. The “ingredients method” for cost analysis, outlined by Levin and McEwan, includes the following broad steps: first, identify and describe programs, then find out what resources—or ingredients—make up the provision; then, the costs of each ingredient; next, work out overall costs and unit costs per child; and finally, determine who bears these costs.

The variation in ECD programming means that the combination of services offered for a particular program will affect the composition of the costs, indicating that the ingredients of an ECD costing exercise will often differ between programs. Indeed, the cost of ECD programming is likely to be affected by a range of key variables. First, which services are actually provided: a particular intervention may be provided alone or in combination with others. For example, food supplements may be distributed in some preschool programs and not in others. The effect of bundling services on costs depends on the potential synergies between programs. If the program is less labor intensive, such as deworming, it may not add much marginal labor to another program, and the cost of administering programs jointly could be lower. On the contrary, adding a labor-intensive service such as preprimary education may not result in efficiencies. The cost of a program will also vary according to frequency and duration of services provided. As has already been noted, the availability of cost data varies across type of intervention, and cost data are not routinely collected in program evaluations. This means
that introducing cost collection and cost analysis is likely to be a change from the status quo for stakeholders. Supplementary Appendix A (online only) is intended to provide users with a comprehensive guide to the process of cost collection using a newly developed standardized tool (described further in the following section). The first two stages of the costing process involve establishing the basic outline of the costing process, collecting information on the nature of the intervention (who the beneficiaries are, type of intervention, duration and frequency of intervention), and then more detailed information about the components of the program in question.

The bulk of the costing exercise consists in collecting cost data across different item categories, or “ingredients.” ECD costs can be broadly divided into the following three main categories: (1) investment costs (including construction, initial training, and start-up costs); (2) operational costs (costs recurring over time, such as personnel, travel, equipment, and maintenance); (3) and imputed costs (volunteer time and the opportunity costs of buildings used). Costs in this last category are frequently excluded from analysis. In order to ensure that investment costs are adequately separated from operational costs, the costing guide (in Supplementary Appendix A, online only) treats “start-up” as an activity, rather than a cost category. Each activity can then include a variety of different cost items—section three of the guide provides a comprehensive overview of the cost items for recurrent program activities to be considered in an ECD intervention. This category list was drawn up in consultation with ECD experts and includes items such as personnel, administration, cash transfers, equipment, food and supplements, and travel and accommodation.

Staff costs may include staff remuneration, staff supervision, and professional development. Costs may increase in line with quality improvements, if there are fewer students per member of staff, or if staff are more qualified. A study of ECD services in Latin America and the Caribbean found that the annual cost per child of a program increased with the education requirements of the most highly trained staff in each program.

Geographic differences may also affect costs. For example, rural programs may have higher unit costs for several reasons: providers may serve fewer children, there may be higher transportation costs, and costs of transporting materials to remote locations could be higher. On the other hand, wage standards in urban areas may make programs more expensive compared to rural areas or alternatively you may have to pay workers more to work in unfavorable rural areas. Costs may also differ by region. Bhutta et al. found that unit costs for their 10 nutrition interventions were higher in Africa than other regions due to higher labor costs and extra travel time.

In addition, there are certain program characteristics related to the type of population served which may affect costs: more vulnerable children may require more extensive, and often expensive, services.

### Complexities of ECD costing

Costing ECD programs may be challenging for a number of reasons beyond those illuminated above. The first of these is the number of actors who are often involved in providing one service—this could be both at an administrative level, if, for example, multiple government agencies are involved with delivering the service or at the provider level, if the intervention involves different service providers (either because the program combines different services, or because different service providers provide the same service). With multiple actors, it may be difficult to coordinate the collection of data, or to avoid double counting beneficiaries.

A further complexity concerns the role of volunteer labor in early childhood services. These interventions often rely on volunteer labor, a type of imputed cost: Araujo et al. found that 28% of the staff in their sample of child care programs were volunteers (who may receive a stipend of some kind, but are not employed by the facility or program). Another type of imputed cost may be donated space for ECD services, if the buildings are not paid for by the program. Imputed costs are often omitted from costing analyses, which can present a barrier to fully understanding the financial implications of scaling up existing programs.

Cost estimates in the past tended to be drawn from official budgets or expenditure records, where capital expenditures (such as buildings) may only be counted in the year of initial expenditure and not spread over the course of their “useful life,” which may lead to poor unit cost estimations, since these
buildings will likely serve multiple cohorts of children. Accurate unit costs are essential for estimating the cost of scaling up a program: if capital expenditures are not properly spread across their useful life, the unit cost may be inflated, causing the program to look more expensive than in reality. However, it may be the case that capital expenditures are paid for over multiple years, which require modified or no adjustments. Unit costs may also prove challenging to accurately estimate because of the need to collect data on beneficiary numbers: the same program may serve several different groups of beneficiaries in different ways, and it may be difficult to identify who exactly should be counted, if, for example, the program targets caregivers, who may care for multiple children.

Given this variation, it is critical to collect descriptive information on the program, and to collect disaggregated cost information to understand the context and quality of the service provided. Previous costing efforts have collected cost data on low-quality programs, which has created challenges in terms of policy recommendations. Sustainably high process quality often requires a systemic view rather than a programmatic view, which may add to costs. Overall, limited data exist on the trade-offs between costs and process quality. In addition, the cost of scaling existing programs is complicated by the fact that marginal costs may be less than average costs, if key infrastructure is already in place. However, as programs are further scaled up, these marginal costs will likely increase again, as increased access may include harder to reach populations, who may be more expensive to serve, for example, if they are in more remote areas.

As Table 1 indicates, the availability of cost data varies widely according to type of service, ranging from low levels of information on access to healthcare and child protection, to high levels of data on exclusive breastfeeding and antenatal care. However, considerable caution should be used in comparing unit costs: variation may arise from methodological differences in calculation, such as treatment of volunteer labor in calculations, as well as from different program inputs.

Even when looking at the same service, for example, preprimary education, costs can vary widely because of wide heterogeneity in the programs and the populations they serve. In particular, there may be differences in the enrollment size, the quality of the programs, the components of the services provided, and the prices of the resources that go into the services.

Table 2 provides a range of estimates for preprimary costs across different countries and regions as well as ex-ante modeling estimations or projected costs. The cost data compiled by Levin and Schwartz, for example, are drawn from academic journals, individual country statistics, and online reports—since a multitude of sources are being used, and it is very difficult to compare cost data across comparable programs or outcomes. The authors from the same study note that “existing data on costs for ECCE programs are derived from highly variable reporting methods.” For example, while Sweden had a per-pupil spend on preprimary of US$5683, and India of US$761, the authors reported vast difference of pupils per teacher: in Sweden, there was one teacher for every 10 children, while in India the figure was 1 to 40. Furthermore, in some countries, disabled or marginalized populations which may have a higher unit cost may be included in the total, while in others they may not be. Consequently, the reported differences could emerge from any number of factors, including enrollment levels, quality, service types, or resource prices. The second part of the table summarizes data on ex-ante cost estimations which vary greatly. Using a model developed by Wils, the total average cost or funding needed to reach 100% preprimary enrollment in low and lower middle income countries between 2015 and 2030 was estimated to be US$31.2 billion. This model estimates the average cost by setting the pupil–teacher ratio to 15, and salaries to 4.4% of GDP per capita. A more recent report, however, estimated the funding need for providing universal preprimary in low- and middle-income countries to be US$200 billion. Currently, domestic governments are only spending an average of 0.1% of GDP on ECD.

**Earlier costing models**

A variety of tools have been developed to capture the cost of providing ECD services around the world, the majority of which are intended to cost preschool or childcare services. Of the 12 tools identified in a review of earlier ECD costing models, seven have been applied in the United States and the remaining five have been used in developing country contexts (Table 3). These include a UNICEF
| Country           | Cost U.S. dollars per year (year data collected); ? if estimation | Source                                |
|------------------|---------------------------------------------------------------|---------------------------------------|
| **Program cost data** |                                                               |                                       |
| Benin            | 55 (1998)\(^a\)                                              | Approximation from Jaramillo and Mingat\(^10\) |
| Brazil           | 1315 (2006)\(^b\)                                            | Levin and Schwartz\(^10\)             |
| Cameroon         | 83 (1998)\(^c\)                                               | Approximation from Jaramillo and Mingat\(^10\) |
| Cote d’Ivoire    | 165 (2000)\(^d\)                                             | Approximation from Jaramillo and Mingat\(^10\) |
| Egypt            | 871 (2001 est, 2007 dollars)\(^e\)                            | Levin and Schwartz\(^10\)             |
| France           | 4995 (2006)                                                   | Levin and Schwartz\(^10\)             |
| Germany          | 5683 (2006)                                                   | Levin and Schwartz\(^10\)             |
| India            | 761 (2003)                                                    | Levin and Schwartz\(^10\)             |
| Indonesia        | 1598 (2006)                                                   | Levin and Schwartz\(^10\)             |
| Mexico           | 1978 (2006)                                                   | Levin and Schwartz\(^10\)             |
| Mozambique       | 30                                                            | Martinez et al.\(^31\)               |
| Nepal            | 15 (1998?)\(^f\)                                              | Meyers\(^32\)                        |
| New Zealand      | 5113 (2006)                                                   | Levin and Schwartz\(^10\)             |
| Niger            | 106 (1998)\(^g\)                                              | Approximation from Jaramillo and Mingat\(^10\) |
| Poland           | 4545 (2006)                                                   | Levin and Schwartz\(^10\)             |
| Russia           | 3291 (2006)                                                   | Levin and Schwartz\(^10\)             |
| South Korea      | 3393 (2006)                                                   | Levin and Schwartz\(^10\)             |
| Sweden           | 5475 (2006)                                                   | Levin and Schwartz\(^10\)             |
| Turkey           | 283 (2004)                                                    | Levin and Schwartz\(^10\)             |
| United States    | 8867 (2006)                                                   | Levin and Schwartz\(^10\)             |
| Latin America and Caribbean | 26–3264 (2010?)                           | For an array of services, including preprimary. Araujo et al.\(^13\) |
| **Modeling estimates** |                                                               |                                       |
| Algeria, Bahrain, Djibouti, Egypt, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Mauritania, Morocco, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, and Yemen | 58–3482 (2003) | For “regular program delivery,” based on a set of cost parameters. van Ravens and Aggio\(^25\) |
| Chile            | 977–1815                                                     | Armendáriz et al.\(^33\)              |
| Colombia         | 817–1572                                                     | Armendáriz et al.\(^33\)              |
| Guatemala        | 630–1103                                                     | Armendáriz et al.\(^33\)              |
| **Global estimate** |                                                               |                                       |
| Low and lower middle-income countries | 258 (2012)\(^h\)                                       | UNESCO\(^21\)                        |
| Low income       | 123 (2012)                                                    | Wils\(^20\)                          |
| Lower middle income | 242 (2012)                                                 | Wils\(^20\)                          |

\(^a\) Conversion from XOF, January 1, 1998 (oanda.com).
\(^b\) Levin and Schwartz report per-pupil spending in USD using PPP.
\(^c\) Conversion from XAF, January 1, 1998 (oanda.com).
\(^d\) Conversion from XOF, January 1, 2000 (oanda.com).
\(^e\) Converted to USD using 2002 PPP conversion factor of 1.5 (Levin and Schwartz\(^10\)).
\(^f\) Conversion from NPR, January 1, 1998 (oanda.com).
\(^g\) Conversion from XOF, January 1, 1998 (oanda.com).
\(^h\) Constant 2012 USD.
modeling and simulation instrument for West and Central Africa, which costs preprimary education and parenting programs; the CARICOM costing model, which captures costs for preschools, daycare centers, special education services, and home visiting programs; and the van Ravens and Aggio Interactive Cost Estimation Model that focuses on early childhood care and education. A J-PAL Costing template can be used for costing across all sectors, but is not ECD specific, while the USAID scale-up and sustainability cost calculator is intended for costing early grade reading.

While overall, on a per country or per program basis, these models have provided important information to key stakeholders involved in programming or policymaking for ECD, there are a number of challenges and weaknesses when considering the models on a global level. Some existing tools have focused on specific types of ECD intervention: the UNICEF regional modeling and simulation instrument allows the user to estimate the cost of achieving targets for preprimary and parenting education, allowing decision-makers to choose between a range of scale-up scenarios. However, one limitation of this is that since the tool is specifically designed around these two types of intervention, it cannot provide estimates for programs which incorporate other types of intervention (e.g., nutrition interventions), and thus will not be flexible enough to simulate the cost of the full spectrum of ECD interventions. The USAID Calculator is intended for early grade reading programs, while the CARICOM model focused on four types of service: preschools, daycare centers, special education services, and home visiting.

An additional drawback of the existing tools is that they tend to serve a specific purpose, rather than offering the flexibility to serve as both a tool to scrutinize existing expenditures and as a tool for budgeting and planning. For example, the J-PAL Costing Template provides the user with a breakdown of spending according to eight ingredients which include program administration, targeting costs, staff and user training. However, while this template would be able to provide the total cost of staff training for an intervention, it would not be able to provide separate totals for a program with multiple components (e.g., a preschool program that includes a nutrition intervention). Similarly, the tool does not produce a granular breakdown of item costs beyond the eight ingredient categories, so it is not possible to establish the cost breakdown of the program by item—for example, how much of the total is spent on transportation across different activities.

The van Ravens and Aggio model is used to simulate the cost of scaling up preschool and home visiting programs to vulnerable children. However, the estimates are based on a range of assumptions about teacher salaries, class sizes, and numbers of beneficiaries. While useful for generating national or regional estimates, the tool does not capture the nuances of different programs, or incorporate the full spectrum of ECD interventions.

In conclusion, none of the existing tools have been flexible enough to cost the full range of ECD interventions, or sufficiently sensitive to capture the variables critical to high-quality ECD while at the same time incorporating mechanisms to produce internationally comparable outputs.

Developing a standardized ECD costing tool: a case study

Origins of the tool development
The development of a new tool for costing ECD, the standardized ECD costing tool (SECT), stemmed from an initiative at the Center for Universal Education at the Brookings Institution aiming to help policymakers to better understand the costs of delivering ECD programs in low- and middle-income countries. While conducting a literature review of the existing costing work in ECD, which informed two Brookings papers on the topic, Brookings established a multiagency working group on costing ECD. Subsequently, an expert costing workshop convened a broad group of ECD specialists; it was in this workshop that a proposal was made for the creation of a standardized costing tool. The task of creating the tool was conducted in partnership with Cornerstone Research and the tool was piloted on ECD programs being evaluated under the World Bank’s Strategic Impact Evaluation Fund (SIEF).

Components of SECT
An early draft of the costing tool in Excel was presented in July 2015 to the ECD costing working
### Table 3. Costing tools used in developing countries

| Name | Summary of work | Countries of application to date | Sector(s) of intended application |
|------|-----------------|----------------------------------|-----------------------------------|
| **Brookings-World Bank Standardized ECD Costing Tool (SECT)** | ECD costing tool to bring methodological consistency to the costing of ECD programs, to ensure they are comparable across countries and interventions. The tool can be used across all ECD sectors and interventions, and can capture imputed costs, inflation rates, and exchange rates. It is intended to be used for cost–benefit analysts and budgeting/planning purposes. | Rwanda, Bangladesh, Mali, Malawi, Mexico, and Mozambique | All subinterventions within ECD |
| **UNICEF Regional Modelling and Simulation Instrument** | Costing of preprimary education and parenting programs in various scale-up scenarios taking into account factors related to quality of inputs as well as amount of financing available for programs. | Mauritania, Cape Verde, Sao Tome and Principe, Congo Brazzaville, Togo, Sierra Leone, Guinea Bissau, Niger, Senegal, and Guinea | Preschool |
| **J-PAL Costing Template** | An ingredients costing tool for a program or intervention. The cost ingredients are program administration, targeting, staff training, user training, implementation costs, user costs, averted costs, and monitoring costs. | Global | All sectors |
| **CARICOM Costing Model** | The original (2004) model includes the key elements needed for minimum standards in four types of ECD service delivery: (1) preschools, nursery schools or preschool classes; (2) daycare centers; (3) special education services; and (4) home visiting programs. Other costs for national investment planning were also included. Later adaptations included simplifications of the worksheet layout and the development of a decision-making model for assessing different policy options. | Jamaica, Suriname, Guyana, Anguilla, and Belize | Preschools, day care centers, special education services, and home visiting programs |
| **van Ravens and Aggio interactive cost estimation model** | An interactive model to estimate the cost of early childhood care and education services based on the salaries of teachers and caregivers relative to primary teachers, the duration of the program, the number of hours of work per teacher or caregiver per year, the group size, and an assumption of what percentage of costs salaries represent. | Algeria, Bahrain, Djibouti, Egypt, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Mauritania, Morocco, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, and Yemen | Early childhood care and education |

*Continued*
group. This version of the tool was separated into four parts: costing model setup and analysis, summary sheets which calculate totals, main costing sheets for entering data on costs of each component, and working information sheets with exchange rates and inflation. The working group concluded that there should be a standard list of item categories, as well as separate tabs for start-up and management costs, but with the flexibility for programs to enter different components. One critique of this early version of the tool was the omission of costs for existing infrastructure and the opportunity cost of volunteer labor. Later meetings of the working group made edits to the activities and item list of the template, and the tool was updated to include imputed costs on each activity sheet of the template. One very important aspect of the tool was the inclusion of detailed information on the delivery of the services including information about both intended and actual delivery and whether or not the targeted population had been reached.

The Excel version of the tool includes the following tabs:

- Model setup
- Program diagram
- Beneficiaries
- Summary sheets (in local currency, dollars, and purchasing-power parity)
- Start-up costs
- Management costs

- Component sheets (preprimary, exclusive breastfeeding, etc...)—these can be adapted according to the program.

In addition, users then enter costs across the sheets according to the following categories:

- Personnel
- Travel and accommodation
- Food and supplements
- Administration
- Equipment

There are several potential uses of the tool, as outlined by Gustafsson-Wright et al.9 First, the tool can be used to perform cost–benefit analyses, to demonstrate the costs of investing in ECD. The tool can also be used to perform cost-effectiveness analyses, to identify the most cost-effective interventions for achieving a particular goal. It can also be used for budgeting and scale-up simulations, in order to help users make decisions about different combinations of inputs—for example, comparing the cost of decreasing class sizes to the cost of increasing teacher training. Below, we outline some different scenarios where the tool could be applied:

**Scenario A: cost–benefit analysis.** The Ministry of Education in Bangladesh would like to make a case to the Treasury that funding should be increased for early childhood programs. Cost data would be compared to the financial benefit of early childhood programming such as lower crime rates,
reduced dependence on social welfare, and increased employment rates. The tool could then lay the foundations for an evidence-based proposal for increased funding for early childhood programs.

**Scenario B: comparison between two programs.** A state government in the United States would like to know which of two similar early childhood programs should receive funding. The tool could be used by policymakers in a cost-effectiveness analysis of each of the programs to decide between these two programs, to evaluate which achieves the outcomes at the lowest price.

**Scenario C: scale-up and budgeting.** The government of Uganda would like to know the cost of expanding preschool access using a public–private partnership, which combines public funding with private services. The tool could be used to estimate the unit and scale up costs of providing the program, to help the government and potential donors with budgeting and planning.

**Scenario D: adding components to an existing program.** A government in the Caribbean wants to improve the quality of an existing home-visiting program by adding parental stimulation. The costing tool could be used to estimate the marginal cost of adding additional components to the program.

**Methodological challenges in the design of the tool**

A variety of methodological challenges arose during the design process of SECT. First, while the average cost per beneficiary is an important starting-point for comparison between programs, the calculation of this figure is often very complex. In the most straightforward program design, average unit cost can be calculated by simply dividing the total program cost by number of beneficiaries. In many ECD programs, counting beneficiaries is far from simple: if the program is aimed at training staff, or providing parental education, it is unclear who should be considered the beneficiaries of this program—just those who receive the training, or all the children they have the potential to influence. More complex programs may have multiple groups of beneficiaries, with different children receiving different sets of services: if children belong only to one group, then it should be easy to calculate unit costs by activity; however, if the same children receive multiple services, they may be double counted. A further challenge for unit costs is the time period that the unit represents—if all children receive the program for 1 year, this should not pose any problems, but in the case where a program runs for less than a year with overlapping groups of beneficiaries, or for multiple years, identifying the cost per child becomes more difficult.

An additional challenge arose in relation to the stage at which a program is being costed. While some costing exercises will be carried out on new programs, others capture the costs of a service which has been added on to a different structure, or which is supported by existing infrastructure. In this case, understanding the true cost of the program will be difficult, especially if the costs of the underlying program are unknown, for example, if the construction for the program took place many years before. Another example could be a scenario where a new intervention is built to complement an existing government program, where management over the overall program may be in the hands of a government department with a range of different responsibilities—which will make it difficult to accurately allocate personnel costs to this specific intervention. In the case of interventions built on top of existing programs, there is a further complexity associated with cost-effectiveness analysis of the program—it may be difficult to attribute impact, and hence judge cost-effectiveness, if the intervention is built on top of an existing program.

**Using SECT in practice**

The first step in using the tool is to collect and report on the basic details of the program. This stage of the process has two key purposes: first, the user is primed to consider the structure and organization of the program itself, which can support the subsequent stages of data collection, where they will need to organize their data around the different components, or stages, of the program. This information will include the type of intervention, details about the duration and frequency of activities, and the number of beneficiaries. Other information is collected which informs data analysis in the rest of the tool: for example, the user must select the program currency used to pay for the intervention—these automatically feed into the rest of the tool, in order to convert the costs into U.S. dollars.

After basic program details are entered into the tool, users must then enter data on each element of the program in turn. The tool incorporates several
elements to guide the user, while allowing enough flexibility to capture the broad range of programs. The tool encourages users to enter start-up activity, management activity, and ongoing program activity costs separately, after which they input the costs for each separate component of the program, across a range of categories (e.g., personnel, training, and equipment).

Once cost data have been entered, the tool provides a range of breakdowns and comparisons. Data across the full program are summed in the local currency, with the total costs per year, per component, and per item cost each available. In addition to these totals, the tool calculates the unit cost of the program per beneficiary—these unit costs can be for the overall program, or broken down by component. With these cost estimates in hand, users can compare total costs and unit costs between programs, and can analyze the different cost categories within a program to establish where money is being spent, and where trade-offs could be made.

The tool also allows users to enter imputed costs of the program, or costs which are not directly incurred (such as the cost of volunteers, or the cost of donated building space). This allows for these costs to be incorporated into the budgets of potential scale-ups of programs. The tool also has the capacity to calculate the amortized costs of capital spending, such as building construction, which may be financed in 1 year, but will have a “useful life” that extends into the future. In this way, the cost of the capital expenditures can be spread across several years, resulting in more accurate estimations of the unit cost per beneficiary.

**Piloting SECT**

The costing tool was piloted in five countries: Bangladesh, Malawi, Mali, Mexico, and Mozambique. The pilot countries were selected to capture a range of different intervention types, across a broad geographical area, and all programs (with the exception of Mexico) were part of World Bank SIEF impact evaluations. The pilots included a parenting education program in Bangladesh, an intervention providing ECD materials in Malawi, a program for micronutrient fortification and early childhood care and development (ECCD) in Mali, parental education in Mexico, and preschool construction and operation in Mozambique. All interventions served children between 0 and 8 years of age, although the specific age ranges depended on the intervention. All pilots were ex-post calculations of program costs although this does not preclude the possibility of using the tool for an ex-ante estimation of program or system costs.

These pilots allowed Brookings to work in collaboration with ECD providers across the five countries, to understand the needs and demands of costing these programs in the field. It also provided the opportunity to observe the tool being used in practice, to provide guidance to early users, and to learn from any challenges or difficulties in using the tool.

Users of the tool reflected that it deepened their understanding of their program costs, and noted that the tool would be a useful addition to advocacy efforts. One of the main advantages of the tool was its flexibility—the tool was used to capture cost data across nutrition, preschool, and parental education interventions. Users were also able to modify the tool in a number of ways, for example, changing the components to suit their programs. Furthermore, the standardized features such as in-built exchange rates and purchasing power parity conversions were noted to be useful. Following these pilots, a number of requests to use the tool have been submitted to Brookings, indicating the scale of demand for a standardized costing tool.

Although the tool has a broad intended audience, from government policymakers to donors and funders and NGOs, the main users in the pilot fell into two groups: consultants closely associated with the project from a research or evaluation perspective, or service providers on the ground (the experience in Mexico was slightly different—for more detail, see below). One of the challenges identified in the pilot cases was unfamiliarity with the Excel software, since the first piloted version of the tool was Excel-based. Users without experience in Excel found the tool overwhelming, as the data input is spread across several Excel Worksheets.

One of the additional challenges faced during the pilot was the variety of actors that needed to be involved and coordinated with. Many ECD programs involve a number of actors, each of whom needs to be engaged with the process, which can mean providing guidance and training to different groups—if these actors are not all identified upfront, this can be time-consuming. The number of actors sometimes compounded problems of data access—it was not always clear where the relevant data were
held, and collecting all the necessary pieces of data from different actors often slowed the data collection process down.

**Mexico pilot costing**

The early childhood program costed in Mexico is run by the Consejo Nacional de Fomento Educativo (CONAFE), or National Council for Educational Development, and provides parenting education in rural and indigenous communities to caregivers of children under 4 years of age. While the program is active in all 31 states, the costing exercise collected data for just two: Aguascalientes and Nayarit. While the program is directly delivered by a team of educational promoters, who are volunteers from the local community, the management of the program includes personnel at state and regional levels, and is coordinated from within CONAFE. The program reaches an estimated 450,000 children per year.

The World Bank provided a loan to support capacity building for parents and personnel in 2014. In Mexico, the costing tool was used by staff at CONAFE, the government organization which oversees the project. The complexity of the different layers of project management at the regional and local levels and the unfamiliarity with the costing tool lead to close collaboration between Brookings and CONAFE in carrying out the costing exercise. One of the key findings from this collaboration was the importance of beginning each costing exercise with a clear and comprehensive view of the context, and system, in which the intervention takes place. In practice, this means thinking about every institution, and actor, who is engaged in the project, from the government management level, down to the direct delivery personnel in the field. At this stage, it is very helpful to draw a diagram to understand the different actors in the program chain.

Thinking carefully about the structure of the system then provided the foundation to guide the next stage of the costing exercise—alloting the proportion of time spent by management personnel to the project, and establishing salary, training, and travel costs across the different categories of staff. The next stage of the exercise was to consider the program resources utilized in each state, as well as the number of beneficiaries served.

The cost analysis for 2016 found that the total cost of the program in Nayarit was higher than in Aguascalientes, at US$651,385 compared to $477,304, with the difference driven by larger numbers of staff in Nayarit, and therefore higher salary costs and more training, with higher associated costs of travel, food, and accommodation. The unit costs per child were similar across the two states, at US$174 in Nayarit and $202 in Aguascalientes, since Nayarit also served considerably more children (3374 in comparison to 2366), suggesting economies of scale in the Nayarit model, allowing the program to serve more children at a lower cost. The cost analysis found that the largest spending category for both states was personnel, at 67% in Nayarit and 66% in Aguascalientes. Workshop food and accommodation was the next largest spending category, at 21% in Nayarit and 19% in Aguascalientes. Only 4% of costs in Nayarit and 7% in Aguascalientes were spent on program resources.

**Mali pilot costing**

The program costed in Mali was an experimental design, run by the World Bank’s Strategic Impact Evaluation Fund, with different groups receiving different combinations of interventions, including seasonal malaria chemoprevention (SMC), deworming, vitamin A supplementation, ECCD, and micronutrient fortification. The intervention, in the Sikasso region in the south of Mali, provided SMC to all children between 3 months and 5 years in the targeted communities, and deworming and vitamin A supplementation for children 0–5 years. The micronutrient fortification was for children 6 months–5 years. The SMC and micronutrient fortification were provided through the existing Save the Children ECCD program.

The costing exercise captured information on the micronutrient fortification and the ECCD components of the intervention, for the years 2015 and 2016. Unfortunately, data were not available for the remaining components: consequently, it is not possible to calculate total program costs, or to compare the unit costs for the different arms of the experimental evaluation, since all three groups received the (uncosted) SMC, deworming, and vitamin A supplementation.

The fortification component includes both the management costs (including personnel salaries and administrative costs, such as building and electricity) and the costs of delivery, which included training and equipment. The ECCD component includes administration costs (such as office costs and travel),
as well as the costs of salaries, insurance, and payroll tax, as well as project delivery costs, such as supplies.

The two components served very different numbers of beneficiaries: 40,474 children received micronutrient fortification, while only 9012 received the ECCD intervention. While the total combined cost of the two components was $1.2 million (in 2015 USD), the ECCD component made up 73% of this cost, or $857,375, compared to only $322,925 for the micronutrient fortification. These differences in total costs, as well as beneficiary numbers, produced very different unit costs per child: for the ECCD component, the unit cost per child was $96, while the unit cost for the micronutrient component was only $15. Across the two components, personnel represented the largest cost category, representing 26% of expenditures, followed by 22% spent on indirect overhead costs, such as vehicle maintenance and office supplies, and 21% spent on training of frontline staff.

Critical lessons learned from the piloting of SECT

A key insight from the pilot exercises was that the Excel version of the tool needs considerable support and guidance in order to be accessible to a broad range of users. In light of this, the developers of the tool plan to make the tool available in a simplified survey-based format to be used online, or on a tablet, while maintaining the integrity of the detailed components of the tool and built-in formulae. Close consultation with the ECD community will be essential for developing the next phase of the tool: seeking regular feedback from experts and practitioners will ensure that the tool is capable of meeting the demands of the ECD field. Once it is available in this format, dissemination efforts will need to span a range of strategies, and target a broad audience of governments and policymakers, multilaterals and private donors, service providers, and program evaluators. These efforts would be best undertaken in coordination within existing ECD regional networks and partnerships, and through the work of donors and service providers.

Conclusion and recommendations

ECD has received growing attention in the last several years among both global and domestic policymakers and practitioners. While in some instances, the question is still if investments should be made, increasingly the question is how they should be made. One of the major bottlenecks is identifying the actual cost of delivering quality programs. Astonishingly, little data are available on the costs of delivery of the gamut of ECD interventions and where data do exist, they are often not comparable given the wide range of methodologies used in its calculation as well as the enormous heterogeneity in the provision of services and contexts. Until now, most implementers have relied on back of the envelope calculations, bespoke tools made for a particular program or weak public sector management tools. The result has led to not only huge variation in cost data, even across similar programs in similar settings, but it has also undermined the ability for ECD advocates, policymakers, and practitioners to ensure that all children receive the quality ECD program necessary for their development.

This paper outlines the challenges involved in calculating the costs for ECD programs and provides recommendations for best practices (see Box 1). It breaks down the necessary components to consider when calculating costs and highlights the potential pitfalls along the way. Finally, it provides a case study of a standardized tool created with the purpose of addressing the constraints faced up until now in the ECD sector and demonstrates the use of the tool in two very different settings.

The collection of standardized ECD cost data has the potential to drive more, and better, investment in ECD. First, collecting full and accurate data on early childhood programs will allow policymakers to carry out cost–benefit analyses, and demonstrate more effectively the private and public benefits associated with investing in the early-years. Second, such data could be used to perform deeper analysis on individual programs, to provide users with a more granular analysis of the cost implications of achieving a particular impact metric. A standardized tool and resulting data could also be used to support performance by results contracting, or in conjunction with quality-measurement tools. A standardized tool also has the potential to drive a broader systems-level change, encouraging an increase in data collection and management, with positive externalities for impact measurement and performance management. It could also be used to drive more informed investments, by supporting more efficient budgeting and planning. Policymakers could use such a tool to plan for the scale-up of
Box 1.

**Key messages**

- Collecting standardized cost data for ECD interventions is essential for providing quality ECD services at scale, but the availability of such data is limited and often inconsistent.
- A high level of demand exists for the collection of these data, in order to assess the cost-effectiveness and cost-benefit of programs, and to plan for improvements in access and quality.
- ECD services are complex to cost: multiple actors, varied programming, and different populations can all provide challenges to data collection.
- Earlier costing models have offered a range of important contributions but have failed to provide a model flexible enough to incorporate the full spectrum of ECD services, while ensuring consistency for comparability.
- The standardized ECD costing tool (SECT) is a response to this demand and has been pilot ed in five countries across five different program types. These pilots provided many opportunities for reflection and improvement, as described in this article. SECT 2.0 will represent a further refinement, harnessing technology to improve data collection, and streamlining the data collection and analysis process.

In conclusion, the research and the development of a standardized tool have illuminated the need for a central point of reference on ECD costing to house information on the methodological questions as well as cost data. Ideally, this would take the form of an online platform and a tool that is application or tablet-based for ease of use. Moving forward, stakeholders are encouraged to work together to build data collection and management capacity at all levels. Each of these improvements will serve to support the collection of standardized, timely, and accurate cost data on ECD programs, which is a crucial step to realizing the goal of equitable, quality ECD for all children.

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Supporting information

Additional supporting information may be found in the online version of this article.

Appendix A. A User’s Guide to Costing ECD: Utilization of the Standardized ECD Costing Tool (SECT).

Appendix B. Screenshot of Standardized ECD Costing Tool.

Competing interests

The authors declare no competing interests.

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