



Unlevel Playing Field: Socioeconomic Determinants of Early Childhood Development in Türkiye

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Abstract

We investigate the socioeconomic determinants of early childhood development (ECD) in Türkiye, focusing on maternal education and household wealth, using representative microdata from the 2018 Türkiye Demographic and Health Survey (TDHS), which collected data on the developmental status of young children aged 36–59 months for the first time. Using this data, we construct an ECD index based on four developmental domains (i.e., literacy-numeracy, physical development, learning readiness and socio-emotional). Our results suggest that 74 percent of children (70.3 percent of boys and 78 percent of girls) are developmentally on track. We find that while over 96 percent of children are developmentally on track in physical and learning readiness domains, only 14.5 percent and 73.6 percent are in the literacy-numeracy and socio-emotional development domains, respectively. The multivariate regression results suggest both maternal education and household wealth improve children's ECD outcomes but the latter has a stronger effect. In fact, we find that mother's schooling is only positively and statistically associated with ECD once mothers have at least a high school education. Kindergarten attendance, which stands at a meagre 11.3 percent, is only likely for children from well-to-do and educated households. As a result, we find large gaps in ECD and its components between children with low and high socioeconomic backgrounds. We conclude that leveling the playing field is only possible via a nationwide multisectoral initiative that can support and educate caregivers and children simultaneously.

Keywords Early Childhood Development · Socioeconomic status · Maternal education · Türkiye

JEL Classification Codes C5 · I00 · O15

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1 Introduction

The topic of early childhood development (ECD) and investment in ECD has attracted much attention in recent years, especially in the context of developing economies. ECD has been identified as one of the 2030 Sustainable Development Goals (SDG) of the United Nations. Research in neuroscience, psychology and economics has shown that children's well-being and future are positively affected by living in an environment where they receive ample stimulation through proper education and care in the early childhood period. Specifically, the child development literature suggests that children who receive quality early childhood education and care have relatively higher levels of school readiness (Hustedt et al., 2008; Magnuson et al., 2004), perform better in school (Barnett, 1995; Campbell et al., 2001), have higher rates of high school graduation (McCoy et al., 2017), higher participation rates in higher education (Anderson, 2008; Garcés et al., 2002), lower crime rates (García et al., 2019), and higher earnings in adulthood (Chetty et al., 2011).

Until recently, the proxy for human capital in the economics literature has been the average years of formal schooling (primary-secondary-tertiary, depending on the definition of human capital) of the working-age population (Barro, 1991; Mankiw et al., 1992; Wößmann, 2002). However, recent studies have shown that human capital accumulation, in fact, starts in early childhood, before formal schooling, and the fastest development of human capital is in this early period. The return on investments in the individual's cognitive, social, emotional and physical development in early childhood is higher than that made in other periods (primary, secondary, tertiary, or on-the-job training) (Heckman, 2008). Heckman et al. (2010) estimate that the social internal rate of return on an early intervention program targeting 3-year-old children from disadvantaged backgrounds amounts to 7 to 10 percent annually. García et al. (2017) quantify the lifetime benefits of two high-quality early childhood programs and find that these programs present up to 14 percent annual internal rates of return and a benefit–cost ratio of 7.3. In this sense, the importance a country attaches to ECD, the investments made by families in this period for their children, how much the government supports these investments, and the alternative policies that the government develops for early childhood development are likely to play an important role in determining the long-term economic growth of that country.

Türkiye's young population and demographic characteristics offer important advantages and opportunities for long-term economic growth prospects. According to the "Our World in Data (2024)" database, the number of young children under five in Türkiye steadily increased between 1950 and 1980, and then it has somewhat stagnated since the 1980s. However, children in this age group still comprise a substantial share of the total population at 7.5 percent as of 2021. While the share of children under the age of five in Türkiye in total population is higher than the average of the group of upper-middle-income countries (6.2 percent), which Türkiye belongs to, this rate is similar to that in some other large-population upper-middle-income countries such as Mexico (7.8 percent) and Argentina (7.4 percent). The relatively high share of young children in total population in Türkiye implies that the demographic window of opportunity will remain open in the foreseeable future. However, the ability to benefit from this opportunity necessitates the development of appropriate

medium and long-term policies. Looking at an easily accessible indicator such as the preprimary school enrollment rate suggests that Türkiye risks missing the possible benefits from this demographic dividend: According to World Bank World Development Indicators (2024), as of 2020, the (gross) preprimary enrollment rate in Türkiye is about 40 percent, while it is 78 percent on average for the upper-middle-income countries, 71 percent in Mexico, and 76 percent in Argentina.

With this background, this paper investigates the socioeconomic determinants of early childhood development in Türkiye using representative microdata from the 2018 Türkiye Demographic and Health Survey (TDHS), which, for the first time, included detailed information about the developmental status of young children of 36-to-59 months old. The theoretical background of the analyses is based on Cunha and Heckman (2007), which conclude that children from households with higher socioeconomic status are able to receive better early childhood investments. We focus on household income and mother's schooling as the previous literature suggests that both variables are important in determining a child's health and education outcomes (for instance, Augustine et al., 2009; Blau, 1999; Buis, 2013; Chen & Li, 2009).

In the empirical analysis, we consider the overall ECD index as well as its four components. Our results suggest that 74 percent of children (70.3 percent of boys and 78 percent of girls) in Türkiye are developmentally on track. While over 96 percent of children are reportedly developmentally on track in physical and learning readiness domains, they lag in the literacy-numeracy and socio-emotional development domains. The linear probability model (LPM) results suggest that if the mother has at least a high school degree, the child is more likely to be developmentally on track.

In addition, we find that household wealth is positively associated with the child's developmental status, and the results imply that the income elasticity of ECD is higher for girls than for boys. When we examine the four development domains separately, we find that the relationship between maternal education, household wealth and ECD is stronger in socio-emotional and learning readiness domains. We implement additional models where the dependent variable is the child's kindergarten attendance and alternatively, the number of development activities with the mother. The results show that both kindergarten attendance and the number of development activities mothers carry out with their children increase with maternal education and household wealth.

The paper is organized as follows. Section 2 introduces the relevant literature. Section 3 is a brief account of ECD in Türkiye. Section 4 presents the data and empirical methodology, while Section 5 presents the descriptive statistics. Section 6 includes the results from the empirical model. Finally, Section 7 presents the concluding remarks and discusses possible policy interventions.

2 Relevant Literature

One of the main implications of the literature on ECD is that children from different socioeconomic backgrounds receive unequal or insufficient levels of social, linguistic and cognitive stimulation necessary for optimal development and, therefore, have unequal skills when they start formal education. In this respect, DeGarmo et al. (1999) find that major socioeconomic status indicators such as income, education

level and occupation of the parents are linked to positive parenting activities such as parents' involvement and investment in the child's skill development activities at home, which positively affects the child's success later at school. Since children from families with lower socioeconomic status develop fewer skills in the first years of their lives, they are less ready compared to children from families with higher socioeconomic status when they start school (Burger, 2010). Therefore, children from disadvantaged socioeconomic backgrounds are more likely to repeat a grade, need special education, or drop out as they accumulate fewer skills to succeed in school.

A substantial body of literature suggests that maternal education has a positive impact on a child's language development (Dollaghan et al., 1999; Magnuson et al., 2009), cognitive development (Carneiro et al., 2013; Gennetian et al., 2008), health indicators (Streatfield et al., 1990; Thomas et al., 1991; Victoria et al., 1992) and behavior (Hughes & Ensor, 2009; Nagin & Tremblay, 2001). It has been shown that education provides mothers with a range of human, social and cultural capital, which influences how they manage and motivate their children's education (Davis-Kean, 2005; Useem, 1992) and enables them to manage their children's school readiness by choosing high-quality early childcare in terms of type, quality and quantity (Augustine et al., 2009). While most of the studies investigating the impact of maternal education on child outcomes originate from advanced economies (for example, Björklund et al., 2006; Carneiro et al., 2013; Currie & Moretti, 2003; Plug, 2004; Sacerdote, 2007; Streatfield et al., 1990), there are nevertheless a limited number of studies on low- and middle-income countries that show the causal effect of maternal education on child outcomes. These studies mainly concentrate on children's health outcomes (e.g., Chen & Li, 2009 for China and Afzal, 2013 for Pakistan). Cuartas (2022) is one of the rare studies on low-income countries that uses data from the 2016 Uganda DHS to show that an additional year of maternal schooling positively affects maternal engagement in stimulating activities, children's attendance to early childhood education programs and, thus, child's development.

Household wealth is considered to be another crucial determinant of a child's well-being. Fernald et al. (2011) show that children from households in the top wealth quintile or those with mothers who have at least secondary education perform better across most of the cognitive measures and language development, and have better linear growth compared to children from households in the lowest wealth quintile or those with uneducated mothers. Guhn et al. (2010) analyze the correlation between a parent's socioeconomic status and ECD indicators using data from teacher assessments of children in British Columbia, Canada, where kindergarten is compulsory for all children as a part of the school system. Their findings show a positive relationship and indicate that girls outperform boys across all socioeconomic levels, with a greater gap among children from low-income families. Paxson and Schady (2007) find that while both household wealth and parental education are associated with children's cognitive development, the effect of the wealth gradient is larger. A recent study using data from 135 Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) between 2010 and 2018 in 94 low- and middle-income countries investigates the inequalities in early childhood care and development (Lu et al., 2020). Findings from this study show that in most countries, children living in urban areas or in the wealthiest households do significantly better on the

four developmental indicators compared to children from rural areas or in the poorest households. Mothers in the highest wealth quintile are also more likely to use prenatal, postnatal and child health care services than those in the lowest quintile (Amin et al., 2010). Lee (2011) examines the impact of permanent poverty on children using data from the Longitudinal Study of Australian Children and observes that children in permanent poverty, defined as the lower 20 percent of income distribution, experience negative impacts on their social-emotional development and learning outcomes compared to those who have never experienced poverty. Using the Bayley Scales of Infant and Toddler Development on a sample of low- and middle-income children aged 6–42 months in Bogota, Colombia, Rubio-Cordina et al. (2015) find that there are significant developmental gaps in cognition, receptive, and expressive language, respectively, between children in the top and bottom quartile of the wealth distribution, and these gaps increase with age. A study in Hong Kong finds that children from low-income families have fewer educational resources at home compared to those from wealthy families (Rao et al., 2013). This results in lower school success due to decreased school readiness. However, pre-school education can help reduce this achievement gap.

In order to circumvent the negative effects of socioeconomic inequalities among parents on young children's well-being, early education and care programs aim to ensure that all children, regardless of their socioeconomic background, gain the prerequisites for a successful start to school (Siraj-Blatchford, 2004). In this sense, early childhood education and care programs are valuable in that they allow all children to start life on equal footing. The availability of publicly subsidized programs benefits children, particularly those from socioeconomically disadvantaged areas, in terms of their academic achievement, and the cost–benefit analyses indicate that scarce public resources may be used more efficiently by implementing these programs (Fitzpatrick, 2008). Likewise, a consensus has emerged in the relevant literature that investments in ECD have a high return and should, therefore, be prioritized. Studies have suggested that the return on investments in ECD programs is much more advantageous than the return on investments made in later periods (Heckman, 2000, 2008). On the other hand, it has been stated that delaying these investments will lead to irreversible consequences and inequalities not only for individuals but also for their families and even for the society in the long term (Denboba et al., 2014).

According to Currie (2001), when parents cannot provide the necessary resources or opportunities for their children to gain the basic preconditions to benefit from school in full efficiency, government's intervention in early childhood development and education can be advocated on equality basis. Individuals who start life with preconditions that are disadvantaged in terms of talent, environment, or opportunities are likely to face unequal results, and a government that prioritizes equality in society is expected to either compensate for unequal results, equalize preconditions, or do both. However, equalizing initial preconditions through early childhood programs can be a preferable approach to tackle the problem of equality, as it can be a far less costly way to compensate for the unequal results encountered in adulthood. In addition, the government is expected to prioritize early childhood education and care programs by nature, as it is better prepared and equipped than the private sector

to deal with market failures, such as liquidity constraints, information asymmetries and externalities.

3 Early Childhood Development in Türkiye

In Türkiye, in top policy documents, especially in the 2019–2023 Eleventh Development Plan, the importance of ECD has been recognized. Compared to previous Development Plans, there is a stronger emphasis on ECD policies including (but not limited to) the policy objective of “*The provision, accessibility and quality of services for early childhood care, education and development will be increased*” under the *Policies and Measures for Children* title. Furthermore, under the policy objectives of *Qualified People, Strong Society* title, the Plan makes the following commitment: “*Effective policies will be implemented starting from early childhood in order for our country, which has a high rate of child and young population, to make the best use of this population potential and turn it into an advantage*”. Although Türkiye has significantly progressed in sustaining early childhood health (i.e., with a considerable reduction in stunting, malnutrition and infant mortality rates) in the last two decades (Assaad et al., 2012; Demirel et al., 2013), much needs to be improved in the early childhood education and care areas.

Pre-school attendance for children aged 0–68 months is optional, and while it is announced to be officially free-of-charge in public institutions starting in the 2023–24 school year, certain fees may be charged by individual institutions under the name of donations for the child’s nutrition, hygiene, educational materials and common stationary purchases (Before the 2023–24 school year, parents had to pay a registration fee). According to the Ministry of National Education (MoNE) regulation regarding pre-school and primary education institutions, 57-to-68-month-old children may be registered in kindergartens and reception classes by the end of each September. However, children aged 36 (45)–56 months may also enroll in kindergartens (reception classes) with adequate physical conditions. Additionally, private kindergartens and daycare centers affiliated with the Ministry of Family and Social Services admit children of 0–66 months.

In the 2015–19 Strategic Plan of the MoNE, the strategy of “*Introducing new regulations to reduce the cost to families in pre-school education*” was specified in line with the strategy target of “*Increasing participation and completion rates in all types and levels of education and training, especially for disadvantaged groups, until the end of the Plan period*”. Even so, families still bear significant costs in their children’s pre-school education, which cause families with limited means to avoid optional pre-school education. In fact, this has been specified among the risks against the wide adoption of pre-school education in the subsequent 2019–23 Strategic Plan of the MoNE. According to the World Bank’s World Development Indicators, preprimary school enrollment in Türkiye was 39.7 percent in 2020, well below the OECD average of 80.8 percent and the world average of 60.9 percent. Türkiye has also performed much below the countries in the same upper-middle income group, which, on average, had a 78 percent preprimary school enrollment rate in 2020. In fact, OECD data shows that as of 2019, public spending on early childhood

education and care programs as a percentage of GDP was 0.3 percent in Türkiye and 0.8 percent on average in OECD countries, respectively (OECD Family Database, 2023). These comparisons indicate that Türkiye falls much behind in public delivery of or support for ECD programs, particularly for children from disadvantaged backgrounds.

According to the Turkish MoNE National Education Statistics, as of the 2021–2022 school year, there are 1.9 million children enrolled in nursery schools, kindergartens and reception classes, both public and private. Although most of these children are enrolled in public institutions, there is an increasing trend in enrollment in private institutions, from 15.8 percent in 2020–2021 to 19 percent in 2021–2022. As of the start of the 2023–24 school year, the monthly fee of a moderately priced private nursery school or daycare is about 4,000 TL (35 percent of the minimum wage), and it is about 8,500 TL (75 percent of the minimum wage) for kindergartens, not including transportation or meals.¹ As such, the high price of privately provided early childhood education programs makes these programs increasingly cater to children from relatively well-to-do families of higher socioeconomic status.

4 Data and Empirical Methodology

The data for this study come from the 2018 round of the Turkish Demographic and Health Survey (TDHS) of Hacettepe University Institute of Population Studies, which is conducted regularly every five years. The TDHS is nationally representative and collects rich information on women aged 15–49 and their children to primarily assess their health and well-being. For the first time in 2018, the TDHS included a set of questions to assess the early childhood development of 36-to-59-month-old children. We utilize these questions to understand the factors determining ECD, focusing on the effects of maternal schooling and household wealth as primary indicators of the family's socioeconomic status. Our operational sample consists of 1,071 children who can be linked to their mothers and for whom complete data exist on ECD variables.²

Whether a child is developmentally on track or not is determined by the answers that mothers provide to a set of 10 questions related to their children's literacy and numeracy skills (3 questions), physical development (2 questions), learning readiness (2 questions) and socio-emotional development (3 questions). The 10-item questionnaire is adopted from the Early Childhood Development module of UNICEF's Multiple Cluster Surveys (MICS). When the Millennium Development Goals in 2000 brought full attention to the importance of ECD, a need had arisen for a globally comparable population-based standardized measure of ECD. With UNICEF's initiative, the ECD Index based on MICS was constructed in 2006 with partnerships

¹ Compiled from www.akademikpersonel.org website.

² In the dataset, there are 1,138 children aged 36- to 59 months old who could be linked to their mothers. For 67 children, information is missing on some components of the ECD index, and therefore we dropped them from analyses.

from different countries. Within the MICS program, the ECD Index provides a global measure of developmental status in early childhood for use at the population level (UNICEF, 2023).³

Although the ECD Index based on MICS is a valuable source of information for researchers and policymakers, it has some limitations. The information collected is based on caregiver reports and does not rely on a direct assessment. Therefore it is, to some extent, subjective.⁴ Data collection via caregivers may include recall errors or misreport. Moreover, assessing child development via only 10 questions is potentially limiting. The concern that the 10-item questionnaire measured a narrower scope of ECD than what was required in SDG indicators led to the development of a new index named ECDI2030. The new index aims to assess children's developmental status more thoroughly with a 20-item questionnaire. Nevertheless, the ECDI2030 also depends on caregiver reports and is subject to the same biases as the 10-item index (UNICEF, 2023).

Within the ECD module of MICS, the child is considered developmentally 'on track' if he/she is on track in at least three of the four development domains (Loizillon et al., 2017). In the literacy-numeracy domain, being developmentally on track would require that the child can at least accomplish two of the following: (1) identify/name at least ten letters of the alphabet, (2) read at least four simple popular words, or (3) name/recognize the symbol of all numbers from 1 to 10. The child's physical development is assessed based on (1) whether he/she can pick up small objects with two fingers and (2) whether he/she is sometimes too sick to play. A child is deemed to be on track if a positive response is given to the first question or a negative response to the second one. In the learning readiness domain, a positive outcome to at least one of the following situations is expected: (1) the child can follow simple directions and (2) when given a task, the child can do it independently. Finally, in the socio-emotional domain, the child is assessed to be on track if at least two positive outcomes are reported on (1) whether the child gets along well with other children, (2) whether the child kicks/bites/hits other children or adults, and (3) whether the child gets distracted easily (Loizillon et al., 2017, p.20).

We construct five dummy variables to reflect the four development domains and the overall ECD index that takes the value of 1 if the child is on track in the respective domain, and zero otherwise. These five dummy variables constitute our main dependent variables. As additional outcome variables, we consider kindergarten participation of children, which is also a dummy variable (1 for participation and 0

³ Before the development of ECD Index based on MICS, there were various attempts to quantify ECD for various purposes that included the Early Development Instrument (EDI) by McMaster University, the Regional Project on Child Development Indicators (PRIDI) by the Inter-American Development Bank and the Global Scales for Early Development (GSED) by WHO. These attempts fell short of providing a global and standardized measure as most were designed to assess individual-level programs rather than continuous, population-based global monitoring (UNICEF, 2023).

⁴ Individual-level measurements, such as the Bayley Scales of Infant and Toddler Development, offer a more detailed assessment of a child's development. However, they are time-intensive, require specialized equipment and specially trained personnel, and are costly. Such individual-level measurement tools are often used in clinical or educational settings and are non-practical for large-scale population-level surveys with larger samples.

for non-participation), and the number of development activities mothers engage in with their children. The latter variable is based on six possible activities that mothers can carry out with their children: reading books, telling them stories, singing songs with them, taking them outside, playing with them and naming, counting, or drawing with them. We sum these activities to create a dependent variable that takes a value between 0 and 6, which implicitly assumes that they are equally important in supporting children's development.

Informed by the relevant literature, we primarily focus on maternal education and household wealth as socioeconomic determinants of ECD. Maternal care is particularly important in countries like Türkiye, where cultural norms assign the duty of childcare to mothers. In the 2018 TDHS, when asked about who takes care of children, 47.8 percent of the mothers of three and four-year-olds declare themselves as the person 'always' taking care of children. Another 25.3 percent say they are the ones who 'usually' care for children, so nearly three-quarters of children are looked after primarily by their mothers. The other key variable is household wealth, constructed based on household assets and housing amenities as given in the 2018 TDHS. Other covariates we consider are the child's age in months and sex, the mother's age, household size, the birth order of the child and number of his/her siblings, the region (NUTS1 level) and type of residence (rural vs. urban).

We estimate the following regression using a linear probability model⁵:

$$ECD_i = \delta + \beta_1 S_i + W_i \beta_2 + X_i \beta_3 + u_i \quad (1)$$

where ECD is the early childhood development status of child i , S is his/her mother's years of schooling, W is the wealth index in the form of five quantiles specified as dummies, X is a vector of independent variables that include the variables listed above, and u is the random error term, which is clustered at the mother level to account for the fact that there might be siblings in the data. The coefficients of interest are β_1 , which shows the improvement in the ECD index when the mother's years of schooling increase by one year, and β_2 , which shows how household wealth impacts the ECD. Using a continuous measure of maternal schooling assumes a constant marginal effect on an extra year of schooling regardless of the schooling stage at which it occurs, which may not necessarily be true. In an alternative specification, we replace the mother's years of schooling with dummy variables showing the different stages of education she has completed. We use the same model to analyze the kindergarten attendance of children and the number of activities mothers do with children. We use sampling weights throughout the analysis.

⁵ We prefer a linear probability model over a non-linear model such as probit for ease of interpretation and because we lose observations when the outcome is predicted perfectly. Nonetheless, we also estimate (1) using a probit model, and the results are very similar.

5 Descriptive Statistics

Table 1 shows the descriptive statistics for the key variables of interest for children aged 36- to 59-months. Girls constitute 47.5 percent of the sample. The average child is 47.8 months old. In total, 74 percent of children are found to be on track in terms of the overall ECD index. Girls fare slightly better than boys; 78 percent of girls are estimated to be developmentally on track compared to 70.3 percent of boys. The overall achievement in Türkiye is similar to the average reported by Allel et al. (2021), using Multiple Indicator Cluster Surveys of 68 low- and middle-income countries, at 72.6 percent.

When the four components of ECD are investigated separately, children are generally found to be on track in physical development (98.6 percent) and learning readiness (96.3 percent) domains. However, in the socio-emotional domain, 73.6 percent of children and in the literacy-numeracy domain, only 14.5 percent of children are assessed to be on track. When girls and boys are compared, the only statistically significant difference is observed in the socio-emotional domain, where 78.2 percent of girls are assessed to be on track compared to 69.4 percent of boys. As noted earlier, this domain is assessed by three questions. Boys' behavior differs from girls' in only one sub-dimension: whether the child kicks/bites/hits other children or adults. While 40.4 percent of boys are reported to display 'physical aggression' towards other children or adults, the corresponding figure among girls is 23.8 percent. The gender difference is likely to result from greater social tolerance when boys misbehave as compared to girls; therefore, more boys are reported to be displaying such behavior compared to girls.

Only 11.3 percent of children attend kindergarten.⁶ The limited availability of affordable early childhood education programs for children of this age group is likely an impediment to their kindergarten participation. Another impediment is the socially held belief that maternal early care is superior to organized care, as families are not sufficiently informed about or aware of the benefits of early childhood education. Indeed, kindergartens are often looked upon as daycare centers; therefore, not much is expected from them regarding early childhood education delivery. It is telling that only 26.9 percent of children who attend kindergarten are on track in the literacy-numeracy domain, though this figure is still higher than that for children who do not attend kindergarten (13 percent).

Children's number of development activities with their mothers averages around 3.4 out of a maximum of 6.⁷ Mothers' most common activity with their children is taking them outside (77.1 percent). This is followed by playing with children (62.7 percent), singing with them (58.9 percent), drawing (57.3 percent), reading (42.5 percent) and telling stories to them (40.9 percent). We do not observe a gap between

⁶The relevant question in the TDHS distinguishes between crèches/nurseries/daycare centers and kindergartens, but this information is not available in the public use file. We use the term kindergarten loosely to refer to a collection of preschool institutions. The (gross) preprimary enrollment rate reported earlier for Türkiye is higher possibly because it includes older children. Children typically start the first grade of primary school the year they turn 6, the mandatory school start age, although late start is also not uncommon.

⁷The reference period is the last three days preceding the interview date.

Table 1 Descriptive statistics

	Whole Sample	Male Children	Female Children
ECD Index (1/0)	0.740	0.703	0.780
Literacy/Numeracy (1/0)	0.145	0.148	0.143
Physical Development (1/0)	0.986	0.989	0.982
Learning Readiness (1/0)	0.963	0.961	0.966
Socio-Emotional Development (1/0)	0.736	0.694	0.782
Kindergarten Attendance (1/0)	0.113	0.112	0.114
N. of Development Activities with Mother	3.393 (1.905)	3.405 (1.886)	3.380 (1.929)
Read Books (1/0)	0.425	0.400	0.452
Tell Stories (1/0)	0.409	0.407	0.410
Sing Songs (1/0)	0.589	0.577	0.603
Take Outside (1/0)	0.771	0.781	0.759
Play (1/0)	0.627	0.641	0.612
Name/count/draw (1/0)	0.573	0.599	0.544
Female	0.478		
Age in months	47.804 (6.693)	47.745 (6.800)	47.869 (6.579)
Mother's Years of Education	7.517 (4.444)	7.571 (4.541)	7.457 (4.338)
Educational Attainment of Mother			
No Education	0.155	0.162	0.149
Primary School	0.303	0.289	0.318
Secondary School	0.232	0.230	0.234
High School or higher	0.310	0.319	0.299
Mother's Age	31.59 (5.734)	31.49 (5.606)	31.70 (5.874)
Household Wealth Quantile			
Bottom 20%	0.233	0.226	0.240
2nd 20%	0.218	0.212	0.226
3rd 20%	0.203	0.198	0.209
4th 20%	0.180	0.198	0.159
Top 20%	0.166	0.166	0.166
Birth Order	2.320 (1.432)	2.244 (1.313)	2.403 (1.549)
Number of Siblings	1.639 (1.385)	1.557 (1.274)	1.729 (1.494)
Household Size	5.238 (1.980)	5.279 (2.005)	5.194 (1.954)
Rural Residence	0.254	0.225	0.286
Number of Observations	1,071	552	519

Includes 36-to-59-month children. Standard deviation for continuous variables are given in parentheses

Sampling weights are used

Source: 2018 TDHS. Authors' calculations

male and female children regarding kindergarten attendance or their activities with their mothers.

Mothers of children are, on average, 31.6 years of age and have 7.5 years of schooling. Overall, 15.5 percent have no education, 30.3 percent have primary schooling, 23.2 percent have lower secondary schooling, and 31 percent have high school edu-

cation or more. In terms of wealth quantiles, because we are looking at households with young children, households are not evenly distributed among the five quantiles. A large proportion of households with young children fall in lower wealth quantiles, suggesting that they are relatively less well-off than households without children or those with older children. The average household size is 5.2, and children have 1.6 siblings on average.⁸

6 Results

6.1 The Effect of the Mother's Education on the ECD Index and its Components

The results for the overall ECD index in Table 2 demonstrate that the mother's schooling has a small positive effect: One more year of schooling increases the probability that the child is developmentally on track by 0.9 percentage points. Noting that 74 percent of children are on track, our results suggest that an additional year of mother's schooling leads to only about a 1 percent increase in the probability that children are developmentally on track when we control for household wealth and other household-level and individual characteristics.

The results of Model 2, where we use dummy variables for the different schooling levels of mothers, suggest that only high school education and above matters for early childhood development. Children whose mothers have completed high school or a higher level of schooling have a 10.9 percentage point higher likelihood of being developmentally on track compared to children whose mothers have less than primary schooling. Interestingly, the coefficients of dummy variables for the mother's primary and secondary education levels are not statistically significant at conventional levels, though, they are positive. Note also that the coefficient associated with the mother's secondary education level is sizeable but it lacks statistical significance.

Miller et al. (2016) and Islam and Khan (2023) investigate the determinants of ECD in 15 low-and middle-income countries and in Bangladesh, respectively. Among the factors they consider is maternal education. They find that children whose mothers have secondary education and above are considerably more likely to be on track developmentally. The effect size we find for maternal education, wherever it is significant, falls within the estimates reported by Miller et al. and Islam and Khan.⁹

To see whether maternal schooling has a differential effect on boys' and girls' development, we estimate Eq. (1) separately for boys and girls. The likelihood that boys are developmentally on track—as measured by the overall ECD index – increases with the mother's schooling level; the likelihood of being on track improves by 12.9

⁸Additional statistics on continuous variables (maximum, minimum, 25th percentile, 75th percentile) are presented in Table A1 in supplementary online material.

⁹Both studies employ logistic regressions and report odds ratios. To render our results comparable, we also run a logistic regression and redefine maternal education so that the top category includes mothers with secondary schooling and above. The odds ratio we find for maternal secondary schooling and above vs. less than primary schooling (1.65) falls within the estimates reported by Miller et al. (2016), from a low of 1.14 in Iraq to a high of 3.64 in Nepal. Islam and Khan (2023) find an odds ratio of 1.52 for Bangladesh (our results are available upon request).

Table 2 Determinants of the ECD index

	Whole Sample		Male Children		Female Children	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Female Child	0.077** (0.031)	0.076** (0.031)				
Mother's years of schooling	0.009** (0.005)		0.011 (0.007)		0.009 (0.006)	
Mother's schooling attainment (ref. Less than primary)						
Primary School		0.039 (0.055)		0.129* (0.078)		-0.030 (0.069)
Secondary School		0.086 (0.059)		0.169** (0.086)		0.047 (0.079)
High School or higher		0.109* (0.064)		0.164* (0.092)		0.083 (0.080)
Mother's Age	0.000 (0.003)	0.001 (0.003)	-0.004 (0.005)	-0.003 (0.005)	0.002 (0.004)	0.004 (0.005)
Household wealth quantile (Ref. Bottom 20%)						
2nd 20%	0.080* (0.048)	0.077 (0.049)	0.062 (0.070)	0.055 (0.071)	0.104 (0.067)	0.103 (0.067)
3rd 20%	0.175*** (0.052)	0.170*** (0.054)	0.124 (0.077)	0.110 (0.079)	0.254*** (0.071)	0.253*** (0.073)
4th 20%	0.172*** (0.061)	0.171*** (0.062)	0.102 (0.091)	0.095 (0.092)	0.248*** (0.076)	0.246*** (0.078)
Top 20%	0.221*** (0.071)	0.227*** (0.072)	0.237** (0.110)	0.258** (0.110)	0.222** (0.096)	0.214** (0.098)
Birth Order	-0.027 (0.027)	-0.029 (0.027)	-0.047 (0.041)	-0.052 (0.042)	0.004 (0.037)	0.003 (0.037)
Number of Siblings	0.056* (0.029)	0.056* (0.029)	0.095** (0.044)	0.101** (0.045)	0.020 (0.039)	0.018 (0.039)
Household Size	-0.019* (0.011)	-0.019* (0.011)	-0.006 (0.014)	-0.007 (0.014)	-0.035** (0.017)	-0.035** (0.017)
Rural Residence	0.067* (0.039)	0.067* (0.039)	0.003 (0.061)	-0.003 (0.062)	0.131** (0.051)	0.133*** (0.051)
Constant	0.411*** (0.154)	0.400** (0.161)	0.463** (0.222)	0.385* (0.234)	0.485** (0.213)	0.505** (0.219)
Month of Age Dummies	YES	YES	YES	YES	YES	YES
Region of Residence Dummies	YES	YES	YES	YES	YES	YES
Mean of Dependent Variable	0.740	0.740	0.703	0.703	0.780	0.780
Observations	1,071	1,071	552	552	519	519
R-squared	0.103	0.103	0.114	0.118	0.168	0.171

Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used

Source: 2018 TDHS. Authors' calculations

percentage points when the mother has primary schooling and by 16.4–16.9 percentage points when she has at least secondary schooling as compared to having less than primary education. The estimated effect sizes for girls are much smaller than for boys and lack statistical significance.

Table 3 presents the effect of the mother's schooling on individual components of the ECD index. In the literacy-numeracy domain (Panel A), children with mothers with at least high school education have a 9.1 percentage point higher likelihood to be developmentally on track than children whose mothers have less than primary education. This effect size is substantial, given that only 14.5 percent of children are on track in this domain. Note that this result is driven mainly by the effect of the moth-

Table 3 Effect of mother's schooling on ECD components

	All	Male Children	Female Children
Panel A: Literacy-Numeracy			
Mother's schooling attainment (ref. Less than primary)			
Primary School	0.029 (0.032)	0.064 (0.045)	-0.035 (0.054)
Secondary school	0.027 (0.040)	0.081 (0.060)	-0.028 (0.064)
High school or higher	0.091* (0.049)	0.143** (0.064)	0.025 (0.079)
Mean of dependent variable	0.145	0.148	0.143
Panel B: Physical Development			
Mother's schooling attainment (ref. Less than primary)			
Primary School	0.045* (0.023)	0.036 (0.029)	0.047 (0.032)
Secondary school	0.033 (0.022)	0.039 (0.032)	0.026 (0.034)
High school or higher	0.056** (0.022)	0.044 (0.030)	0.066** (0.030)
Mean of dependent variable	0.986	0.989	0.982
Panel C: Learning Readiness			
Mother's schooling attainment (ref. Less than primary)			
Primary School	0.030 (0.030)	0.071* (0.040)	-0.014 (0.039)
Secondary school	0.029 (0.030)	0.094** (0.046)	-0.014 (0.038)
High school or higher	0.035 (0.029)	0.078* (0.042)	-0.001 (0.032)
Mean of dependent variable	0.963	0.961	0.966
Panel D: Socio-Emotional Development			
Mother's schooling attainment (ref. Less than primary)			
Primary School	0.010 (0.055)	0.032 (0.078)	0.029 (0.075)
Secondary school	0.033 (0.061)	0.040 (0.090)	0.072 (0.084)
High school or higher	0.049 (0.066)	0.031 (0.096)	0.118 (0.086)
Mean of dependent variable	0.736	0.694	0.782

Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used. Each panel comes from a separate regression. Other covariates included are as in Table 2. Full estimation results are available in online appendix Tables A2-A5

Source: 2018 TDHS. Authors' calculations

ers' schooling on boys' outcomes. Although the effects for lower levels of schooling (i.e., primary and secondary schooling) are also sizeable, they are not statistically significant. Interestingly, a similar effect is not observed for girls.

Children's physical development tends to improve with maternal schooling. Children with mothers with at least primary education have a 4.5 percentage point higher likelihood of being on track than children with mothers with less than primary education (Panel B of Table 3). Although the effect size is slightly larger when the mother has at least a high school education (5.6 percentage points) than when she has just primary schooling, the difference is not statistically significant.¹⁰ When we separately analyze boys' and girls' physical development, the effect sizes are similar across the two groups. However, smaller sample sizes mean the associated marginal effects are less precisely estimated. Nonetheless, children are generally on track in the physical development domain (98.6 percent overall), so the estimated effect sizes in relative terms are rather small.

In the learning readiness domain, the mother's schooling improves boys' development, but not that of girls. The effect sizes for the different levels of mother's schooling (without statistically different impacts) are 7.1–9.4 percentage points for boys and close to zero for girls (Panel C of Table 3). Given that 96 percent of boys are developmentally on track in this domain, the improvement is at a maximum of 10 percent.

Finally, in the socio-emotional development domain, a statistically significant effect of the mother's schooling is not observed for either group, although the coefficient estimates are all positive. Notwithstanding the lack of statistical significance, even the largest effect—observed for girls whose mothers have at least high school education – would correspond to an improvement of about 11.8 percent.

6.2 Household Wealth and Early Childhood Development

Household wealth is positively associated with the ECD index and its components. Children from households in the top 20 percent of the wealth distribution have a 22.7 percentage point higher likelihood of being developmentally on track than children from households in the bottom 20 percent (Table 2, Model 2). Children in the third and fourth wealth quintiles also fare better, having about a 17 percentage point higher likelihood of being on track than children from households in the poorest quintile.

The wealth effect we find is somewhat larger than what is reported in the literature. For instance, using DHS and MICS data from 60 low- and middle-income countries, Lu et al. (2020) report a 10.6 (12.5) percentage point (crude) gap in ECD index between children from richest and the poorest quintiles in upper-(lower) middle-income countries. Miller et al. (2016) and Islam and Khan (2023), mentioned earlier,

¹⁰ We perform a Wald test to see whether the coefficients associated with primary and secondary schooling are different from each other. The resulting *p*-value is 0.225, which implies that we cannot reject the null hypothesis at the 10 percent level that the two coefficients do not statistically differ from each other.

also find smaller gaps.¹¹ These findings suggest particularly sharp divides among children by household wealth in Türkiye.

Investigating the wealth effect further, we find it to be particularly important for girls' development, as evidenced by the substantially larger effect sizes for girls than boys, except in the richest quintile where the effect sizes are similar. While the wealth gradient is positive in all wealth quintiles for boys, statistical significance exists only in the top 20 percent. In contrast, girls in the top 60 percent of the wealth distribution have a 21-to-25 percentage point development advantage over girls in lower wealth quintiles. These findings suggest a higher income elasticity for girls' early childhood development than that of boys. This finding is in line with evidence from developing countries that education demand for girls is more income elastic than that for boys (Glick & Sahn, 2000; Lincove, 2009; Song et al., 2006) so that any additional income to the family budget – except in the poorest and in the richest households – is likely to produce more favorable effects for girls.

Looking at the components of the ECD index, we find that household wealth matters primarily in improving children's outcomes in learning readiness and in the socio-emotional domains (Table 4 Panels A through D). In the literacy-numeracy domain, the effect of wealth is sizeable (9.8 percentage points) in the richest quintile, but it is marginally statistically insignificant at conventional levels (Panel A). In the physical development domain, an increase in wealth seems to be more important in lower quintiles, suggesting that an improvement in household budget impacts children's physical health favorably (Panel B). Higher household wealth also has a favorable impact on children's learning readiness. Compared to the children in the bottom quintile, children in the upper quintiles are 5-to-9 percentage points more likely to be on track in this domain (Panel C). The estimated effects are relatively small, given that 96.3 percent of children are on track. In contrast, much larger wealth effects are observed in the socio-emotional domain. Children in the top 60 percent of the wealth distribution have a 17-to-21 percentage point higher likelihood to be on track than children in the bottom quintile (Panel D). These effects are substantial both absolutely and relatively, considering that, on average, 73.6 percent of children are on track in this domain.

Boys in the richest quintile enjoy better early childhood development than boys in lower wealth quintiles. This effect mainly comes from the socio-emotional development domain; boys from the richest wealth quintile are more likely to be developmentally on track socio-emotionally than boys in the poorest quintile by 20.7 percentage points. In the learning-readiness domain, being in the top 40 percent matters, but the effect sizes are smaller at 7-to-10 percentage points. Similarly, the wealth effect on girls' development occurs mainly through the socio-emotional and learning-readiness domains. In the case of the former, girls have a 19-to-24 percentage point

¹¹Among the 15 countries studied in Miller et al. (2016), the odds ratio is highest in Nepal at 1.5 for children in the richest quintile vs. the poorest quintile. Islam and Khan (2023) report an odds ratio of 1.63 for Bangladesh. Running a logistic regression, we find an odds ratio of 3.97. Part of the reason why we find larger wealth effects has to do with the control variables. Among other variables, both Miller et al. and Islam and Khan consider stunting as a determinant of ECD index. Since stunting is likely to be related to household resources, some of the wealth effect is likely to be captured by this variable reducing the effect of household wealth.

Table 4 Effect of wealth on ECD components

	All	Male Children	Female Children
Panel A: Literacy-Numeracy			
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	-0.002 (0.030)	-0.034 (0.046)	0.035 (0.040)
3rd 20%	0.008 (0.041)	0.009 (0.064)	0.008 (0.054)
4th 20%	-0.028 (0.049)	-0.062 (0.066)	0.014 (0.071)
Top 20%	0.098 (0.061)	0.072 (0.083)	0.102 (0.087)
Mean of dependent variable	0.145	0.148	0.143
Panel B: Physical Development			
Household wealth quantile (Ref. Bottom 20%)			
2nd 20% percent	0.024* (0.013)	0.015 (0.012)	0.026 (0.023)
3rd 20% percent	0.022 (0.019)	-0.015 (0.023)	0.054* (0.030)
4th 20% percent	0.023 (0.015)	0.004 (0.012)	0.042 (0.030)
Top 20% percent	0.004 (0.028)	0.001 (0.025)	0.005 (0.051)
Mean of dependent variable	0.986	0.989	0.982
Panel C: Learning Readiness			
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	0.064*** (0.023)	0.052* (0.031)	0.072** (0.034)
3rd 20%	0.048 (0.030)	0.038 (0.042)	0.052 (0.041)
4th 20%	0.082*** (0.025)	0.074** (0.035)	0.092*** (0.035)
Top 20%	0.085*** (0.027)	0.097*** (0.036)	0.082** (0.041)
Mean of dependent variable	0.963	0.961	0.966
Panel D: Socio-Emotional Development			
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	0.060 (0.049)	0.035 (0.072)	0.089 (0.069)
3rd 20%	0.178*** (0.054)	0.120 (0.084)	0.241*** (0.073)
4th 20%	0.171*** (0.064)	0.102 (0.098)	0.225*** (0.079)
Top 20%	0.209*** (0.074)	0.207* (0.115)	0.194** (0.098)
Mean of dependent variable	0.736	0.694	0.782

Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used. Each panel comes from a separate regression. Other covariates included are as in Table 2. Full estimation results are available in online appendix Tables A2-A5

Source: 2018 TDHS. Authors' calculations

higher likelihood of being on track when they come from households in the top 60 percent of the wealth distribution. In the case of learning readiness, not being in the bottom 20 percent increases the likelihood of being developmentally on track by 7-to-9 percentage points.

6.3 Other Determinants of Early Childhood Development

Aside from the mother's education and household wealth, the number of siblings positively affects the overall ECD index. This effect primarily comes from boys as the number of siblings does not affect the ECD index for girls (Table 2). Among the ECD components, the only development domain that sibship size affects is socio-emotional development; the probability that boys are developmentally on track increases by 7.4 percentage points with each sibling. Although the evidence is scant and is sometimes contradictory on how siblings affect the socio-emotional development of young children, in a longitudinal study, Downey and Condrón (2004) find that having a sibling improves children's social skills. Although they do not investigate whether this effect differs by gender, they argue that children with at least one sibling are better able to control negative emotions, which we have noted to be more frequently reported among boys in Türkiye than girls. Birth order and household size are not generally found to affect the development outcomes of boys and girls. We do not find any evidence that the mother's age impacts the ECD index or its components.

Controlling for regions and other covariates, we find that rural residence generally has a favorable impact on the development of children.¹² Note that the average achievement of rural children is lower than that of urban children but this achievement gap disappears once we control for the socio-economic background of children. The positive effect of rural residence is particularly strong for rural female children in the socio-emotional development domain, which may result from a stronger desire on the part of the mothers to convey 'appropriate behavior' to their daughters in rural areas that generally boast more conservative social norms.

6.4 Simulation Exercises

In this section, we simulate ECD outcomes for children using Model 2 estimates to show the disparities among children with different socioeconomic status. Consider first an average child, depicted in Table 1, with the exception that he/she is in the bottom 20 percent of the wealth distribution and his/her mother has less than a primary school education. The probability that this child is developmentally on track is 55.4 percent. In contrast, a child from the top 20 percent of the wealth distribution with a mother with at least a high school education has an 89.1 percent probability of being developmentally on track. The gap is large because the two indicators of socioeconomic status are correlated. Notwithstanding this correlation, holding mother's education at less than primary school level but increasing household wealth from bottom 20 percent to top 20 percent increases the probability that the child is on track from

¹² Full estimation results where the dependent variables are the ECD components are available in online Appendix in Tables A2-A5.

55.4 percent to 78.1 percent. In contrast, keeping the child in the bottom 20 percent of wealth distribution but increasing his/her mother's education from less than primary school to at least high school increases the probability of being on track to 66.4 percent, suggesting that household wealth is more effective than mother's schooling in improving the ECD index.

Going back to the two cases with low and high socioeconomic status and examining the domains of the ECD, an improvement is observed in all domains with higher wealth and maternal education but generally with stronger effects stemming from the former. In the literacy-numeracy domain, the first child (i.e., whose mother has less than primary school education and is in the bottom 20 percent of the wealth distribution) has a 9 percent probability of being on track, while the second child (i.e., whose mother has at least high school education and is in the top 20 percent of the wealth distribution) has a probability of 27.9 percent. Mother's schooling and wealth are equally effective in improving the literacy-numeracy outcome of children as starting from a low base of 9 percent, increasing one socioeconomic condition without changing the other roughly doubles the probability of being on track. In the physical development domain, the first child has a 93.3 percent, and the second has a 99.3 percent probability of being on track. In this domain, it is primarily wealth that improves children's outcomes. In the learning readiness domain, while the first child has an 88.4 percent probability of being on track, for the second child, the probability increases to 100 percent. In this case, household wealth plays a larger role; an improvement in maternal education as described above increases the probability that the child is on track from 88.4 percent to 91.9 percent, while increasing wealth alone increases the probability to 96.9 percent. Finally, in the socio-emotional domain, the relevant probabilities are 59.6 percent and 85.4 percent for a child with low and high socioeconomic status, respectively. Again, household wealth plays a larger role than maternal schooling by increasing the probability of being on track from 59.6 percent to 80.4 percent as compared to 64.5 percent with an improvement in maternal schooling alone.

6.5 The Effect of the Mother's Education and Wealth on Kindergarten Attendance and Development Activities with the Mother

Higher socioeconomic status as measured by maternal education and household wealth may improve child development via higher amount of resources available for children or better parenting skills (i.e., a better use of available resources). As possible reflections of both, we consider children's kindergarten attendance and the development activities mothers engage with their children.¹³ Table 5 (Panels A and B) presents the effects of mother's schooling and household wealth on these two outcomes.¹⁴ Kindergarten attendance of a child increases when the mother has at least

¹³The ECD index mainly relies on quantitative rather than qualitative methods in measuring the education and care received by children. For instance, it focuses on the number of activities provided, but not on their effectiveness or duration. The positive effects of time spent with parents on child development are shown in the literature (Thomsen, 2015; Youderian, 2019). Naturally, the approach that only measures the number of activities is limited in measuring parental involvement in child's development.

¹⁴Full estimation results where the dependent variables are kindergarten attendance and number of development activities with mother are available in online appendix in Tables A6 and A7, respectively.

Table 5 Effect of mother's schooling and wealth on kindergarten attendance and development activities with mother

	All	Male Children	Female Children
Panel A: Kindergarten attendance			
Mother's schooling attainment (ref. Less than primary)			
Primary School	-0.017 (0.022)	-0.018 (0.029)	-0.019 (0.035)
Secondary school	0.035 (0.028)	-0.009 (0.040)	0.066 (0.040)
High school or higher	0.098*** (0.032)	0.068* (0.041)	0.126** (0.053)
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	-0.013 (0.022)	0.016 (0.027)	-0.079** (0.040)
3rd 20%	-0.035 (0.031)	-0.036 (0.035)	-0.033 (0.052)
4th 20%	-0.008 (0.037)	0.006 (0.043)	-0.033 (0.059)
Top 20%	0.185*** (0.053)	0.232*** (0.067)	0.123 (0.079)
Mean of Dependent Variable	0.113	0.112	0.114
Panel B: Number of development activities with mother			
Mother's schooling attainment (ref. Less than primary)			
Primary School	-0.131 (0.206)	-0.240 (0.289)	-0.156 (0.263)
Secondary school	0.427* (0.229)	0.321 (0.325)	0.378 (0.287)
High school or higher	0.852*** (0.241)	0.592* (0.328)	1.068*** (0.322)
Household wealth quantile (Ref. Bottom 20%)			
2nd 20%	0.437** (0.172)	0.433* (0.255)	0.348 (0.214)
3rd 20%	0.644*** (0.193)	0.292 (0.281)	1.070*** (0.251)
4th 20%	1.098*** (0.207)	1.162*** (0.297)	0.980*** (0.297)
Top 20%	1.287*** (0.237)	1.268*** (0.325)	1.312*** (0.325)
Mean of Dependent Variable	3.393	3.405	3.381

Includes 36- to 59-month children. Standard errors are given in parentheses. Sampling weights are used. Each panel comes from a separate regression. Other covariates included are as in Table 2. Full estimation results are available in online appendix Tables A5-A6

Source: 2018 TDHS. Authors' calculations

high school education (Panel A). This increase is by 9.8 percentage points for all children, by 6.8 percentage points for boys and by 12.6 percentage points for girls. These are substantial effects given that, on average, only 11.3 percent of children attend kindergarten. Although the effects are close to zero and not statistically significant, it

is interesting to note that for boys a lower maternal schooling than high school level carries the wrong sign. This is true for girls with primary school-educated mothers as well.

Higher wealth also increases children's kindergarten attendance. Children from the top 20 percent of the wealth distribution are more likely to attend kindergarten by 18.5 percentage points compared to children from the bottom quantile (Panel A). Looking at boys and girls separately, we observe that being in the top 20 percent increases the likelihood of boys' (girls') kindergarten attendance by 23.2 (12.3) percentage points. It is interesting to note that the wealth effect is only statistically significant at the top wealth quantile and with a larger effect on boys (note that the effect of wealth at this quantile is marginally insignificant for girls).

Children who have mothers with high levels of education and who simultaneously belong to wealthier families are more likely to attend kindergarten. To explain the disparity in kindergarten attendance among children, we consider the following family structures. In one case, the child has a secondary school-educated mother and comes from the fourth 20 percent of the wealth distribution. The probability that this child attends kindergarten is 8.7 percent. Were this child to come from the top 20 percent of the wealth distribution, his/her probability of kindergarten participation would jump to 28 percent. Furthermore, if his/her mother were to have at least high school education, his/her probability of kindergarten attendance would increase to 34.3 percent. In contrast, a child in the bottom 20 percent of the wealth distribution with a primary school-educated mother would only have a 4.3 percent probability of kindergarten attendance. As noted earlier, the monetary cost and the widespread belief that kindergartens are no match to a mother's care generate the observed differences.

The number of development activities children perform with their mothers is more responsive to maternal education and wealth than kindergarten attendance as we observe positive responses at lower levels of both variables as well. Panel B of Table 5 shows that the number of development activities children perform with their mothers increases by 0.4 and 0.9 when their mother has secondary and at least high school education, respectively. Girls whose mothers have at least a high school education engage in 1.1 more activities with their mothers than girls whose mothers have less than a primary school education. The corresponding effect for boys is 0.6 activities.

Turning to wealth, children in the second 20 percent of the wealth distribution experience 0.4 activities more with their mothers than those in the bottom 20 percent. This effect increases monotonically with wealth, reaching 1.3 activities for those in the top 20 percent of the wealth distribution. Boys from the top 40 percent of wealth distribution engage in more developmental activities than those in the lower 60 percent. The pattern observed for girls is similar to the general patterns noted above. When mothers' development activities with their children are examined in detail, statistically significant effects are observed for maternal education for reading, storytelling, playing and naming/counting/drawing but not singing or going out with the child. Consistent with our analysis in Table 5, maternal education exerts a statistically significant positive effect when the child's mother has at least secondary school education. Turning to the wealth effect, we find that increases in household wealth increase the likelihood that mothers read to their children, tell them stories, sing with

them and engage in activities that involve naming/counting/drawing but not playing or going out (results not shown). The wealth effect promotes children's well-being by potentially increasing the time mothers spend with them by substituting market goods for home production and allowing for the purchase of materials – books, drawing pens, and the like – that can support children's educational development. It is telling that 43.5 percent of children have no children's books in their homes. The number of books owned by children increases with household wealth and maternal education. While 78.9 percent of children at the bottom of the wealth distribution have no children's books, at the top, this ratio reduces to 1.9 percent. Similarly, while 84.5 percent of children whose mothers have less than primary schooling have no books, this figure reduces to 11.4 percent for mothers with at least a high school education. In contrast to books, nearly all children own at least one toy according to the 2018 TDHS.

6.6 Determinants of ECD among 48–59-Month-Old Children

This section replicates our analysis for children aged 48 to 59 months. This is motivated by the fact that certain aspects of the 10-item ECD index, such as literacy-numeracy, may pose greater challenges for 3-year-olds than skills in other areas. This is particularly true when children are not expected to possess specific skills just yet because they are considered 'too young' to develop skills in that particular domain (Cappa et al., 2021). Our previous analyses attempted to control for age differences among children through month-of-age fixed effects. Here, we take a more direct approach by only considering 4 and 5-year-olds. It should also be mentioned that the new ECDI2030, among other changes and improvements discussed earlier, incorporates different milestones by age (UNICEF, 2023).

Among the 48–59-month-old children, we observe that 76.5 percent are developmentally on track, which is higher than the mean obtained from the main sample (74 percent). Similar to our earlier findings, girls fare better: 82.1 percent of girls are developmentally on track compared to 71.2 percent of boys.¹⁵

Table 6 presents the results for the key variables of interest for children aged 48–59 months based on Model 2. The full results are given in Appendix Table A8. For ease of comparison, we also reproduce in Table 6 our main results given earlier in Table 2. Compared to the total sample of children, maternal education plays a larger role in determining the ECD index among older children. However, consistent with our earlier findings, this effect mainly stems from the effect maternal education has on boys. For instance, the effect size associated with having a primary school-educated mother is 25.9 percentage points, which is nearly twice the size of the effect estimated for the total of all boys. Equally large effects are observed for other maternal schooling levels as well. As will be discussed shortly, these effects mainly come from the literacy-numeracy and socio-emotional domains, also noted for the whole sample.

When we turn to the wealth index, we find similar results for this sub-sample as the total sample. Higher household wealth increases the likelihood that children are

¹⁵The results obtained from the subsample are presented in Tables A8–A10 in supplementary online material.

Table 6 Effect of mother's schooling and wealth on the ECD index (Subsample: Child's Age 48–59 months)

Variables	Whole Sample		Male Children		Female Children	
	All (ages 36–59)	Sub-sample	All (ages 36–59)	Sub-sample	All (ages 36–59)	Sub-sample
Mother's schooling attainment (ref. Less than primary)						
Primary School	0.039 (0.055)	0.146** (0.070)	0.129* (0.078)	0.259** (0.114)	-0.030 (0.069)	0.026 (0.081)
Secondary School	0.086 (0.059)	0.189** (0.074)	0.169** (0.086)	0.247** (0.115)	0.047 (0.079)	0.113 (0.096)
High School or higher	0.109* (0.064)	0.273*** (0.078)	0.164* (0.092)	0.398*** (0.131)	0.083 (0.080)	0.110 (0.092)
Household wealth quantile (Ref. Bottom 20%)						
2nd 20%	0.077 (0.049)	0.045 (0.061)	0.055 (0.071)	0.052 (0.096)	0.103 (0.067)	0.111 (0.082)
3rd 20%	0.170*** (0.054)	0.186*** (0.066)	0.110 (0.079)	0.175* (0.100)	0.253*** (0.073)	0.323*** (0.088)
4th 20%	0.171*** (0.062)	0.157** (0.079)	0.095 (0.092)	0.068 (0.125)	0.246*** (0.078)	0.341*** (0.100)
5th 20%	0.227*** (0.072)	0.189** (0.086)	0.258** (0.110)	0.256** (0.129)	0.214** (0.098)	0.231* (0.118)
Mean of Dependent Variable	0.740	0.765	0.703	0.712	0.780	0.821

Sub-sample includes 48- to 59-month children. Standard errors are given in parentheses. Sampling weights are used. Each panel comes from a separate regression. Other covariates included are as in Table 2. Full estimation results obtained from sub-sample are available in online appendix Table A8

Source: 2018 TDHS. Authors' calculations

developmentally on track, with stronger wealth effects for girls than for boys. Furthermore, the effect sizes between the two age groups are quite similar. For instance, we find that the probability that boys are on track increases by 25.6 percentage points when they come from the richest quintile for older children compared to 25.8 percentage points for the total sample of boys. The corresponding figures for girls are 23.1 and 21.4 percentage points, respectively.

Regarding the subcomponents of ECD, apart from the literacy-numeracy domain, the share of older children who are developmentally on track is similar to the share estimated for the total children population. For the literacy and numeracy domain, we find that 19.1 percent of children aged 48–59 months are on track compared to 14.5 percent in the total sample of 36–59-month-old children. Again, a larger share of boys (20.6 percent) than girls (17.5 percent) are developmentally on track in this domain. When we examine how the roles of maternal education and household wealth change in determining the different components of ECD between older children and the total sample, we observe a differential impact in the literacy-numeracy domain and the learning readiness domain for the effect of maternal education (see Appendix Tables A9 and A10). In the case of the wealth effect, significant differences are observed for the socio-emotional and learning-readiness domains. Therefore, our discussion in this section is limited to these domains.

In literacy-numeracy, we find that maternal education plays a stronger role among boys and older children. The effect of maternal education on girls' development in this ECD domain is statistically significant neither in the whole sample nor among older girls. However, among older boys, the effect size of maternal education increases (see Appendix Table A9). While in the whole sample of boys, maternal education is statistically significant only when the mother has at least high school education, mothers with primary and secondary school education also have a favorable impact on older children's literacy-numeracy skills. The likelihood that boys are on track in the literacy-numeracy domain increases by 17.1 percentage points when boys have mothers either with primary or secondary education and by 27.9 percentage points when she has high school education.

In the learning readiness domain, we again observe that maternal education has a stronger effect on boys than girls. Similar to the results obtained for the total sample, maternal education does not significantly affect girls' probability of being developmentally on track in the learning readiness domain. In contrast, boys' likelihood of being developmentally on track increases between 16.4 to 18.7 percentage points when maternal education is above less than primary. This effect is estimated to be between 7.1 and 9.4 percentage points in the total sample of boys.

Regarding the wealth effect, we observe a weaker effect on the sub-sample of older children than the full sample in the learning-readiness domain. As a result, the wealth effect loses its statistical significance. In contrast, in the socio-emotional domain, the wealth effect is slightly larger in the subsample than in the full sample, which mainly stems from the larger wealth effects on girls.

7 Discussion and Conclusion

In this paper, we investigate the relationship between maternal education, household wealth and the development of young children in Türkiye using representative microdata from the 2018 Türkiye Demographic and Health Survey (TDHS). The data include information about the developmental status of young children of 36-to-59 months old. A child's developmental status is related to whether the child is on track concerning (i) literacy and numeracy skills, (ii) physical development, (iii) learning readiness, and (iv) socio-emotional development. An ECD index for each child is constructed using these four developmental domains. We find that children are developmentally on track regarding physical development and learning readiness but lag in literacy-numeracy and socio-emotional development. The high physical development level achieved by children is most likely the result of the availability of universal health care. The high achievement level in learning readiness, which requires children to be alert and able to follow instructions, can also, in part, be attributed to ready access to healthcare services by their caretakers. In contrast, less than 15 percent of children are on track in the literacy-numeracy domain. Low participation in an organized early childhood education and care program is a likely explanation for children's lower achievement in the literacy-numeracy and socio-emotional domains. Only about 11 percent of children in the sample attend kindergarten or nursery school and, therefore, go through a structured early education program. Low participation rates may stem from these programs not being compulsory and fully publicly subsidized, the lack of parental awareness about the benefits, and the direct costs to parents in enrolling children in such programs. In the absence of a system that entitles children to an organized program, family resources – income and maternal education – become important factors in children's development.

Our results reveal that maternal education and household wealth are important in determining ECD in Türkiye, with the latter playing a bigger role. We find that children whose mothers have at least high school education are substantially more likely to be developmentally on track than children with less educated mothers. Since we are controlling for household wealth, this may imply better parenting skills among more educated mothers. Interestingly, however, the improvement observed in the ECD index due to maternal education primarily comes from the improvement in boys' literacy-numeracy skills and learning readiness without an effect on girls. Our findings reveal that the differential impact of maternal education on boys' and girls' development is not a result of the differential effect of maternal education on their kindergarten attendance or the number of educational activities their mothers carry out with them at home. A plausible conjecture that requires further investigation is that educated mothers spend more quality time with their sons. Since girls are naturally inclined to spend more time with their mothers particularly in societies where gender roles are learned early in life, maternal education does not have any impact on girls' ECD outcomes but it has an important effect on those of boys.

Higher household wealth improves children's ECD outcomes through improved learning readiness and socio-emotional development. We also find girls' ECD index to be more responsive to household income than boys', which aligns with the literature in developing countries that the demand for girls' schooling is more income elas-

tic. Children's kindergarten attendance is also substantially more likely in wealthier households. Despite this finding, we do not find wealth to increase children's literacy-numeracy skills, which is likely to stem from the greater emphasis kindergartens place on care than on education.¹⁶ Clearly, more can be done with available resources to increase children's literacy-numeracy outcomes. Children from wealthier households also spend more time with their mothers on educational activities and are likely to possess more materials that stimulate learning, such as children's books, contributing to better ECD outcomes.

Our results suggest that children from resource-poor families lag considerably behind. This is true also for many other middle-income countries, as well as low-income countries, for which data exist. For instance, Miller et al. (2016) report for 15 low-and middle-income countries and Islam and Khan (2023) for Bangladesh that children whose mothers have secondary education or above and who come from higher wealth quintiles are considerably more likely to be developmentally on track. Supporting the development of socioeconomically disadvantaged children is extremely important since, as Carneiro and Heckman (2003) demonstrates, development gaps that open up early in life can become permanent and grow over time. Furthermore, closing the gap in early childhood by way of early childhood education programs appears to be more cost-effective than compensating for the unequal outcomes later in adulthood (Currie, 2001). Naturally, an ideal situation would be a fully subsidized compulsory public ECD program encompassing all children, regardless of socioeconomic background.

When governments fall short of providing necessary child development programs, especially for children from disadvantaged backgrounds, non-governmental organizations may step in to fill in the gap. The Mother–Child Education Foundation (AÇEV) in Türkiye is a case in point. The Mother–Child Education Program of AÇEV targets children from disadvantaged environments and offers a dual-focus program that aims to support children with no prior pre-school education in terms of cognitive, socio-emotional, and physical development and improve the parenting skills of mothers. The program results suggest that children whose mothers are supported through the program experience improvements in IQ scores, school grades, academic tests, and social/personality development compared to those whose mothers were not supported (Kagıtcıbası et al., 1995, 2001; Bekman and Kocak, 2013). Myers (1992) argues that programs that focus on the child and caregiver simultaneously, as in this example, are more effective than single-focus programs. Considering our results that maternal schooling only above a certain threshold improves child's early development and that children from socioeconomically disadvantaged backgrounds significantly lag in ECD, developing a nationwide multisectoral initiative to support and educate caregivers and children simultaneously would result in superior outcomes in terms of children's well-being and future.

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¹⁶We find that controlling for maternal education and wealth (and other control variables discussed in Model 1 and 2), kindergarten attendance does not increase children's literacy-numeracy skills.

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Data Availability Turkish Demographic and Health Research Survey DataSet is available upon request from Hacettepe University, Institute of Population studies.

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