The Cost and Quality of Full-Day Year-Round Early Care and Education in Massachusetts: Infant and Toddler Classrooms

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Preface

The message emanating from brain research and research on early education and care programs is clear: quality early experiences have a positive impact on the development of a young child, and contribute to greater school readiness. Providing early educational, emotionally supportive and nurturing experiences are vital in order for children to develop successfully.

There are an estimated 173,520 children in early education and care programs in Massachusetts. The Commonwealth's substantial investment of over $500 million in early childhood education, coupled with the high numbers of children in child care programs, makes understanding the quality of services imperative, both to children's welfare and for planning effective state investments.

We are pleased to present the final report from this study, addressing early care and education for infants and toddlers in full-day, year-round centers. Other reports from the Massachusetts Cost and Quality Studies of Early Care and Education address early care and education for preschool-aged children in full-day, year-round community centers, as well as early care and education in publicly-administered preschool classrooms and in family child care homes. These reports are available through the Wellesley Centers for Women's publication office, at http://www.wcwonline.org.

Introduction

Over the last 30 years, there has been an enormous increase in the rate at which mothers with young children enter the labor force. Approximately 65 percent of mothers in the workforce have children under the age of six (U.S. Census, 2000). In addition, 59 percent of mothers with children under the age of one are in the work force (U.S. Bureau of Labor Statistics, 2000). Early care and education is a vital community resource enabling parents to work; early care and education also contributes to children's development (Smith 1998).

The Cost, Quality and Child Outcomes Study (Helburn 1995) provided dramatic evidence of the lack of quality early care and education in the four states studied, with 76% of the observed center-based programs rated "poor" or "mediocre" on the Early Childhood Environment Rating Scale. Infant/toddler rooms were of even lower quality, with about 90% rated less than "good." The Relative and Family Day Care Study (Galinsky et al. 1994) found that relative care was of lower quality than regulated family child care, with 69% of relative caregivers rated "inadequate," compared to only 13% of regulated family child care providers.

Similar to the above study, The Massachusetts Cost and Quality Studies of community-based preschools, publicly-administered preschools, and family child care have found that there are areas of needed improvement within the early care and education system in the state. For example, a majority of Massachusetts community preschool schools and family child care homes failed to meet the "good" benchmark for Language-Reasoning and Activities on the Early Childhood Environment Rating Scale and the Family Day Care Rating Scale.

Given the national picture generated by the cumulative evidence from these and other studies, serious questions are raised about the quality of early care and education in Massachusetts. While Massachusetts has many exemplary programs, what is the range of quality in infant and toddler programs in the state? How does the quality of center-based care vary for infants and toddlers?

The Quality of Care

A key element of any response to these questions is the measurement of the quality of care that children are receiving. Two main aspects of quality have been the focus of many studies of early care and education quality: structure and process. Structural characteristics such as group size, staff-child ratios, and caregiver education have been associated with children's development—the ultimate indicator of quality care. These characteristics, however, only explain a portion of the variance in children's development. A more thorough understanding of the quality of care that children experience requires an examination of what actually happens in the care setting—How do caregivers and children interact? What materials are available for the children and how do adults support children's use of those materials? These process characteristics of care tell us a great deal about the quality of care that children experience. By examining both structural and process characteristics, we can describe more fully the care that children receive. Then, by examining the relationships between the two aspects of quality, we can begin to address ways to improve quality.

The Cost of Quality Care

Another central component of the early care and education puzzle is the cost of care—for families and for providers. For children in center-based care, the relationship between family income and quality is often not linear. Rather, children in either lower-income families or higher-income families are more likely to receive higher quality care than children in moderate-income families (Phillips et. al. 1994). Low-income families, however, are less likely to use center-based care, at least in part because the cost of this form of care can be prohibitive. The questions remain: Do families with low or moderate incomes have access to quality early care and education in Massachusetts? If we were to raise the overall level of quality of care in Massachusetts and make high quality care available to families from all income levels, what might it cost?

In order to answer the second question, we must first understand what the cost of providing early care and education is in Massachusetts. One of the challenges we are presented with is the proper measurement of the full cost of early care and education. As noted in the Cost, Quality, and Child Outcomes Study, full costs include both costs incurred by a center and reported on its statement of income and expense, as well as the value of in-kind contributions (e.g. volunteer labor and donated or subsidized space). To truly understand what it costs to provide early care and education, it is essential to gather information in both areas. Then, by gathering information on the cost of care, we are able to explore the relationship between cost and quality and understand how much more quality costs.

Research Questions and Study Design

The Massachusetts Cost and Quality Study was designed to address four broad research questions:

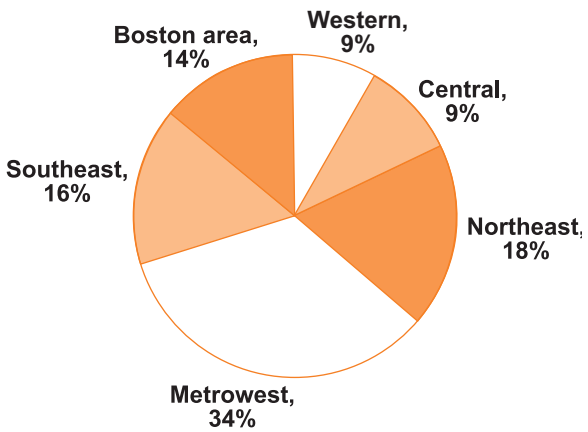
- What is the quality of early care and education services in Massachusetts?
- What are the costs of early care and education services?
- What is the relationship between quality and costs? Does it cost more to provide higher quality care?
- What is the relationship between the family income of children served and the quality of care provided by early care and education programs?

This report presents the findings from the final phase of the Massachusetts Cost and Quality Study, which examined the research questions in community-based centers serving infants (defined as children under 15 months in Massachusetts licensing regulations) and toddlers (children age 15 months to 32 months). This study was designed to provide an accurate, up-to-date picture of the cost and quality of early care and education services for infants and toddlers. This study was not designed to evaluate the effectiveness of specific regulations, subsidies or other policies. Answers to these and other questions would require a different study design than that used to provide this snapshot of early care and education for infants and toddlers in Massachusetts.

Study Design. We drew a random sample of 102 community-based centers serving infants on a full-day, full-year basis and a separate random sample of 104 community-based centers serving toddlers on a full-day, full-year basis. About fourteen percent of the sampled centers were randomly selected into both the infant and toddler sample. The centers were randomly sampled from the Office for Child Care Services (OCCS) licensing lists for the six OCCS regions. Early Head Start programs were not included in the sample because other on-going studies were addressing the specific needs of this program model.

Centers were drawn from across the state, in direct proportion to each region's market share of the state's center-based, early care and education market. Figure 1 shows the distribution of centers in this sample across the six OCCS regions: Region 1 (Western Massachusetts), Region 2 (Central Massachusetts), Region 3 (Northeastern Massachusetts) Region 4 (MetroWest), Region 5 (Southeastern Massachusetts) and Region 6 (the Boston area).

Figure 1: Sample Distribution



Approximately 81% of eligible toddler centers and 74 % of eligible infant centers agreed to participate in the study. This is better than the response rates from the original Cost, Quality and Child Outcomes Study (Helburn 1995), which ranged from 41% in North Carolina and 44% in California, to 68% in Colorado and Connecticut.

Each center's likelihood of being selected into the sample was proportional to their share of the market. That is, their likelihood reflected the number of children they served, relative to the number of children served by other centers in their OCCS region. In our descriptive analyses, the data from each center were weighted to reflect their market share. In addition, all data have been weighted to adjust for sampling probability, ineligibility for the study, and non-response, to produce descriptive statistics representative of the entire state. This report includes data from centers from all regions of the state, from not-for-profit and for-profit centers, and serving a variety of children and their families.

The study design was modeled on the original Cost, Quality and Outcomes Study (Helburn, 1995) and paralleled the design of our other studies of preschool classrooms in community centers and public schools, and of family child care homes. To measure the quality of care, a single infant classroom was randomly chosen in each of the selected infant centers in our sample and a single toddler classroom was chosen in each of the selected toddler centers. Specially-trained data collectors observed classrooms for three to four hours, working with center staff to select a time that was convenient for the providers and that was typical of the usual care environment for that classroom provider (i.e., not on a day when a field trip was planned, nor when half the class or the regular provider was sick). At the conclusion of the observation, data collectors interviewed providers to gather information on their education and training. Center directors or owners were interviewed separately, by another research team member, about general center characteristics, enrollment, staffing, revenues and expenditures.

Summary of Results

Recent research on brain development, coupled with rising concerns about school readiness, has fueled an interest in the ways in which early care and education can support young children's cognitive and language development. The research on early child care clearly indicates that child care can play an important role. Children who attend child care centers that offer higher quality care, particularly more language stimulation, show more advanced cognitive and language development (Burchinal, Roberts, Riggins et al, 2000; NICHD ECCRN 2000).

The early years are also crucial years for the development of social skills – the ability to make friends, to get along well with others, to cooperate in group activities, to understand others' perspectives – skills that are necessary to the development of self-esteem and social relationships, and to later school success. Research has found that higher process quality is associated with young children's social and emotional development (c.f., Lamb 1998). The quality and stability of children's relationships with their child care providers appears to be particularly important to children's social and emotional development (c.f., Howes & Hamilton 1992, 1993; Howes, Matheson & Hamilton 1994).

The cumulative evidence of the research on early child care and children's development is clear; for children in child care, the quality of that care is consistently associated with children's development. As the National Research Council notes (2000, pg. 313), "…high-quality care is associated with outcomes that all parents want to see in their children, ranging from cooperation with adults to the ability to initiate and sustain positive exchanges with peers, to early competence in math and reading."

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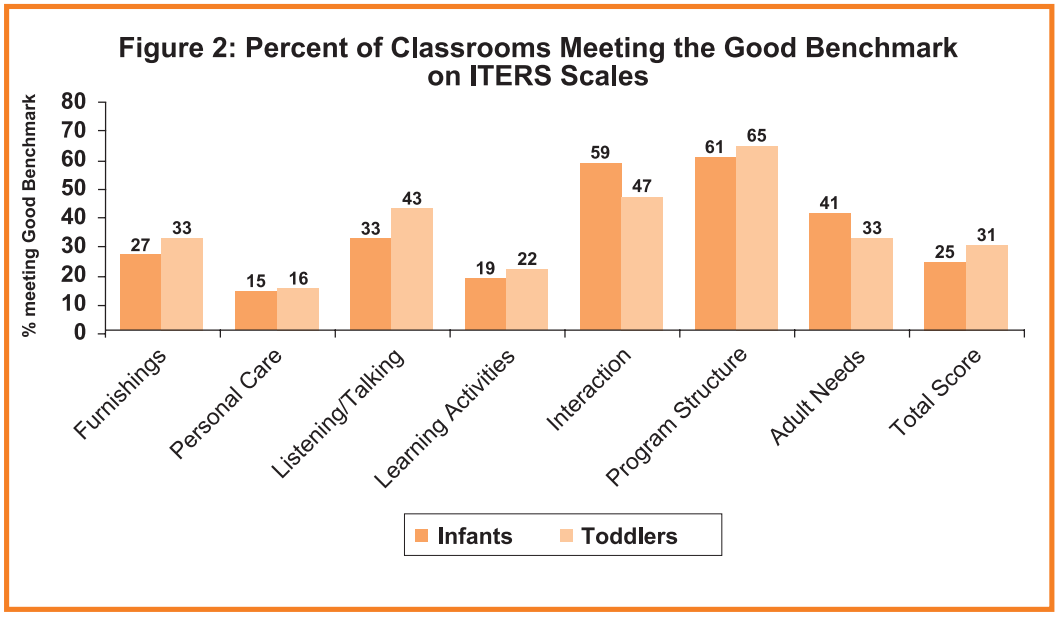
— National Research Council (2000)

◆ One-quarter of infant classrooms and 31% of toddler classrooms provided early care and education that met professional standards for developmentally-appropriate infant/toddler programs.

While we found that many Massachusetts classrooms for infants and toddlers do not meet accepted standards of infant/toddler care, this must be understood in the context of a national picture of poor quality infant/toddler care, as evidenced in the original Cost, Quality and Outcomes Study (Helburn, 1995), where almost 90% of infant/toddler rooms failed to meet the Good benchmark. In contrast, Massachusetts has a core of quality programs, with one-quarter of infant classrooms and almost one-third of toddler classrooms meeting the Good benchmark.

◆ Massachusetts' infant and toddler classrooms vary considerably in the quality of care and education that they provide.

More than two-thirds of the classrooms did not meet the ITERS Good benchmark. Children in these classrooms are receiving less than the standards set for developmentally-appropriate care, and, while



they may be in care that meets minimal standards, many opportunities to enhance their development are being missed. Many children are in care for 6 to 8 hours a day, and this time could be an ideal opportunity to enrich their lives.

Our findings suggest particular areas of strength in these and other programs, as well as areas that need improvement. The majority of infant and toddler classrooms in this study did not meet standards for good early care and education practices, in almost all areas. Classrooms often did not provide the physical equipment and arrangements that young children need to maintain appropriate personal care routines. While children generally had positive interactions with each other and caregivers often worked well together, caregivers did not provide the informal talk and exposure to books that are the early building blocks for children's language and literacy skills, or the variety of activities and materials that promote children's optimum development. At the same time, while centers' policies and practices supported parents' involvement, centers often did not provide adequate opportunities for professional development for these same caregivers. Infant caregivers were weaker than toddler caregivers on listening and talking, while toddler caregivers were weaker than infant caregivers on caregiver-child interaction and discipline, and less likely to have opportunities for professional development.

◆ Children attending centers that served predominantly low-income or low-moderate income families were less likely to receive the level of early care and education that will prepare them for school and later life, with toddlers in low-income centers at the greatest risk.[1]

Massachusetts' performance is also uneven across centers serving different income groups. We found that centers that serve predominantly low- or low/moderate income families were rated as poorer quality overall than centers that serve predominantly moderate/higher income families. While

[1] The sample consisted of community-based centers, but did not include Early Head Start programs.

infants in low-income and low-moderate income centers are as likely to experience warm, sensitive interactions with their caregivers as are children in moderate/higher income centers, toddlers in low-income centers experience poorer quality interactions than toddlers in low-moderate income centers, and both experience poorer quality interactions than do toddlers in moderate/higher income centers.

Interestingly, infants in low-income centers are as likely as infants in moderate/higher income centers to receive a level of language stimulation that meets developmentally-appropriate standards; children in low-moderate income centers are less likely to receive adequate language stimulation. In contrast, toddlers in low-income centers receive the lowest levels of age-appropriate language stimulation. The combined patterns on these scales suggest that children attending centers that serve predominantly low-income or low/moderate families are less likely to receive the level of early care and education that will prepare them for school and later life, with toddlers in low-income centers at the greatest risk.

◆ Regulatable characteristics of infant and toddler classrooms, such as child:staff ratios, group size, teacher education and teacher experience, were significantly related to the quality of early care and education.

We found that centers with better child:staff ratios, smaller group sizes, better educated and more experienced teachers provided better quality care overall, including more developmentally-appropriate stimulation, and better relationships between classroom staff and children. While qualified teachers are clearly an important part of quality early care and education, center directors reported that it was difficult to hire qualified teachers – in fact, 57% of recently-hired lead teachers and 43% of teachers were less qualified than their predecessors.

◆ Parent fees are the most important source of revenues for centers serving low-to-moderate or moderate-to-high income families. Government subsidies are an important revenue source for centers serving low-income families.

On average, the bulk of centers' revenues (67% for infant centers, 70% for toddler centers) are from parent fees, with government subsidies comprising nearly all of the rest (26% & 27%, respectively). Total revenues are lowest for centers serving low-moderate income families. Parent fees are the primary revenue source for centers serving moderate-high income families, while government subsidies supplement parent fees in low-income centers. Centers serving low-moderate income families rely heavily on parent fees, which are lower in this income group than among moderate-high income families; at the same time, centers serving low-moderate income families receive little in the way of government subsidies.

◆ Labor is the single largest component of center expenditures.

Center expenditures go largely to labor (72% for both groups of centers). The higher revenues in centers serving low-income and moderate-high income families is reflected in higher expenditures for labor in these centers than in centers serving low-moderate income families. Our exploratory analyses suggest

that centers serving low-moderate income families keep their labor costs lower through maintaining lower ratios – more children per teaching staff – rather than through paying lower wages or using more assistant teachers than teachers or lead teachers.

◆ Higher quality infant and toddler care costs significantly more than lower quality infant/toddler care.

Because infant care is more costly than toddler care – a function of the smaller ratios and group sizes – we estimated costs at the classroom level, rather than at the center level. We found significantly higher costs at the classroom level associated with "more than minimal" quality (a 4.0 or higher on the ITERS) compared to lower quality (below a 4.0), for both infant and toddler classrooms. We found that it would cost 13% more to operate an infant classroom that meets or exceeds a 4 on the ITERS (between the Minimal and Good benchmark) compared to the costs of operating a infant classroom that does not meet that standard. Similarly, it would cost 14% more to operate a toddler classroom that meets or exceeds a 4 on the ITERS, compared to a toddler classroom that does not meet that standard.

Conclusion

What are the key factors that are related to better quality early care and education for infants and toddlers? We found that classrooms with better child:staff ratios, more experienced and better educated teachers provided better quality care overall, including more developmentally-appropriate stimulation, and better relationships between classroom staff and children. In addition, we found that centers serving different income groups varied considerably in the quality of care they provided. While qualified teachers are clearly an important part of quality early care and education, center directors reported that it was difficult to hire qualified teachers.

We also found evidence to support the belief that higher quality care and education costs more than poorer quality care and education. These findings, alone, do not provide a prescription for policy and practice. We cannot necessarily infer that lower-quality centers can achieve higher levels of quality by spending more. Nonetheless, these data present compelling evidence that higher quality early care and education is associated with greater costs.

Our findings on the relationship between labor and quality, combined with the fact that labor constitutes 72% of the costs of infant and toddler classrooms, point to the importance of hiring enough staff to maintain small group sizes and ratios, and hiring staff with the education and experience to provide high quality infant and toddler care. In order to reach the highest levels of quality early care and education for all centers, centers must be able to spend real resources if they are to increase the quality of their staff. We hope that this report will contribute to a fruitful discussion of the cost and quality of infant/toddler care and education in Massachusetts, and to efforts to extend its benefits to all children.

What is Quality Early Care and Education?

Quality of early care and education has been defined differently across numerous studies of the quality of care. Many studies have relied on structural characteristics as the sole measure of quality. Structural characteristics include classroom characteristics, such as the child:staff ratio (number of children per qualified classroom staff) and group size (number of children in the classroom). It also includes features of providers and directors including education and specialized training. The features of structural quality are regulatable, and most states set minimum standards for at least some aspects of structural quality. These structural characteristics have been shown to be associated with children's development (c.f., Howes 1997; NICHD Early Child Care Research Network 1999; Burchinal, Roberts, Riggins et al 2000), the ultimate indicator of quality care. These characteristics are only one piece of the overall quality, however, and help to set the stage for the process characteristics.

A more thorough understanding of the components of quality requires an examination of what actually happens in the early care setting (that is, the process). How do adults and children interact? What materials are available for the children and how do adults support children's use of those materials? It is these aspects of the early care and education environment that scales like the Infant/Toddler Environmental Rating Scale (ITERS; Harms, Cryer, & Clifford, 1990) have been designed to measure. These process measures tell us much more about the quality of care children receive. The process characteristics refer to the nature of the care that children experience and are often harder to measure than the structural characteristics. They include the caregiver-child interactions, informal use of language and health practices and the activities available to children, the developmental appropriateness of activities, and the learning opportunities available to children. These process measures of quality have been shown to be associated with children's cognitive and socio-emotional development (c.f., Helburn & Howes 1996). Unlike the features of structural quality, process characteristics are not generally subject to state or local regulations.

To fully understand the quality of care children are receiving, it is necessary to understand both aspects of quality. Then, we can examine the relationship between structural and process characteristics of quality to begin to address ways to improve the quality of early care and education.

Structural Characteristics of Quality

Through our observations we were able to gather information on both the structural and the process characteristics of quality. Information on provider *education* and *specialized training* in early care and education was gathered through interviews with providers and directors. During the course of their observations, data collectors recorded the numbers of children and staff present at different times. From this, we calculated average *group size* and average *child:staff ratio* for each classroom. From center directors or owners, we gathered information on the structure of the center, the education and training levels of all teaching staff (not just those in the observed classroom), and issues surrounding *staff turnover* and hiring.

Process Characteristics of Quality

To provide a comprehensive understanding of the process characteristics of quality, multiple measures were used during the observation. We selected measures that have been widely used in early child care and education research as well as those used in the original Cost, Quality, and Child Outcomes Study (Helburn, 1995). It was also important to select measures that would allow us to compare the data from this study with data from other studies, to place the quality of Massachusetts' early care and education in a broader context.

The ITERS Benchmarks for Early Care and Education

The main measure of quality used in this study was the Infant/Toddler Environment Rating Scale (ITERS; Harms, Cryer, & Clifford, 1990). The ITERS has been widely used for a number of years, and has become one of the standards in the field, offering useful benchmarks for practitioners, researchers and policymakers. The ITERS has good predictive validity, and has been shown to be predictive of children's development (Clifford, Russell, Fleming et al., 1989).

The ITERS is a 35-item scale designed to be used to assess center-based infant and toddler care. The ITERS is organized into seven scales: Furnishings and Display, Personal Care Routines, Listening and Talking, Learning Activities, Interaction, Program Structure, and Adult Needs. Each scale has additional subscales, with multiple items that must be passed to receive a given score. Each subscale is scored on a seven-point scale, with benchmarks established for 1 = "Inadequate," 3 = "Minimal," 5 = "Good," and 7 = "Excellent." Programs that pass some of the items that are part of the benchmark for a "3," but not all of them, are scored a "2" on that subscale. Similarly, programs that fall between "Minimal" and "Good" are scored a "4," and programs that fall between "Good" and "Excellent" are scored a "6."

The ITERS ratings were based on observations by trained observers. As a measure of the inter-rater reliability of the observations, we calculated the proportion of the items on which a pair of observers, observing the same classroom, agreed exactly on the ratings. On average (across all possible pairs of observers), a pair of observers agreed exactly on 78% of the ITERS items; on average, a pair of observers agreed within one point on the seven-point scale on 91% of the ITERS items.

In the following sections, we provide an overview of the meaning of these benchmarks in the seven ITERS scales.

Furnishings and Display Benchmarks

Furnishings and Display. This scale focuses on the setting in which the care takes place.
Inadequate space is crowded, poorly maintained, lacks softness and display and difficult to supervise. These settings also lack sufficient furnishings for the basic care of children (e.g., high chairs, cribs) or furniture that is in poor repair (e.g., broken, unstable). These classrooms have limited "softness" for children's play (e.g., no upholstered furniture, carpeting or cushions for play) and offer no display

materials (e.g., photos, mobiles, store-bought pictures, drawings). The arrangement of the space makes it difficult for children to play – materials aren't grouped in ways that encourage children to use them, walls between areas make it difficult for staff to supervise children at play, or children do not have access to play areas apart from the main flow of the classroom.

Classrooms that provide the bare minimum – enough space and enough safe, well-maintained basic furniture for children, some age-appropriate display, some soft materials (e.g., rug or cushions) and some easy to clean soft toys – are rated as meeting **Minimal** standards.

To be rated as **Good** on Furnishings and Display, a classroom must provide some adult-sized furniture for use during routine care, furniture that accommodates the individualized care of children, low, open-shelving for age appropriate toys, sturdy storage containers to keep toys separated and organized, a special cozy area that is protected from active play, easily accessible routine care areas, a separation of active and quite play areas and many colorful pictures and mobiles which are referenced to by the teachers during interactions with children.

Classrooms are rated as **Excellent** on Furnishings and Display if they meet all of the above standards, plus additional, higher standards, including the presence of: child-sized furnishings that can be used independently by toddlers (applicable to toddler classrooms only), comfortable adult furnishings to assist with person care routines (e.g., bottle feeding an infant), convenient storage of extra toys which can be easily accessed by caregivers, a special cozy area for quiet play plus additional softness in other parts of the classroom (e.g., several soft rugs, soft chairs and cushions). Classrooms must also offer a variety of learning experiences in both routine and play areas (e.g., many toys in play area and mobiles over changing areas); defined interest areas that are organized with like-materials and easily accessible by children (e.g., open shelves, labeled containers); a display that includes photographs of children in the room and their families, scribbles pictures done by toddlers and protection for pictures to prevent ripping (toddler classrooms only).

Personal Care Routines Benchmarks

Personal Care Routines. A classroom is rated as **Inadequate** in Personal Care Routines if: children are often not greeted on arrival; parent's are discouraged from entering the classroom and do not have direct contact with caregivers; meals and snacks do not meet USDA nutritional guidelines and are prepared in an unsanitary manner; infants are not held during bottle feeding and children are put to bed with bottles; nap/rest times does not meet the individual needs of children (e.g., schedule does not fit with child's needs, inappropriate sleeping areas are used for napping); cribs are used for extended play; nap/rest times are not supervised; toileting/diapering area is not sanitary and hand washing is often neglected; staff respond harshly to toileting accidents; diapers are not checked every 2 hours; spread of germs is not diminished (noses not wiped, diapers not disposed of properly, food preparation and toileting/diapering done near one another); the classroom lacks proper ventilation and maintenance (e.g., equipment poorly maintained, dirty floors, pealing paint); no emergency or health records on kept for children; several indoor or outdoor hazards that could result in serious injuries exist and the center has no written safety and emergency procedures.

A classroom that meets **Minimal** standards is one in which: most children and parents are greeted and parents are allowed to enter care giving area; staff share information on children's health and safety with parents; well-balanced meals and snacks are provided in an atmosphere that is non-punitive and meets the individual needs of children and guidelines for sanitary food preparation; infants are held when bottle fed; nap is scheduled appropriately for individual children with sufficient supervision; toileting/diapering meets the individual needs of children and sanitary practices are implemented; staff take action to minimize the spread of infectious diseases (cribs placed appropriately, children have own blanket and designated sleeping place); classroom is adequately maintained; no major hazards are present in classroom or outside; health records of children are maintained; and emergency plans are posted and practiced.

To be rated as **Good**, classrooms must: greet each child individually by name; maintain a written record of infant's feeding, diapering and naps must be maintained; handle separation problems in a sensitive manner; feed children individually or in small groups and provide a pleasant social atmosphere; post menus for parents; encourage and assist children with eating independently; ease toddlers into a group nap schedule; offer child-sized toilets and self-help around toileting and diapering; provide stimulation during personal care routines (e.g., sings songs); model good health practices for children; provide accommodations for sick children; record and consider special health problems of children during planning; administer medication only with written permission from the parent; teach children safety rules as soon as possible; avoid safety problems through a well-planned environment (e.g., a non-mobile child is separated from older children during play); have access to trained substitutes and one staff person that is trained CPR and first aid.

Classrooms are rated as **Excellent** on Personal Care Routines only if they meet these standards, plus other, higher standards, including: on arrival and departure, staff share specific information about the day with parents; (e.g., new skills developed, play activities); the caregiver sits with children during feeding times and provides appropriate stimulation (e.g., labels food, teaches toddler to use spoon); caregivers work with parents to establish healthy eating habits; at nap/rest time, staff help children to relax with soft music, cuddly toys or back rubs; provisions made for early-risers ; when toileting/diapering, providers talk and relate to children and encourage toddlers self-help skills; providers inform parents about children's diapering and toileting; staff use personal grooming is used as a learning opportunity; individual toothbrushes and a sink that can easily access are provided for toddlers; health and safety information is offered to parents; health-related books, pictures and games are used with toddlers; surfaces of the room are easy to maintain and clean; the center has an arrangement with a medical consultant children and all regular caregivers have training in first aid and CPR.

Listening and Talking Benchmarks

Listening and Talking. A classroom is rated as **Inadequate** in the Listening and Talking area when little or no talking takes place between the caregivers and the children; caregivers fail to respond to children's communicative attempts; fewer than 4 books are accessible to children and the staff do not label objects and pictures for children.

Classrooms that provide the bare minimum – some social talking to children, 6 accessible books, the use of books and pictures at least 3 times per week without the forced participation of children– are rated as **Minimal**.

To be rated as **Good**, caregivers must frequently respond verbally to children's gestures, sounds and cries, maintain eye contact when talking to children, frequently label objects and actions and take part in verbal play (e.g., singing, verbal turn-taking). The classrooms must have at least 12 books accessible daily and the caregiver must read books, talk about pictures or say nursery rhymes daily with small groups of interested children or with interested individual children.

To be rated as **Excellent** on Language-Reasoning, a classroom must meet all the above standards, plus other stricter standards, including the caregivers:
talking to each infant and toddler during play and routines, repeating what toddlers are saying, enhancing children's understanding of language (e.g., providing clear and appropriate directions, repeating words); and maintaining a good balance of between listing and talking. Additionally, each child must be given at least one opportunity daily for a language activity using books, pictures or puppets and a cozy book area must be maintained for the independent use of books by toddlers (required in toddler classrooms only).

What Is the Difference Between "Good" and "Excellent"?

Sample Items on Informal Use of Language (from Listening and Talking)

To Receive a Score of "5: Good," a Classroom Must Pass:

5.1 Caregiver frequently responds verbally to infants'/toddlers' crying, gestures, sounds, words, and questions.
5.2 Caregiver usually maintains eye contact while talking to child.
5.3 Caregiver names and talks about many objects and actions for infants/toddlers.
5.4 Caregiver takes part in verbal play.

To Receive a Score of "7: Excellent," a Classroom Must Pass:

7.1 Caregiver talks to each infant and toddler during play and routines about child's activities.
7.2 Caregiver repeats what toddlers say, adding words and ideas when appropriate (toddler classrooms only)
7.3 Caregiver adds to children's understanding of language all day (example: gives clear directions, repeats new word often).
7.4 Caregiver maintains a good balance between listing and talking (example: does not overwhelm child with constant talk).

Learning Activities Benchmarks

Learning Activities. A classroom is rated as Inadequate on the Learning Activities scale if there are very few developmentally-appropriate materials available; if no materials are present that build eye-hand coordination, facilitate active physical play, expose children to art (if children are over 12 months of age), offer access to music, facilitate building (if children are over 9 months of age), encourage pretend play, offer the opportunity for water (if children are over 12 months) and sand play (if children are over 24 months) and expose children to cultural diversity (e.g., dolls, books or pictures).

A classroom is rated as meeting **Minimal** standards if some of each of the following types of **materials** are available: eye-hand materials (e.g., grasping toys, busy boxes, stacking cups, shape-sorter, simple puzzles, stacking rings); drawing materials available at least 1 time per week for children over the age of 12 months and additional art materials (e.g., paint, chalk) available to children over 18 months at least once time per week; toys that make sound (e.g., rattle, drum, xylophone); blocks and accessories for children over the age of 9 months; pretend play materials (e.g., dolls, puppets, telephones, soft animals) and some ethnically and racially diverse materials. In addition, providers need to provide children with uncluttered indoor space for walking and crawling, outdoor physical play 3 times per week, a musical activity done at least 3 times per week (e.g., caregiver singing or playing music), a sand activity (for children 24 months and older) or water activity (for children over 12 months) at least 2 times per week.

To receive a **Good** rating, a classroom must provide more of the above materials, and a greater variety of each type of material, and the materials must be organized in such a way as to facilitate children's creative use of the materials. In addition, a classroom with a **Good** rating has uncrowded active play areas, artwork displayed at children's eye level, informal and planned musical activities, adequate space for block play that is out of the way of traffic patterns and child-sized play furniture for toddlers (e.g., small stove, baby stroller).

To receive an **Excellent** rating on Learning Activities, a classroom must meet all the above standards, plus: rotate materials regularly to maintain interest; providers must talk about and facilitate children's activities that use of eye-hand materials, blocks, active play equipment, art and drawing materials, pretend play activities and sand and water play. In addition, cultural awareness must be evidenced in a variety of activities (e.g., types of music, celebrations of holidays, dramatic play props) and non-gender biased pictures of men and women, boys and girls must be displayed.

Interaction Benchmarks

Interactions. A classroom is rated as Inadequate on the Interaction scale if: discipline is either punitive (for example, yelling, belittling children) or too lax, children have little opportunity to interact with peers, little or no caregiver guidance is offered to facilitate peer interaction, care is impersonal and lacking affection and warm physical contact.

A classroom that meets Minimal standards for Interactions is one in which children are allowed to move freely and form their own natural groupings; non-mobile infants are removed taken out of cribs, playpens, and swings and allowed to explore freely; the caregiver address negative social interactions

(e.g., biting, biting); some smiling, talking and affection is shown to all children; the caregiver engages in warm physical contact during routines and responds sympathetically when children are upset; most supervision and discipline is not harsh and expectations for children's behavior are largely appropriate for the age and to prevent children from hurting one another.

A classroom that receives a **Good** rating is one in which peer interaction is usually positive – infants watch and react to others, toddlers play side by side with few conflicts – and caregivers serve as a model for positive social interactions. In addition, there are frequent positive caregiver-child interactions, caregivers and children are relaxed, use a pleasant voice tone and frequently smile; caregivers show physical warmth through frequent holding and patting; caregiver-child interactions are consistent across all caregivers. Finally, the classroom environment is set up to reduce conflict among children (enough toys, travel paths do not lead through activity areas); caregivers expectations are realistic and age-appropriate; alternative methods of discipline are used effectively (giving attention for positive behaviors, redirecting children from unacceptable to acceptable activities); and caregivers react consistently to children's behavior .

To receive an **Excellent** rating, classrooms must meet all of the above standards, plus: caregiver reinforces positive social interactions (e.g., smiles and talks to babies who notice other children); caregiver points out and talks about positive social interactions; caregivers are given the responsibility for a small number of children; caregivers vary interactions to meet the needs of individual children (e.g. animated around an active child, calm and soothing around a tired child); caregiver are sensitive about children's feeling and reactions; caregivers give attention to positive behaviors; caregivers acts proactively to avoid problems and explain simple rules to toddlers .

What Is the Difference Between "Good" and "Excellent"?

Sample Items on Discipline (from the Interactions Scale)

To Receive a Score of "5: Good," a Classroom Must Pass:

5.1 Few discipline problems because program is set up to avoid conflict and promote age-appropriate interactions (example: duplicate toys accessible, child with favorite toy given protected place to play, smooth transitions).
5.2 Alternative methods of discipline used effectively (example: removing child from negative activity, redirection).
5.3 Expectations are realistic and based on age and ability of each child (example: caregiver is patient with crying baby and negative toddler).
5.4 Caregiver reacts consistently to children's behavior.

To Receive a Score of "7: Excellent," a Classroom Must Pass:

7.1 Attention frequently given for good behavior.
7.2 Caregiver avoids problems (example: helps children avoid serious conflict over toy, stays close to toddler who bites)
7.3 Rules are simple and explained to toddlers.

Program Structure

Program Structure. A classroom is rated as **Inadequate** on the Program Structure scale if: the schedule is too rigid, with little time for play, talking and the individual needs of children to be met; insufficient supervision is provided to protect the health and safety of children; staff do not communicate needed information to meet children's needs, interpersonal relations among the staff interfere with caregiving responsibilities, responsibilities among staff are not shared fairly, no attempt is made to meet children's special needs or to involve children with disabilities with the rest of the group.

A classroom that meets **Minimal** standards in this area has a basic schedule that is flexible, individualized to the children and written; the caregivers play as part of the daily schedule; caregivers are with sight, hearing and easy reach of the children at all times, supervision is sufficient to meet the every children routine needs with little time spent waiting, communication among the staff is related to children need and not interfere with caregivers' responsibilities, caregiving duties are shared fairly; staff make minor modifications to include children with special needs in play activities.

A classroom that meets **Good** standards is one in which the daily schedule provides a balance of indoor and outdoor activities, with a variety of play opportunities offered most of the day; active and quiet play is varied as children's needs change; leaning and play experiences are incorporated throughout the day including during routine care; careful supervision with caregivers intervening to avoid problems is provided; caregivers show appreciation for children's efforts and react quickly to solve problems in a supportive manner; staff have time for communication and responsibilities for both play and care are clearly defined and handled smoothly. In classrooms with exceptional children, the caregiver provides activities and adapts the daily schedule and physical environment to meet the child's special needs, interacting with the exceptional child as much as with other children.

To receive an **Excellent** rating, a classroom must meet the above standards, plus: appropriate learning activities are planned and carried out daily with either individual children and in small groups; staff act to make transitions in the schedule smooth (have materials for next activity ready before current activity ends); supervision is catered to the learning needs of children; a balance is maintained between children's needs exploration and caregiver assistance; caregivers have time for biweekly planning and the have assess to social gatherings and attend professional meetings together.

Adult Needs

Adult Needs. A classroom is rated as Inadequate on the Adult Needs scale if: staff are not able to take breaks; no special areas are available to staff (e.g., do not have access to a phone, storage space for materials, or separate space for individual conferences when children are in attendance); no resource materials on infant/toddler are available at the center; no information on the program is provided to parents in writing and parents are not offered the opportunity to participate in the program; no in-service training and limited staff meetings are offered.

To meet Minimal standards, programs must: provide written information about the program to parents; share child-related information with parents and staff, allow some involvement of parents and family in program; make provisions for the personal (e.g., separate adult restrooms, at least one staff break

per day, adult-sized furnishings) and the professional needs of staff (access to a phone, storage space, professional articles and books, individual conference space); and hold monthly staff meetings to handle administrative concerns.

A program that receives a **Good** rating on Adult Needs is one in which parents are encouraged to observe before enrolling their child, and are provided with information about the philosophy and approaches of the program; there is much sharing of child-related information between parents and staff, and parent involvement is encouraged in a variety of ways; there is a separate staff lounge (may have dual use as administrative space); three staff breaks are allowed in an 8-hour day; there is on-site satisfactory space for conferences and a good professional library; regular in-service training is provided; frequent staff meetings are held that include staff development activities; an orientation for new caregivers which addresses caregiving practices and administrative issues.

To receive an **Excellent** rating, a program must: ask parents for an evaluation of the program annually, involve parents in decision-making roles in the program along with staff and offer parents referrals to professional for special parenting assistance; provide a separate staff lounge and some flexibility in scheduling staff breaks; develop individual in-service training plans for caregivers and conduct yearly observations of providers with feedback on staff performance, in a helpful and supportive way; provide support for staff professional development of staff through offering paid planning and meeting time as well as accommodations for providers to attend training.

Other Measures of Quality

While the ITERS provides an excellent set of benchmarks for many aspects of quality, we also used one additional measure that provided more specific information about caregiver behavior, the Global Caregiving Rating Scale (Arnett, 1989), a 26-item scale that measures caregiver involvement and teaching style with children. The items are rated on a scale from 1=never meets the standard to 4=consistently meets the standard. As a measure of the inter-rater reliability of these observations, we calculated the proportion of the items on which a pair of observers, observing the same classroom, agreed exactly on the ratings. On average (across all possible pairs of observers), a pair of observers agreed exactly on 77% of the Global Caregiving Rating Scale items The percent agreement within one point was 80%. The Arnett GCRS consists of four subscales: positive interactions, punitive interactions, detachment and permissiveness.

Composites Created for This Study

The results presented in this report use the ITERS and its component scales, and the Arnett Global Caregiving Rating Scale. However, we collapsed these measures into two composites for our analyses examining the links between structural measures of quality and process measure of quality, to simplify the results. These composite variables were: Warmth and Sensitivity, and Stimulation. Each of these

composites was created from relevant subscales or items from the measures described above, following the same procedures we used in our previous studies of preschool classrooms in community centers and public schools and of family child care homes.

The *Warmth and Sensitivity* composite describes how providers interact with the children in the classroom, how warm they are to the children, the amount and types of interactions that occur, and how sensitive they are to children's needs. High scores signify a classroom where providers interact often and appropriately with the children, show warmth to the children, and respond to children's needs. The Warmth and Sensitivity Composite combines the Arnett Global Caregiving Rating Scale subscale on positive interactions with the Interactions scale of the ITERS. The Chronbach's Alpha was .85 for toddler classrooms and .79 for infant classrooms.

The *Stimulation* composite is a measure of the amount and variety of activities available to the children, the developmental appropriateness of the classroom structure, the amount and appropriateness of the language in the classroom, and how actively providers introduce stimulation into the environment. Higher scores signify more stimulating classrooms. The Stimulation composite combines the Listening and Talking, Learning Activities and Program Structure scales of the ITERS. The Chronbach's Alpha was .83 for toddler classrooms and .64 for infant classrooms.

The Quality of Early Care and Education in Infant and Toddler Classrooms

In this section, we provide an overview of the quality of early care and education in infant and toddler classrooms, including structural characteristics of quality and observed process quality.

Structural Characteristics of Quality

The most commonly reported measures of the structural characteristics of quality are child:staff ratio, group size, teacher education and experience. All of these characteristics can be and are regulated by the state. There are age-related guidelines for maximum group size and child:staff ratio as well as minimum educational requirements for early childhood teachers. The Massachusetts child care licensing regulations limit the group size for infant classroom to no more than 7 infants and group sizes for toddler classrooms to no more than 9 children. For infants, there must be at least one teacher if there are 3 infants, and one teacher and at least one other teacher or assistant teacher present in the classroom for 4-7 infants. For toddlers, there must be at least one teacher for every 4 children, and one teacher and at least one other teacher or assistant teacher present in the classroom for 5-9 children.

The Massachusetts state regulations also specify levels of teacher education and experience. For infant and toddler classrooms, at least one staff person in the room must be Infant/toddler Teacher qualified. That is, the person must have a high school diploma or equivalent and have some minimal training in child development or early childhood education (three credits in child development coursework and a practicum; Child Development Associate credential; or graduate of a two-year vocational program in early childhood education). In addition, teachers must have a minimum of 3 months work experience caring for infants and toddlers. For assistant teachers, the minimum education requirement is also a high school diploma or equivalent, but no specialized training in child development or early childhood education is required. Assistant teachers must work at all times under the supervision of a teacher (Massachusetts Office of Child Care Services, Regulations for Group Day Care, 2000).

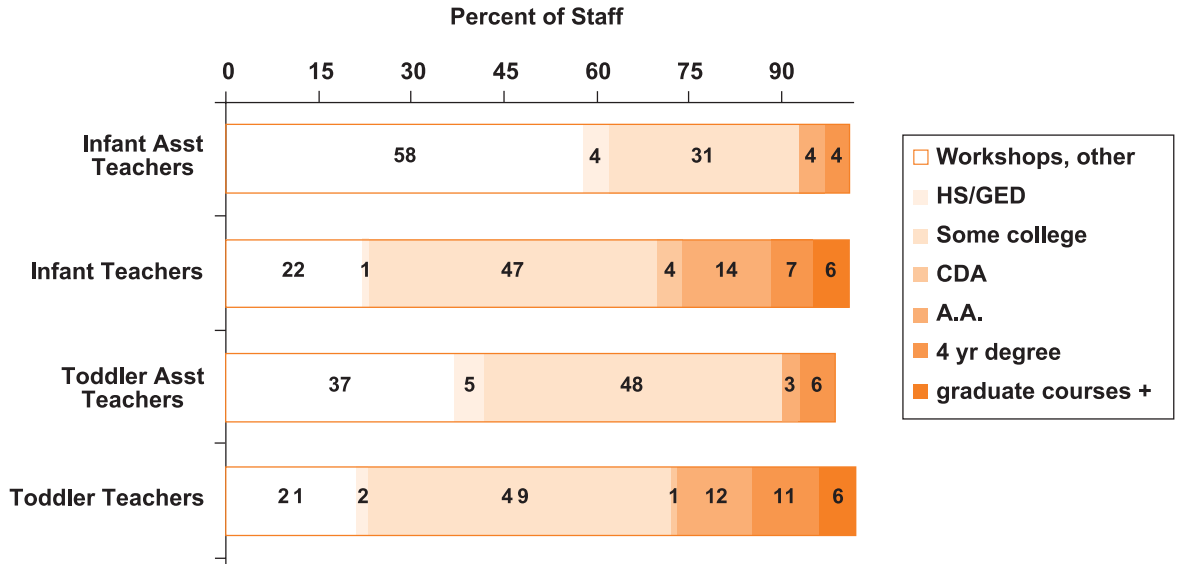
Group Size. When we calculated the average actual group size over the course of our observations, we found that the classrooms in our sample had smaller group sizes than required by state regulations. While state regulations require a maximum group size of 7 for infants in full time care, the average group size in the current study was 5.29 infants. The observed group size for toddlers was 7.63 toddlers, which is lower than the maximum group size of 9 set by state regulations for the care of toddlers. Observed group size is different from licensed capacity, because of children's absences for illness, children's temporary absence from the classroom for toileting or activities outside of the classroom, and under-enrollment. Other studies often report observed group sizes and ratios that are lower than state minimums, for these reasons (see for example the Cost, Quality, and Child Outcomes Study; Helburn, 1995).

Child: Staff Ratios. While observed group sizes were lower than licensed capacity, we found ratios that were close to what one would expect from the licensing regulations. The average child:staff ratio

over the course of the observation time for the infant classrooms in our sample was 2.62 infants per adult – roughly one adult for three infants – and 3.52 toddlers per adult in toddler classrooms – roughly one adult for four toddlers.

Staff Education. In addition to child:staff ratios and group size, we also examined classroom staff education. Figure 3 reports the levels of education for teaching staff, by job title (job title is not the same as OCCS certification level).[2] As shown in Figure 3, 11% of infant teachers and 17% of toddler teachers have a 4-year degree in early childhood education or a related field. An additional 14% of infant teachers and 12% of toddler teachers have an A.A. degree in the field. Finally, 51% of infant teachers and 50% of toddler teachers have a CDA or at least one college course in the field. All told, 76% of infant teachers and 79% of toddler teachers have college-level training in early childhood education or a related field. As would be expected, the levels of education are lower for assistant teachers, with 39% of infant assistant teachers and 57% of toddler assistant teachers having college-level training in the field.

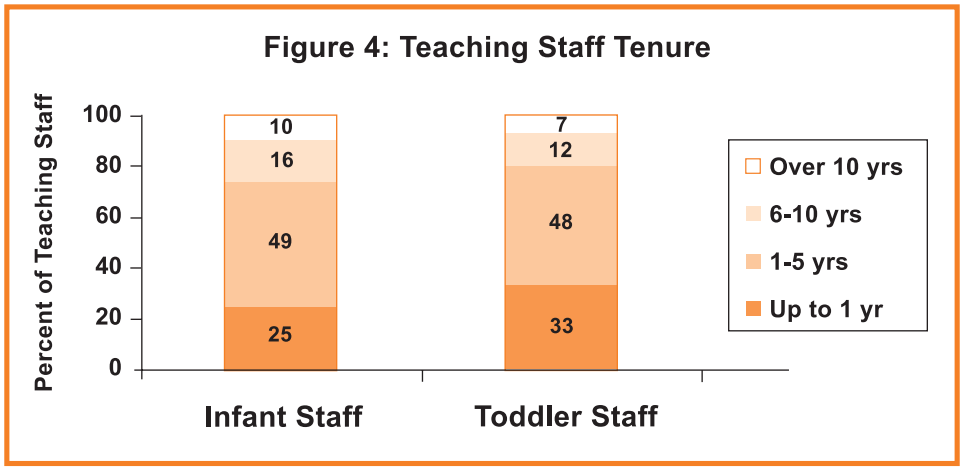
Figure 3: Years of Education in ECE by Job Title



Teacher Tenure. Finally, we examined how long teaching staff in the Infant and Toddler classrooms had been at their respective centers. As Figure 4 shows, while only one-quarter of Infant teaching staff are new hires (within the year), one-third of Toddler teaching staff are new hires. Conversely, more than one-quarter (26%) of Infant teaching staff have been employed at their centers for more than 5 years,

[2] During the interview, center directors categorized all center staff based on their responsibilities. We provided specific definitions for each classification, however, we did not specify that directors classify staff according to OCCS regulations. Rather, we asked them to classify staff according to what their job responsibilities entailed. Thus, a staff person identified as an assistant teacher in this study may not meet the exact requirements as outlined by OCCS.

compared to less than one-fifth (19%) of Toddler teaching staff. This pattern, combined with Figure 3 above, suggests that some centers may be placing their more experienced teaching staff in their Infant classrooms, and their better-educated teachers in their toddler classrooms.



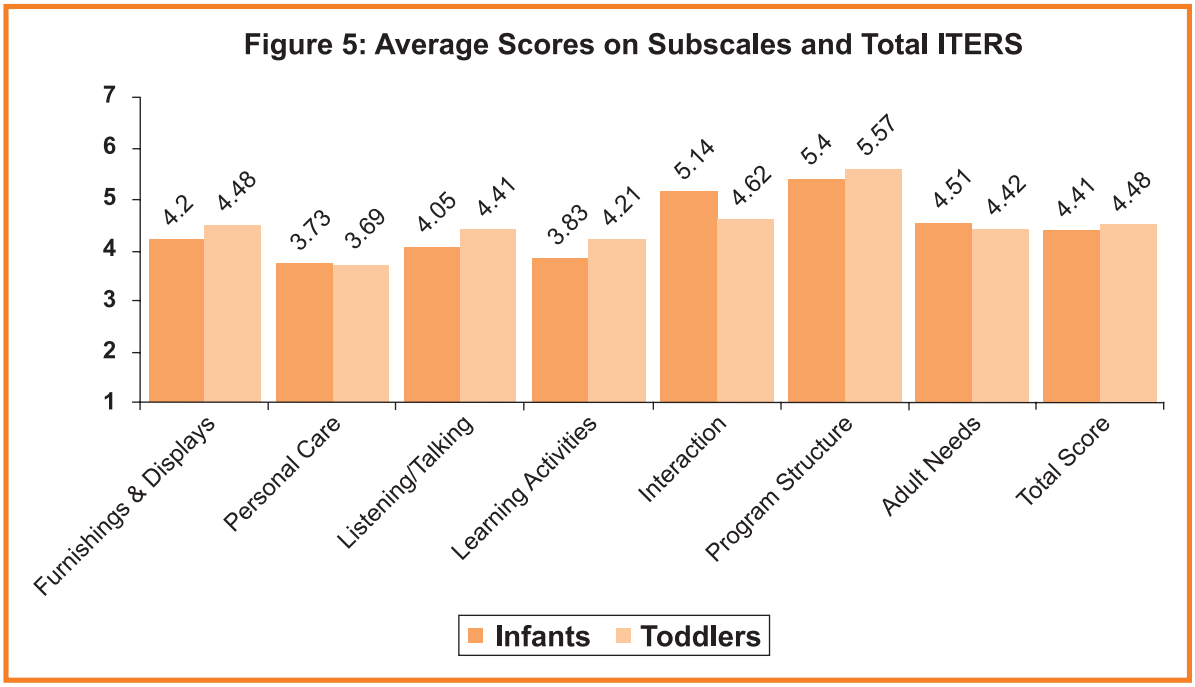
Process Characteristics of Quality

While structural characteristics tell us part of the story, process characteristics of quality tell us more about what actually happens in the classroom – how stimulating an environment it is, how teachers and children interact, what the materials and physical space are like, how safe it is.

The Infant Toddler Environment Rating Scale (ITERS) is a commonly used measure of process quality that provides benchmarks for different levels of quality – as described in the previous section. These benchmarks are labeled 1 = inadequate care, 3 = minimally adequate care, 5 = good care and 7 = excellent care. The ITERS is described in detail in the previous section of this report, *What is Quality Early Care and Education?*

Figure 5 displays the mean scores for each of the scales and for the total score for the classrooms in our sample. The average total ITERS score was just below 4.5. However, averages tell only part of the story. In fact, only 31% of toddler classrooms and 25% of infant classrooms had total scores of five or higher, meeting or exceeding the Good benchmark (Figure 5). The remaining 69% of toddler classrooms and 75% of infant classrooms did not meet the Good benchmark.

We learn more about the strengths and weaknesses of infant/toddler care and education in Massachusetts when we examine the scores on each of the seven ITERS subscales. Subscale average scores ranged from 3.69 to 5.57 (Figure 5). The strengths and weaknesses of Massachusetts classrooms are even more evident when we examine the proportion of classrooms that meet the Good benchmark (a 5 or higher) on each of these scales (Figure 6). While almost two-thirds of classrooms meet the Good benchmark on Program Structure and about a half meet the Good benchmark on Interactions, only about a third meet the Good benchmark on Listening/Talking, and less than a quarter meet that benchmark on Activities.



What do these findings mean? We examine each of these scales in detail in the following sections. We discuss infant and toddler classrooms together, noting differences when they are present.

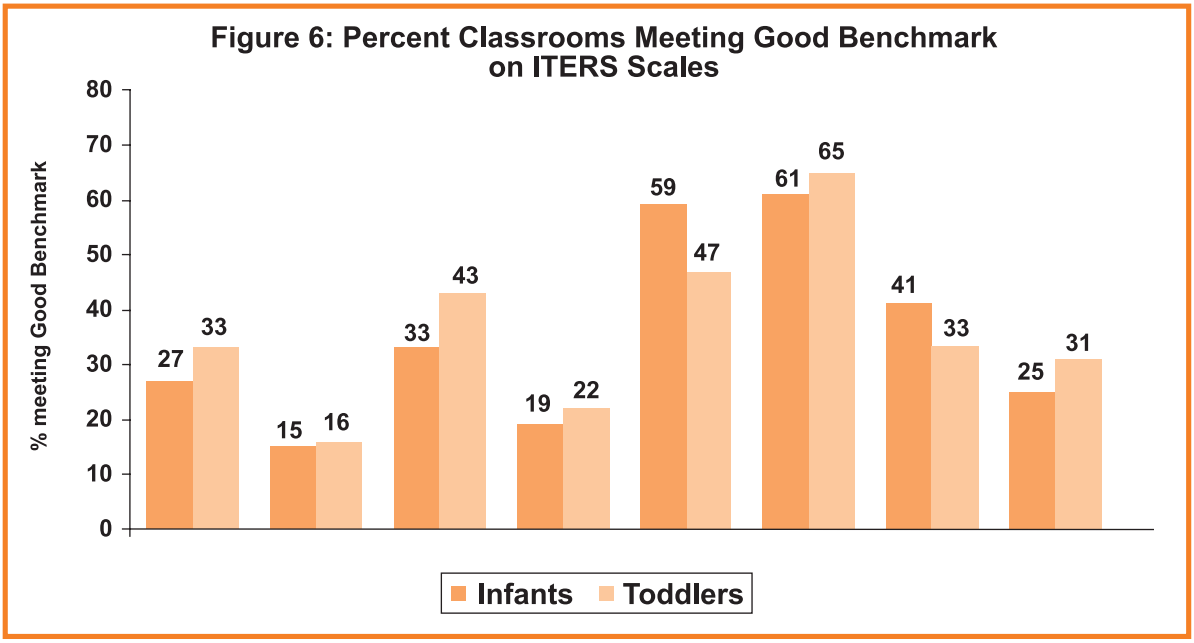
Furnishings & Displays. The average score was 4.2 for Infant classrooms and 4.48 for Toddler classrooms on the Furnishings and Displays scale. Only 27% of Infant classrooms and 33% of Toddler classrooms met the Good benchmark. The Furnishings and Displays scale assesses the availability of well-designed space, appropriate furnishings and displays, such as colorful pictures and mobiles.

The observed classrooms were more likely to meet Minimal or Good benchmarks on furnishings for routine care (feeding, sleeping, storage), and furnishings for learning activities (child-size furnishings, appropriate storage). The observed classrooms received lower scores on room arrangements (to provide space for crawling and play, clear sight-lines for caregivers to see all children at a glance) and for inadequate displays for children (colorful, age-appropriate displays – mobiles, photos – where children can see them).

Personal Care Routines. The average score was 3.73 for Infant classrooms and 3.69 for Toddler classrooms on the Personal Care Routines scale. Only 15% of Infant classrooms and 16% of Toddler classrooms met the Good benchmark. About one quarter of the classrooms – 24% of infant classrooms and 29% of toddler classrooms – did not meet the Minimal benchmark. The Personal Care Routines scale assesses the quality of health and safety routines and policies, feeding, diaper-changing and toileting, napping and greeting and departure routines.

Infant classrooms had average scores at the Good benchmark or better on greeting and departure routines, formal health policies (maintaining health records, emergency information), and safety practices and policies (emergency plans, first aid supplies and training). However, infant classrooms'

average scores were below the Minimal benchmark on all other routines: meal/snacks (sanitary food service, children fed when hungry instead of on a schedule that does not meet the child's needs, hand-washing for toddlers who finger-feed themselves); nap routines (children nap on individual schedules, children do not use the same bedding used by a different child); diapering routines (diapering area disinfected between changes, caregivers wash own hands/change protective gloves after each diaper change); personal grooming for children (washing of children's hands, changing children's clothes as needed), and health practices (e.g., caregiver washes own hands frequently, models good health practices).

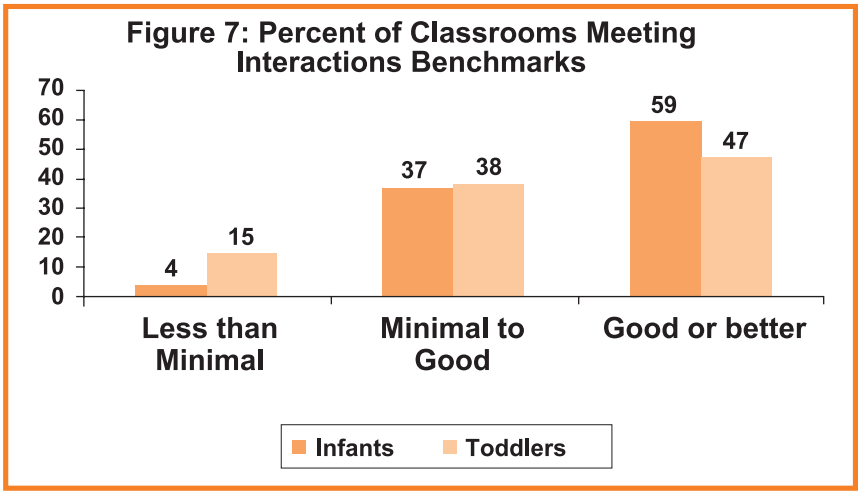


Similarly, toddler classrooms had average scores above the Good benchmark on greeting and departure routines, formal health policies (maintaining health records, emergency information), and safety practices and policies (emergency plans, first aid supplies and training). However, toddler classrooms had average scores at the Minimal benchmark on the nap and personal grooming items and average scores below the Minimal benchmark for the meals/snack, diapering/toileting, and health practice items.

Adult Needs. The average score was 4.51 for Infant classrooms and 4.42 for Toddler classrooms on the Personal Care Routines scale. Fewer than half of the classrooms – 41% of Infant classrooms and 33% of Toddler classrooms – met the Good benchmark. The Adult Needs assesses how well the program meets the needs of staff (breaks, professional development, staff meetings) as well as the needs of parents (communication between parents and staff, parent involvement in the program).

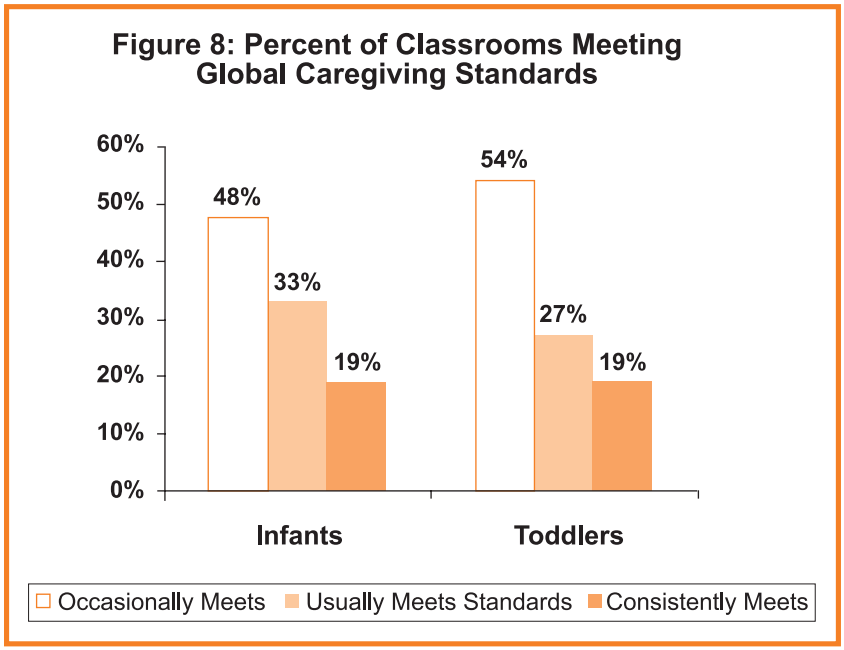
Classrooms had average scores at or above the Good benchmark on the availability of meeting space for adults and on provisions for parents, including parent-program communication. Average scores did not meet the Good benchmark on items assessing opportunities for professional growth or meeting staff needs (separate staff lounge, storage space for personal belongings).

Interactions. The average score was 5.14 for Infant classrooms and 4.62 for Toddler classrooms on the Interactions scale. More than half of the Infant classrooms (59%) met the Good benchmark, and only 4% failed to meet the Minimal benchmark. In comparison, 47% of Toddler classrooms met the Good benchmark and 15% failed to meet the Minimal benchmark (see Figure 7). The Interactions scale assesses the quality of the interactions between staff and children, and among the children.



Both Infant and Toddler classrooms had average scores of 5 (at the Good benchmark) on the rating of peer interactions – peer interactions were usually positive and caregivers modeled positive social interaction. However, infant classrooms scored higher than toddler classrooms, on average, on caregiver-child interaction and discipline. Caregivers in infant classrooms were rated more positive in their interactions with the infants than were caregivers in toddler classrooms. In addition, infant caregivers were more likely to hold age-appropriate expectations and to promote age-appropriate interactions through the set-up of the program than were toddler caregivers.

Global Caregiving Rating Scale. The Arnett Global Caregiving Rating Scale (Arnett, 1989) rates the caregiver's relationship with the child in terms of positive interactions, punitive interactions, detachment and permissiveness. The scale consists of 26 items, rated on a scale from 1=never meets the standard and 2=occasionally meets the standard to 3=usually meets the standard and 4=consistently meets the standard. The positive interactions subscale captures the caregiver's warmth and sensitivity and is reported here.

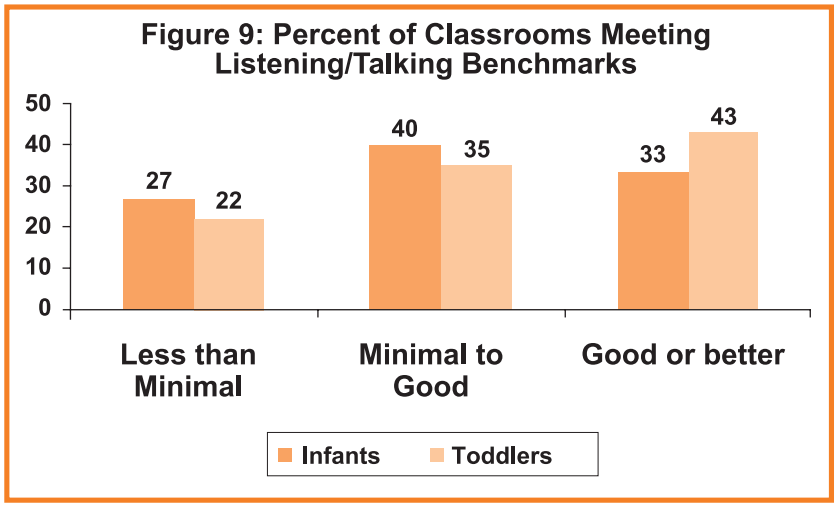


About half of the teachers in both the infant and toddler classrooms had an average score that was lower than a 3; on most items they were rated as only occasionally meeting the standards for warm and sensitive caregiving (see Figure 8). For example, a provider with a total score below 3 might have

been rated as "Often does not listen attentively, but there are some moments when she does listen;" and "Usually does not seem to enjoy the children, but there are a few instances of enjoyment;" and "Usually does not talk to children on a level appropriate for their developmental level, but in a few instances does talk at a level children understand."

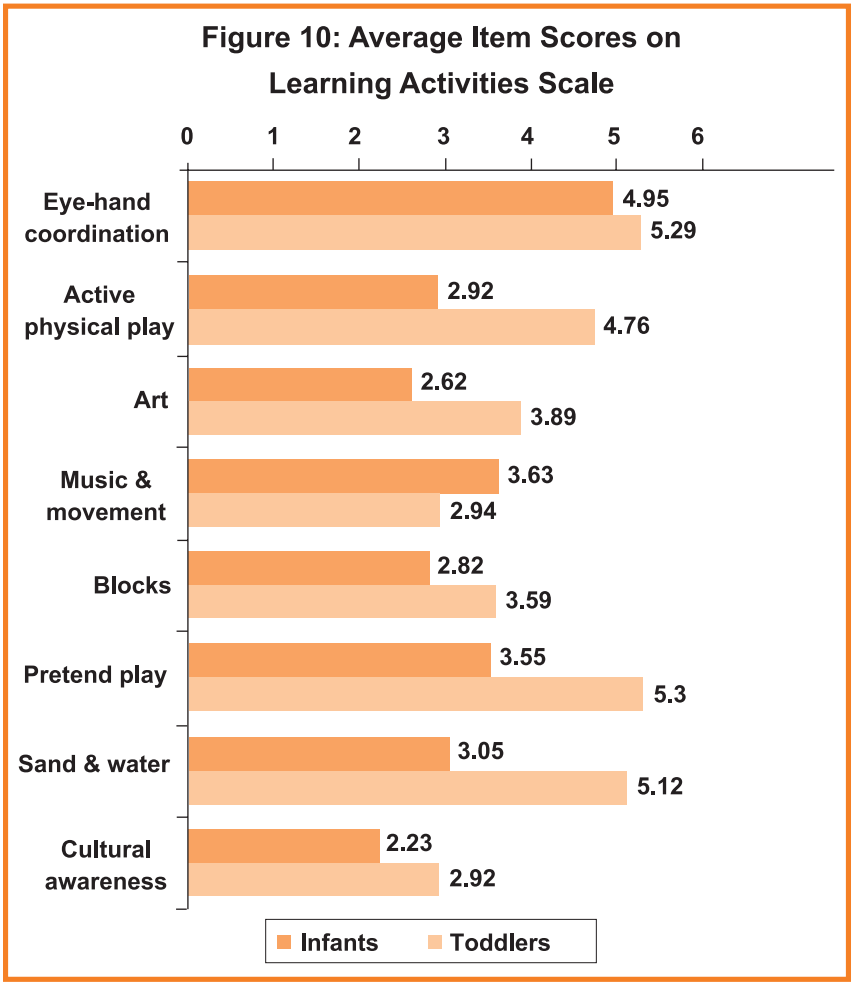
In contrast, only one in five (19%) of both infant and toddler caregivers received high marks (a total score between 3.5 and 4); these providers were rated as "Usually or consistently listens attentively to the children;" "Usually or consistently seem to enjoy the children;" and "Usually or consistently talk to children on a level they can understand." The remaining 33% of infant caregivers and 27% of toddler caregivers had average scores that fell between 3 and 3.5; they were rated as usually meeting standards, but not consistently meeting a majority of the standards. Overall, as we saw on the ITERS Interactions scores, infant caregivers were more likely than toddler caregivers to have positive, warm interactions with the children.

Listening and Talking. The average score was 4.05 for Infant classrooms and 4.41 for Toddler classrooms on the Listening and Talking scale. Only one-third (33%) of the Infant classrooms met the Good benchmark, and 27% failed to meet the Minimal benchmark. In comparison, 43% of Toddler classrooms met the Good benchmark and 22% failed to meet the Minimal benchmark (see Figure 9). The Listening and Talking scale assesses the informal use of language, and the presence and use of infant/toddler books.



Learning Activities. The average score was 3.83 for Infant classrooms and 4.21 for Toddler classrooms on the Learning Activities scale. About one in five classrooms met the Good benchmark – 19% of Infant classrooms and 22% of Toddler classrooms – 27% of Infant classrooms – but only 8% of Toddler classrooms – failed to meet the Minimal benchmark. The Learning Activities scale assesses the availability of age-appropriate activities and materials.

As Figure 10 indicates, the average score in Infant classrooms was below the Minimal benchmark (3) for active physical play and cultural awareness. In addition, infant classrooms scored below the Minimal benchmark for art (for children 12 months and older), and blocks (in classrooms where all infants are over 9 months old) –the lower scores may reflect the challenges of providing art and blocks in classrooms with both younger and older infants, or a lack of recognition of the importance of these activities for older infants. Infant classrooms were stronger on eye-hand coordination activities (e.g. busy boxes), music/movement (e.g. caregiver singing or playing music) and sand and water for infants at least 12 months old.



Toddler classrooms are strong on pretend play, sand and water play, and eye-hand coordination activities (e.g. puzzles). The average scores in Toddler classrooms were below the Minimal benchmark on the music/movement and cultural awareness items. Toddler classrooms fell between the Minimal and Good Benchmark on Art and Blocks.

Program Structure.

The average score was 5.40 for Infant classrooms and 5.57 for Toddler classrooms on the Furnishings and Displays scale. Almost two-thirds of Infant classrooms (61%) and Toddler classrooms (65%) met the Good benchmark.

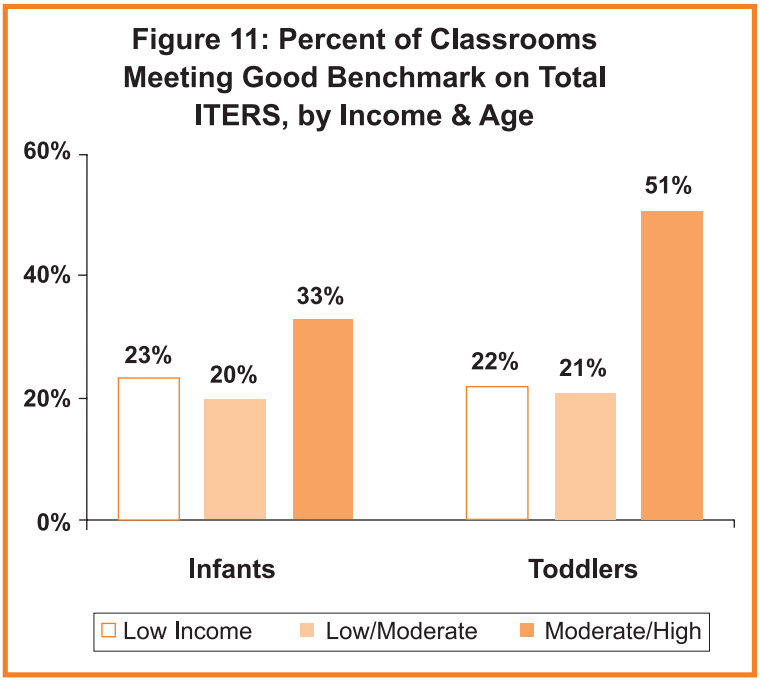
A classroom that meets the Good benchmark on Program Structure is one in which the daily schedule provides a balance of indoor and outdoor activities, with a variety of play opportunities offered most of the day; active and quiet play is varied as children's needs change; leaning and play experiences are incorporated throughout the day including during routine care; careful supervision with caregivers intervening to avoid problems is provided; caregivers show appreciation for children's efforts and react quickly to solve problems in a supportive manner; staff have time for communication and responsibilities for both play and care are clearly defined and handled smoothly. In classrooms with exceptional children, the caregiver provides activities and adapts the daily schedule and physical environment to meet the child's special needs, interacting with the exceptional child as much as with other children.

Classrooms scored particularly high on staff cooperation with each other and provisions for exceptional children (in the 14 infant classrooms and 16 toddler classrooms with children with special needs). Classrooms were less likely to meet the Good benchmark on the scheduling and supervision of daily activities.

Family Income and the Quality of Infant/Toddler Care and Education

A central issue surrounding quality child care is whether low-income children attend centers of comparable quality to those that serve children from higher-income families. Specifically, we were

interested in whether centers serving infants and toddlers from families with different income levels differed in the quality of early care and education they provided. We categorized centers into three income groups. Low-income centers were defined as those in which directors reported that at least 75% of the children come from families with incomes below $30,000 per year. Low/moderate income centers are those in which at least 75% of the children come from families with incomes below $80,000 per year (but not 75% below $30,000). Moderate/higher income centers are those in which at least 50% of children come from families with incomes over $30,000 (and they do not meet the criteria for low/moderate classification) or 40% or more of the children come from families with incomes over $80,000.[3] In this sample, 26 classrooms were in centers serving low-income families, 84 classrooms were in centers serving low-to-moderate income families and 94 classrooms were in centers serving moderate-to-high income families; there were equal numbers of infant and toddler classrooms in each category.



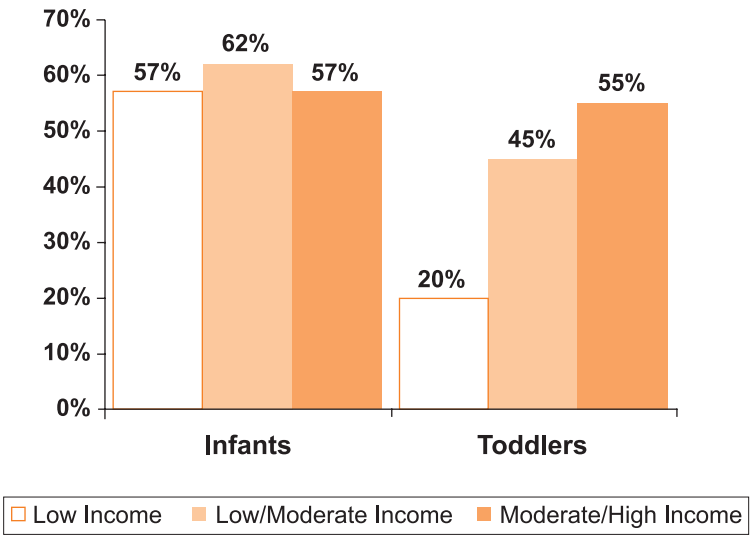
Overall Quality. We found that centers serving a majority of moderate/higher income families were more likely to meet the Good benchmark on the total ITERS score in both Infant and Toddler classrooms than were centers serving predominantly low-income families or low/moderate income families (Figure 11). Centers serving low and low/moderate income families had scores that were much more similar to each other (23% and 20%, respectively, for Infant classrooms; 22% and 21%, respectively, for Toddler classrooms). It's also important to note that 51% of centers serving moderate/higher income families met the Good benchmark on the Total ITERS for their Toddler classrooms.

When we examined income group differences on the individual ITERS scales, we found the same pattern of higher scores for centers serving moderate to high income families for the Furnishings and Displays, Personal Care Routines and Adult Needs scales – centers serving moderate/higher income families were more likely to meet the Good benchmark on Furnishings and Displays, Personal Care Routines and the Adult Needs scales. However, we found different patterns on the other scales that warrant further discussion.

[3]These categories were developed to reflect the requirements for needs-tested benefits in Massachusetts (such as food stamps), on the one hand, and the higher cost of living in Massachusetts (in Massachusetts, the median income for a family of 4 was $78,025 in 2000, compared to $62,228 for the U.S. as a whole) on the other.

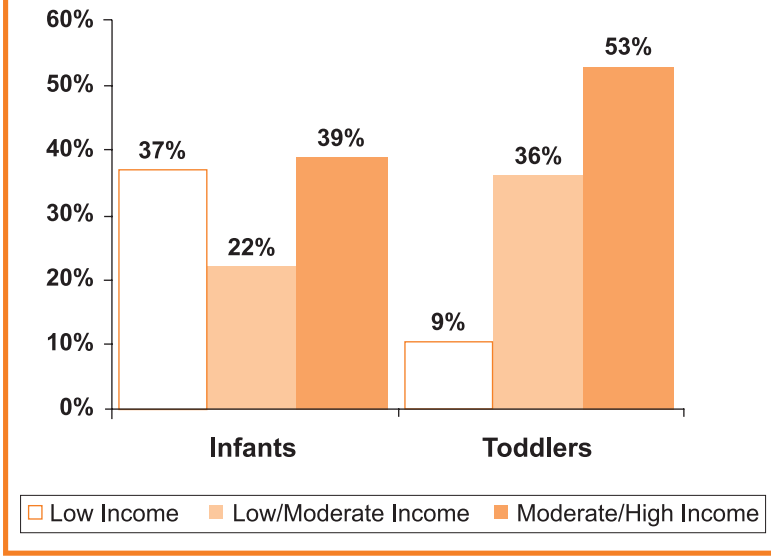
Interactions. The Interactions scale is a measure of the quality of interactions between staff and children, and among the children themselves. As Figure 12 shows, there was no real variation among Infant classrooms in the quality of interactions – more than half of all Infant classrooms met or exceed the Good benchmark. However, we found that Toddler classrooms in centers serving low-income families were much less likely to meet the Good benchmark on Interactions. In fact, Toddler classrooms in centers serving low-income families were five times more likely than Toddler classrooms in centers serving moderate/higher income families to be rated as not meeting Minimal standards for Interactions (41% compared to 8%; 13% of Toddler classrooms in centers serving low/moderate income families failed to meet Minimal standards).

Figure 12: Percent of Classrooms Meeting Good Benchmark on Interactions, by Income & Age



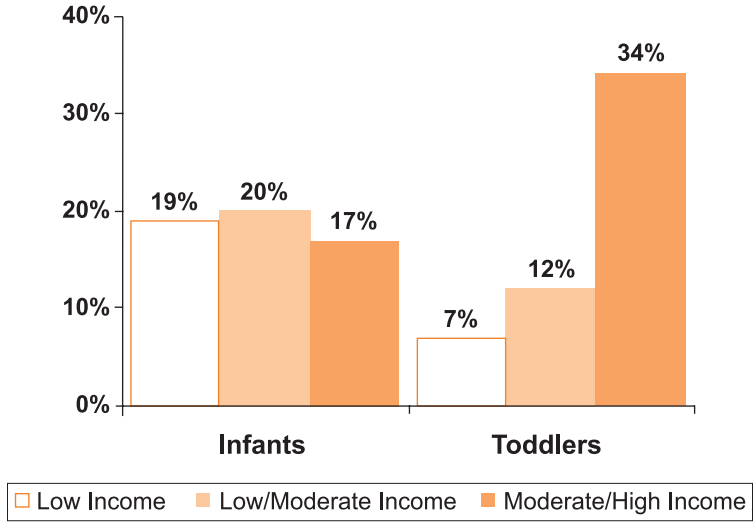
Listening and Talking. We see a different pattern for Listening and Talking – Infant classrooms in centers serving low-income families are as likely to meet the Good benchmark as are infant classrooms in centers serving moderate/higher income families; Infant classrooms in centers serving low/moderate income families are less likely to meet the Good benchmark. Conversely, in Toddler classrooms, we found that the higher the income level of families served, the more likely Toddler classrooms were to meet the Good benchmark on Listening and Talking (Figure 13).

Figure 13: Percent of Classrooms Meeting Good Benchmark on Listening/Talking, by Income & Age



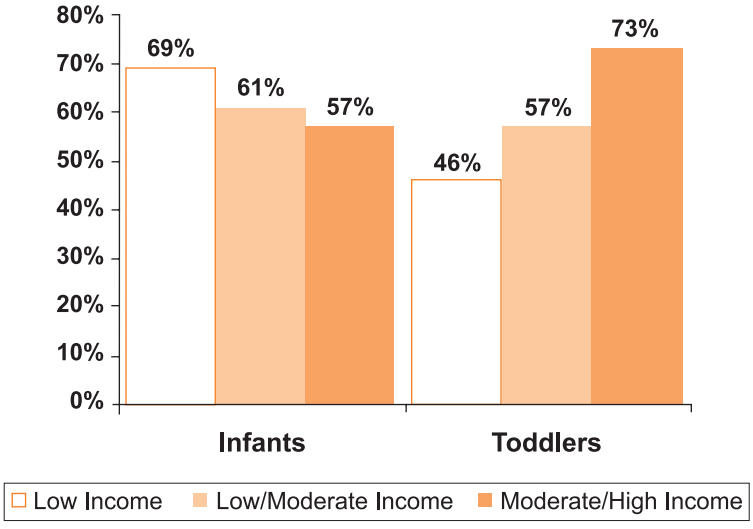
Learning Activities. While there were no real differences among Infant classrooms, we found that Toddler classrooms in centers serving moderate/higher income families were more likely to meet the Good benchmark on Learning Activities than were Toddler classrooms in centers serving low-income or low/moderate income families (Figure 14). Toddler classrooms are required to provide a greater range of learning materials and activities than are Infant classrooms, especially if there are older toddlers in the room.

Figure 14: Percent of Classrooms Meeting Good Benchmark on Learning Activities, by Income & Age



Program Structure. As Figure 15 shows, we found two divergent patterns among Infant and Toddler classrooms. Among Infant classrooms, classrooms in centers serving low-income families were more likely to meet the Good benchmark on Program Structure, whereas, among Toddler classrooms, classrooms in centers serving moderate/higher income families were more likely to meet the Good benchmark, and the differences among centers serving different income groups are greater in Toddler classrooms than in Infant classrooms. While it is tempting to suggest that low-income centers serving infants may be "doing more with less" based on this chart, it is important to put this into the context of the results on the other scales and the total ITERS score, which do not suggest that low-income centers serving infants are able to do more with less. We will discuss this in greater detail in the Summary section, below.

Figure 15: Percent of Classrooms Meeting Good Benchmark on Program Structure, by Income & Age



However, before discussing the implications of these findings, we first address the question of the relationship between group size, ratio, teacher education and experience, on the one hand, and classroom quality on the other.

Improving the Quality of Infant/Toddler Care and Education in Massachusetts

As we noted earlier, there are two main aspects of quality of care that we measured: structural and process. Many of the structural aspects of quality can be, and are, regulated by states. Process characteristics are not easily regulated but help us to understand the environments in which children spend their time, and are directly related to children's development. To the extent that regulatable structural indicators of quality are related to process quality – to what happens in the classroom – regulations can improve children's outcomes. To understand how such regulatables are related to process, we examined the relationship between several structural variables and our process measures: stimulation in the classroom, warmth and sensitivity of the teacher-child relationship, and the ITERS total score.

We used four structural variables that are most often subject to state regulations:

- child:staff ratio;
- group size;
- highest education level among classroom teaching staff (measured as years of education);
- teacher tenure (number of years employed at this center)

Table 1 reports the estimates of the extent to which an increment in each of these structural variables is associated with an increment in the observed quality of infant/toddler care and education in Massachusetts. Because the estimates are standardized, they can be compared to each other, both within each model, and across models. We will discuss each of these models in turn.
The table also reports the significance level (*p*) of each estimate—that is, the probability that this estimate is an artifact of the particular sample of homes that were chosen for this study (and would not be found in a different sample), rather than representing the true relationship among structural variables and process quality in all full-day infant/toddler classrooms in Massachusetts.[4] Finally, the table reports the R^2 for each model (column); R^2 is a measure of the proportion of the variation in the process quality measure that is explained by all of the listed structural variables combined.

Structural Variables and Process Quality in Infant Classrooms. We examined the relationships between the structural variables and the process quality measures in Infant classrooms (see Table 1). The *Stimulation* composite is a measure of the amount and variety of activities available to the children, the developmental appropriateness of the classroom structure, the amount and appropriateness of the language in the classroom, and how actively classroom staff introduce stimulation into the environment. Higher scores signify more stimulating classrooms. The *Warmth and Sensitivity* composite describes how providers interact with the children in the classroom, how warm they are to the children, the amount and types of interactions that occur, and how sensitive they are to children's needs. High scores signify a classroom where providers interact often and appropriately

[4]For example, an estimate that is significant at the $p < .05$ level has five chances out of 100 of being due to chance. Put another way, that same estimate has 95 chances out of 100 of representing the true value for all Massachusetts infant/toddler classrooms. In this report, we treat as significant those estimates that have at least 95 chances out of 100 of being valid ($p < .05$); p values < .10 are interpreted as marginally significant.

with the children, show warmth to the children, and respond to children's needs. The Total ITERS scores includes these measures, plus measures of the quality of Furnishings and Displays and center policies for health and safety, staff needs and parent-teacher communication.

As Table 1 shows, in Infant classrooms, child:staff ratio and teacher tenure at the center are the most important predictors of the level of Stimulation and the Total ITERS score; group size and teacher tenure are the most important predictors of Warmth and Sensitivity, with child:staff ratio marginally significant. Given the nature of infant care, with the range in individual infant's feeding and sleep "schedules" and the need for multiple adults to meet the needs of a group of infants, it is not surprising that infant classrooms with fewer infants, and fewer infants per adult, were more likely to provide high quality stimulation and warm and sensitive interactions.

Table 1. Standardized Estimates of Relationships Between Regulatables and Process Quality Measures

	Infant Classrooms			Toddler Classrooms		
	Stimulation Composite	**Warmth & Sensitivity**	**Total ITERS**	**Stimulation Composite**	**Warmth & Sensitivity**	**Total ITERS**
Child:Staff Ratio	-0.245 *	-0.194 ^	-0.280 *	-0.050	-0.210 *	-0.093
Group Size	-0.126	-0.261 *	-0.062	-0.012	-0.133	-0.048
Highest Education	0.073	0.059	0.022	0.280 **	0.137	0.252 **
Teacher Tenure	0.323 **	0.294 *	0.336 **	0.126	0.130	0.148 ^
Adj R2	0.126 *	0.155 *	0.128 *	0.091 *	0.125 *	0.101 *

^ = $p < .10$, * = $p < .05$, ** = $p < .01$

Teacher tenure was also significant. Longer teacher tenure reflects both more experienced teachers, as well as teachers who have been retained by their present centers (rather than fired). These processes that lead to longer teacher tenure may also contribute to the presence of teachers in Infant classrooms who provide higher quality care and education for infants. Teacher tenure is also the inverse of turnover – less turnover among teachers means longer teacher tenure. These regression results suggest, therefore, that reduced turnover, reflected in longer tenure, is associated with higher quality infant care and education.

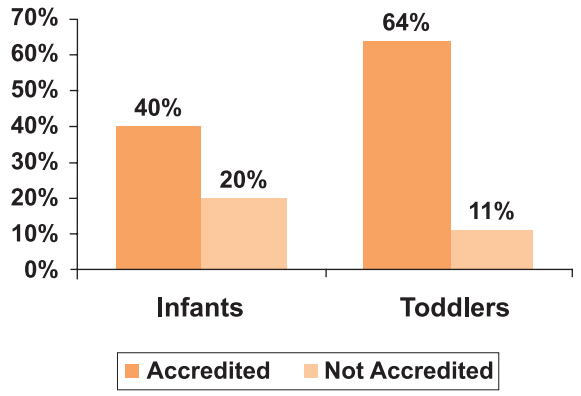
Structural Variables and Process Quality in Toddler Classrooms. We also examined the relationships between the structural variables and the process quality measures in Toddler classrooms (see Table 1). We found that child:staff ratios were important to the warmth and sensitivity of providers' relationships with the toddlers, but teacher education was the only significant predictor of

the levels of stimulation. As we reported above, Toddler lead teachers have higher levels of education than do Infant lead teachers; this may explain why variations in highest level of teacher education in a classroom (most often the lead teacher) were related to stimulation in Toddler classrooms, but not in Infant classrooms.

Similarly, as we noted above, infant classrooms are more likely than toddler classrooms to have teachers who have been at the center for more than five years, perhaps reflecting a practice of placing more experienced teachers in infant classrooms; this may contribute to the finding that variations in teacher tenure were related to quality in Infant classrooms but not in Toddler classrooms.

NAEYC Accreditation and Classroom Quality. Another indicator of quality that is increasingly used is that of NAEYC Accreditation. NAEYC (the National Association for the Education of Young Children) Accreditation criteria include standards for staff qualifications, as well as curriculum, interactions among teachers and children, health and safety, teacher-family relationships and administration. The NAEYC accreditation process involves a self-study by program staff and parents, an on-site visit by trained validators to assess how well the program meets the accreditation criteria, and a final accreditation decision by a three-person Commission. In the sample for this Massachusetts study, 30% of infant classrooms, and 38% of toddler classrooms, were in NAEYC-accredited centers. Classrooms in NAEYC-accredited centers were significantly more likely to meet or exceed the Good benchmark than were classrooms in non-accredited centers (Figure 16).

Figure 16: Percent of Classrooms Meeting Good Benchmark by NAEYC Accreditation Status



Summary

This study was undertaken to provide a picture of the quality of Massachusetts early care and education for infants and toddlers. The impetus for this study came from previous research that found that both structural and process quality make a difference in children's development. Child: staff ratios and teacher training have been found to be related to children's development in several studies (c.f., Howes, Phillips & Whitebook 1992; NICHD ECCRN 1999). These regulatable measures impact children's lives through their links to process quality – the actual experiences of children in classrooms (NICHD ECCRN 2001). Higher process quality, including age-appropriate stimulation, as well as sensitive and responsive caregiving, has been found to be associated with better developmental outcomes in most studies of early care and education, including the Bermuda Study (McCartney 1984; Phillips, McCartney & Scarr 1987); the Chicago Study (Clarke-Stewart, Gruber & Fitzgerald 1994); the Child Care and Family Study (Kontos, Howes, Shim & Galinsky 1995); the Cost, Quality and Outcomes Study (Peisner-Feinberg & Burchinal 1997) and the NICHD Study of Early Child Care (NICHD ECCRN 1998, 2000a).

Recent research on brain development, coupled with rising concerns about school readiness, has fueled an interest in the ways in which early care and education can support young children's cognitive and language development. The research on early child care clearly indicates that child care can play an important role. Children who attend child care centers that offer higher quality care, particularly more language stimulation, show more advanced cognitive and language development (Burchinal, Roberts, Riggins et al, 2000; NICHD ECCRN 2000).

The early years are also crucial years for the development of social skills – the ability to make friends, to get along well with others, to cooperate in group activities, to understand others' perspectives – skills that are necessary to the development of self-esteem and social relationships, and to later school success. Research has found that higher process quality is associated with young children's social and emotional development (c.f., Lamb 1998). The quality and stability of children's relationships with their child care providers appears to be particularly important to children's social and emotional development (c.f., Howes & Hamilton 1992, 1993; Howes, Matheson & Hamilton 1994).

The cumulative evidence of the research on early child care and children's development is clear; for children in child care, the quality of that care is consistently associated with children's development. As the National Research Council notes (2000, pg. 313), "…high-quality care is associated with outcomes that all parents want to see in their children, ranging from cooperation with adults to the ability to initiate and sustain positive exchanges with peers, to early competence in math and reading."

While we found that many Massachusetts classrooms for infants and toddlers do not meet accepted standards of infant/toddler care, this must be understood in the context of a national picture of poor quality infant/toddler care, as evidenced in the original Cost, Quality and Outcomes Study (Helburn, 1995), where almost 90% of infant/toddler rooms failed to meet the Good benchmark. In contrast, Massachusetts has a core of quality programs, with one-quarter of infant classrooms and almost one-third of toddler classrooms meeting the Good benchmark.

However, more than two-thirds of the Toddler classrooms and three-quarters of the Infant classrooms did not meet the ITERS Good benchmark. Children in these classrooms are receiving less than the standards set for developmentally-appropriate care, and, while they may be in care that meets minimal standards, many opportunities to enhance their development are being missed. Many children are in care for 6 to 8 hours a day, and this time could be an ideal opportunity to enrich their lives.

Our findings suggest particular areas of strength in these and other programs, as well as areas that need improvement. The majority of infant and toddler classrooms in this study did not meet standards for good early care and education practices, in almost all areas. Classrooms often did not provide the physical equipment and arrangements that young children need or maintain appropriate personal care routines. While caregivers often worked well together and had warm, positive interactions with the children in their care, they did not provide the informal talk and exposure to books that are the early building blocks for children's language and literacy skills, or the variety of activities and materials that promote children's optimum development. At the same time, while centers' policies and practices supported parents' involvement, centers often did not provide adequate opportunities for professional

development for these same caregivers. Infant caregivers were weaker than toddler caregivers on listening and talking, while toddler caregivers were weaker than infant caregivers on caregiver-child interaction and discipline, and less likely to have opportunities for professional development.

Massachusetts' performance is also uneven across centers serving different income groups. We found that centers that serve predominantly low- or low/moderate income families were rated as poorer quality overall than centers that serve predominantly moderate/higher income families. While infants in low-income and low-moderate income centers are as likely to experience warm, sensitive interactions with their caregivers as are children in moderate/higher income centers, toddlers in low-income centers experience poorer quality interactions than toddlers in low-moderate income centers, and both experience poorer quality interactions than do toddlers in moderate/higher income centers.

Interestingly, infants in low-income centers are as likely as infants in moderate/higher income centers to receive a level of language stimulation that meets developmentally-appropriate standards; children in low-moderate income centers are less likely to receive adequate language stimulation. In contrast, toddlers in low-income centers receive the lowest levels of age-appropriate language stimulation. The combined patterns on these scales suggest that children attending centers that serve predominantly low-income or low/moderate families are less likely to receive the level of early care and education that will prepare them for school and later life, with toddlers in low-income centers at the greatest risk.

Consistent with these variations in quality, and the importance of teacher education to toddler care and education, we found that only 4% of teachers in toddler classrooms in low-income centers had a B.A. or more in early childhood education or a related field, compared to 24% of toddler teachers in low-moderate income centers and 18% of toddler teachers in moderate-high income centers.

How can Massachusetts ensure that all children have access to quality early care and education, and that centers provide the stimulation and strong teacher-child relationships important to children's development? There are many options to be considered, and this study was not designed to evaluate specific policies. However, the study found that classrooms with better child:staff ratios, smaller group sizes, better educated and more experienced teachers provided better quality care overall, including more developmentally-appropriate stimulation, and better relationships between classroom staff and children.

The Cost of Early Care and Education in Infant and Toddler Classrooms

In this chapter, we present descriptive data on *revenues* and *costs of center care* for centers serving infants and toddlers, and the relationship between cost and quality. For comparability, all costs and revenues are expressed in terms of dollars per child care hour.[5] In addition, the reader must bear in mind that "costs" are not the same as "price"; the term *costs* refers to expenditures plus donated resources (*full costs*), while *price* refers to what consumers pay for care.

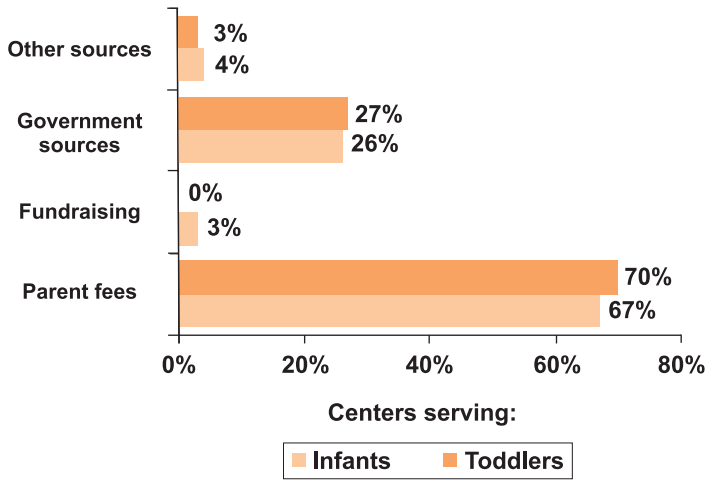
Results are presented side by side for "centers serving infants" and "centers serving toddlers," based on two representative samples of centers. To a large extent, both of these samples comprise centers that serve both age groups. All of the centers with observed infant rooms also serve toddlers; and of the centers with observed toddler rooms, the great majority also serve infants: 83 percent (weighted) among those that had complete cost data.[6] The center-level results presented in this chapter are therefore quite similar between the two groups. Both expenditures and revenues tend to be higher for centers serving infants, because 17 percent (weighted) of centers serving toddlers that provided costs data exclude these more labor-intensive infant classes. As shown below, classroom-level analysis indicates that costs for serving infants are substantially higher than for toddlers.

Revenues

Across all centers in the sample, average revenues per hour of care were $4.52 in centers with infant rooms, and $4.41 in centers with toddler rooms. Because some centers were open for fewer than 52 weeks, actual average revenues per full-time child were $10,535 and $10,239, respectively.

Revenues were grouped into four categories: parent fees, fundraising, government funds (including food program subsidies), and other cash funds (including grants and employer contracts). For both groups of centers, parent fees comprised

Figure 17: Revenue Sources



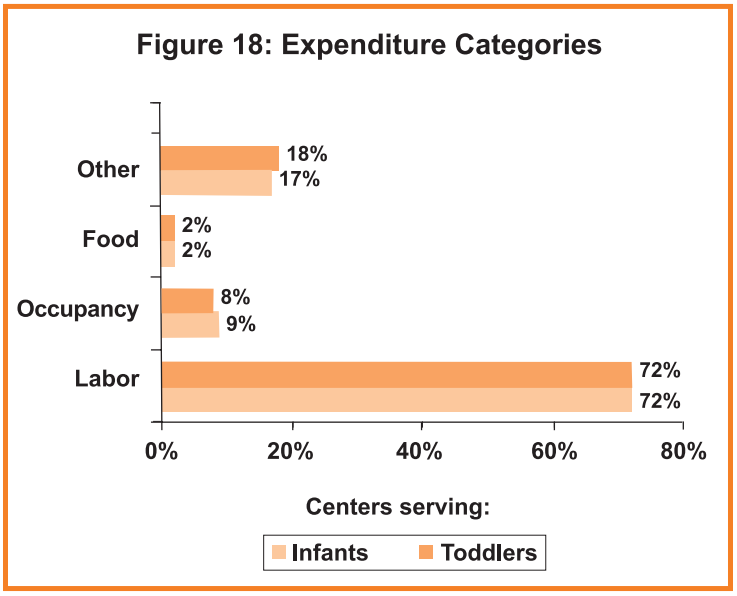
[5]This measure is calculated based on number of children enrolled in each class full-time and part-time, along with the number of hours for full-time and part-time enrollees.

[6]We had complete data on costs and revenues from 94 infant centers and 94 toddler centers; 3 infant centers and 3 toddler centers had partial data. The reader may ask why the analysis of costs and revenues of centers serving toddlers is not based on all centers in the combined infant and toddler sample with data, given that they all do in fact serve toddlers. The reason is that the centers included in the analysis comprise a probability sample of all centers in Massachusetts that serve toddlers (regardless of whether they also serve infants), so that statistical inferences can be drawn for all such centers. This feature would be lost if the separately drawn sample of centers serving infants were appended.

the main source of revenues, accounting for about two-thirds of the total, while government sources provided about a quarter of the total (Figure 17).

Expenditures

Average expenditures per child care hour were $4.42 for centers serving infants and $4.28 for centers serving toddlers. These correspond to full-time care expenditures of $10,343 and $10,015 for the two groups of centers. Center directors reported expenditures in some 20 subcategories, which were combined into four broad categories: labor, food, occupancy, and "other." The breakdown of expenditures was extremely similar for the two groups of centers (Figure 18). Expenditures for **labor** include salaries, wages, fringe benefits, and payroll taxes for all staff. These comprise nearly three-quarters of center expenditures. **Occupancy** expenditures, including rent and mortgage payments, real estate taxes, utilities, and repairs and maintenance, account for 8 to 9 percent of the total. Expenditures for **food** comprise 2 percent of the total. The remaining 17 to 18 percent is spent on **other goods and services** such as educational materials, equipment, office supplies, liability insurance, and children's transportation.

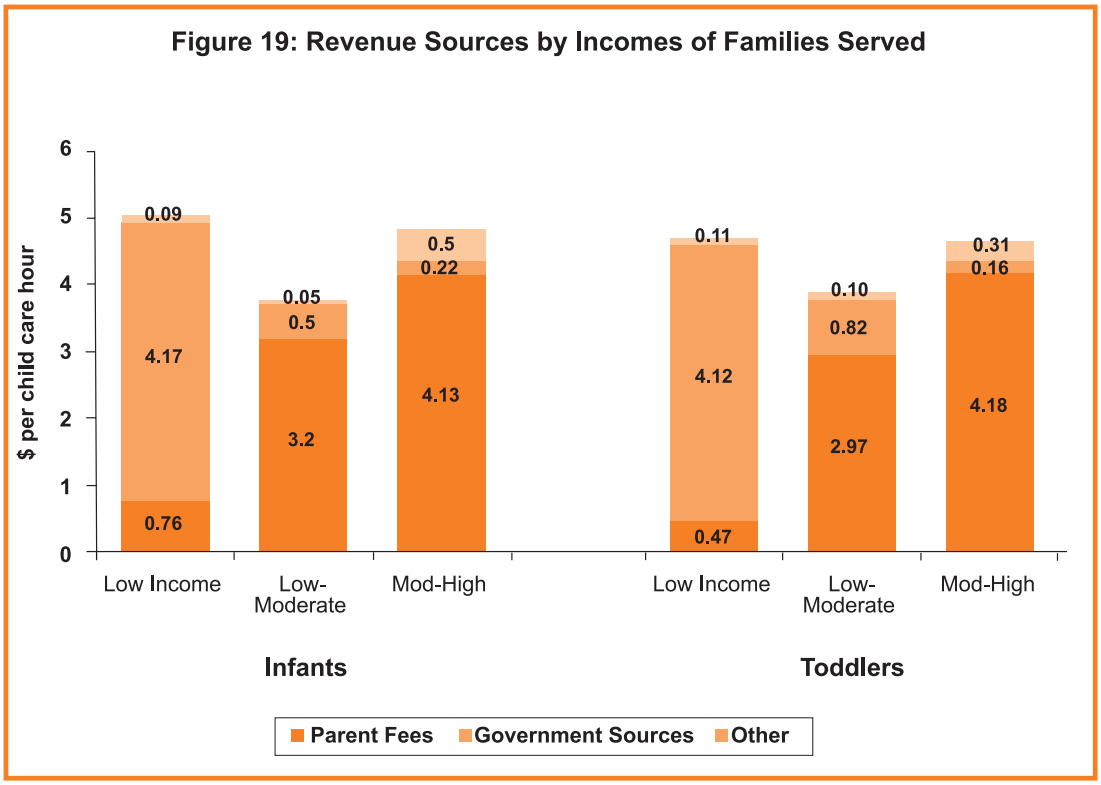


Revenues and Expenditures by Income of Families Served

As described earlier, centers were categorized as low-income centers, low-moderate income centers, or moderate-high income centers, based on directors' reports of the incomes of the families they served.

Revenues. For both samples of centers—those serving infants and those serving toddlers—total revenues followed a U-shaped curve (Figure 19), with centers serving low/moderate income families reporting the lowest total revenues.[7] The *sources* of revenues also differed markedly by the income of families served. For centers serving low-income families, the great bulk of revenues came from government sources—75 percent of revenues for centers serving infants, and nearly 90 percent for centers serving toddlers (Figure 19). Parent fees comprised only 10 to 15 percent. Among centers serving high-income families, in contrast, parent fees were the main contributor to revenues, comprising around 90 percent of the total. The centers that serve low- to moderate-income families get about a quarter of their revenues from government sources, and virtually all the rest from parent fees.

[7]The revenue and expenditure results for centers serving infants are heavily influenced by two centers that had very large fundraising incomes in the reported calendar year. We have excluded these outliers – atypical centers – from these charts. To illustrate their impact, when these two centers are deleted, average revenue per child care hour among low-income centers falls from $5.47 to $5.03.

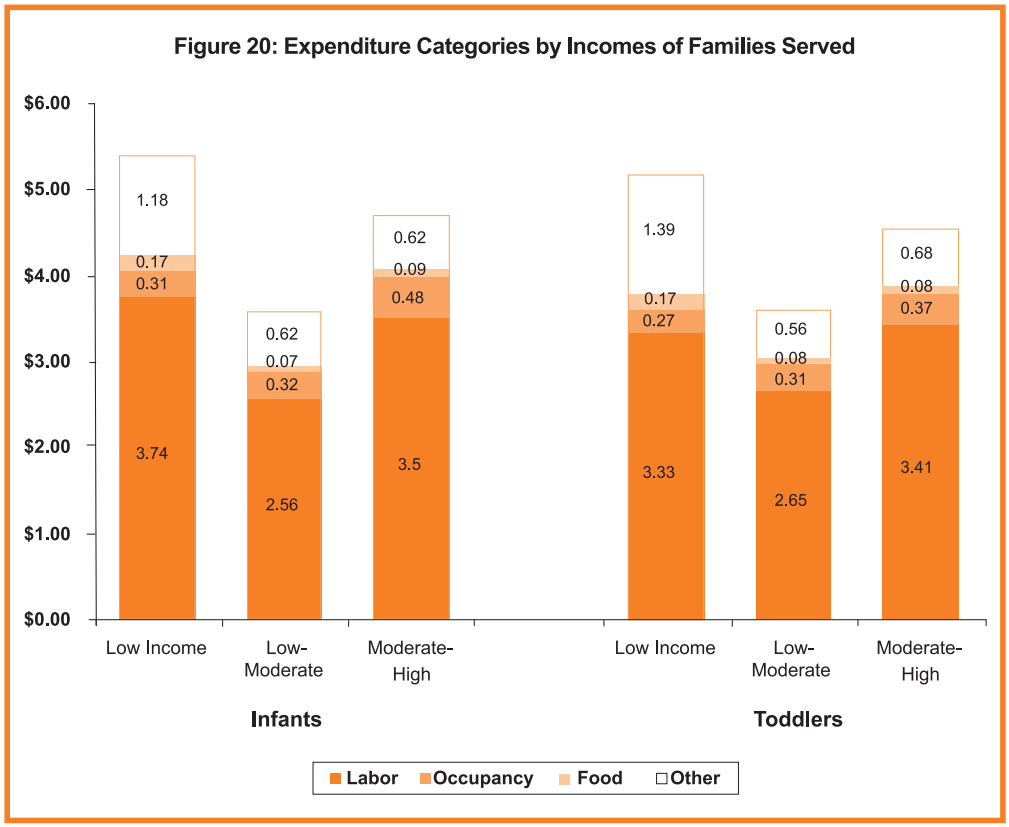


Expenditures. For both groups of centers, expenditures per child care hour are highest for centers serving low-income families, and lowest for centers serving low- to moderate-income families (Figure 20).

The composition of expenditures shows similar patterns for the two groups of centers (Figure 20). For centers serving infants and for centers serving toddlers, labor comprises around 65 to 75 percent of total expenses across income categories of families served, tending to comprise a higher fraction of expenses for centers serving higher-income families. The actual dollar amount spent on labor per child care hour is, however, quite similar between the highest and lowest income groups (and substantially lower for the middle group). Occupancy comprises 5 to 10 percent of the total, and food 2 to 3 percent for all income groups. Other expenditures comprise 14 to 27 percent of total expenses, with the higher values in centers serving lower-income families.

The differences in patterns of expenditures at the center level are of special interest, particularly the differences in labor expenditures. These patterns could be due to three factors: higher wages or benefits paid to staff, a different mix of staff (e.g. teachers versus aides), or lower child/adult ratios.[8] Based on exploratory analysis of data relevant to these factors, it appears that centers serving low-to-moderate income families keep their labor costs lower through lower ratios (more children per teaching

[8]The values of these three factors are not known for each center for the same time period for which cost data were collected (The cost data were collected for the preceding calendar year, to provide a full year's data, so we do not have data on these three factors for the same time period for which cost data were collected. However, we assumed relative stability of staffing patterns and wages over the two years in our exploration of this pattern.



staff), rather than through paying lower hourly wages, or using more assistant teachers (who are paid less) than lead teachers or teachers. See Appendix A for details on these analyses.

Comparison of Revenues to Expenditures

On average, revenues exceed expenditures by 5 percent in centers serving infants, and by 4 percent in centers serving toddlers. (These figures do not change if the two centers with massive fundraising revenue are excluded, as they also had high expenditures.) These overall averages reflect higher profit margins in centers serving low-to-moderate income families, and lower profit margins or even losses in centers serving low-income families (see Table 2).

Table 2. Average ratio of revenues to expenditures, by income category served, and by sample (infants vs. toddlers samples)

Income of families served	Infants	Toddlers
Low	1.02	0.93
Low to moderate	1.06	1.10
High	1.05	1.03
All centers	1.05	1.04

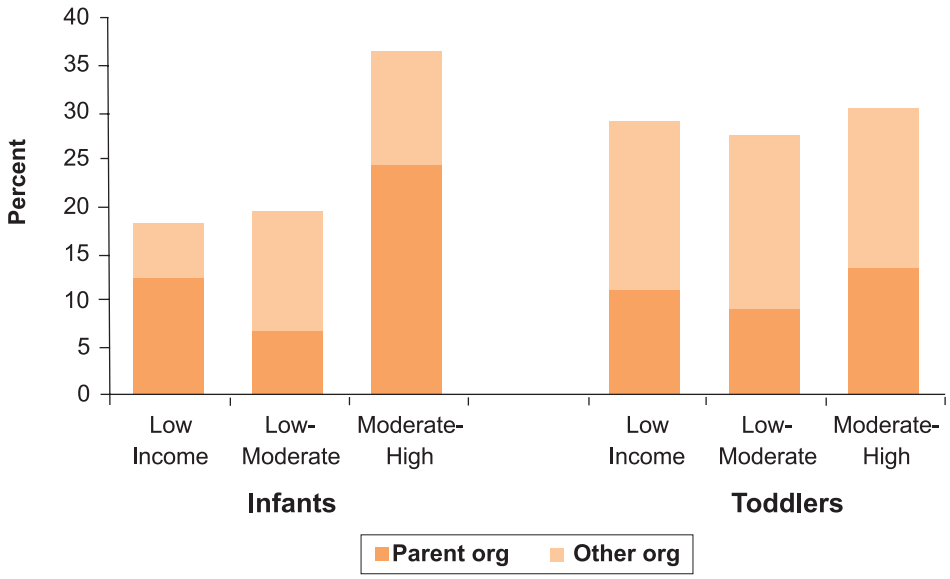
Full Costs

Annual expenditures do not correspond to the full cost of operating a center. Centers may receive goods and services from parent organizations[9], and may benefit from volunteer workers and in-kind donations. The major divergence between centers' expenditures and their true costs is their occupancy costs, which are often substantially subsidized by sponsoring groups and landlords.

Volunteer Labor. Volunteers were reportedly used by 65 percent of centers serving infants, and by 59 percent of centers serving infants. The total number of reported hours was, however, small—only 76 and 39 hours per month on average, in centers serving infants and toddlers, respectively. Center Directors were unable to estimate the value of this labor, but the small number of hours of volunteer labor, relative to paid labor, means that volunteer labor would add very little to our estimate of full costs.

Occupancy subsidies. We asked directors whether centers paid reduced rates or nothing for their classroom or administrative space. Of centers serving infants, 16% received such a subsidy from the parent organization, and an additional 11% from some other organization. The remaining 73% reportedly paid market price for occupancy. However, the receipt of such a subsidy varied markedly with the income of families served, favoring higher-income families (Figure 21). In particular, centers serving infants from moderate-high income families were most likely to receive support from a parent organization. Among centers serving low-income or low-moderate income families, centers in the infant sample are less likely to receive an occupancy subsidy from any source than are centers in the toddler sample (some of whom served infants as well). When we consider the relative contributions of parent organizations vs. other sources of subsidies, we note that, in most cases, other subsidy sources are more common than subsidies from parent organizations.

Figure 21: Occupancy Subsidies by Income of Families Served



[9]"Parent organization" refers to the organization that houses the particular child care program, and has fiscal management responsibilities. For example, a YMCA or JCC may house a child care program, along with their other programming.

Only among infant centers serving low-income or moderate-high income families are parent organizations more likely than other sources to subsidize occupancy.

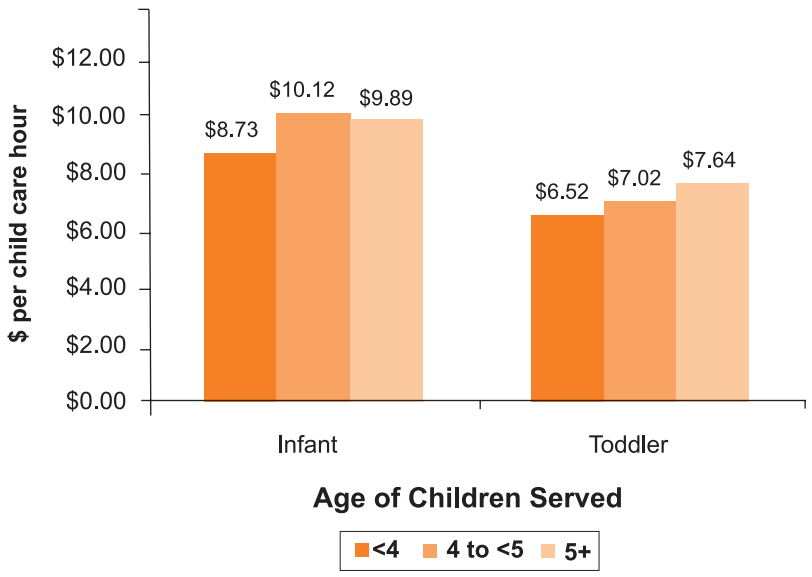
Other donations. Other differences between full costs and expenditures were small, totaling $0.19 to $0.20 per child hour. Nearly half ($0.08) was attributable to meals and snacks provided by parents. The remainder was in the "other" category. USDA commodity donations comprised less than half a cent.[10]

The Relationship between Cost and Quality

In this section, we examine the relationship between infant and toddler classroom quality and expenditures *at the classroom level*. In previous reports from the Massachusetts Cost and Quality Study, we examined the relation between quality and center-level costs. However, infant and toddler classrooms, with their small group sizes and ratios of fewer children per adult, incur a greater proportion of a center's costs, relative to the number of children served. In addition, *quality* was measured at the classroom level; we believe that a rigorous test of the relationship between cost and quality is best conducted using measures collected at the same level of analysis. Therefore, we collected the data that would allow us to estimate classroom-level expenditures. See Appendix A for a description of the way in which we estimated classroom-level costs, and for a report of our analyses using center-level cost data.

To understand the relationship between cost and quality, it is important to consider not only structural and process measures of quality, but also other factors that may be related to costs and/or quality, such as the local labor markets and local markets for commercial space, as well as variations in center characteristics, such as size, for-profit status or participation in a multi-service or sponsoring organization. Before we discuss these more complex, multivariate models, we first examine average costs among groups of centers varying in structural and process measures of quality.

Figure 22: Mean Classroom Costs, by Quality of Care



[10]Cash reimbursements for meals served are included in "revenue," under government sources.

Classroom-Level Costs

We first examined the bivariate relationship between classroom cost – measured as cost per child care hour – and quality – measured using the ITERS, where a 3 is the Minimal benchmark, a 5 is the Good benchmark, and a 4 means the classroom met the Good benchmark on some indicators, but not all. The difference in average cost between the middle and lowest level of quality for infant rooms is marginally significant (at the $p < .10$ level), as is the difference in average cost between the highest and lowest level of quality for toddler rooms (Figure 22). [11]

A Multivariate Framework

Expenses incurred for operating a center during a year, like the cost of operating any business, are assumed to be determined by output, input prices, quality, and type of establishment. *Output* is measured as the number of child hours of early care and education provided per year at the center. *Input prices* include market wages, rent per square foot, and the local unemployment rate. *Quality* is measured by the ITERS measure, described at the beginning of this report.

The bivariate results were supported by the multivariate analysis (see Table 3). Contrasting classrooms with ITERS scores of at least 4 (between the Minimal and Good benchmarks) with those with ITERS scores of less than 4, we find that the higher quality care is associated with costs that are 13 percent higher in infant rooms, and 14 percent higher in toddler rooms.[12]

Table 3. Increment in cost, relative to centers with ITERS < 4

	Infant classrooms	Toddler classrooms
ITERS 4 and above	0.13*	0.14*

* = $p < .05$

Summary

On average, the bulk of centers' revenues (67% for infant centers, 70% for toddler centers) are from parent fees, with government subsidies comprising nearly all of the rest (26% & 27%, respectively). The average expenditure for care is about $4.42 per child hour for centers serving infants, and $4.28 for centers serving toddlers, or $10,343 and $10,015 per year for full-time care for the two groups of centers. Center expenditures go largely to labor (72% for both groups of centers).

Both revenues and expenditures are lowest for centers serving low-moderate income families. Parent fees are the primary revenue source for centers serving moderate-high income families, while

[11]Some centers cross-subsidize the high cost of infant child care by charging higher fees for toddler, preschool or school-age care – that is, they keep fees lower for infants so that families can afford infant care by charging higher fees for older children than needed to cover expenditures for older children. However, this practice does not affect our analyses, because we are considering expenditures, not fees charged to consumers (price).

[12]We combined the top two groups (4 to less than 5, and 5+) because the costs associated with the highest quality classrooms were too variable.

government subsidies supplement parent fees in low-income centers. Centers serving low-moderate income families rely heavily on parent fees, which are lower in this income group than among moderate-high income families; at the same time, centers serving low-moderate income families receive little in the way of government subsidies.

The higher revenues in centers serving low-income and moderate-high income families is reflected in higher expenditures for labor in these centers than in centers serving low-moderate income families. Our exploratory analyses suggest that these centers keep their labor costs lower through maintaining lower ratios – more children per teaching staff – rather than through paying lower wages or using more assistant teachers than teachers or lead teachers.

Because infant care is more costly than toddler care – a function of the smaller ratios and group sizes – we estimated costs at the classroom level, rather than at the center level. Using the data from this sample of centers, we found significantly higher costs at the classroom level associated with "more than minimal" quality (a 4.0 or higher on the ITERS) compared to lower quality (below a 4.0), for both infant and toddler classrooms. These results were confirmed in the multivariate context, suggesting that the relationship between cost and quality was real and that it could not be explained away by confounding factors such as region of the state, operating characteristics, the income of families served, or labor market conditions. These data present compelling evidence that higher quality early care and education for infants and toddlers is associated with greater costs.

The multivariate models of total cost can be used to estimate how much it would cost to fund (through parent fees, government subsidies and other revenue sources) all infant/toddler center-based care above some quality threshold. The multivariate models *do not* tell us what it would cost to *improve* the quality of existing infant/toddler programs. Rather, the multivariate models tell us, once all programs reach a given level of quality, what it will cost to operate those programs – given the current costs of higher quality programs. We found that it would cost 13% more to operate an infant classroom that meets or exceeds a 4 on the ITERS (between the Minimal and Good benchmark) compared to the costs of operating a infant classroom that does not meet that standard. Similarly, it would cost 14% more to operate a toddler classroom that meets or exceeds a 4 on the ITERS, compared to a toddler classroom that does not meet that standard.[13]

These estimates of the additional costs needed to operate infant/toddler programs in Massachusetts if different quality standards were met might not be precise. It may be possible to target factors that support higher quality programs but that are unrelated to cost, or it might be possible to target costs strategically so as to incur lower costs. In addition, the multivariate analysis estimates were based on 94 infant classrooms and 94 toddler classrooms and have a margin of error associated with them. Equally important, while it is clear that higher quality care costs more, these models do not explain *how* to improve the quality of infant/toddler programs in Massachusetts, or how much such improvements would cost. However, the first section of this report, on quality, provided clear evidence that ratios, group size, education, experience are strongly associated with the provision of higher quality infant/toddler care.

[13]These increased costs only apply to the 35% of infant classrooms and 29% of toddler classrooms that do not yet meet this standard.

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Appendix A

Sample Description

The study involved two samples, one sample of infant classrooms, randomly drawn from all centers licensed to serve infants, and a second sample of toddler classrooms randomly drawn from all centers licensed to serve toddlers. The characteristics of these two samples are described in Table A1.

Table A1. Sample Description

	Sample	
	Infant Classrooms	**Toddler Classrooms**
N	102	104
Mean Observed Group Size	5.29	7.63
Mean Child: Staff Ratio	2.62	3.52
% Lead Teachers with Associates or higher education	60%	68%
% Teachers with Associates or higher education	38%	40%
% Teachers at this center for more than 5 years	26%	19%
% Teachers at this center for less than 1 year	25%	33%

Comparisons of Expenditures Across Centers Serving Different Income Categories

The composition of expenditures shows similar patterns for the two samples of centers (Figure 20 in the body of this report). For centers serving infants and for centers serving toddlers, labor comprises around 65 to 75 percent of total expenses across income categories of families served, tending to comprise a higher fraction of expenses for centers serving higher-income families. The actual dollar amount spent on labor per child care hour is, however, quite similar between the highest and lowest income groups (and substantially lower for the middle group). Occupancy comprises 5 to 10 percent of the total, and food 2 to 3 percent for all income groups. Other expenditures comprise 14 to 27 percent of total expenses, with the higher values in centers serving lower-income families.

The differences in patterns of expenditures at the center level are of special interest, particularly the differences in labor expenditures. These patterns could be due to three factors: higher wages or

benefits paid to staff, a different mix of staff (e.g. teachers versus aides), or lower child/adult ratios.[14] Based on exploratory analysis of data relevant to these factors, it appears that centers serving low-to-moderate income families keep their labor costs lower through lower ratios (more children per teaching staff), rather than through paying lower hourly wages, or using more assistant teachers (who are paid less) than lead teachers or teachers. We reached this conclusion based on the following analyses.

For each center, we calculated the following measures:

- As an indicator of the wage structure, the average hourly wage paid to teachers (including head teachers and assistant teachers).
- As an indicator of the mix of staff, the ratio of full time equivalent assistant teachers and aides to full time equivalent teachers (where "full-time" is defined for each center as the number of hours it is open).
- As an indicator of the child/adult ratio, current center full-time equivalent enrollment divided by current center full-time equivalent staff.

These measures of course do not tell the whole story. Centers that pay the same wages to teachers may pay different wages to other staff; the substitution of assistant teachers and aides for teachers is only one dimension of the staff mix; and the full time equivalent staff is a mixture of many job categories. Nonetheless, examination of these measures is quite suggestive, indicating that the primary driver of the lower labor expenditures in centers serving low-to-moderate income families is lower adult-to-child ratios. Focusing on centers that serve infants, and comparing centers serving low-to-moderate income families to those serving low-income families, we find that average teachers' wages are only 8 percent lower, and the ratio of aides to teachers is actually lower (which would tend to raise labor costs); but the overall adult-to-child ratio is 16 percent lower. Looking at centers that serve toddlers, teachers' wages are actually a little higher in centers that serve low-to-moderate income families than in centers that serve low-income families, and the mix is more heavily weighted to teachers relative to assistant teachers and aides; but the overall adult-to-child ratio is 22 percent lower.

The remaining differences in the profiles of expenditures are harder to understand. The difference in "other" costs between the centers serving low-income and higher income families ($1.39 versus $0.56 and $0.68 per child hour) is most striking, although the difference in food expenditures is also notable. The difference in "other" costs comes from three direct cost subcategories: administrative allocation, overhead, and indirect costs paid to sponsoring agencies; transportation of children to and from programs, including vehicle depreciation; and "miscellaneous." While toddler centers serving low-income families are disproportionately likely to be part of a larger organization, the difference is certainly not enough to explain the greater payments to sponsors. For infant centers, those serving low-income families are not much more likely to part of a larger organization, as can been seen in Table A2.

[14]The values of these three factors are not known for each center for the same time period for which cost data were collected (The cost data were collected for the preceding calendar year, to provide a full year's data, so we do not have data on these three factors for the same time period for which cost data were collected. However, we assumed relative stability of staffing patterns and wages over the two years in our exploration of this pattern.

Table A2. Organization Characteristics by Income Category Served for Infant & Toddler Samples

		Income of families served		
Organization Characteristic	**Sample**	**Low**	**Low to moderate**	**Moderate to high**
Payments to sponsoring agency per child care hour	Infants	$0.32	$0.06	$0.07
	Toddlers	$0.41	$0.08	$0.13
Center is part of larger organization	Infants	60%	64%	55%
	Toddlers	72%	53%	49%

The greater average expenditures for food among centers serving low-income families is not due to their lower participation in various food programs. Centers serving low-income families are much more likely to participate in CACFP, and some of them (and almost none of the other centers) also participate in the School Breakfast and National School Lunch Programs. It might be that centers serving low-income families are more likely to provide food rather than have families send in lunches with children. Yet among centers serving infants, the percentage with no food expenditures is about the same (4 to 6 percent) across the three income groups; and among centers serving toddlers, the centers serving low-income families are actually much more likely to have zero food expenditures (15 percent versus 10 and 6 percent).

Center-Level Costs and Infant/Toddler Classroom Quality

It might be thought that a relationship between cost and quality is practically tautological if for no other reason than that both are strongly driven by adult/child ratios. This is not the case, however, at least at the center level. Overall center expenditures per child care hour are indeed strongly correlated with the overall adult/child ratio and also with the overall teacher/child ratio (i.e. excluding directors, administrative staff, etc.). Yet neither of these center-level ratios is strongly correlated with quality in the observed rooms.[15] The correlations of the two ratio measures with infant room quality are each only 0.18 (not significant), and their correlations with toddler room quality are actually slightly negative (–0.09) and zero, respectively.

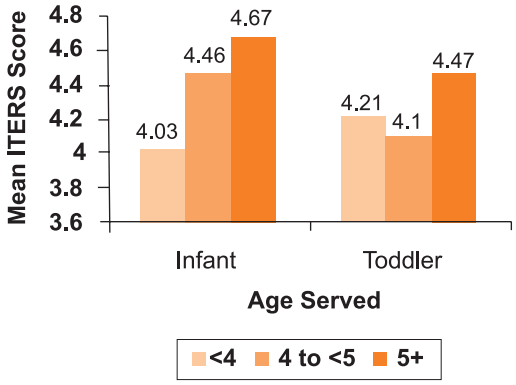
Still, mean center expenditures do appear to vary systematically with ITERS scores (Figure A1). Centers with infant rooms meeting at least a "good" standard have expenditures of $4.67 per child hour, compared with only $4.03 for centers less than halfway between "minimal" and "good." Similarly, centers with toddler rooms meeting at least a "good" standard have expenditures of $4.47 per child hour, compared with $4.21 for centers less than halfway between "minimal" and "good." [16]

[15]Recall from an earlier section that observed quality is related to the staff/child ratio in the classroom. The relationship discussed here is with the overall center-level ratio.

[16]These ITERS categories were chosen because of the distribution of ITERS scores in the sample. Sample sizes are 32 (ITERS lower than 4), 34 (ITERS between 4 and 4.9), and 29 (ITERS of 5 or greater) for centers serving toddlers. The corresponding sample sizes for centers serving infants are 38, 34, and 25, respectively.

These costs, however, have a very wide dispersion. Cost per child care hour for centers serving infants with ITERS scores of less than 4, for example, ranges from $2.08 to $8.12; the range for those with ITERS scores of at least 5 is $3.09 to $7.90. Consequently, the difference between the highest and lowest groups is only marginally statistically significant for infants ($p < 0.10$, two-tailed test), while the other differences are not.

Figure A1: Cost of Center Care, by Age of Children Served & Quality



It is also possible that the observed relationships between cost and quality could be either due to or masked by other covarying factors, such as the local labor markets and markets for commercial space, as well as variations in center characteristics, such as size, for-profit status, or participation in a multi-service or sponsoring organization. Therefore, we estimated multivariate models that relate center cost to classroom quality.

In addition to indicators for the levels of quality, our models include several measures of center characteristics: the size of the center (in child care hours per year), and indicators for:

- total enrollment over 40
- center is for profit
- part of a multi-service organization
- participation in CACFP
- accreditation by NAEYC.

The models for toddler rooms also include an indicator for center serves infants (which may raise overall costs).

We took labor and occupancy costs into account in several ways. The simplest way was to include indicators for region—which can be expected to capture differences in markets (cost of labor, cost of space). We also attempted to include explicit measures of these costs, with limited success. For labor costs, we used the average weekly wage of child care workers in 2002, in the county in which the center was located, from the State's DES-202 form. We were unable to find a usable occupancy cost measure for the sample, and so ultimately simply included an indicator that the center's rent was subsidized.

Versions of the multivariate models that treated factor prices in these alternative ways all reached the same conclusions about the relationship between cost and quality—and in fact, the same qualitative conclusions that were seen in the bivariate relationships. Cost of care is marginally significantly higher ($p < 0.10$) in centers whose infant rooms provide at least "good" quality care compared to those whose infant rooms provide care that is less than halfway between "adequate" and "good" (e.g. ITERS below 4) – see Table A3. The estimated cost difference is 13 percent. Other differences were not statistically significant.

Table A3. Increment in cost, relative to centers with ITERS < 4		
	Centers serving infants	**Centers serving toddlers**
ITERS 4 to 5	0.05	0.06
ITERS 5 and above	0.13 +	0.06

+ = p < .10

We also estimated the models with two different two-way breaks in quality, contrasting centers whose infant and toddler rooms achieved ITERS of over 4 or over 5 with those that did not. Despite this, the cost-quality relationship, using center-level costs, was not found to be significant for either centers serving infants or for centers serving toddlers using either two-way break.

Estimating classroom costs

Annual expenditure data were collected in centers about 20 categories. For each category, we decided on the appropriate allocation basis. There are four potential bases. These are:

- Child care hours, our basic measure of center size (and the proposed default basis for cost allocation). This measure is calculated based on number of children enrolled in each class full-time and part-time, along with the number of hours for full-time and part-time enrollees.
- Classroom payroll, i.e. weekly payroll for teachers working in that classroom. This is necessarily estimated at a point in time, from the staff roster. For each staff member we know whether they were teaching in the observed classroom, their salary or wage, and hours per week worked.
- Classroom square footage, measured directly by our interviewers.
- Fiat—e.g. some costs by their nature belong entirely to one classroom or another.

The general principle is that child care hours, classroom payroll, and classroom square footage are known for each classroom and for all classrooms combined, and the ratios are applied to various cost items.

Classroom payroll was used to allocate the following expenses:

- Salaries and wages for all staff (including director, cook, etc.)
- Fringe benefits and payroll taxes
- Training and professional development (thought of as a fringe benefit)
- Staff mileage and travel (ditto)

Classroom square footage was used to allocate the following expenses:

- Rent/mortgage/fee for space + real estate taxes
- Utilities (e.g. electricity, gas)
- Repairs, maintenance, related supplies

Child care hours were used to allocate the following expenses:

- Cost of food
- Educational materials, program supplies, equipment, field trips
- Office supplies and equipment, postage

- Telephone, duplicating, advertising, recruiting (can't be separated)
- Liability insurance
- Subcontractors (e.g. accountants, janitorial services)
- Supplemental services for children (e.g. health screenings, speech therapy)
- Administrative allocation paid to parent organization
- "Miscellaneous"

Transportation costs were assigned by fiat. Transportation of children to and from the program was not charged to infant or toddler classrooms, since we assumed that this item most often pertained to bringing children from (and in the case of kindergartners to) their regular school. But of the 47 centers that report costs in this category, 2 serve only infants and toddlers. For these programs, we allocated these transportation costs to the toddler classrooms.

These allocation bases seemed reasonable, based on the nature of the expenditures. We expected that, other than with regard to labor, any arbitrariness in the allocation formulas would have little effect on the conclusions. Furthermore, the various bases tended to move together. For example, among centers serving toddlers, the percent of total center staff salaries, child care hours, and classroom square footage allocated to the observed toddler rooms were correlated with each other, with rho's ranging from 0.62 to 0.77. The correlations among centers serving infants were lower, but still strong: 0.50 to 0.76. That is, centers in which the observed classroom accounted for a relatively high percentage of salaries were also centers in which the observed classroom accounted for a relatively high percentage of child care hours and classroom square footage.

Finally, we had hypothesized that classroom level costs would be closely related to center-level costs, although recognized that there were factors that mitigated this possibility. In this study, we found that classroom and center costs were strongly correlated – 0.45 for infant rooms, and 0.51 for toddler rooms.