



Comparing Costs of Early Childhood Care and Education Programs: An International Perspective

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Abstract

The purpose of this article is to outline the determinants of early childhood care and education (ECCE) costs as well as a method for measuring them, and to set out available cost data provided by countries for their ECCE endeavors. The analysis is based upon comparison of available data for 17 countries. We first address why costs may differ significantly for ECCE from country to country. Second, we address why existing reporting of costs is highly inconsistent and typically incomplete, including an examination of disparities in reported ECCE expenditures across countries. Third, we outline an appropriate way, known as the ingredients method, for determining costs that can provide consistent measurement for comparative purposes.

Keywords: Early Education, Costs, International.

JEL classification: I22, H5, I2.

1. Introduction

It is recognized that early childhood care and education (ECCE) prior to primary school is a good social investment. Not only does such educational provision permit parents to be more productive in the workplace while their children are provided for, but the early formation possible in a high quality program improves school performance and educational attainment and reduces later social problems (Nores & Barnett, 2010; van der Gaag & Tan, 1998). A careful economic analysis of the benefits and costs of a quality preschool program that followed students to age 40 in comparison with a randomly assigned control group found that the experimental group had higher student achievement, lower grade retention and assignment to special education, greater educational attainment, and lower participation in crime and public assistance. Heckman *et al.* (2010) found social rates of return on this preschool program—the High/Scope Perry Preschool Program—to be about 7-10%.

With the increased recognition of the social value of early childhood care and education programs in preparing the young for successful schooling experiences and freeing parents for the workplace, there is a concerted effort to understand the cost and financial requirements for such programs (Bella & Loizillon, 2010; UNESCO, 2007). The concern for the cost of ECCE is rising for several reasons. First, because the research has shown the importance of early interventions on subsequent schooling and adult success, nations have taken an interest in establishing and expanding their ECCE. In these regards, recent studies of preschool internationally have documented cognitive, behavioral, and health benefits of increased access to preschool, with greatest effects for disadvantaged students (Nores & Barnett, 2010; Leuven *et al.*, 2010). Although access to pre-primary education has increased over the past 10 years within every single region within the world (Bella & Loizillon, 2010), access to and the quality of pre-primary education is still highly uneven. Second, nations need to understand how the demography of their countries will translate into different cost requirements as the systems expand and possibly add more services. For these reasons, it is useful to explore the treatment of ECCE and associated costs and their determinants among different countries.

Any attempt to expand early childhood care and education in a comprehensive manner first requires an understanding of the inputs the intervention requires and the costs associated with them. The purpose of this paper is to delineate the determinants of costs as well as their measurement, and to set out available cost data provided by countries for their ECCE endeavors. In so doing, we will show that the overall cost of ECCE programs depends upon a number of features including enrollments and quality. For example, not surprisingly, public spending on pre-primary education (as a share of GDP) is positively correlated with greater enrollment in early childhood care and education (Bella & Loizillon, 2010).

The existing data on costs for ECCE programs are derived from highly variable reporting methods and must be viewed with caution when placed in a comparative framework. Although valid methods for measuring costs are available, they are rarely employed because of complications that will be noted. The available published data are rarely commensurable when trying to compare patterns across countries. In what follows we will first address why costs for ECCE may significantly differ from country-to-country. Second, we will address why existing reporting of costs is highly inconsistent and typically incomplete. Third, we will outline the appropriate way of determining costs.

To anchor the discussion, we provide concrete information on 17 countries, compiled in Table 1, which shows pre-primary educational enrollment, aggregate funding, and quality measures. This table draws together the most recent available evidence from research published in academic journals, statistics made available by individual countries to international agencies such as UNESCO or OECD, and from less formally collected data available in online reports. It is important to note that because the data do not come from a single source, there are both missing categories for any particular country as well as results that are susceptible to large errors in magnitude.¹ Data standards for these measures have not been established or implemented in a rigorous fashion across countries, and most countries are limited

in their ability to provide reliable information on costs for reasons that will be reviewed. Nevertheless, some of the detail in Table 1 will be sufficiently useful to provide approximate magnitudes of differences in enrollments, funding, and quality. However, it is important to emphasize that precise comparisons among countries are not readily available, and these data should be viewed through a cautionary lens. What is particularly striking about the information on these 17 countries is the remarkable difference among them in what is provided and its purported cost (for countries where costs are provided) under the seemingly common label of ECCE. That is, what is offered as ECCE is far from homogeneous with perhaps its only common dimension being the pre-school age of the children.

2. Why do Costs for ECCE Differ?

Even if costs of ECCE were measured in a standardized way, they will differ considerably among countries. The reason is that what we call ECCE is far from homogeneous. For any given society it is the magnitudes of enrollments in ECCE, the quality of the ECCE programs, types of services provided, and the price levels of ECCE resources that determine costs. These can account for differences in costs per student of 30 times or more as illustrated in the nominal comparisons for the U.S. and Turkey.

2.1. Enrollments

Enrollments depend upon eligibility requirements of programs, demography of eligible children, and accessibility to ECCE centers.

Eligibility is a major determinant of enrollments. Both the covered age ranges and family eligibility requirements are important factors. Of particular importance is the age provision. As Table 1 shows, some countries report that ECCE is provided from ages three to five, others for one year of age only, and yet others three to six. Many provide multiple ECCE programs targeted at different age ranges and with greater and lesser degrees of coverage. To the extent that some countries provide four years of services while others one or two years, total costs will be affected profoundly. Eligibility is also determined by the inclusive nature of the plan. In some countries the ECCE programs are restricted to particular groups defined by income level, region, ethnicity or immigration status. In others they are universal in extending eligibility to the overall population of children in the covered age groups. Some provide ECCE services free of charge, while other assess parental fees. The degree of public subsidy for the program can effectively restrict access to the proportion of the population that can afford services. These provisions account for large potential differences in enrollments and consequent overall costs of ECCE. An additional cost factor is that of education of physically and mentally disabled students. Some countries make explicit provisions for addressing the needs of disabled students (e.g., Sweden, Russia, New Zealand) while many others do not. Such students require closer assistance and greater services than non-disabled students, so their inclusion can increase costs substantially.

Table 1
INTERNATIONAL PRE-PRIMARY EDUCATION, ENROLLMENT, FUNDING AND MEASURES

Country	Age Group served	Coverage (Total enrollment/ total pop in targeted age group)	Percent of enrollees in private education	Providers	Funding sources	Public funding as % GDP	Per pupil spending (US \$ using PPP)	Duration	Teacher / pupil ratio	Teacher qualifications	Notes
Brazil	ages 4-6	61% (2007)	24% (2007)	Municipalities must provide to all parents that it request ^g 105,616 preschools, 26% of which are private (2005) ^g	0.4% GDP (2006) ^f (includes public and private sources)	\$ 1,315 (2006) ^f	Varies by municipality. Average day is 4.5 hours (2005) ^a for an average of five days per week (2003) ^h	330,000 teachers (2007) 1:20 (2007)	Preschool teachers must have completed secondary education. 31% of preschool teachers had a college degree; the balance have completed secondary education (2003). ^h		
China	ages 3-6	42% (2007)	34% (2007)	Four entities run kindergartens: (1) government institutions; (2) enterprises; (3) neighborhood collectives / civil administration; and (4) rural collections / community operations. ^p 133,722 public and 83,119 private pre-schools (2008) ^m	Public 54.6% Private 45.4% (2000) ^b	0.1% (2000) ^b	Kindergartens serve children ages 3-6. ⁿ <= 12 classes per week, 30 minutes / class ^a	898,522 (2007) 1:22 (2007)	95% of public pre-school teachers have received training (2003/2004) ^a	Highest educational attainment of the 776,491 teachers reported in 2006: 51% have some post-secondary education; 45% have completed high school; 5% have not completed high school ^q	

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Cuba	ages 3-5	111% (2007)	No private sector.	Three preschool programs: child care centers for ages 6mos. – 5 years (serves 17% children); Educate Your Child program, home visiting program (serves 71% of children); preschools for 5 year olds (serves 12% of children) (2004). ^r	Public sector only.	*		Full-day, 5 days/week ^c	28,000 teachers (2007) 1:16 (2007)	License, 5-year degree required from institute of higher education. The last of the five years is devoted to professional training. ^{kr}	
Egypt	ages 4-5	17% (2007)	30% (2007)	Approximately 50% public (5,700 kindergartens), and 50% private.	Government, NGOs, parents. Parents pay average fee of 120 L. E. (2006) ^a	0.02% ^d	\$871 (2001 est., 2007 dollars) ^{ae}	Publicly run kindergartens: 32-36 weeks per year. 6 hrs / day, 6 days/week (2006) ^a	23,000 teachers (2007) 1:25 (2007)	Public teachers required to have a B. A. in specialize in education or early childhood development (2006) ^a 86% trained (2002) ^a	Public pre-primary providers do not assess parental fees (2006) ^a
France	ages 3-5	113% (2007)	13% (2007)	Education Ministry offers schooling for children ages 2-6. (2007) ^l	Public share: 94% (2006) Private share: 6% (2006) ^f	0.06% (2006) ^f	\$4,995 (2006) ^f	Full day, 5 days / week. ^l	141,000 teachers (2007) 1:18 (2007)	Like primary teachers, 5-year tertiary education, the last year of which is on the job. ^l	Public pre-primary providers do not assess parental fees (2007) ^l

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Germany	ages 3-5	107% (2007)	63% (2007)	Local youth welfare offices. ¹ The state provides optional kindergarten for children as young as five. ¹	Public share: 72% (2006) Private share: 28% (2006) ^f	0.03% (2006) ^f	\$5,683 (2006) ^f	Full-day and half-day, 5 days/week ¹	207,000 teachers (2007) 1:12 (2007)	At least 3 years of post-secondary education, one year of which involves professional training. ¹	Both public and private primary providers assess parental fees (2007). ¹
India	ages 3-5	40% (2006)	3.7% (2001)	State run through decentralized sectors and centers within sectors; more than 750,000 Integrated Child Services Development Centers in the country (2007). ^s	Public share: 73% Private share: 27% (2003) ^f	2.25% (2003) ^f	\$761 (2003) ^f		738,000 teachers (2006) 1:40 (2006)	Secondary or higher secondary examination (i. e. 10 – 12 years of education) plus 1-2 year course at pre-school teacher training institutions. ^a	
Indonesia	ages 5-6	44% (2007)	99% (2007)	Ministry of National Education, municipalities, sub-districts, private providers. ^a	Public share: 5% Private share: 95% (2002) ^f	0.01% (2002). ^t	\$1,598 (2006) ^f		280,000 teachers (2007) 1:13 (2007)		
Jordan	ages 4-5	32% (2007)	(2007)	Of those who attend kindergarten, 77% attend private, 18% NGO, and 5% attend public sector kindergartens. (2002). ^a	Public share: 1% Private share: 99% (2002) ^f	Minimally public funded.		23 hours per week for 28 weeks per year. ^a	5,000 teachers (2007) 1:19 (2007)	Kindergarten teachers highest educational attainment: high school. 5% some post-	

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Kenya	ages 3-5	48% (2007)	35% (2007)	Local authorities, NGOs, private providers. 80% of centers are private ^a				22.5 hours weekly recommended ^a 4 or 8 hours per day ^u	76,000 teachers (2007) 1:22 (2007)	Secondary education required. ^u 44% trained (2002). Training consists of 2-year in-service training, + 1 five-month in-service training ^a	secondary: 80% bachelor's degree: 17% (2002) ^a Teachers are to have a university degree in ECE or related field and to receive 160 hours of training once hired. ^a
South/ Republic of Korea	age 5 (kinder-garten)	106% (2007)	78% (2007)	Public kindergartens: 22% Private kindergartens: 78% Public childcare centers: 44% Private childcare centers: 56% (2006) ^v	Public share: 40% (2006) Private share: 60% (2006) ^v	0.2% (2006) includes public & private sources ^f	\$3,393 (2006) ^f	4-8 hours / day, 180 days / year. 1/3 of kindergartens offer half day and 2/3 offer full day ^a	29,000 teachers (2007) 1:19 (2007)	Kindergarten teachers must have at least a 3-year college degree in ECE. (2008) Depending on type of preschool, teachers must have at least a high school diploma and 1 year	

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Mexico	ages 3-5	11.4% (2007)	15% (2007)	As of 2009, states to provide preschool spaces. 90% preschools are public, 10% private (2005) ^w	Public share: 82% (2006) Private share: 19% (2006) ^f	0.52% (p)	\$1,978 (2006) ^f	Compulsory attendance from age 3 as of 2009. 3-4 hours per day, 5 days per week in the school year ^w	167,000 teachers (2007) 1:28 (2007)	B. A. or degree from teacher training institute required. Great majority do not have training though (2005) ^w	childcare ed. course. 55% of all public & private childcare centers participate in national accreditation process; 27% accredited (2007) ^v
New Zealand	ages 3-4	93% (2007)	41% (2009) ^z	Of 4,123 licensed ECE centers, 60% community-based (all kindergartens are community-based), and 40% privately owned. (2009) (s) Over half of children in ECE attend education & care service, 22% kindergartens.	Public share: 71% (2006) Private share: 37% (2006) ^f [sic]	0.35% (2006) ^f	\$5,113 (2006) ^f	Approximately 80% of licensed centers are all-day year round, and the balance is part time (2009) Average hours of attendance per week	18,397 ECE teachers, of which 2,213 kindergarten teachers (2009) ^z 1:10 (2009) ^z	Whereas 96% of kindergarten teachers are qualified (i. e., hold a recognised ECE teaching qualification that leads to registration with the national teachers council), 69% of teachers in casual education & care and 58% of	

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Poland	ages 3-6	60% (2007)	9% (2007)	Municipalities offer schooling for children ages 3-6. (2007) ¹	Public share: 85% (2006) Private share: 15% (2006) ^f	0.98% (2006) ^f	\$4,545 (2006) ^f	across provider types is 19.5 hours. (2009) ^z	49,000 teachers (2007) 1:18 (2007)	teachers in education & care are. (2009) ^z	Some free provision of public education, of which one year must be pre-primary, as well as fee paying public and private pre-primary providers (2007) ¹
Russian Federation	ages 3-6 (kindergarten)	88% (2007)	2% (2007)	79% kindergarten municipal-owned, 13% state-owned, 4% private, 4% other (2005) ^a	Funding has been almost entirely delegated from federal down to regions & localities & parental fees. ^a	6.8% (2006) ^f [sic]	\$3,291 (2006) ^f	Norm is full day (10.5-12) hours. Half or full day, year round or school year. ^a	628,000 teachers (2006) 1:7 (2006)	Highest level of obtained education: higher education degree: 30% some post-secondary: 4% secondary specialized education: 66% ^a	Depending on region, parental fees ranged from 230-1050 rubles per child per education: (2004?) ^a
Senegal	ages 4-6	9% (2007)	51% (2007)	There are three preschool years. NGOs and local	(per capita) 2.54% (2004) ^a	(per capita) 2.54% (2004) ^a		25 hours per week, 30 weeks per	6,000 teachers (2007)	No mandatory criteria. Primary Teacher Training	

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				authorities are the main providers (2004) ^a				year. Community preschools are year-round (2004) ^a	1:17 (2007)	Colleges provide in-service and pre-service early childhood teacher training to volunteers. However, the Ministry reports 100% of teachers are trained. (2004) ^a	
South Africa	age 5-6	51% (2007)	4% (2008) ^x	Grade R (voluntary) for five year olds, pre grade R for 0-4 year olds. Provision dominated by private, home, and NGO ^a	75% costs paid by fees (2002) ^a	(per capita) 13.36 (2004) ^a		Suggested time allocation is: literacy: 40% numeracy: 35% life skills: 25% ^a	54,503 (2001) ^a 1:36 (1998)	Bachelor of Education degree required ^y	
Sweden	ages 3-6	95% (2006)	12% (2006)	The state offers schooling for children ages 3-6, as well as early programming for ages 1-2 (2007) ^l	Public share: 100% (2006) ^f [sic]	5.4% (2006) ^f	\$5,475 (2006) ^f	Full day, Government-paid entitlement to at least 525 hours/year for 4-5 year olds.	34,000 teachers (2006) 1:10 (2006)	University diploma in Child and Youth Training required. Equals approximately 3.5 years of full-time enrollment, at least 1.5 years of which consists of professional training ^l	Both public and private providers assess parental fees (2007) ^l
Turkey	ages 3-5	16% (2007)	9% (2007)	The state offers optional ECCE for	Public share: 99% (2004) ^f	0.01% (2004) ^f	\$283 (2004) ^f		25,000 teachers	Four years of post-secondary	Both public and private

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USA	ages 3-5	62% (2007)	35% (2007)	Federally-funded Head Start centers, state-funded pre-k, privately funded child care centers.	children ages 3-6. (2007) ^l Private share: 1% (2004) ^f	0.3% (2006) ^f	\$8,867 (2006) ^f	Full day or half day depending upon the local service provider.	1:26 (2007)	education, at least one year of which consists of professional training ^l	vate pre-primary providers assess parental fees (2007) ^l
USA	ages 3-5	62% (2007)	35% (2007)	Federally-funded Head Start centers, state-funded pre-k, privately funded child care centers.	Public share: 78% (2006) Private share: 22% (2006) ^f	0.3% (2006) ^f	\$8,867 (2006) ^f	Full day or half day depending upon the local service provider.	468,000 teachers 1:16 (2007)	For federal program (Head Start), child development associate, associates, or B. A. degree required ^o	

Unless otherwise noted, statistics are from UNESCO (2010). *Education for All: EFA Global Monitoring Report 2010*.

^a Country-specific reports provided by UNESCO International Bureau of Education. 2006 or 2007. Downloadable at: <http://www.unesco.org/en/efareport/resources/background-papers/>

^{*} Country-specific reports for Cuba provided by International Bureau of Education for UNESCO stated ECCE spending equals 18.41% of GDP (2004). This percentage is too high to be reliable, but perhaps represents the gross public expenditure on ECCE as a percent of GDP *per capita*.

^b UNESCO. 2003. Early Childhood Care and Education in E-9 Countries: Status and Outlook. UNESCO, Paris. Downloadable at: http://www.unescobkk.org/fileadmin/user_upload/appeal/ECCE/reports_and_publications/E9.pdf

^c Susan Miller. 2002. Early Childhood Education in Cuba. *Childhood Education* 78(6),359-362.

^d Calculated using statistics from two sources: 575,000 pre-primary pupils in 2007 (EFA Global Monitoring Report 2010), average per unit cost is LE 417 in 2001^(d), conversion of LE to international dollar using 2001 Purchasing Power Parity factor of 1.78, making the per unit cost = \$742.26 (2001). \$262.03 billion GDP in 2001 (PPP valuation in current prices) (2009 World Economic Outlook). (575,500*742.26) / 262,030,000,000 = 0.00163.

^e Prices converted to US\$ using 2002 Purchasing Power Parity conversion factor of 1.5. Source: 2004 World Bank Development Indicators, Relative Prices and Exchange Rates. Available at http://siteresources.worldbank.org/ICPIN/7Resources/Table5_7.pdf: Average costs of kindergarten were reported as LE 385 (avg. over 6 years - 1994 - 2000) and LE 417 in 2001. Source: Egypt report provided by International Bureau of Education for UNESCO.

^f Most recent fiscal year data available (2006) from OECD. Stat Extracts. Data extracted on July 14, 2010 from OECD. Stat.

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- k International Association of Universities, World Higher Education Database. Available at www.unesco.org/iau/online/databases/systems_data/cu.rtf
- l Information Database on Education Systems in Europe (2006/2007). Available at www.eurydice.org
- m Ministry of Education statistics. 2008. Accessed on July 15, 2010 at <http://www.moe.gov.cn/edoas/website18/96/info1261474691589796.htm> and <http://www.moe.gov.cn/edoas/website18/91/info1261474347781791.htm>
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- t World Bank Indicators, GDP (current US \$).
- u UNESCO. 2005. Policy Review Report. Early Childhood Care and Education In Kenya. Early Childhood and Family Policy Series No 11. Accessed on July 15, 2010 at <http://unesdoc.unesco.org/images/0013/001390/139026e.pdf>
- v Sonja Sheridan, Joanna Giota a, You-Me Hanb, Jeong-Yoon Kwonc. 2009. A cross-cultural study of preschool quality in South Korea and Sweden: ECERS evaluations. *Early Childhood Research Quarterly* 24(2): 142–156.
- w OECD. 2006. Starting Strong II: Early Childhood Education and Care, Appendix E. Mexico. Accessed on July 15, 2010 at <http://www.oecd.org/dataoecd/16/20/37423645.pdf>
- x Department of Education. 2008. Education Statistics in South Africa in 2008. Accessed on July 15, 2010 at <http://www.education.gov.za/emis/emisweb/08stats/Education%20Statistics%20in%20South%20Africa%202008.pdf>
- y Nelson Mandela Metropolitan University School for Initial Teacher Education. 2010. Foundation Phase Studies. Accessed on July 15, 2010 at <http://www.nmmu.ac.za/default.asp?id=2639&bhcp=1>
- z Education Counts. 2009. ECE (Early Childhood Education) Statistics. New Zealand Ministry of Education. Accessed on July 16, 2010 at <http://www.education-counts.govt.nz/statistics/ece>

The demographic composition of the population is also an important factor. Some countries have a relatively young adult population with very high birthrates and a high concentration of children of pre-school ages. Other countries such as those of Western Europe have an older adult population with low fertility rates and relatively few children eligible for ECCE. These differences mean that, for any given overall population, the population of pre-school children eligible for and enrolled in ECCE will vary considerably.

Finally, accessibility is an important determinant of the number of enrollments. Unless ECCE centers are placed conveniently in every neighborhood, they may be difficult to access, especially in rural areas where sparse populations make it difficult to provide even minimal access to centers. Even in urban areas there may be uneven access because of inadequate transportation for some families. In some cases ECCE is provided at local schools, private homes, and in workplaces, promoting accessibility.

2.2. Quality of ECCE services ²

It has been well established that higher quality of ECCE is positively associated with positive developmental outcomes, including improved cognitive, behavioral, and health outcomes (e. g., National Institute of Child Health and Development (NICHD) Early Child Care Research Network (ECCRN), 2000, 2005; Burchinal *et al.*, 2009; Nores & Barnett, 2010). Costs are, in turn, highly dependent on the quality of ECCE services.

Measures of ECCE quality fall into two major categories for assessment: structural and process measures (Currie, 2001). Structural measures of ECCE include aspects such as the levels of education and training of staff, class size, child-staff ratios, and the quality of the physical environment. Governments often regulate these features through facility licensing standards or specific standards or requirements in publicly subsidized programs. Process characteristics are those aspects that relate to the interactions between teachers and children, to the use of class time, and to disciplinary and classroom management techniques (Mashburn *et al.*, 2008).

There is no consensus in ECCE research about which isolated aspects of child care constitute quality and their respective contributions to children's readiness for school. There is suggestive evidence, though, that the quality of teacher-child interactions in particular is an important factor influencing child care quality (Mashburn *et al.*, 2008; Howes *et al.*, 2008). However, identifying the quality of interactions can be quite expensive and difficult to regulate; for example, the assessment typically requires direct observation of classrooms by trained observers—a time consuming and expensive proposition. In the context of developing countries where services are highly uneven and only reach a small minority of the overall population, collecting data about ECCE process measures may pose too great a burden in cost and time to be practical.

Partly in light of such cost limitations, the most widely used quality rating system (ECERS) in the U. S. focuses on structural measures. The Early Childhood Environment Rating Scale-Revised (ECERS-R) is a 43-item inventory of observing classrooms and centers

serving children from 2.5 to 5 years of age (Harms, Clifford, & Cryer, 1998). Among the 43 items, only one specifically relates to staff-child interactions (ranking whether staff show warmth and support towards children). The balance of the 43 items relate to structural aspects of child care such as staff qualifications, ratios, safety, furnishings, classroom settings, and the curriculum. A far more extensive approach that attempts to measure child-teacher interactions and other aspects of the early childhood classroom and their consequences has been increasing its presence in recent years (Mashburn *et al.*, 2008).

Since the focus in this paper is the understanding of the costs of expanding of pre-primary education internationally in countries with nascent ECCE systems and limited revenues to support their expansion, we prioritize the five most basic structural elements of ECCE. They can be divided into the following five categories: (1) length of ECCE sessions; (2) personnel ratios; (3) qualifications of personnel; (4) facilities; and (5) auxiliary services such as health and nutrition.

Length of sessions

ECCE sessions can vary from a few hours a day to twelve hours where parents can drop off their children as early as seven AM and pick them up at seven PM. For example, as Table 1 illustrates, New Zealand reports an average of 19.5 hours a week or a little less than 4 hours a day, with many operating only during certain seasons (i.e., the school year). Other countries such as Sweden and Russia report full days and (in some cases) full calendar years, while yet others sponsor ECCE arrangements between these extremes. Of course, in most of the countries shown in Table 1 the sponsorship of ECCE is private, regional, or local, so there can be considerable variance within countries.

It is generally assumed that longer sessions will have greater effects on educational preparation for school and pro-social behavior, although not necessarily proportionate to the additional time (Nores & Barnett, 2010). However, the difference between a three - or four-hour session and a twelve-hour one will have profound implications for costs, perhaps with the longer sessions costing even more than three times as much in personnel due to benefits associated with full-time as compared to part-time employment.

The length of sessions also has important implications for eligibility for services. If ECCE is only available a few hours per day, it may mean that full-time working parents must arrange for alternate services to cover some of the time they are at work. Likewise, full-day ECCE may have the effect of discouraging use by part-time working parents or parents who only wish to enroll their child for a few hours each day.

Personnel ratios

Also, significant in determining costs is the ratio of children to adult personnel. This varies immensely from country to country. For example, in Russia it is reported as 7:1 in

contrast with a ratio as high as 40:1 in India. If all other things were equal, this alone would amount to a personnel cost difference that was more than six times as high per child in Russia as in India. Since personnel usually dominate the overall costs of ECCE, differences in personal ratios heavily influence overall costs. The adult to child ratio is considered to be one of the key indicators of quality for ECCE services. It is presumed that with more personnel, more services can be provided along with more individualized, higher quality interactions with children. With low ratios of personnel to children, ECCE becomes more limited to childcare, maintenance, and safety issues. With more personnel it is possible to increase the teaching and educational function of ECCE. And personnel ratios tend to be particularly high with younger children such as toddlers who need more monitoring.

Qualifications of personnel and range of services

Clearly the qualifications of personnel are a key element in the quality of ECCE programs. As Table 1 shows, countries report a variety of qualifications. In some countries there are virtually no specific requirements for employment in ECCE. In others, the key personnel are expected to engage in four or five years of post-secondary study or obtain an appropriate university degree and must meet licensing requirements as in Cuba. In India the qualification does not require high school completion, but requires a specialized course in pre-school education of one or two years. In some cases, such as South Korea, there are lower requirements for staff in private ECCE centers than public ones. In other cases such as Brazil, requirements are set forth, but only a minority of teachers actually meets these benchmarks. Staff qualifications may also vary by region within a country; in some regions there are many staff without even the minimum qualifications because the salaries are inadequate to attract a supply of qualified persons. But, we must also recognize that these are minimum qualifications, and the average qualification in some countries may be considerably higher than the minimum when salaries and working conditions are attractive.

Personnel qualifications are also considered an important determinant of quality of care and education for pre-schoolers. Presumably those with specialized training in early childhood education or strong teacher preparation are superior in their teaching ability and are able to make a larger educational contribution. The higher the qualifications in market-based economies, the higher must be the salaries to attract such educated and capable staff. This means that superior qualifications of personnel, and especially ECCE teachers, will have profound effects on overall costs of ECCE, even though they are expected to have a corresponding, positive effect on quality and outcomes. Finally, the number of staff with full-time responsibilities and with full credentials rather than part-time or with lower educational attainments such as assistants will also have an important impact on costs.

Along with the ratio of personnel to children and their qualifications, the variety of services and composition of needed personnel can have an important impact on costs. Some ECCE programs provide comprehensive services such as those of France, Germany, Sweden, and the Head Start program in the U.S. This means that various types of psychological,

medical, dental, and nutritional services are available along with the personnel to provide these services (this is discussed in greater detail below). Some programs also include teachers who visit homes to work with parents to improve their parenting practices. These added services require additional personnel beyond those needed for child care and education of children.

Facilities and transportation

Costs are also influenced heavily by the characteristics of the ECCE facilities, their size, and the provision of transportation. In some countries the typical ECCE facility is minimal, with a single room for the children to shield them from the weather. But much of the actual care and play takes place out of doors, so not much indoor space is needed. Others require communities to provide space for ECCE in homes, churches, mosques, or buildings constructed by the community—particularly in rural areas. The most industrialized countries often provide extensive facilities characterized by many specialized rooms and substantial space per child. Rooms are allocated not only for play, rest, teaching activities, and food preparation, but also for testing, counseling, and special educational needs. In addition, bathrooms are specially designed with appliances that are accessible to children and with showers in case the children get unusually dirty. Offices for administrative and teaching personnel and for family conferences are also common. It is clear that the types of facilities provided can vary considerably in cost and cost per child.

Another factor affecting the cost per child is the size of the facility. To the degree that even in rural areas a minimal facility must be provided, the facility can benefit from economies of scale in terms of its enrollment (Mocan, 1997). That is, a minimum-sized facility may be able to accommodate as many as 50 children with its physical features and complement of personnel. But, if only 25 are enrolled, the facility cost per child is almost twice as high as if there is a full complement of 50. The only marginal or additional costs per child are for supplies and food, and these are very low in comparison with personnel and facility costs.

In some cases it may be feasible to create larger enrollments at a single facility through providing transportation. But, transportation has its own cost and is not feasible in many areas where roads that can carry vehicles are not present or are impassable during the rainy season. And transportation is often viewed as inappropriate for very young children. Thus, the density or sparseness of population and the size of facilities are related to facilities costs per child, at least when one is considering a minimum size facility.

Auxiliary services health and nutrition

While most countries claim children's health and well-being as a goal of ECCE provision, the information about health-related services offered through ECCE programs is hard

to obtain. Inclusion of health or nutrition services certainly increases the cost and quality of ECCE. The extent of provision (e.g., full service immunizations and physicals, number of meals per day), location of services (home visits versus center-based care), and extent of parental instruction are important determinants of cost. By way of example, the following two programs are among the most comprehensive national health-related ECCE policies.

The Netherlands provides all children with free preventative health care. For ages 0-4, nurses and doctors provide health care services either in preschools, or via home-care programs, or within private, not-for-profit foundations. Meanwhile, Municipal Health Services are responsible for providing health care for children age 4-18. For children age 4-6, Municipal Health Services provides care in the school. Records on a child's pre-school health care (including developmental and psychosocial in addition to physical health) are transferred at the parents' permission to the child's school as of age 4-5. According to a 1999 OECD report on early childhood education in the Netherlands, 97% of infants and 80% of three year olds receive home-visits or visit clinics for treatment, check-ups (nine during the child's first year), vaccinations and advice (OECD Country Note, 1999).

While the U. S. does not offer universal health care to children, the Head Start preschool program for economically-disadvantaged children arranges for similar health care services as in the Netherlands. Per program regulations, Head Start staff interview parents to determine whether the child has access to health services. If not, staff are expected to assist the parents to gain access to public and private agencies to enroll the children in local health insurance and services. Specifically, staff are expected to educate parents about the importance of health care prevention services and their child's eligibility for Medicaid (a program funded by states and the federal government), make sure parents arrange health care appointments for their children, help arrange transportation for those families to attend the appointments, and provide other relevant support. Within 90 days of enrollment, Head Start staff are expected to screen children to identify those who need referrals to formal assessments for services such as vision, hearing aids, mental health services, special education, or other related services. Head Start agencies commonly arrange for a local health service provider to come to the preschool to provide immunizations or physical and dental examinations to children. Unlike the Netherlands, there is no formal method for sharing student health records across the preschool to primary school transition (Office of Human Development Services, n.d.).

2.3. Composition and level of costs

The composition and level of costs depends upon the services offered as well as their quality. If a full range of services including health, nutrition, and educational inputs are provided and for a long daily session such as 8-12 hours over a full year with highly-qualified personnel and low child-to-adult ratios, the cost per child can be as high as a good quality secondary education. Clearly, this is not typical. In contrast, if the sessions are short and the services offered are largely those of child maintenance using minimally-qualified personnel, the costs per child will be considerably lower than those for primary school children. There is no valid fig-

ure for the cost of ECCE without a specification of the types of services, duration of sessions, and quality of personnel. In this context it is more expensive to serve the youngest or the children such as toddlers because of greater personnel requirements to meet their needs.

This also means that although different types of students may require more services than others such as very poor children and those with special needs, the differential costs may be ignored in the design of common programs for all children. Further, the design of ECCE programs in societies with low GDP per capita are more likely to be influenced by what can be assembled with available resources rather than establishing a design and ascertaining its costs and financing. Typically, the provision of ECCE in such societies is extremely limited because of stringent resource availability and is relegated to very minimal services and sessions with large ratios of children to only minimally-qualified adults.

3. Why Existing Data are Inadequate for Comparing Costs

Even if we knew the true cost of ECCE in different countries, we would not know if costs across countries were higher or lower for similar types of services because of the large qualitative differences in participation and quality of what is called ECCE. But, even setting aside this serious challenge to the interpretation of accurate data, the data that presently exist are highly inaccurate. Existing data provided by countries in their annual reports or transmitted to international organizations are very rough and incomplete estimates of total public and private costs of ECCE or the per-pupil costs, although the patterns may differentiate correctly among gross differences in costs. For some countries the methods for determining costs will be more nearly complete and accurate than for others.

Why are the data inaccurate? The main reasons include the fact that the costs of ECCE are borne by many sources and not just the government. Also, accounting systems are not designed to measure program costs. Standard government accounting systems were designed to account for *expenditures* rather than *costs*. But many countries lack the capacity to accurately report government expenditures or their enrollment counts because of inadequate systems for compiling the information and corruption in the financial sphere that may distort reported financial data.

3.1. Multiple sources of funds

ECCE costs are derived from many sources. First, in many countries the ECCE function is supported by more than one level of government, such as regional and municipal governments as well as the national government. It is often difficult for the national government to coordinate and obtain accurate information from decentralized units of government because of poor accounting systems and a lack of capacity in many rural areas. As a result the national figures are often rough estimates of something that may bear little resemblance to the true enrollments and costs.

Second, the private sector bears many of the costs of ECCE through families, religious and voluntary agencies, employers, nongovernmental agencies, and in-kind contributions from communities. Depending upon the country, parents may be expected to pay fees and provide uniforms, supplies, and food for their children. Studies at the primary level by Mun Tsang (2002) suggest that these costs can be considerable, even 60% or more beyond public costs. Religious and voluntary agencies subsidize the costs of ECCE in some countries where students are enrolled in private centers that are operated by these entities. In some cases these entities receive some public assistance, but much of the cost is born privately. Although the provision of services by individual volunteers and voluntary agencies, which are prevalent in some industrialized societies, has costs to those entities, these are not found in government accounting reports. Finally, in some countries ECCE is available only if the community provides the facility for the center and housing and other emollients for the teacher-costs that are also ignored in public expenditure figures.

3.2. Inappropriate accounting systems

Government accounting systems were generally designed to provide some transparency in how public funds were spent according to bureaucratic criteria such as agencies, functions, and objects (salaries, materials, and so on), but not the costs of specific services or programs. The goal of such accounting systems was that of ensuring honesty in the disbursement of public funds through specifying a general system of accounts that would identify the ways in which the money was spent, not the cost of specific services for particular populations. It is difficult to identify the costs of any specific government service that is funded through an overall agency such as a Ministry of Education, when ECCE is only one of many services provided.

Government budgets typically separate operating costs from those of capital costs, and it is usually the former that are reported under annual expenditures. Even if one could include the annualized costs (amortization and interest payments) for facilities and equipment, the government accounting systems are not based upon providing annual costs of these inputs into ECCE. Usually, capital costs are funded out of separate budgets from operating expenses and sometimes from a ministry different from the one providing the service for children. Although there are standard principles for computing the annual service cost of such facilities, these are not typically used by governments. Rather, they report the expenditures for all of the capital construction financed in a given year in their capital spending or the annual debt service on accumulated indebtedness. The latter is primarily a function of the timing of such construction rather than the annual pattern of facilities use. Public buildings that already exist and are used for ECCE are not usually included under current costs or expenditures because they were fully paid for previously. They may be included in an amalgamated category of debt payments for all construction on which borrowing has taken place. But, the specific value of the facilities that are used each year for ECCE will not appear in the overall cost information. From a cost accounting perspective this is an inappropriate practice since the cost of facilities should be distributed over their lifetime of use and allocated appropriately to cost calculations for each year of use.

A final problem in creating comparative cost figures is that the price levels differ immensely in different countries for the same resources. That is, the same model of ECCE can carry different costs because the cost of qualified labor or facilities can differ by several factors from country to country. For example, university-qualified personnel in the U.S. have a cost that is at least five times as high as equally qualified personnel in countries like India, and the differential may be even higher when comparing the U. S. to some other countries. Costs of land and construction create large differences in the cost of facilities as well. A large portion of the differences in costs may be attributable to these price differentials of resources rather than to the quality of ECCE program offerings.

Although much more can be done by countries to accurately report the costs of ECCE, the difficulties in gathering data from private sources and different government levels and entities pose obstacles to obtaining comprehensive and accurate information. Even enrollment figures in ECCE may be far from precise because of these barriers. Government accounting conventions that were not designed to measure costs of specific services further compounds this difficulty. The result is that estimates of costs of ECCE reported by individual countries are not reliable, and comparisons among countries may not fully reflect reality.

3.3. Illustrating the challenge of comparing costs

Even setting aside the challenge of accurately comparing costs across countries, several cost studies of early childhood care illustrate some of the above-mentioned difficulties of measuring costs *within* a country. These studies illustrate the failure of existing data to adequately capture the full costs of ECCE. In general, Tsang (2002) has found that in the studies that he sampled on ECCE, many of the public and most private costs have not been accurately identified and included. The reviewed studies neglect costs of equipment and facilities, regional variation, higher costs associated with special needs and disadvantaged children, auxiliary services such as health care, or the value of volunteer or in-kind services. Most studies acknowledge that costs such as teacher salaries, transportation, and sites vary across regions within a country, but then use country-level aggregate expenditures reported by the Ministry of Education and country-level enrollment percentages to estimate a per capita cost. As an example, a detailed study for Jordan uses this approach (Young & van der Gaag, 2002).

Most studies seek to improve upon a rudimentary per capita cost despite the limitations in the existing data. For example, several studies attempt to adjust for the variation in amount of ECCE services provided. A New Zealand cost study estimates cost per hour to take account of the fact that school days and total school hours per year vary greatly across different ECCE provider types (Meade, 1998). A Latin American ECCE cost study accounts for the variation in operating schedule of various programs (Waiser, 1998). Overall, few studies consider both public and private expenditures on ECCE (Tsang, 2002): only one of five studies reviewed by Tsang explicitly accounted for private fees paid for ECCE, although the

study uses the official private fee of 19 LE (Egyptian pound) despite acknowledging that private fees range up to 1,000 LE (Janssens, van der Gaag, & Tanaka, 2001).

Likewise, few studies capture operating and capital costs of ECCE. Although a cost study for expanding East African ECCE services considers the costs of capital equipment and the Egyptian cost study purports to include recurrent and investment costs, the regional variation in capital costs is ignored (Issa, 2006). The East African cost study improves upon most by analyzing school-level tuition fees, enrollments, teachers, and location in order to generate average fees by region within a country. It is unclear if tuition fees represent the full costs (salaries, annualized costs of equipment, meals, health services, materials, etc.) of providing ECCE services. Rarely do fees account for overall costs.

As the mentioned studies show, accurately estimating costs requires information about public and private costs, the expenditures of each level of government on ECCE, operational and capital costs, and intra-country variation in these costs.

3.4. Costs of ECCE across countries

The extreme variation in per student ECCE costs reported in Table 1 reflects some of the inadequacies in data collection mentioned above. Consider expenditures per student. In Indonesia, it purportedly costs \$64 to provide a year of preschool for a single student. This low value could represent the publicly funded portion of preschool costs, or it could simply be an artifact of an accounting system that only captures, for example, national but not regional expenditures or private costs of ECCE.

Countries with well-established preschool programs (e.g., Germany, France, Sweden, U.S.) spend approximately 0.5-0.6% of GDP on ECCE. Mexico, New Zealand, Brazil, and Poland also report public spending near this range. Considering the crudeness of per pupil expenditure measures, the public expenditure as a percent of GDP may be the best existing indicator of approximate spending required in industrialized countries for comprehensive preschool services. And it should be emphasized that reported expenditures are highly unlikely to include all costs.

4. Measuring Costs of ECCE

The method for providing and accurate, comparative and interpretable cost accounting for educational interventions was first outlined in Levin (1975) and revised in Levin (1983). Levin and McEwan (2001) provide the most recent formulation and its application to educational settings. This approach has been used to evaluate the costs of major ECCE interventions such as the well-known experimental program of the Perry Preschool in the U.S. (see the benefit-cost analysis by Belfield *et al.*, 2006), and other various studies (e.g., Masse & Barnett, 2002; Barnett, 1997). This standard methodology for measuring the

costs of ECCE can be adapted to the quest for development of comparable data reports among countries.

The basic model used to evaluate the resources needed and their cost is known as the ingredients method (Levin & McEwan, 2001). The steps for following this approach are summarized in Table 2. This method requires that cost estimations follow a number of relatively simple steps. The first is to identify and describe the specific programs that are offered for ECCE. There needs to be clarity on which programs are included. There may be more than one because of offerings of different government agencies or levels of government, and there may be variants such as a rural model and an urban model. The second step is to specify the ingredients or resources that are required to produce ECCE services (Levin & McEwan, 2001: Chap. 3). To the degree that each country has a model of ECCE, it is possible to identify the ingredients required for that model in terms of personnel, facilities, supplies, equipment, transportation, and other inputs. These ingredients can then be specified for each type of center.

Table 2
STEPS FOR DOING A COST ANALYSIS OF ECCE

1	<i>Identify programs and descriptions</i> If more than one identify separately, for example, if there are differences between rural and urban areas or government agencies.
2	<i>Specify resource ingredients that are utilized</i> Personnel, materials, facilities, transportation, and other requirements in terms of quantities and qualities for a given number of students.
3	<i>Establish costs of each ingredient</i> Market values, actual costs, or other method.
4	<i>Determine overall costs of programs and costs per student</i> Costs can also be determined by region or type of program or as percent of GDP.
5	<i>Analyze which constituencies bear costs</i> According to government levels, NGO s, families, volunteers.

Source: Details of each step are found in Levin, H. M. and P. J. McEwan, 2001. *Cost-Effectiveness Analysis*, 2nd Ed. London: Sage Publications.

This type of analysis is facilitated by the use of financial spreadsheets where the first column lists the required ingredients for a center as well as the qualitative dimensions such as personnel qualifications, time allocations, and specific characteristics required of facilities and equipment. Ultimately, all of the ingredients should include sufficient detail about qualities and characteristics required. Obtaining this detail usually requires interviews with the authorities who implement the program; articles and reports on experiences of ECCE centers are also instructive. The reason for going beyond the official descriptions of the ECCE programs is that often they are based upon aspirations rather than reality. Cost analysis must be premised on the *actual* resources or ingredients used in the endeavor, not just aspirations of what the program should entail. Further, the resources or ingredients that must be specified include not only those that are purchased by government, private agencies, and families, but also those that are provided in-kind such as donated space and volunteer labor. Each of these

has an economic cost to those who provide the ingredient. From the overall analysis, it is possible to determine the relative contributions of government and other entities.

It would be ideal if there were a single ECCE model in each society that was implemented with great fidelity, almost by formula, where the qualities and quantities of required ingredients were similar across the nation. However, this is a rare situation. The analysis becomes more complex when there are many different models used by different levels of government or differentiated by rural and urban areas or when private entities are employing their own approaches to ECCE. In that case, the prototype used by a central government agency will not suffice for cost analysis because there are other models as well. As we will suggest below, one strategy is to select representative samples of each type of ECCE center or other entity for analysis and aggregate them to obtain an overall picture.

The third stage in appropriate cost methodology is to identify the costs associated with each of the ingredients. Methods of setting out the cost for each have been well-developed in the literature (Levin & McEwan, 2001: Chap. 4) and usually employ costs for obtaining the resource in the marketplace. Thus, the salary and fringe benefits for obtaining teachers of a given quality are used to estimate their costs. Not all costs are ascertainable in the market, so other methods have been established for estimating the annual cost value of, say, existing facilities or of volunteers (Levin & McEwan, 2001: Chap. 4). A complete listing of the ingredients and their costs is a requirement to complete the fourth stage of determining the overall cost of the intervention or the cost per student when divided by enrollments.

Beyond the costs at the level of ECCE centers, it is important to estimate the cost of coordinating and administering the overall system. If this takes place in a central agency or ministry, it is possible to identify the ingredients and costs associated with the ECCE effort by specifying the personnel, facilities use, and other inputs at that level. Of course, these administrative costs must be included in estimating the aggregate cost of the ECCE system.

The fifth step is to ascertain where the resources come from or who provides them. That is, what is the division of cost burdens among national, regional, and local government as well as families and private entities supporting ECCE? Not all of the costs will be covered by government expenditures, so costs must be distinguished from expenditures rather than assumed to be reflected in them. This type of cost distribution analysis is valuable because it also enables an evaluation of the proportion of costs borne by families and the private sector, rather than simply assuming that all of them are borne by the public sector.

Unfortunately, the type of methodological analysis summarized briefly here has not been done for most countries. The reasons are that such analyses cannot be easily implemented with existing data and the many different versions of ECCE that are found in the same country. Such analysis using the ingredients method requires substantial access to information and analysis, often a luxury in countries with poor infrastructure for such tasks. But, even beyond these difficulties, there does not seem to be a pressing interest in many countries to identify the specific costs of ECCE beyond the obvious expenditure categories.

Even accurate pictures of enrollment are not always easy to ascertain, and, as mentioned previously, present accounting systems for government were designed for other purposes.

However, as just discussed, it is possible to create a design for each society that will provide information on costs that is far more accurate than the simple summation of government expenditures. The strategy begins by first determining the country's different approaches to ECCE. Typically, the models differ between rural and urban communities and by level and type of government sponsorship. A reasonable approach is to sample each kind of ECCE provision in the country to estimate overall costs for a society as well as for geographic sub-units and for public and private entities. This will require a survey of distinct types of ECCE and their locations and the numbers of students whom they serve. Appropriate samples of each type can be selected, and the ingredient analysis can be applied to estimate costs of each type as well as how they are financed by level of government, families, communities, and private entities. These costs for each type of ECCE or sponsorship can be multiplied by enrollments to get an aggregate measure of cost and a per-student cost. The totals for each region can also be divided by potential enrollments as a measure of service fulfillment for different regions and their populations. Finally the costs of administration and oversight of the supervising government agencies can be added in.

At this moment, few countries even begin to approach this type of cost analysis (with the exception of those that have a single non-varying national system where all of the costs are borne by the central government so that operating expenditures are closer to operating costs). Even in these cases, annual private costs and capital costs are usually not included or accounted for accurately, so the costs are understated. In the near future it would be helpful if the following were accomplished:

1. Establishment of a set of standards and guidelines that countries could use to produce cost information that would be comparable across countries.
2. Systematic analysis of the relation between ECCE quality and service mix dimensions and their cost implications.
3. Systematic evaluation of outcomes of ECCE associated with quality and service mix differences.

For researchers and policy-makers there are major agendas that must be undertaken if costs and services of ECCE are to be fully reported, validated, and understood. Researchers must set out the types of data that are needed to provide a comprehensive picture of ECCE costs as well as the costs of alternative versions of ECCE and how they might be financed if different types and levels of services are provided. They must also establish procedures for measuring such costs and who will bear the financing burdens in by levels of government and families.

Policy-makers must strive to establish systems of information that enable consistent and reasonably accurate accounting of costs and financial burdens. For some countries this is approachable as they modernize their systems of information and use of information technol-

ogy. For others, the challenges will be more formidable because of a lack of resources and capacity. Hopefully, if an international study of ECCE is undertaken in the near future, we will see greater transparency, accuracy, and comparability of information and a basis for fuller understanding of costs and the basis for their differences. Such an advance will assist all countries in viewing the costs and desirability of alternative approaches to ECCE and their financing.

Notes

1. The selection of countries does not include Spain, where research on ECCE is still in the earliest stages of development. For a recent description of the ECCE situation in Spain, see Garc a D ez & Torrubia, 2011.
2. This section draws on the discussion of ECCE quality in Zellman *et al.*, 2008.

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Resumen

El propósito de este artículo es describir los determinantes de los costes de atención y educación de la primera infancia (Early Childhood Care and Education, ECCE), proponer un método para medirlos, y analizar los datos proporcionados por distintos países acerca de sus esfuerzos en materia de ECCE. El análisis se basa en la comparación de los datos disponibles para 17 países. Se aborda en primer lugar la cuestión de por qué los costes de la ECCE pueden diferir significativamente entre países. En segundo lugar, se plantea por qué la información existente relativa a los costes es altamente inconsistente e incompleta por lo general, incluyendo un examen de las disparidades en los gastos en ECCE declarados por los países. En tercer lugar, se propone un método adecuado para determinar los costes que puede proporcionar una medida estandarizada de dichos costes con fines comparativos, conocido con el nombre de ingredientes .

Palabras clave: Educación de la primera infancia, educación temprana, costes, internacional.

Clasificación JEL: I22, H5, I2.

