Policy Research Working Paper 10221

Risks to Child Development and School Readiness among Children under Six in Pakistan

Findings from a Nationally Representative Phone Survey

Elizabeth Hentschel
Heather Tomlinson
Amer Hasan
Aisha Yousafzai
Amna Ansari
Mahreen Tahir-Chowdhry
Mina Zamand

WORLD BANK GROUP
Education Global Practice
November 2022

Policy Research Working Paper 10221

Abstract

This paper analyzes the risks to child development and school readiness among children under age 6 in Pakistan. Drawing on a nationally representative telephone survey conducted between December 2021 and February 2022, it presents the first nationally representative estimates of child development for children under 3 years of age and school readiness for children 3 to 6 years of age, using internationally validated instruments. The paper examines how risk factors such as parental distress, lack of psychosocial stimulation, food insecurity, low maternal education, no enrollment in early childhood education, and living in a rural area are associated with children's outcomes. The data indicate that more than half (57 percent) of parents with children under age 3 were distressed and that 61 percent of households reported cutting down on the size of or skipping meals since the start of the pandemic. The data reveal that over half of parents fail to engage in adequate psychosocial stimulation with their child and enrollment in early childhood education is very low (39 percent). The paper finds that child development outcomes decline rapidly as the number of risks increase. Specifically, for children under 3 years, lack of psychosocial stimulation at home and higher levels of parental distress were most significantly associated with lower child development levels. For a child aged 3 to 6 years, early childhood education enrollment and the amount of psychosocial stimulation the child receives at home had the strongest association with school readiness scores.

This paper is a product of the Education Global Practice. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at ahasan1@worldbank.org.

Risks to Child Development and School Readiness among Children under Six in Pakistan: Findings from a Nationally Representative Phone Survey

Elizabeth Hentschel, Heather Tomlinson, Amer Hasan, Aisha Yousafzai, Amna Ansari, Mahreen Tahir-Chowdhry and Mina Zamand

JEL Classification: J13, J24, I31

Keywords: Early Childhood Development, School Readiness, Risk Factors, Pakistan, Children under 6

1. Introduction

Human capital levels in Pakistan are low, and the risks to human capital development begin in early childhood. Pakistan, the fifth most populous country in the world with 221 million people, has a low Human Capital Index (0.41), indicating that by age 18, a Pakistani child born today can only expect to be 41 percent as productive as she could be if she had access to full education and health. Many of the risks to development occur in the first 5 years of life, when brain development is exceptionally rapid and sensitive. Missed opportunities for nurturing care and stimulation cannot easily be made up later in life. Children in their early years require nurturing that emerges not only from adequate nutrition and health care, but also from safe environments with engaged caregivers who interact with their young children responsively and provide psychosocial stimulation through everyday activities such as talking and playing (Devercelli et al., 2022; World Health Organization, United Nations Children's Fund, World Bank Group, 2018). Access to nurturing and stimulating environments in the early years impacts human development into adulthood.

Across Pakistan, child development before school entry and learning outcomes in school are undermined by widespread geographical, gender, and wealth inequalities. Over 11 million households or 21.9 percent of the population lives below the poverty line, and poverty disproportionately affects young children: 27.0 percent of children aged 0-2 years and 29.6 percent of children aged 3-5 years live in poverty, according to calculations using the 2018 Pakistan Social and Living Standards Measurement (PSLM) . Among 3- to 4-year-old children living in the lowest income quintile, just 26.0 percent are developing on track (Tomlinson et al., forthcoming). Two-thirds (62.8 percent) of the population is rural (World Bank, 2021a), and Pakistan also has one of the lowest gender parity indices in primary school (girls' enrollment compared to boys' enrollment) in the world: 0.88 in Pakistan vs. 0.98 in low- and middle-income countries and 0.99 in South Asia (World Bank, 2021b). Learning poverty, which measures the share of school-age children unable to comprehend a simple text at age 10, is higher in Pakistan (75 percent) than in low- and middle-income countries (53 percent); and the rate is estimated to increase to 79 percent because of COVID-19 setbacks (Geven & Hasan, 2020). In short, too many vulnerable children, including those living in poverty, in rural areas, and with uneducated or distressed parents are at risk of starting life at a disadvantage, which has repercussions throughout the life course. Addressing inequities by supporting child development and school readiness skills, especially among vulnerable populations, is an important step in reducing learning poverty and improving child and human capital outcomes.

Data on the status of early child development (ECD) in Pakistan are incomplete and, in the case of children under 3 years of age, data are largely missing. ECD data are not collected at the country-wide level, are only available for a small subset of children—those aged 3-4 years—and

vary by year, province, and indicators, rendering comparisons difficult. The Early Childhood Development Index (ECDI),[1] the best available measure of child development at scale across provinces, shows substantially lower-than-average scores for children in Pakistan relative to the 75.1 percent average seen across 60 low- and middle-income countries (Lu et al., 2020): 59.4 percent in Punjab (2017–18), 47.5 percent in Sindh (2018–19), and 54.6 percent in Khyber Pakhtunkhwa (2019) (Tomlinson et al. forthcoming). There are no recent ECDI scores from Balochistan, the poorest province in Pakistan, and except for health surveys that provide proxies for ECD, there are no national ECD data sets for children from birth to age 3. Smaller-scale or province-specific studies shed light on patterns and rates of parental distress or depression, psychosocial stimulation, participation in ECE, and similar variables of interest, such as integration of parenting and nutrition interventions in community health settings in Sindh (Yousafzai et al., 2018) and Idara-e-Taleem-o-Aagahi (ITA)-Early Learning Partnership (ELP) studies of ECD during COVID disruptions in Punjab (ITA, 2021). This study aims to broaden the knowledge base by providing nationally representative data.

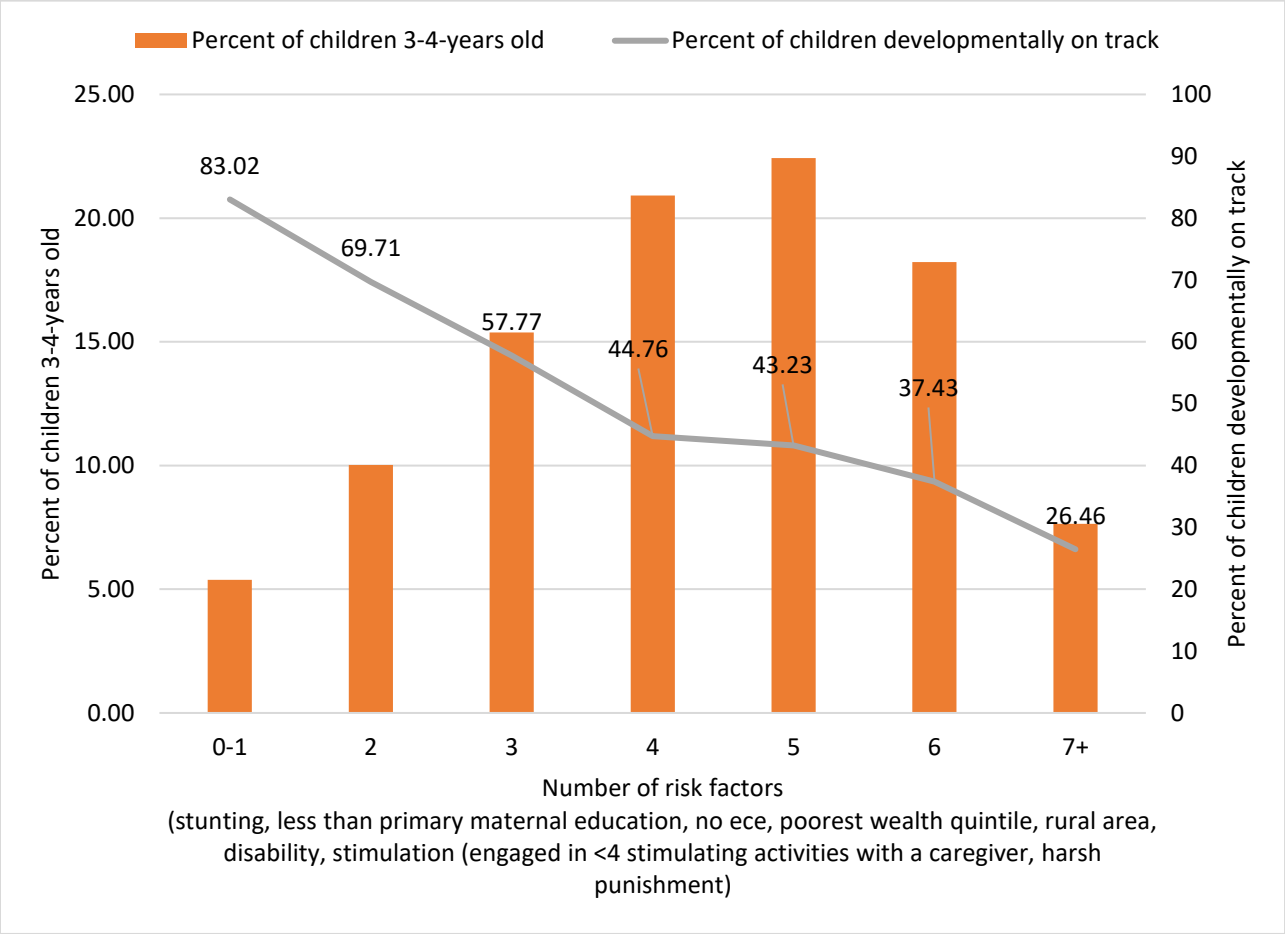
Young children in Pakistan are exposed to a host of risk factors that impede development

Child development occurs through a series of biological and psychological processes that are influenced by risk and protective factors that have the potential to alter brain structure and have implications throughout the life course. Common risk factors include social determinants of health, such as poverty, poor water and sanitation, and lack of maternal education, the health of the caregiver and child, including physical and mental health of the caregiver and malnutrition and infections for the child, and caregiver psychosocial health, including parental distress. Exposure to multiple risk factors reduces children's chances of staying on track developmentally, and the rates of multiple exposure are high in Pakistan. Province-level estimates find that approximately one-quarter of households with young children experience four risk factors—for comparison, the same share of households with young children in the United Kingdom experience just two risk factors (Sabates & Dex, 2012)—and about 10 percent of young children in Pakistan experience six or more risk factors (Tomlinson et al., forthcoming). There is a clear negative association between the number of risks experienced and the likelihood of developing on track in every province. For example, 83.0 percent of young children in Sindh exposed to one or no risk factors are developing on track vs. 44.8 percent of children experiencing three risk factors (See Figure 1, as reported in Tomlinson et al., forthcoming). Reducing the number of risks

[1] The ECDI is a population-based measure of child development that includes 10 items in four early developmental domains: 3 language/cognitive items, 2 physical items, 3 social-emotional items, and 2 approaches to learning items. Based on parent-report of children's ability, children are classified as being either on-track or off-track in terms of development.

experienced would increase children's odds of developing to potential—but COVID-19 setbacks have increased the number and severity of challenges families face.

Figure 1. The likelihood of being developmentally on track declines with the number of risk factors, children aged 3 and 4 in Sindh



Source: Authors' calculation using data from the Multiple Indicator Cluster Survey 2018–19.

Risk factors included being in the lowest income quintile, stunted, living in a rural area, having a functional disability, mother with less than a primary school education, low early stimulation at home (less than four activities in the previous 24 hours), exposed to harsh parenting, and not enrolled in early childhood education.

COVID-19 has introduced loss and hardships for families worldwide, including through reduced household resources and increased caregiver distress, which pose direct threats to young children's wellbeing. In Pakistan, the pandemic has severely contracted economic activity, with GDP growth expected to slow to 4.0 percent in FY23 (World Bank, 2022), half of the working population experiencing job or income losses, and an increase in the incidence of poverty from 4.4 to 5.4 percent (World Bank, 2021a). More than 40 percent of Pakistani households experienced moderate-to-severe food insecurity in 2020 (World Bank, 2021a), which is associated with serious psychological distress among parents (Tseng et al., 2017) and obvious

repercussions for children's growth and development (Alderman & Fernald, 2017). Global studies have shown that the pandemic may seriously harm young children's development through increased levels of poverty and food insecurity, disruptions in education, health care and social support systems, elevated stress levels and decreased wellbeing for parents (Yoshikawa et al., 2020). A World Bank report noted that "young children around the world are at risk of a developmental catastrophe" and reported that the pandemic has taken a tremendous toll on parenting programs, child stimulation, and nurturing care programs: 81 percent of countries, including Pakistan, halted such programs, including home visiting and group meetings, which provide important knowledge, skill-development, and social supports to parents (Galevski et al., 2021, p. v).

High levels of parental distress can lead to a lack of psychosocial stimulation

When parents feel stressed, isolated, depressed, and anxious, young children suffer as well. Acute, chronic or cumulative stress is a common antecedent to caregivers' emotional distress, which can include feelings of depression, anxiety, fear, or being unable to cope. High levels of stress among caregivers are a threat to ECD outcomes, correlating with increased child externalizing behaviors (e.g., irritability, temper outbursts, oppositional behaviors), internalizing behaviors (e.g., anxiety, depression, sadness), and later health and academic problems for children (Edil et al., 2020; Bufferd et al., 2012; Pinquart, 2017).

Maternal depression is a well-recognized risk for young children, associated with poor child cognitive development, child behavioral problems, low-quality caregiver-child interactions, and weak attachment (Howard et al. 2014). These findings have been born out in studies in Pakistan. For example, up to 53 percent of untreated women in a study in Punjab met the criteria for major depression postpartum (Rahman et al., 2008). In another study, mothers experiencing depression prenatally and currently were more likely to have children at age 7 with worse scores on measures of emotional and behavioral problems, compared to mothers who did not experience depression (Maselko et al., 2016). There is a significant treatment gap for mental health in low- and middle-income countries generally (Patel et al., 2018), and in Pakistan specifically, which has been described as having a massive treatment gap—an estimated 90 percent of mental health concerns go untreated (Sikander, 2020).

In conjunction with distress, many caregivers are undereducated. In Pakistan, between 42 and 89 percent of children under age 5, depending on the province, have a mother who either did not attend or did not complete primary school (42 percent in Punjab, 65 percent in Sindh, 66 percent in KP, 89 percent in Balochistan) (Tomlinson et al., forthcoming). Maternal education plays an important role in early childhood outcomes with multiple facets of parenting influenced by education levels, including knowledge and skills relative to health, nutrition, sleep, and

hygiene practices, stimulating cognitive and language development, and providing warm and responsive social-emotional support in the early years (Cuartas, 2022). Studies demonstrate that increased years of schooling among mothers positively relate to increased maternal engagement with young children, through more stimulating activities, improved ECE attendance, and reduced use of harsh discipline (Cuartas, 2022; Hasan et. al, 2020). Maternal education has been shown to serve as a mediation pathway through which greater cognitive and verbal stimulation from mother to child occurs, which relates to children's language skills, social-emotional responsiveness, and later social competence (Huang et al., 2022; Hasan et. al 2020).

Without sufficient knowledge, skills, and mental health supports in place, caregivers in Pakistan are not providing their young children with the early psychosocial stimulation they need to learn and thrive. Everyday activities that support learning in young children include telling stories, singing songs, going outside together, playing, reading books, or naming or counting objects. Rates of adequate early stimulation in Pakistan are lower than the average rate for least developed countries (48 percent) and considerably lower than the average rate for low- and middle-income countries (69 percent) for children aged 2-5 years (Lu et al., 2020). Based on data from the Multiple Indicator Cluster Survey (MICS), among Pakistani children aged 3-5, stimulation rates for the prior three days are just 35 percent in Punjab (2017-18), 45 percent in Sindh (2018-19), 35 percent in Khyber Pakhtunkhwa (2019), and 23 percent in Balochistan (2010) (Tomlinson et al., forthcoming). Children younger than 3 years old, whose brain development is at its most rapid and sensitive, have equally or even lower odds of experiencing adequate stimulation through responsive interactions, ranging from 26 percent in Punjab, to 29 percent in Khyber Pakhtunkhwa to 45 percent in Sindh (Tomlinson et al., forthcoming).[2] However, more recent data collected in Punjab during the first year of pandemic disruptions indicated higher levels of psychosocial stimulation from caregivers relative to playing (86 percent), looking at a book (90 percent), or telling a story (86 percent) in the prior 15 days (ITA, 2021).

Access to child-oriented learning materials at home is also low. In addition to the critical stimulation that occurs through engaging interactions, children learn through exploration and manipulation of objects such as toys, picture books, dress-up objects, and other playthings. Across provinces and settings, less than 9 percent of 3- to 5-year-olds in Pakistan and less than 2 percent of 0- to 2-year-olds have access to books at home (Tomlinson et al., forthcoming). These low rates of access to learning materials at home contribute further to insufficient opportunities for early learning for too many children, and those living in poverty or experiencing losses in the face of the pandemic are most likely to be left out. The cumulative lack of adequate social-

[2] Data on caregiver engagement with stimulating activities was not collected for children in Balochistan under the age of 3 in the 2010 MICS survey. The 2019-2020 data in Balochistan is forthcoming, but not yet available.

emotional and cognitive stimulation intersects with lack of proper nutrition and other critical inputs to increase the likelihood of long-term risks to development (Yousafzai et al., 2013).

All of these risks operate in conjunction with rising levels of food insecurity, which was estimated to be 37 percent prior to the pandemic and has increased as a result of the pandemic (National Nutrition Survey, 2018; World Bank, 2021a). Many under-resourced households suffer from high rates of malnutrition leading to high rates of child stunting and wasting, with an estimated 40 percent of children stunted and 29 percent of children underweight (National Nutrition Survey, 2018). These health and nutritional risk factors to development are highly associated with other risk factors, such as living in a rural area, and low maternal educational status (Khan et al., 2019), which leads to a cumulative negative impact on development.

Early learning opportunities outside the home, through early childhood education, are also few

Enrollment in early childhood education is very low for children aged 3-5 in Pakistan, further curtailing access to early stimulation and learning opportunities for young children. According to 2019-20 PSLM data, just 18.9 percent of 3- to 5-year-olds nationally are enrolled in ECE (Tomlinson et al., forthcoming). The greatest level of coverage is seen in Punjab, where just over one-quarter of eligible children (27.0 percent) are enrolled, whereas in Balochistan, only 5.2 percent of eligible children are enrolled (Tomlinson et al., forthcoming), putting 95 percent of children in this province at a considerable disadvantage in terms of school readiness. Low-income and rural children are especially disadvantaged in terms of access to ECE—and gender inequality begins to emerge as well. Children in Pakistan who lack ECE experiences show lower rates of on-track development than children who attend ECE programs (e.g., 52 percent vs. 74 percent respectively in Punjab, 2017-18) (Tomlinson et al., forthcoming).

Very little is known about the barriers to ECE enrollment in Pakistan, including at what age parents in Pakistan think their children should enroll and whether that correlates with actual behaviors. It is known through studies elsewhere that parents' beliefs about child development are malleable and, when shifted, improve parents' investments in their children and school readiness levels (Dizon-Ross, 2019). To our knowledge, the relationship between caregiver beliefs about when children should enter school and actual enrollment has not been explored in Pakistan. Although ECE enrollment requires more than parental belief in education—for example, program proximity, affordability, and quality—accurate perceptions of what young children need to develop and learn are important, given that beliefs drive investments. Compounded by insufficient early stimulation at home, especially for very young children, caregivers' beliefs about young children's needs may be a key to behavioral and subsequent outcome changes.

Longitudinal research in the United States indicates that age of entry into kindergarten shows a modest relationship to cognitive-academic achievement but not social-emotional functioning (NICHD Early Child Care Research Network, 2007), and researchers note that age-of-entry effects are dwarfed by other aspects of children's family and early care and education experiences.

Current Study

In order to better understand the developmental status of young children in Pakistan, and the impact of various risks on young children's development, we conducted a nationally representative telephone survey of households with children aged 0-6 years. Health protocols precluded in-person interviews during the pandemic. To date, a nationally representative study of child development among children under age 3 or school readiness for those ages 3-6 has not been conducted in Pakistan. Thus, these data fill critical knowledge gaps.

This study shares the findings from the survey, conducted from December 2021 to February 2022. The aims of this study are to describe the current status of ECD and school readiness for children aged 0-6 in Pakistan and explore how these outcomes are related to six key risk factors—food insecurity, living in a rural area, low maternal education, lack of psychosocial stimulation at home, experiences of parental distress, and no ECE enrollment. This list of risks a child could face is not intended to be exhaustive. These are risks informed by the literature and identifiable in the current survey format.

This study aims to fill key gaps in the literature for ECD particularly around parenting capacity as related to parents' education levels, mental health or distress levels, and engagement with their young children, specifically provision of psychosocial stimulation. The study also provides insight into the state of child development and subsequent risk factors during the COVID-19 pandemic. Section 2 discusses the data and methods and describes both the research design as well as key variables. Section 3 reports results and section 4 concludes with a discussion of the implications for policy and programming.

2. Data and Methods

Research Design and Data Collection Strategy

Gallup Pakistan was contracted by the World Bank to conduct a nationally representative survey. As pandemic health protocols precluded in-person interviews, interviews were conducted by telephone. Calls were made from December 2021 to February 2022 using random digit dialing (RDD) of mobile phones using all four telecom providers with active numbers across the country.

Landline penetration is extremely limited in Pakistan at less than 3 percent, whereas 94 percent of households have access to a mobile phone (PSLM 2019-2020). According to the Pakistan Telecommunication Authority, the market share of the four telecom providers in Pakistan (in terms of active working numbers) are: PMCL Jazz (37.8 percent), Telenor (27.1 percent), CMPAK Zong (22.0 percent), and PTML Ufone (13.1 percent). The market share was used to allocate the sample across providers. For example, 37.8 percent of numbers were randomly chosen from PMCL Jazz. Such an allocation was feasible to make because each of the four telecom providers was assigned a pre-set exchange number followed by an 8-digit mobile number. Despite the high levels of mobile phone access, the 6 percent of the population that does not have access to a mobile phone, likely some of the most disenfranchised, were systematically excluded from our sample. Further, 79 percent of our respondents were men, with 69 percent of these being fathers, 7 percent being grandfathers, and 24 percent being another male relative. This indicates that although 94 percent of households report having access to a mobile device, there is likely gender inequity in terms of phone ownership and use.

Computer Assisted Telephone Interviewing (CATI) was used. Interviewers began the survey process by calling a randomly generated number. Each number was called until the phone was answered, or a maximum of three times. Each call was made at a different time of the day. Once an individual was contacted on their mobile phone, consent was obtained, a screening questionnaire was administered, and a study identification number was randomly generated and assigned to the individual. Data collectors entered participants' responses into a tablet, which was collected using Survey CTO, which also hosted the electronic questionnaire with automated skip patterns.

Our study population included caregivers in households with at least one child who was 72 months of age or younger. A selected child served as the focus for interview questions based on two stratification criteria to ensure a 50:50 gender split and a 50:50 age group split (children aged 0-35 months and children aged 36-72 months). SurveyCTO was programmed to randomly select an index child who met these criteria in the child roster. Interviewers asked each participant for the province they lived in to facilitate sample allocation across provinces. Interviewers also noted the status of the interview (refused, partially completed, completed) at the end of the survey form. All data collection was monitored by Gallup Pakistan to ensure that the planned allocation of participants across strata was met. Once a target was reached, no further interviews were conducted with participants from that stratum. Of 3,907 individuals contacted, 448 people declined to be interviewed, 438 partially completed the interview, and 3,021 completed the interview in its entirety. Data from Azad Jammu Kashmir (n=104), Islamabad Capital Territory (n=23) and Gilgit Baltistan (n=21) was not representative and was therefore excluded from the study. As such, our final study population contained 2,896 households.

To ensure that our study population was generalizable to the national population of Pakistan that has access to a mobile phone, post-stratified weighting was applied. The weighting corrected for differences in the achieved sample's profile and what was expected as per the latest population census (2017). For creation of weights, two strata were used, namely: 1) Province (Punjab, Sindh, KP, and Balochistan) and 2) region (urban or rural). Thus, a total of 10 weights were created.

Key Variables and Tools

The study focuses on the following key risk variables: parental distress, psychosocial stimulation, food insecurity, maternal education, ECE enrollment,[3] and living in a rural area. The two main outcome variables were child development for children under 36 months and school readiness for children 36-72 months. The age at which a parent believes their child should begin school was also analyzed to understand the association between parental belief and ECE enrollment. The following variables were constructed. A description of the independent variables follows.

Outcome Variables

Child Development for Children 0-3

The Caregiver-Reported Early Development Instrument (CREDI) is a globally validated, population-level, developmental assessment tool for children aged 0-3 years (McCoy et al., 2018). It has been used in over 17 countries and is designed to be culturally and linguistically neutral. The short form questionnaire was chosen given that data were collected using a phone survey and respondent fatigue was a concern. The short form is also recommended for population-level surveys. This version of CREDI has 20 questions to be completed by household parents or caregivers[4] about a selected child. The scale captures development across four domains: motor, language, cognition, and social-emotional development. There are 20 items per form, with items representing developmentally appropriate skills for each of six age groups ranging from 0-2 years (0-5, 6-11, 12-17, 18-23, 24-29, and 30-35 months). Forms are standardized by age such that a question about social-emotional development looks different for a child under 6 months than a child aged 30 months, and so forth.[5] Differences in child development are interpreted in standard deviation units. A child who scores more than 2 standard deviations below the mean is typically considered to be developmentally "off-track."

[3] This item is only asked for children old enough to be enrolled in school – i.e., children aged 36-72 months.
[4] The terms "parent" and "caregiver" are used interchangeably in this paper to refer to key adults in a child's household providing care and supervision, including mothers, fathers, grandparents, and other household adults.
[5] The short and long-form CREDI questionnaires are open access and available online via: https://credi.gse.harvard.edu/credi-materials.

School Readiness for Children Aged 3-6

Items from the Measuring Early Learning Quality and Outcomes (MELQO)-Measure of Development and Early Learning (MODEL) Teacher/Caregiver report (UNESCO, 2017) were adapted and embedded in the survey to evaluate school readiness among children ages 36-72 months. Using yes/no response options across 25 items, three subdomains were evaluated to assess school readiness levels: mathematics knowledge and skills (6 items), language/literacy knowledge and skills (10 items) and social-emotional development (9 items). Mathematics items included questions such as, "Knows that 8 is more than 2," and "Knows that a cow is heavier than a goat." Language/literacy items included questions such as, "Names at least three alphabet letters in Urdu or mother tongue," and "Identifies the direction of English script (left to right)." Examples of social-emotional skills included "Stops an activity when told to do so," and "Gets along with other children." Of the 25 items used, 20 similar items are included in the Anchor Items for Measurement of Early Childhood Development (AIM-ECD) assessment tool, which allowed us to compare our sample results to other populations.

Independent Variables

Psychosocial Stimulation

The Early Learning Indicator Tool (Hentschel et al., 2021), commissioned by the World Health Organization, was used to quantify psychosocial stimulation in each household, including stimulation with playthings or learning resources, and stimulation with people. The tool consists of 14 yes/no questions that capture information on the availability of playthings in the home (e.g., items for noisemaking, role playing, reading, or looking at pictures) and the amount of caregiver-provided engaging interactions (e.g., being talked to, singing, read to, visiting others) experienced in the previous 24 hours. The tool takes less than 5 minutes to administer and has been validated in Pakistan (Hentschel et al., *in preparation*). Scores ranged from 0-14 depending on the number of items to which a respondent replied yes. These scores were created for each child included in the survey and were based on stimulation from any adult caregivers in the household.

Parental Distress

Participants were asked five questions regarding their level of distress in the previous 15 days. The questions asked if the parent had found it difficult to be affectionate to their child, had been more irritated or angry, found it difficult to get enough sleep, had been nervous or anxious, and had been unable to stop or control worrying. A score from 0 to 5 was created for each respondent (typically an adult) using their responses to these five items with 5 indicating the most distress.

Food Insecurity

Food insecurity was captured by asking about changes relative to the start of the COVID-19 pandemic. Participants were asked "Since March 2020, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?" Answer options included not at all, very little, somewhat, or a great extent. To be classified as "experienced food insecurity" individuals had to have answered very little, somewhat, or to a great extent.

Parental Educational Attainment

Maternal and paternal education levels were grouped into three categories: less than a primary education, completed primary, and completed secondary school. The questions were asked for both mothers and fathers regardless of who participated as the survey respondent.

Enrollment in Early Childhood Education

ECE enrollment was determined using an open-ended item administered only if the index child for a given household was between 3 and 6 years of age. Responses included *katchi* (the primary provision of ECE in primary schools), ECE, play group, preprimary (year 1, 2 or 3), nursery, kindergarten, and preparatory class ("prep").

Living in a Rural Area

Determination of living in a rural area was based on the respondent's perception of whether they lived in an urban or rural area as a binary choice.

Parental Beliefs about Appropriate Age for School Entry

In order to capture parents' beliefs on when children should enter an organized learning environment outside the home, parents were asked a single open-ended question: "When do you think a child should start school?" Answers were captured by year of age and ranged from 2 to 10 years of age.

Statistical Analyses[6]

First, we investigated the bivariate association between key variables: province, gender, each of our risk factors of interest (living in a rural area, psychosocial stimulation, maternal education, parental distress, food insecurity, and enrollment in ECE) and our outcomes of interest (child development for children under 36 months of age and school readiness for children 36-72 months of age), using unadjusted Ordinary Least Squares (OLS) linear regression analyses (See Tables 2 and 3). Second, we focused on individual risk factors and generated plots that showed the proportion of the population with each specific risk factor, and the overlap of the three most

[6] All statistical analyses were performed in Stata v17 (Stata-Corp, College Station, Texas, USA).

prevalent risk factors in our population (See Figures 2 and 3). Third, we generated prevalence plots that showed the share of the population experiencing various risk factors (i.e., experiencing 1 risk factor, experiencing any 2 risk factors, etc.) and the child development/school readiness score among that proportion of the population (See Figures 4 and 5). Fourth, we created two simple OLS linear regression models, one that assessed the relationship between our key risk factors and child development under 36 months, and one that assessed the relationship between our key risk factors and school readiness 36-72 months (See Tables 4 and 5). Region, psychosocial stimulation, maternal education, parental distress, and food insecurity were included in all risk factor assessments with our outcomes of interest. Enrollment in ECE was only included in the risk factor assessment for children aged 36-72 months. Lastly, we selected two risk factors, psychosocial stimulation which was most associated with child development, and enrollment in ECE which was most associated with school readiness and unpacked them by parental gender and educational status. For enrollment in ECE, we also assessed the relationship between ECE enrollment, and the age parents believe their child should begin school (See Figures 7 through 9).

3. Results

Descriptive Tables

Our sample included 2,896 complete cases, with 1,389 children under 36 months and 1,507 children 36 months-72 months. Table 1 provides the distribution of the key variables in our sample, overall and disaggregated by age-group. Weighted estimates indicated that the majority of our sample reported living in a rural area (64 percent) and lived in Punjab (53 percent). Approximately a quarter of households reported living in Sindh (23 percent), followed by Khyber Pakhtunkhwa (17 percent), and Balochistan (6 percent). Of note, almost half (47 percent) of mothers in our sample and about a third (29 percent) of fathers had less than a primary school education. Most households (55 percent) reported some extent of parental distress, 62 percent reported losing income since the pandemic started, and 61 percent of the sample reported skipping or cutting down on food since the pandemic started. Forty-six percent of our sample of 3- to 6-year-olds were reported to be out of school at the time of the survey.

Table 1. Distribution of Risk Factors and Household Variables by Child Age

	Children 0-35 Months (N=1,389)	Children 36-72 Months (N=1,507)	All Children (N= 2,896)
Average CREDI Z-Score	0.03	N/A	N/A
School Readiness Score (percent correct)	N/A	67.76	N/A
Age of Child (months)			

(mean, sd)	13.42 (0.29)	54.77 (0.35)	35.04 (0.48)
(median, IQR)	12 (5, 24)	60 (48, 60)	36 (12, 60)
Child Gender			
Male	55.26	55.34	55.30
Female	44.74	44.66	44.70
Region			
Urban	38.88	34.18	36.43
Rural	61.12	65.82	63.57
Province			
Punjab	52.24	54.58	53.46
Sindh	24.34	22.30	23.27
Khyber Pakhtunkhwa	17.58	16.98	17.27
Balochistan	5.84	6.14	6.00
Income loss since March 2020			
Experienced income loss	59.35	63.70	61.62
Did not experience income loss	38.39	31.61	34.85
Did not know/did not respond	2.26	4.69	3.53
Psychosocial Stimulation (Min=0, Max=14)			
(mean, sd)	6.41 (0.12)	8.00 (0.10)	7.24 (0.08)
(median, IQR)	6.5 (3, 10)	8 (6, 11)	7 (5, 10)
Low stimulation (0-4 items)	34.06	16.88	25.08
Low-medium stimulation (5-7 items)	23.43	27.89	25.76
Medium-high stimulation (8-10 items)	24.63	27.98	26.38
High stimulation (11-14 items)	17.88	27.25	22.78
Maternal Education			
Less than primary	43.47	49.38	46.56
Primary	19.88	20.12	20.02
Secondary or greater	36.64	30.50	33.43
Paternal Education			
Less than primary	26.97	31.02	29.09
Primary	20.97	21.94	21.48
Secondary or greater	52.06	47.04	49.44
Parental Distress Sum Score (Min=0, Max=5)			
(mean, sd)	1.67 (0.06)	1.71 (0.06)	1.69 (0.04)
(median, IQR)	1 (0, 3)	1 (0, 3)	1 (0, 3)
No parental distress	43.22	47.08	45.24
Some parental distress	56.78	52.92	54.76
Cut the size of meals or skip meals since March 2020			
Not at all	39.91	38.96	39.42
Very little/Somewhat	44.98	43.39	44.16
A great extent	15.10	17.65	16.42
School Enrollment			

Out of School	N/A	45.52	N/A
Enrolled in ECE	N/A	39.11	N/A
Enrolled in Primary	N/A	15.36	N/A
Age parent believes child should begin school			
(mean, sd)	4.53 (0.03)	4.48 (0.03)	4.50 (0.02)
(median, IQR)	5 (4, 5)	5 (4, 5)	5 (4, 5)

Note: All estimates weighted. Psychosocial stimulation ranges from 0 to 14. Parental distress sum score ranges from 0 to 5. The age parents believe children should begin school is open-ended and represents the child's year of age.

Table 2 provides the average child development Z-scores for children 0-35 months by key variables. Consistent with evidence from other LMICs, the average Z-score in our sample was 0.03 (95%, CI= -0.02, 0.09). Evidence from the CREDI Short-Form Validation Paper (McCoy et al., 2018) finds similar distributions for India and Nepal. Unadjusted OLS linear regression analyses were run on child-development Z-scores by each key variable independently. The p-values from these regressions are reported in column 5. Variables found to be positively associated with development included: living in an urban area, receiving high levels of psychosocial stimulation, having a mother with a primary education or above, having parents who experienced no parental distress, and living in a household with no food insecurity. Paternal education and gender were not associated with development.

Table 2. Development for Children Under 3 Years of Age by Key Variables (N= 1,389)

	N (unweighted)	Average CREDI Z-Score	95% CI	Linearized Standard Error	p-value
	(1)	(2)	(3)	(4)	(5)
All children under 3					
0-35 months	1389	0.03	(-0.02, 0.09)	0.03	
Age (REF= <6 months					
<6 months	390	-0.16	(-0.29, -0.02)	0.07	
6-11 months	269	0.34	(0.19, 0.47)	0.07	<0.001
12-17 months	201	0.13	(0.01, 0.26)	0.06	0.002
18-23 months	114	-0.32	(-0.45, -0.20)	0.06	0.075
24-29 months	304	0.09	(0.03, 0.15)	0.03	0.001
30-35 months	111	-0.02	(-0.08, 0.04)	0.03	0.072
Child Gender					0.155
Male	774	0.07	(0.00, 0.14)	0.04	
Female	615	-0.01	(-0.10, 0.08)	0.04	
Region					<0.001
Urban	615	0.16	(0.08, 0.24)	0.04	
Rural	774	-0.04	(-0.12, 0.03)	0.04	
Province (REF= Punjab)					
Punjab	611	0.06	(-0.02, 0.14)	0.04	

Sindh	215	0.14	(0.01, 0.26)	0.06	0.303
Khyber Pakhtunkhwa	436	-0.26	(-0.36, -0.15)	0.05	<0.001
Balochistan	104	0.26	(0.06, 0.46)	0.10	0.069
Psychosocial Stimulation (REF= Low stimulation)					
Low stimulation (0-4 items)	476	-0.73	(-0.82, -0.63)	0.05	
Low-medium stimulation (5-7 items)	332	0.24	(0.16, 0.33)	0.04	<0.001
Medium-high stimulation (8-10 items)	323	0.46	(0.38, 0.54)	0.04	<0.001
High stimulation (11-14 items)	258	0.60	(0.51, 0.70)	0.05	<0.001
Maternal Education (REF= Less than primary)					
Less than primary	609	-0.08	(-0.17, 0.01)	0.04	
Primary	261	0.22	(0.10, 0.34)	0.06	<0.001
Secondary or greater	519	0.07	(-0.02, 0.15)	0.04	0.020
Paternal Education (REF= Less than primary)					
Less than primary	375	-0.02	(-0.13, 0.08)	0.05	
Primary	274	0.07	(-0.06, 0.20)	0.06	0.258
Secondary or greater	740	0.05	(-0.02, 0.12)	0.04	0.244
Parental Distress Sum Score					<0.001
No parental distress	589	0.23	(0.16, 0.31)	0.04	
Some parental distress	800	-0.12	(-0.19, -0.04)	0.04	
Cut the size of meals or skip meals since March 2020 (REF= Not at all)					
Not at all	545	0.11	(0.03, 0.20)	0.04	
Very little/Somewhat	603	0.04	(-0.04, 0.13)	0.04	0.244
A great extent	211	-0.15	(-0.27, -0.02)	0.06	0.001

Note: All estimates weighted except for the N, which is unweighted. Psychosocial stimulation ranges from 0 to 14. Parental distress sum score ranges from 0 to 5.

The average overall school readiness score in our sample was 17.95 (out of a maximum of 25), indicating that on average, children were rated by caregivers to have achieved 72 percent of age-appropriate math, language/literacy, and social-emotional school readiness knowledge and skills. Table 3 provides the average school readiness scores for children 36-72 months by our key risk factors of interest. OLS linear regression analyses were run on school readiness sum scores by each key risk factor of interest, controlling for age. Variables found to be positively correlated with school readiness levels included: living in an urban area, receiving high levels of psychosocial stimulation, having a mother with a secondary education or above, having parents who

experienced parental distress, and being enrolled in ECE or primary school. Paternal education, food insecurity and gender of the child were not associated with school readiness. Available comparable data suggest that estimates from our sample are consistent with what has been found in other settings.

Table 3. School Readiness for Children Aged 3-6 Years by Key Variables (Maximum= 25 points) (N= 1,507)

	N (unweighted)	Weighted Sum Score	Weighted Percent Correct	95% CI	Linearized Standard Error	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
All children 3-6						
3-5 years (36-72 months)	1507	17.95	71.80	(16.54, 17.35)	0.21	
Age (REF= 3 years)						
3 years (36-47 months)	352	12.60	50.40	(11.82, 13.38)	0.39	
4 years (48-59 months)	372	15.36	61.44	(14.55, 16.18)	0.42	<0.001
5 years (60-71 months)	494	18.92	75.68	(18.28, 19.56)	0.32	<0.001
6 years 1 month (72 months)	289	20.77	83.08	(20.10, 21.43)	0.33	<0.001
Child Gender						0.139
Male	847	16.84	67.36	(16.28, 17.40)	0.28	
Female	660	17.07	68.28	(16.48, 17.67)	0.30	
Region						0.012
Urban	620	17.52	70.08	(16.90, 18.13)	0.31	
Rural	887	16.63	66.52	(16.10, 17.16)	0.26	
Province (REF= Punjab)						
Punjab	690	17.32	69.28	(16.76, 17.89)	0.29	
Sindh	210	16.66	66.64	(15.66, 17.66)	0.50	0.168
Khyber Pakhtunkhwa	467	16.20	64.80	(15.49, 16.91)	0.36	0.065
Balochistan	119	16.65	66.60	(15.07, 18.23)	0.80	0.092
Psychosocial Stimulation (REF= Low stimulation)						
Low stimulation (0-4 items)	245	13.04	52.16	(11.91, 14.17)	0.58	
Low-medium stimulation (5-7 items)	414	16.06	64.24	(15.30, 16.81)	0.38	<0.001
Medium-high stimulation (8-10 items)	429	17.38	69.52	(16.67, 18.10)	0.36	<0.001
High stimulation (11-14 items)	419	19.45	77.80	(18.80, 20.10)	0.33	<0.001
Maternal Education (REF= Less than primary)						
Less than primary	732	16.30	65.20	(15.69, 16.91)	0.31	
Primary	290	16.88	67.52	(15.96, 17.80)	0.47	0.151
Secondary or greater	485	18.02	72.08	(17.37, 18.67)	0.33	<0.001

Paternal Education (REF= Less than primary)						
Less than primary	455	16.11	64.44	(15.33, 16.91)	0.40	
Primary	311	16.60	66.40	(15.70, 17.49)	0.45	0.158
Secondary or greater	741	17.66	70.64	(17.11, 18.21)	0.38	<0.001
Parental Distress Sum Score						0.047
No parental distress	704	16.54	66.16	(15.97, 17.12)	0.29	
Some parental distress	803	17.30	69.20	(16.73, 17.88)	0.29	
Cut the size of meals or skip meals since March 2020 (REF= Not at all)						
Not at all	586	16.97	67.88	(16.33, 17.62)	0.32	
Very little/Somewhat	593	16.76	67.04	(16.09, 17.44)	0.51	0.252
A great extent	259	16.90	67.60	(15.90, 17.90)	0.45	0.536
School Enrollment (36-72 months) (REF= Out of school)						
Out of School	621	12.58	50.32	(11.99, 13.16)	0.30	
Enrolled in ECE	508	19.79	79.16	(19.25, 20.33)	0.27	<0.001
Enrolled in Primary	193	21.85	87.40	(21.21, 22.50)	0.33	<0.001

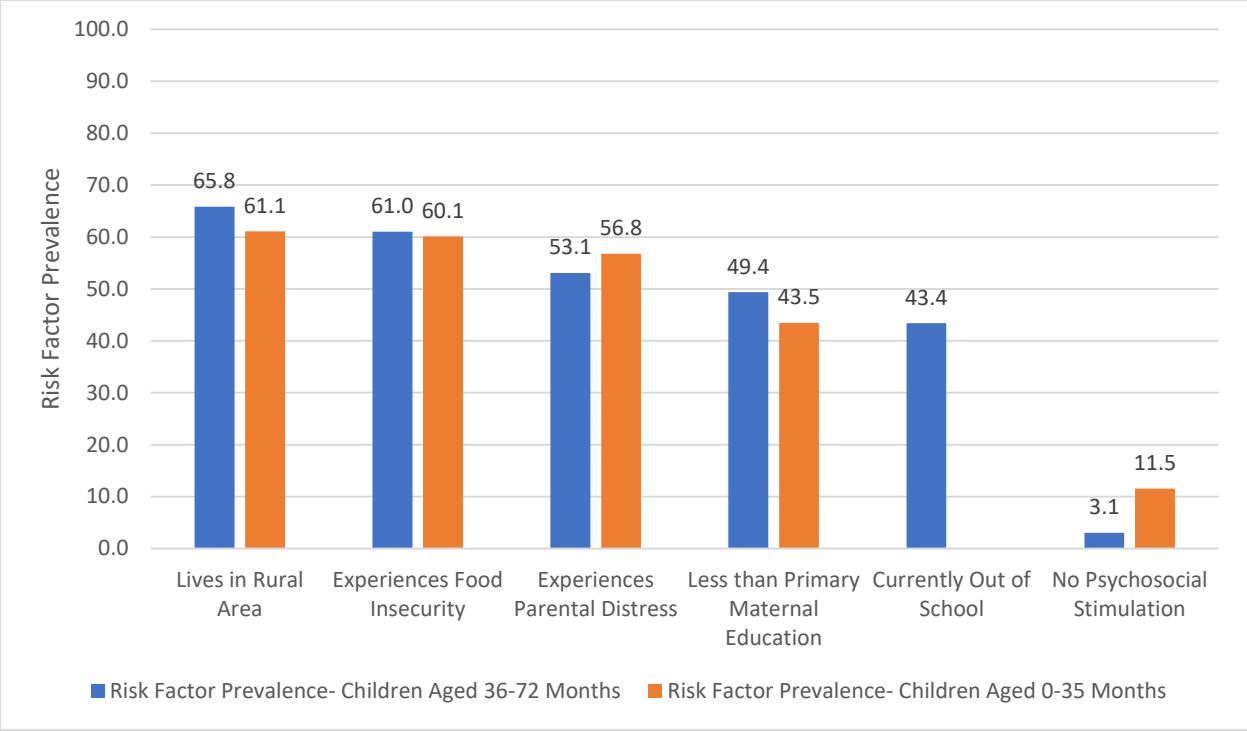
Note: All estimates weighted. Psychosocial stimulation ranges from 0 to 14. Parental distress sum score ranges from 0 to 5. The age parents believe children should begin school is open ended and represents child year of age. Linearized standard error is based on the weighted sum score variation.

Risk Factor Prevalence

Risk factor prevalence is similar in households with children 0-35 months and those with children 36-72 months. The three most prevalent risk factors in all households were: experiencing some level of food insecurity, living in a rural area, and parental distress (Figures 2 & 3). Households with children aged 0-35 months, compared to 36-72 months, experienced much higher levels of parental distress (57 percent to 53 percent, respectively) and less psychosocial stimulation (12 percent compared to 3 percent experience no psychosocial stimulation, respectively). Households with children 36-72 months experienced slightly higher levels of food insecurity (61 percent to 60 percent, respectively), lived in rural areas at higher rates (66 percent to 61 percent, respectively), and were more likely to have a mother with low levels of maternal education (49 to 44 percent, respectively), but none of these age-group differences were statistically significant. Approximately 43 percent of 36-72-month-old children are currently not enrolled in any type of ECE or primary school.

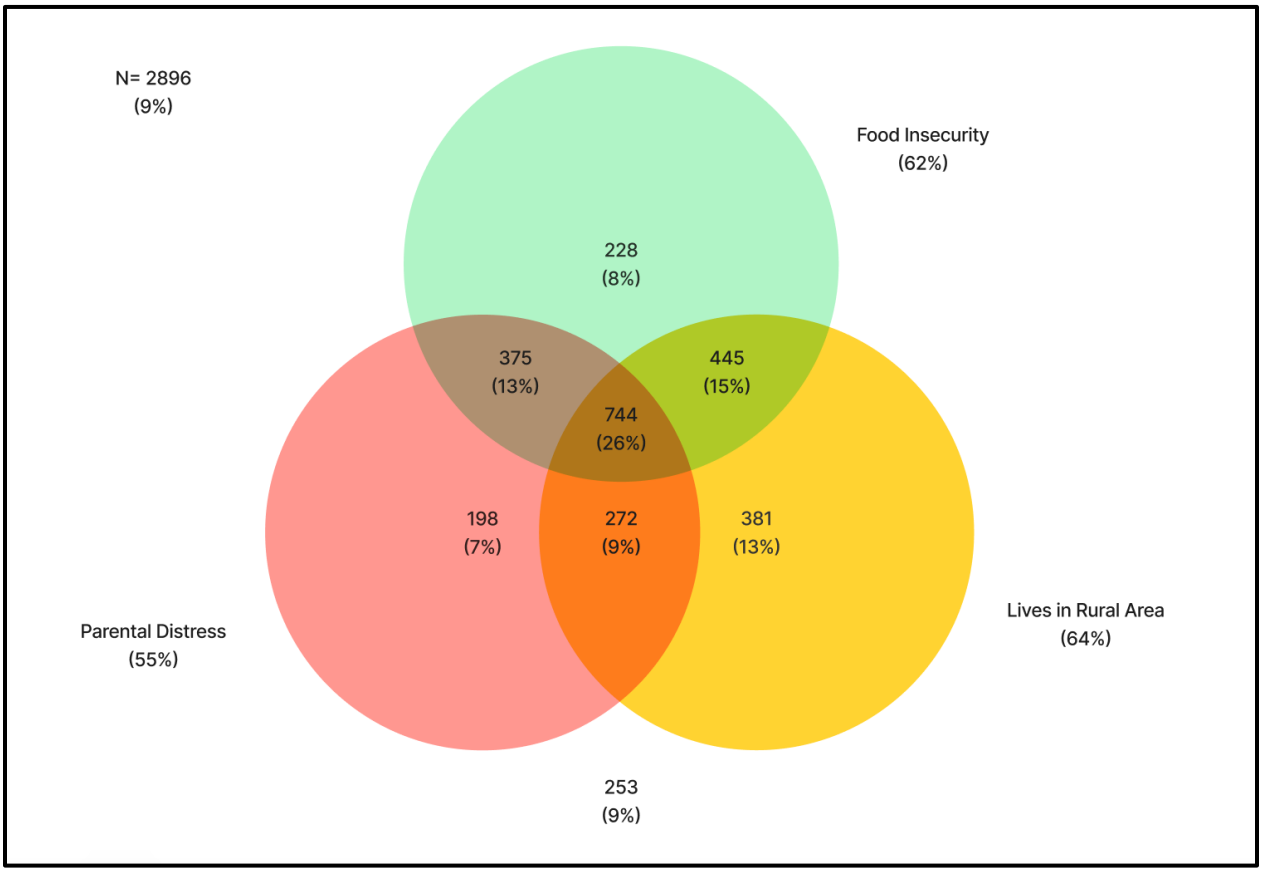
There was also a high level of co-occurrence of risk factors in our sample overall. For example, as Figure 3 indicates, 64 percent of households lived in a rural area; of those, for 13 percent, living in a rural area was an isolated risk factor, whereas the remaining 87 percent of those households also experienced parental distress, experienced food insecurity, or both.

Figure 2. Prevalence of Risk Factors by Child Age (N=2,896)



Note: All estimates are weighted. "Experiences parental distress" indicates a score of 1 or higher. "Experiences food insecurity" indicates cutting back on meals since March 2020 due to insufficient funds to some extent. Data on school attendance is only measured for children 36+ months. "No psychosocial stimulation" indicates that the child did not have access to any learning materials nor did they participate in any stimulating activities with adult caregivers in the past 24 hours. Statistically significant differences by age group are bolded and include the experience of parental distress and lack of psychosocial stimulation.

Figure 3. Venn Diagram of Most Prevalent Risk Factors in All Households



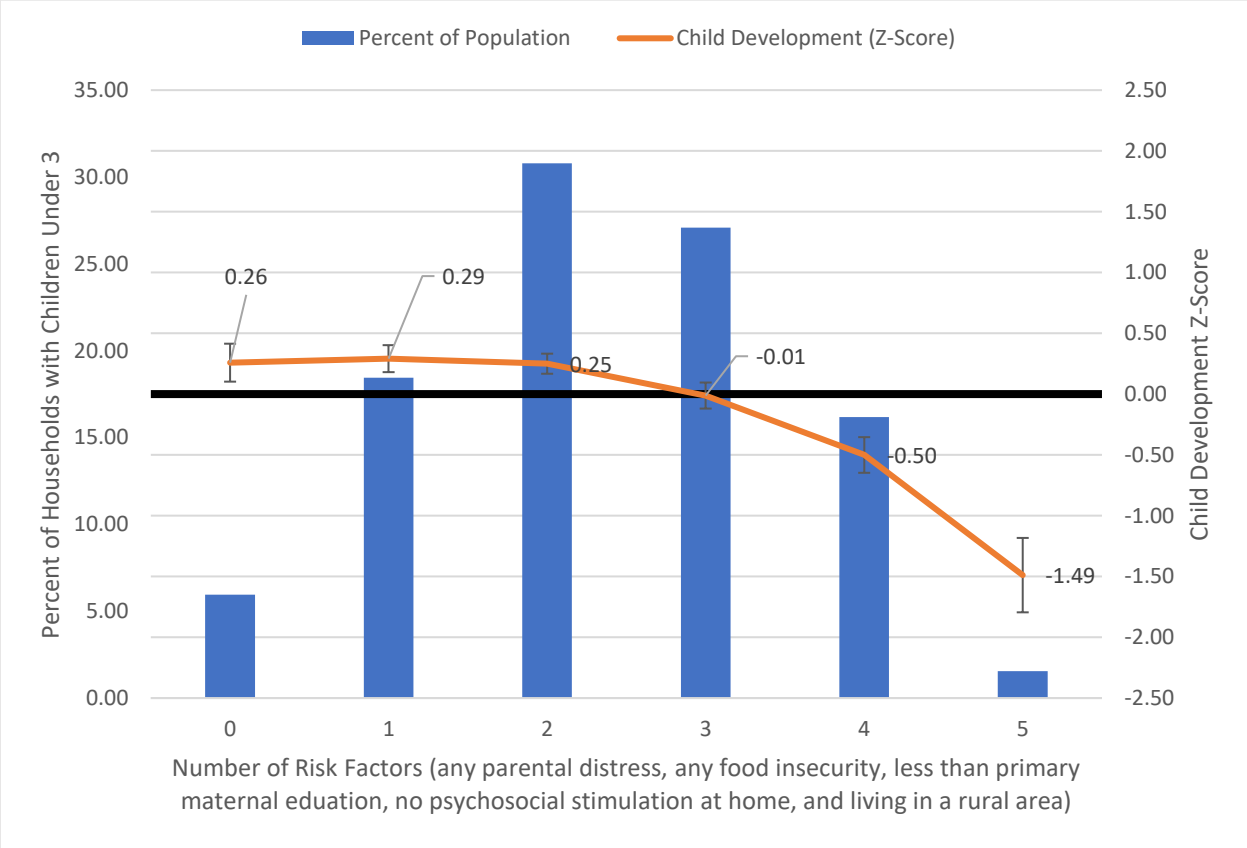
Note: All estimates are weighted. "Experiences parental distress" indicates a score of 1 or higher. "Experiences food insecurity" indicates cutting back on meals since March 2020 due to insufficient funds to some extent.

Risk Factors and Average Child Development and School Readiness Scores

Figure 4 shows the average child development Z-scores for children under age 3 by the number of risk factors experienced. Error bars indicate 95 percent confidence around each average. As such, there are minimal differences in average child development among children experiencing up to three risk factors, but sharp declines in development appeared for those experiencing four or five risk factors. For example, a child who experienced no risk factors—that is, experienced no parental distress or food insecurity in their household, had a mother with a primary school education or greater, experienced some amount of psychosocial stimulation at home and lived in an urban area—on average had a development Z-score 0.26 standard deviations (SDs) above the mean. A child who experienced any two risk factors on average scored 0.29 SDs above the mean. This is in sharp contrast to a child who experienced three risk factors (0.01 SD below the mean), four risk factors (0.50 SDs below the mean) or all five risk factors (1.49 SDs below the mean).

Comparing the children who were in the top 75th percentile of child development z-scores to those in the bottom 25th percentile, those in the top quartile experienced higher rates of maternal education (53 percent of mother completed primary school compared to 49 percent, respectively), lower rates of parental distress (52 percent of households compared to 67 percent, respectively) and higher rates of psychosocial stimulation (97 percent of households reported some psychosocial stimulation compared to 65 percent, respectively).

Figure 4. Development for Children Less than 3 Years of Age by the Number of Risk Factors Experienced



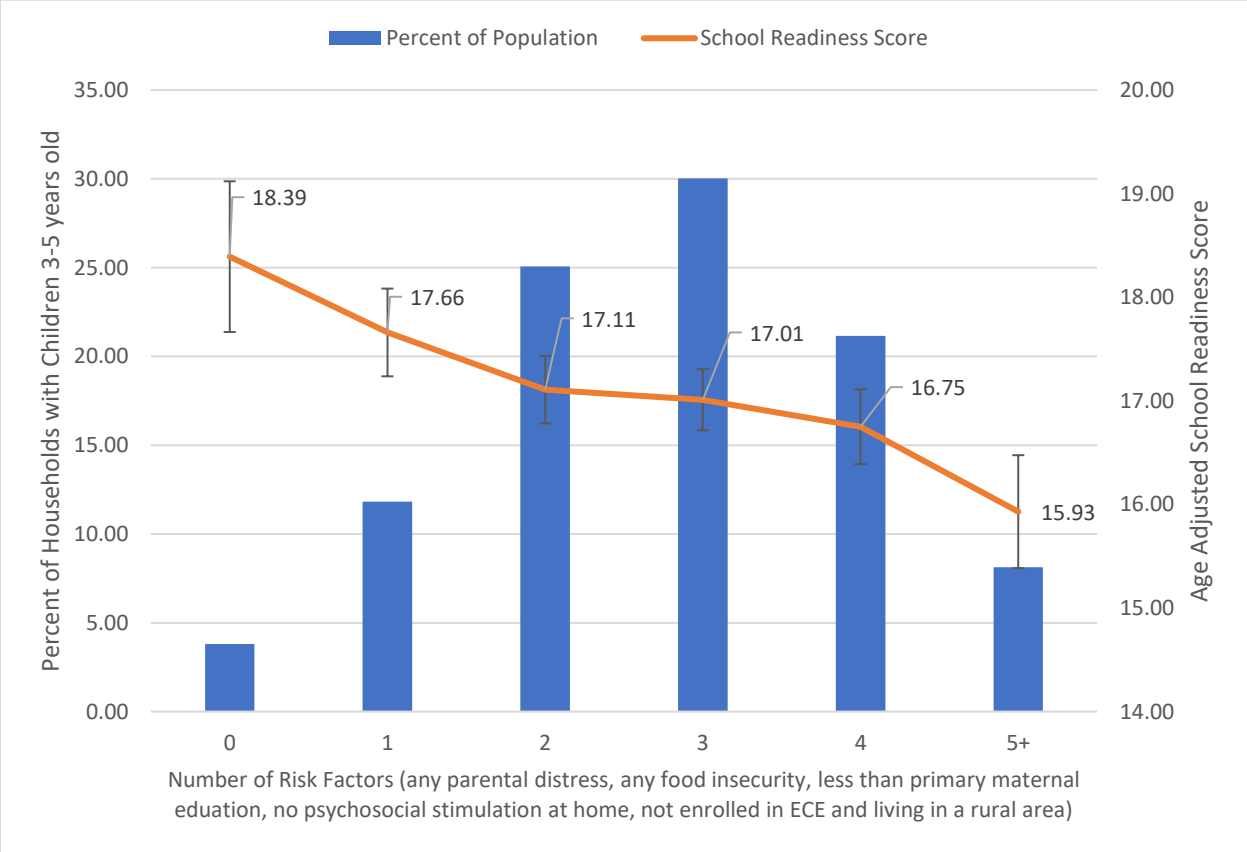
Note: All estimates weighted. Sample includes 1,389 children who are 0-35 months of age. "Experiences parental distress" indicates a score of 1 or higher." Experiences food insecurity" indicates cutting back on meals since March 2020 due to insufficient funds to some extent. "No psychosocial stimulation" indicates that the child did not have access to any learning materials nor did they participate in any stimulating activities with adult caregivers in the past 24 hours.

Figure 5 shows the average age-standardized school readiness sum score for children aged 3-6 by the number of risk factors experienced. Error bars indicate 95 percent confidence around each average. As such, there were minimal differences in average school readiness among children experiencing zero to three risk factors, but sharp declines in school readiness were evident for those experiencing four or more risk factors. For example, a child who experienced zero risk factors—that is, the child experienced no parental distress or food insecurity in their household,

had a mother with at least a primary school education or greater, experienced some amount of psychosocial stimulation at home, was enrolled in ECE, and lived in an urban area—on average would have an average school readiness score of 18.4 out of a possible 25 points, or score a 74 percent in terms of school readiness. This is in sharp contrast to a child who experienced five or six risk factors, who on average would score a 15.9 out of a possible 25 points or score a 64 percent in terms of school readiness.

Comparing the children who were in the top 75th percentile of school readiness sum scores to those in the bottom 25th percentile, those in the top quartile attended school at higher rates (74 percent compared to 18 percent enrolled in school), and experienced higher rates of maternal education (55 percent completed primary school compared to 42 percent, respectively).

Figure 5. School Readiness Among Children Aged 3-6 Years by the Number of Risk Factors Experienced



Note: All estimates weighted. Sample includes 1,389 children who are 0-35 months of age. "Experiences parental distress" indicates a score of 1 or higher." Experiences food insecurity" indicates cutting back on meals since March 2020 due to insufficient funds to some extent. "No psychosocial stimulation" indicates that the child did not have access to any learning materials nor did they participate in any stimulating activities with adult caregivers in the past 24 hours.

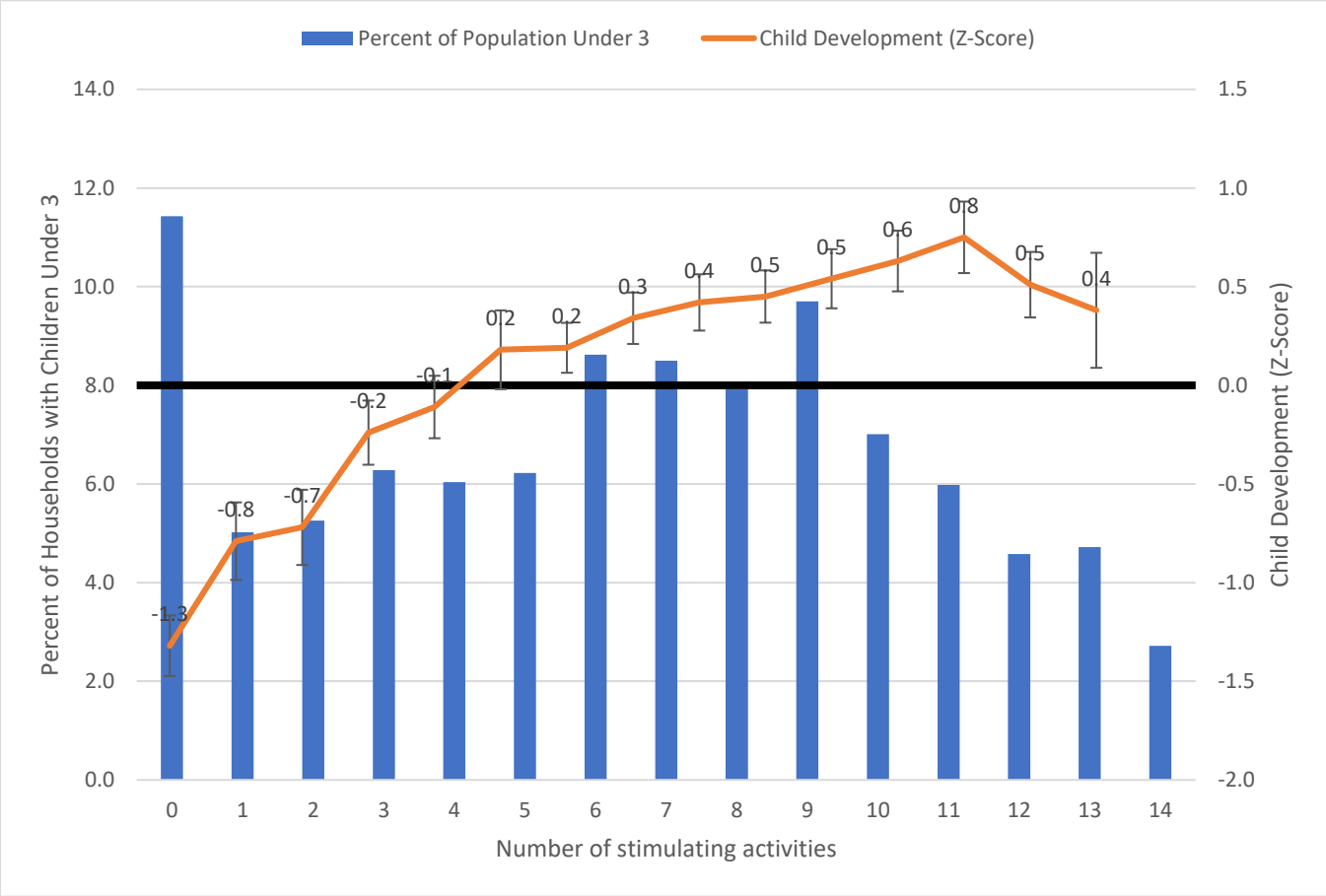
Psychosocial Stimulation and ECE Enrollment Show Associations with Child Development and School Readiness

For each age group, 0-35 months and 36-72 months, a simple OLS linear regression model was conducted of child development or school readiness on all risk factors of interest. Controlling for all key risk factors, the amount of psychosocial stimulation a child receives at home had the strongest association with child development for children 0-35 months ($p<0.001$) (Table 4). That is, holding the child's age, province, level of parental distress, maternal education, food insecurity status, and region constant, a one unit increase in psychosocial stimulation was associated with a 0.15 SD increase in child development Z-scores. Parental distress had the second strongest association with child development under age 3 ($p<0.001$). A one unit increase in parental distress was associated with 0.07 SD decrease in child development Z-scores. Figure 6 shows the descriptive relationship between the amount of stimulation received at home and average child development scores.

Table 4. Regression Results for Risk Factors on Child Development Under 3 Years of Age (N=1,389)

Variable	Beta Coefficient	Linearized Standard Error	P-Value
Constant	-0.48	0.11	<0.001
Early Learning/Stimulation	0.15	0.01	<0.001
Child Age	-0.01	0.00	<0.001
Parental Distress Sum Score	-0.07	0.01	<0.001
Province (REF=Punjab)			
Sindh	-0.03	0.06	0.664
Khyber Pakhtunkhwa	-0.18	0.06	0.001
Balochistan	0.01	0.08	0.940
Female Child Gender	-0.08	0.05	0.071
Maternal Education (REF=less than primary)			
Primary or Middle	0.11	0.06	0.074
Secondary or greater	-0.06	0.05	0.272
Any Food Insecurity	0.05	0.05	0.283
Rural Area	-0.01	0.05	0.768

Figure 6. Child Development Under 3 Years of Age by Varying Levels of Psychosocial Stimulation



Note: All estimates weighted. Sample includes 1,389 children who are 0-35 months of age. Psychosocial stimulation as measured by children's access to learning materials and participation in stimulating activities with adult caregivers in the past 24 hours on a scale of 0-14.

For children 36-72 months old, comparing all risk factors revealed that ECE enrollment had the strongest association with school readiness scores ($p<0.001$) (Table 5). That is, holding the child's age, province, level of parental distress, maternal education, food insecurity status, and region constant, being enrolled in school was associated with a 4.99-point increase in the school readiness score, or a 20-percentage point increase overall. For reference, this gap is equivalent to the difference between an average 3-year-old and an average 5-year-old's school readiness level. The amount of psychosocial stimulation a child received at home had the second strongest association with school readiness ($p<0.001$), which was associated with an increase of 0.43 school readiness points for each unit increase of psychosocial stimulation, controlling for all other risk factors. Secondary or greater maternal education (compared to less than primary maternal education) also had a positive association with school readiness ($p=0.025$). Child gender, living in a rural area, parental distress, and experiencing any level of food insecurity were not associated with school readiness.

Table 5. Regression Results for Risk Factors on School Readiness for Children Aged 3-6 Years (N=1,507)

Variable	Beta Coefficient	Linearized Standard Error	P-Value
Constant	6.97	1.20	<0.001
Enrolled in School	4.99	0.41	<0.001
Child Age	0.15	0.01	<0.001
Early Learning/Stimulation	0.43	0.06	<0.001
Maternal Education (REF=less than primary)			
Primary or Middle	-0.13	0.44	0.768
Secondary or greater	0.81	0.38	0.033
Province (REF=Punjab)			
Sindh	-0.17	0.43	0.691
Khyber Pakhtunkhwa	-0.44	0.37	0.244
Balochistan	-0.81	0.68	0.231
Female Child Gender	0.41	0.32	0.207
Rural Area	-0.24	0.34	0.475
Parental Distress Sum Score	0.05	0.09	0.562
Any Food Insecurity	-0.09	0.35	0.788

Parental Beliefs about Appropriate Age for School Entry

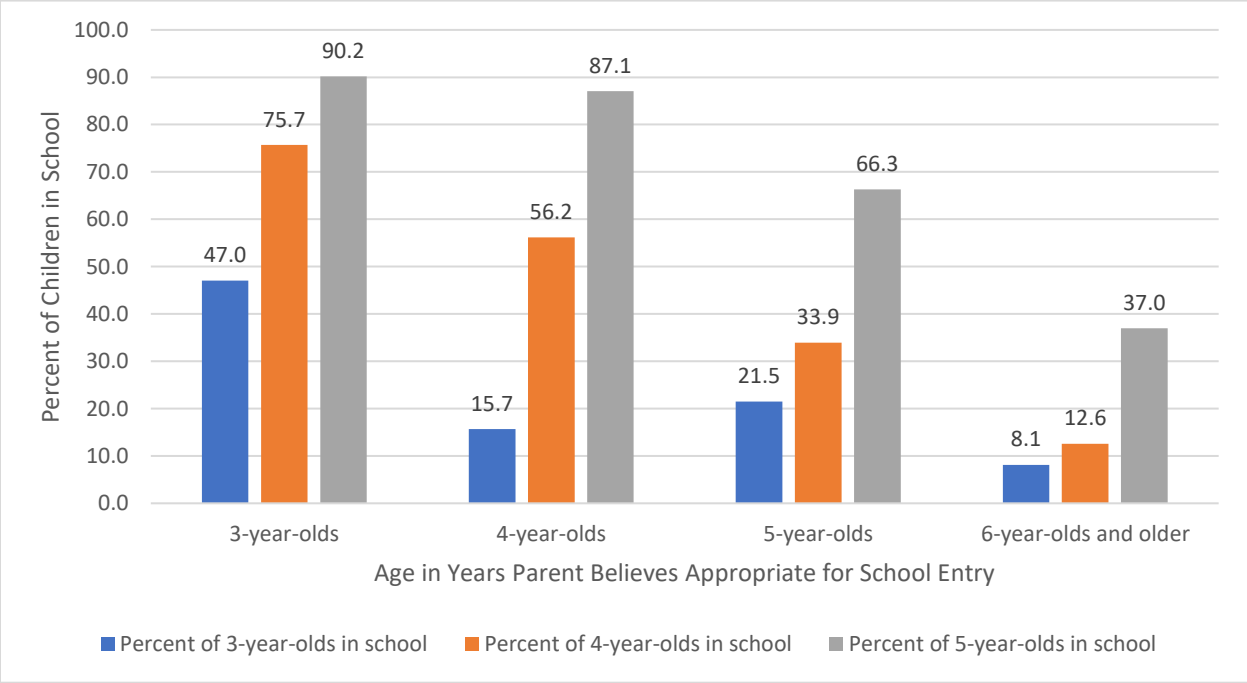
As ECE participation had the strongest association with school readiness, we asked parents when they think their child should begin school. Most parents believed their child should begin school at 5 years of age (42 percent), followed by 4 years of age (34 percent), 3 years of age (14 percent), 6+ years of age (10 percent), and 2 years of age (1 percent). Parents who reported they believe their child should begin school at a younger age tended to enroll their children at younger ages (Figure 7). For example, among parents who believed their child should begin school at age 3, we saw the highest rates of enrollment for all ages (47 percent for 3-year-olds, 76 percent for 4-year-olds, and 90 percent for 5-year-olds). This is in sharp contrast to parents who believed their child should not begin school until age 6 or older; among this group, only 8 percent of 3-year-olds, 13 percent of 4-year-olds, and 37 percent of 5-year-olds were enrolled in school.[7]

Parental beliefs on appropriate age of preschool entry also varied with maternal education (Figure 8). On average, mothers with less than a primary school education believed their child should begin school 4 months later than a mother with a primary school education or greater (4 years and 8 months vs. 4 years and 4 months respectively). This difference was statistically significant. Though mothers, on average, reported believing a younger age was more appropriate

[7] Enrollment in school refers to an index child between the ages of 36-72 months. Belief about the age when children should begin school refers to the caregivers' belief about all of their children, not just the index child.

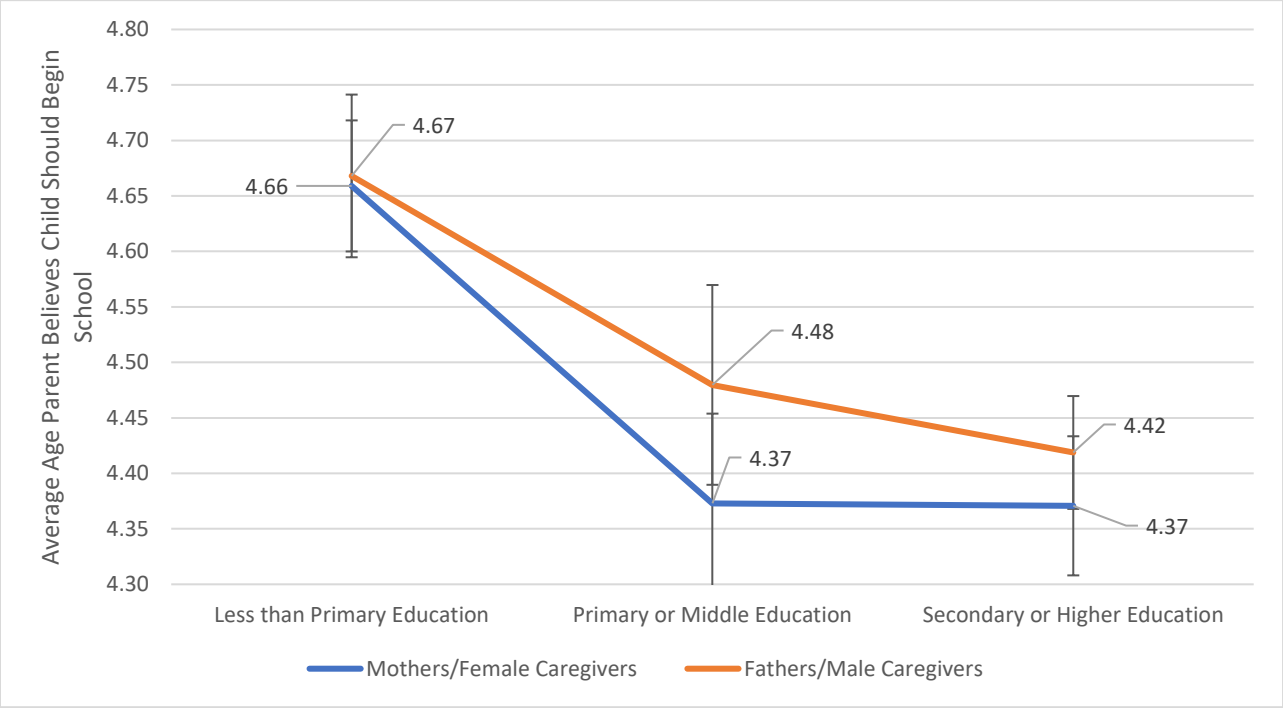
for school entry compared to that reported by similarly educated fathers, this difference was not statistically significant.

Figure 7. Actual School Enrollment for 3–5-year-olds by Age Parent Believes Child Should Begin School



Note: All estimates are weighted. The age parents believe their child should begin school is an open-ended question and the answer is in years. Sample includes all caregivers with a child aged 36-72 months (N=1,507)

Figure 8. Age Parents Believe Their Child Should Begin School by Parent Gender and Parental Educational Attainment

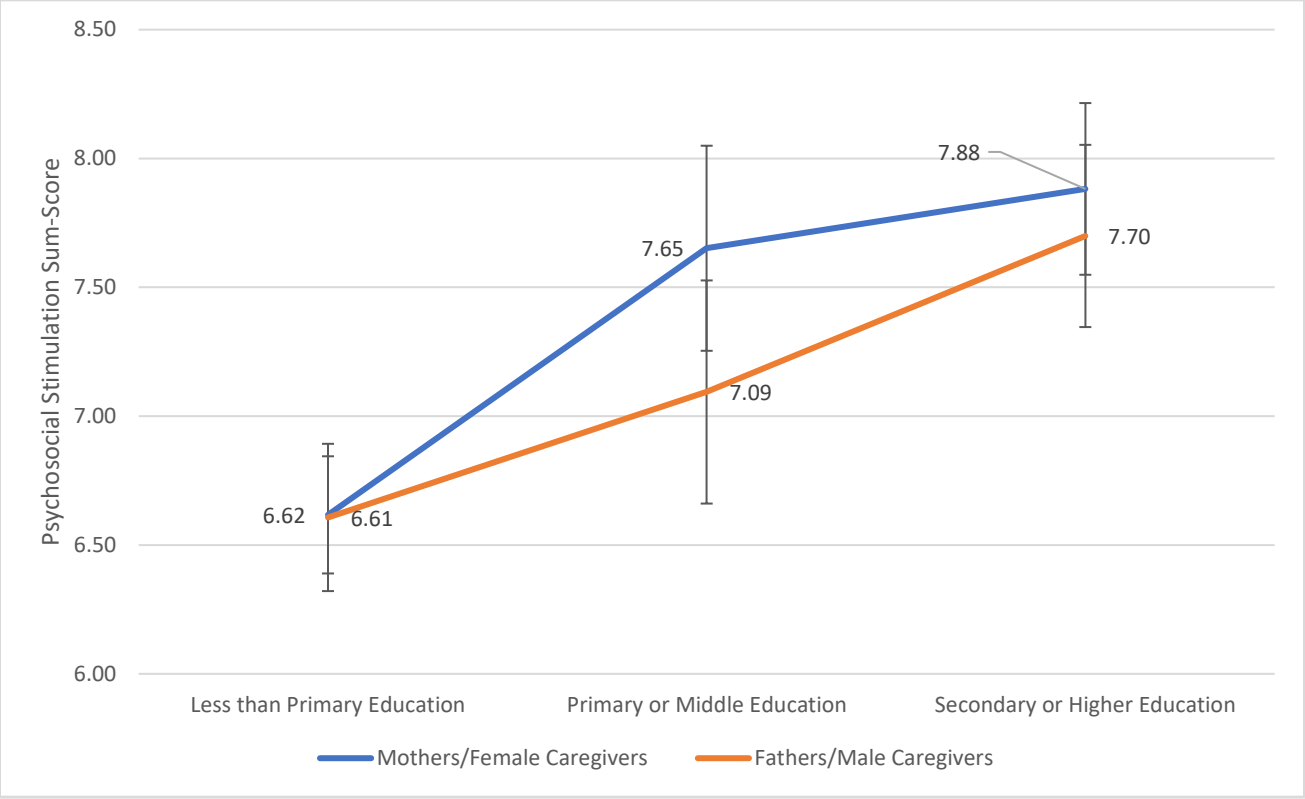


Note: All estimates are weighted, 95% confidence intervals included; Sample includes all caregivers with a child aged 36-72 months (N=1,507). The age parents believe their child should begin school is an open-ended question and the answer is in years.

Psychosocial Stimulation by Child and Caregiver Sex

Psychosocial stimulation was more strongly correlated with child development for children aged 0-35 months than any other independent variable examined, and it was also highly correlated with school readiness for children aged 36-72 months. No differences were found in the amount of psychosocial stimulation by child sex (p=0.9380). However, when assessing differences by parent sex, mothers reported providing significantly higher rates of psychosocial stimulation than fathers (p<0.001). On a scale of 0-14, a low level of stimulation was defined as four or fewer opportunities for learning and a high level of stimulation was defined as 11 to 14 opportunities. Twenty-seven percent of male caregivers reported providing low stimulation, whereas only 19 percent of female caregivers reported providing low stimulation. The median number of activities that mothers engaged in with their children is 8 (IQR= 6, 11), while the median number of activities that fathers engaged in with their children is 7 (IQR=4, 10). Greater maternal and paternal education were positively associated with statistically significantly higher levels of psychosocial stimulation (Figure 9). Notably, uneducated mothers and fathers provided almost the same (low) amount of psychosocial stimulation on average, but mothers who have completed at least primary school reported slightly higher provision of psychosocial stimulation than did similarly educated fathers, although this difference was not statistically significant.

Figure 9. Average Psychosocial Stimulation Scores Among Children Aged 0-72 Months in Pakistan by Parent Gender and Educational Attainment



Note: All estimates are weighted. Psychosocial stimulation as measured by children's access to learning materials and participation in stimulating activities with adult caregivers in the past 24 hours on a scale of 0-14. Sample includes all children (N=2,896))

4. Discussion

ECD has been an understudied area in Pakistan, particularly for very young children, and this study contributes to our understanding of how young Pakistani children are faring, through a holistic lens. Other national-level surveys tend to measure nutritional and physical growth metrics among children under age 3, academic performance among older children, or provide province-level but not national-level data, as in the case of the MICS surveys. This study, which provides national estimates of ECD, fills key gaps in the literature on children's development under age 3 and school readiness for children aged 3-6 years. We quantify the compounding and pernicious impact of multiple risk factors on children's development for both children under 3 and aged 3-6, with clear declines in development and school readiness as risk factors increase.

The study also explores which household- and caregiver-oriented variables have the strongest associations with child outcomes. For children under age 3, we found that higher levels of psychosocial stimulation at home and lower levels of caregiver distress are most significantly associated with higher scores on child development. For children ages 3-6, higher levels of

psychosocial stimulation at home were again shown to be one of the strongest correlates with school readiness levels, and enrollment in school was the strongest correlate of school readiness. The school readiness measure spanned content knowledge of literacy and math but also included age-appropriate social-emotional skills. To our knowledge, very little has been studied relative to young children's social-emotional skills in Pakistan until now. An exception is the recent ITA (2021) study in Punjab, which found that caregivers reported high levels of social-emotional skills among their young children, for example, getting along with other children (94 percent) and adjusting easily to transitions (79 percent). This domain, which includes the ability to share, follow directions, and cooperate, is known to be a key determinant of children's concurrent and long-term wellbeing and achievement (Taylor et al., 2017).

To better understand caregiver beliefs about enrollment, parents were asked at what age they believe their child should begin school. We found that 42 percent of parents believe their child should begin school at age 5, followed by 34 percent believing their child should begin school at age 4. This range aligns with current education policy in Pakistan, which states that compulsory education begins at age 5, and children should have at least one year of preprimary education. Given that well over half (58 percent) of children aged 5 are, in fact, not enrolled in school (Tomlinson et al., forthcoming), the current finding underscores the need to better understand supply- and demand-side barriers and to expand access to preschool opportunities across Pakistan. The ITA (2021) study findings from Punjab underscore this need, given that only one-fifth (21 percent) of heads of school reported high levels of regular attendance in school between January and March 2021, once schools reopened after COVID closures.

Results also showed a strong association between the age parents believe their child should begin school and actual enrollment, with younger-age beliefs correlating with actual enrollment. For example, parents who believe their child should begin school at age 3 have the highest rates of enrollment (regardless of child age); whereas parents who believe a child should enroll at age 6 are less likely than other parents to have a child enrolled in school (regardless of child age). Beliefs about school entry also differ by parental educational status. Uneducated mothers and fathers—that is, those who did not complete primary school—believe their child should start school at an older age than educated caregivers. The same pattern is seen with psychosocial stimulation; uneducated caregivers provide far less psychosocial stimulation than educated caregivers, who are more likely to talk with their young child, tell them stories, read to them, or take them on outings. This is true for mothers and fathers, but higher education levels—completion of secondary school or higher—correlates with higher stimulation for mothers than for fathers. This suggests both that supporting girls and women to go further in their education is especially important for improving ECD levels, and that intentionally teaching male caregivers about the importance of early stimulation could boost ECD outcomes.

Parents need support to manage distress and mental health concerns

Regardless of education, income or other assets, all parents need support to manage distress and mental health concerns, which have spiked during this COVID-19 period of isolation, service deprivation, and scarcity. Parental mental health is equally as important as physical health and nutrition status in terms of impacts on child development and school readiness. Investments in the holistic wellbeing of mothers and all household caregivers are investments in young children and human capital formation for Pakistan.

Our findings indicate a strong association between parental distress and child development; that is, children of non-distressed parents show higher ECD scores than children of distressed parents, and in more than half (57 percent) of households with children under age 3, parents were distressed. High rates of distress were similarly found across male and female caregivers, indicating that this is a universal issue in Pakistan. Caregivers of young children with pre-existing mental health conditions are at especially high risk for distress because of the social isolation, employment instability and school and childcare center closures imposed by the pandemic (UNICEF, 2021). Stress-related risks can be mitigated through effective interventions that promote parental wellbeing, such as those found in Turkey (Aksoy Derya et al., 2021) and China (Liu et al., 2021). In Pakistan, there are opportunities to meet parents' mental health needs at least partially through home visits, counseling, and dissemination of health and wellbeing messages.

Very low rates of psychosocial stimulation, especially for children under 3 years

Our study also found overall low rates of psychosocial stimulation in households, which was especially pertinent for children under 3 years of age, many of whom experience insufficient engaging interactions. This finding indicates a need to teach caregivers in Pakistan why and how to provide engaging and responsive interactions with children from birth onward. We also found that higher levels of psychosocial stimulation at home is strongly and positively associated with both ECD and school readiness levels. However, approximately 1 in every 9 children (12 percent) under age 3 in our study had experienced no psychosocial stimulation in the prior 24 hours. Bonding, hearing words, songs and rhymes, developing trust through responsive caregiving, experiencing playful interactions, and going on outings during the first 1,000 days of life have enormous bearing on brain development and cognitive and social-emotional trajectories. This is true in the next 1,000 days as well. It has been noted that caregivers in Pakistan—including not only mothers, but also fathers, older siblings, and other caregiving adults in the household—need to understand not only how but also why their interactions with infants and young children are pivotal to learning and development for sustained behavioral change (UNICEF, 2017). The ITA (2021) study highlights that children with disabilities are especially disadvantaged in terms of psychosocial stimulation, receiving less playtime, reading time or story telling than children without a disability.

Parenting education from the prenatal stage and throughout the early years is needed at scale across Pakistan, especially relative to early stimulation. Research in Pakistan and other South Asian countries such as India and Nepal have demonstrated the effectiveness of parental education programs on early stimulation and responsive care in improving children's development (ARNEC, 2019; Devercelli et al., 2022; Khan et. al, 2019; Sesame Street, 2019; Yousafzai et al. 2014), but there is need to build on them to provide programs at scale. Employing flexible, participatory, and multimodal approaches that are designed to meet the needs of extended-family caregivers is recommended (ARNEC, 2019), and programs should emphasize quality, frequency, and variety in interactions (Nieto, 2019). Programs can serve as distribution mechanisms to get books and learning and play materials into households and, when modeling and hands-on practice are involved, can strengthen caregiver-child bonds.

Prioritizing Early Childhood Education

ECE enrollment was the strongest predictor of school readiness in this study, and it is an essential area for enforcing and strengthening policy in Pakistan. Just 19 percent of children aged 3-5 are enrolled nationally, and the rates are even lower among vulnerable populations (Tomlinson et al., forthcoming). There is global evidence showing that including ECE in compulsory education effectively increases enrollment rates (e.g., Tanzania; UNICEF, 2019). In Pakistan, children aged 5 years are considered primary students in some data sets and preprimary in the National Education Policy 2009—regardless, 58 percent of 5-year-olds are not enrolled in school at any level (Tomlinson et al., forthcoming). Given the strong link shown in this study between school enrollment and school readiness levels in Pakistan, supported by a deep body of research internationally, Pakistan would benefit from both enforcing existing policies and ensuring that programs are widely available and of high quality. Further clarity in policy documents citing national or provincial goals for intensity and duration of enrollment, backed by data gathering on key performance indicators, would elevate ECD and school readiness as national priorities.

Our findings that show that most parents believe children should be enrolled in school between ages 4 and 5 contrast with high levels of non-enrollment at those ages, which suggests barriers to enrollment need to be better understood and removed. The ITA (2021) study in Punjab reported that costs, transportation, lack of information about program quality, and clarity on parents' rights and responsibilities were barriers to participation (World Bank, 2019). Given Pakistan's successes with deploying and expanding cash transfer programs, the expansion of early childhood education could also be supported using this approach. The lack of ECE-oriented information and school accountability can be addressed via community-driven interventions that leverage local community and religious leadership to participate in awareness raising, cultivating a culture that elevates the importance and benefits of ECE.

Need to promote holistic ECD programs

Despite the challenges, Pakistan already has programs and platforms in place to effectively promote holistic ECD (Devercelli et al., 2022). Pilot interventions have shown that low-cost mental health interventions such as the Thinking Healthy Programme, delivered by community health workers, show modest benefits including reduced maternal depression and disability, improved knowledge about play and development, and improved breastfeeding practices (Rahman et al., 2012; Sikander et al., 2019). Community-based health interventions have been shown to promote newborn survival, improve children's health, and reduce stunting (Lassi et al., 2016; Khan et al., 2019; Yousafzai et al., 2018). In addition, teaching stimulation and nurturing care in parenting programs delivered through community health services and family physicians has been shown to significantly benefit children's development and care in Pakistan (Khan et al., 2019; Yousafzai et al., 2014).

Resources and attention directed toward families with children under age 3 who provide inadequate psychosocial stimulation would boost outcomes for this vulnerable population and would engender greater opportunities for healthy development and learning longitudinally. This population is likely to be larger than it appears in this study because the sample excludes the most disenfranchised families, those who lack the resources to have a cell phone and are therefore likely among the poorest households. Providing caregivers—including the more than one-tenth of the population lacking early stimulation knowledge and skills—with the support needed, for example, through parenting programs or health-based services, to responsively engage with their young children will facilitate disadvantaged children's likelihood of reaching their developmental and productivity potential.

Implications for data collection

Better and more data are needed through national and provincial surveys to explore the nexus between ECD services and children's cognitive and social-emotional development. At present, household surveys such as PSLM, MICS and National Nutrition Survey, along with administrative data on service uptake, allow for analyses of some ECD outcomes, such as nutritional status and ECE enrollment. However, these surveys do not lend themselves to a comprehensive analysis of holistic ECD that focuses on cognitive and social-emotional development for children across the birth to age 6 span. The current survey constitutes a first attempt to gather and analyze this information—albeit in an operating environment restricted by the pandemic. Comprehensive and regular survey data tracking children's development and school readiness, based on ECE experience, socioeconomic status, location, gender, and other factors, can provide insights into which interventions work and for whom. Monitoring of inequities is crucial to assess if the most

vulnerable populations are reached, especially given the higher poverty risk for families with young children (World Bank, 2012).

Second, there is a need to better understand constraints and effective mechanisms to increase access to and quality of ECE programs. Research on age of entry, program type and duration, and intensity of attendance is needed to understand which ECE programs are working and for whom. Program quality data are almost entirely lacking. Reliable administrative data on elements of quality, including teacher-child interactions, student-teacher ratios, mixed-aged classrooms, physical environments, availability of materials, curriculum, teacher training, incentive structures, and parent engagement, among other inputs, would be invaluable. Notably, it would be worth exploring the frequency and effectiveness of psychosocial stimulation in the classroom. Data on both supply- and demand-side barriers are needed, with analysis of the impacts of socio-cultural norms and income inequalities, to allow for more targeted access to ECE and entry points for coordinated service provision.

Third, further research is needed to explore the role of gender-related norms, knowledge, and skills relevant to ECD. While this study provides an initial analysis of parental stimulation and ECD, further research is needed on differential patterns of early stimulation between women and men caregivers, how those might impact child development, and what approaches to parenting education programs are effective for women and men respectively.

Limitations

Several constraints in data collection limit the conclusions we could draw. First, the respondents were predominantly male, which meant that most respondents were not the child's primary caregiver. Second, an issue with cell-phone towers in Sindh resulted in under-sampling the province, however we were able to account for any selection bias with survey weights. Third, approximately 6 percent of Pakistani households that do not own a phone were excluded from our study. As such, our study results are only representative of the phone-owning households in Pakistan. Fourth, given the nature of the phone survey, all responses were caregiver-reported. Fifth, since the survey was cross-sectional, we could not draw any causal inferences from our regression analyses, and rather could only comment on associations between our exposures and outcomes of interest.

Conclusion

This work sheds light on a major gap in the ECD literature as, prior to this study, no nationally representative data existed that quantified ECD among 0–3-year-olds in Pakistan. Moreover, it highlights the need to expand the reach of parenting education programs that explicitly teach

parents, including fathers, both why and how to provide responsive and engaging interactions with their children from infancy onward. These programs should prioritize caregivers of children of all ages, but specifically the one-ninth of caregivers who provide no stimulation to children under age 3 – an age when responsive engagement is uniquely important to development. Early childhood education was gaining ground in the education sector prior to COVID-19, and gains must not be lost due to pandemic-related economic setbacks if Pakistan wants to invest efficiently. ECD has been overlooked as a key contributor to child development, academic achievement, and human capital development in Pakistan, and until more attention and resources to young children and families are provided, the status quo will remain.

References

Aksoy Derya, Y., Altiparmak, S., AkÇa, E., GÖkbulut, N., & Yilmaz, A. N. (2021). Pregnancy and birth planning during COVID-19: The effects of tele-education offered to pregnant women on prenatal distress and pregnancy-related anxiety. *Midwifery*, *92*, 102877. https://doi.org/10.1016/j.midw.2020.102877

Alderman, H., & Fernald, L. (2017). The nexus between nutrition and early childhood development. *Annual Review of Nutrition 37*(1). DOI:10.1146/annurev-nutr-071816-064627.

ARNEC, (2019). *Noteworthy ECD Parenting Programmes in Support of Young Children's Holistic Development and Protection in the Asia-Pacific Region.* Singapore: ARNEC.

Bufferd, S. J., Dougherty, L. R., Carlson, G. A., Rose, S., & Klein, D. N. (2012). Psychiatric disorders in preschoolers: continuity from ages 3 to 6. *The American journal of psychiatry*, *169*(11), 1157–1164. https://doi.org/10.1176/appi.ajp.2012.12020268Cuartas J. (2022) The effect of maternal education on parenting and early childhood development: An instrumental variables approach. *Journal of Family Psychology.36*(2):280-290. doi: 10.1037/fam0000886.

Edil, E.T.A., Narayanasamy, A., & Kadri, N. M. (2020). The relationship between parental distress and child emotional problems. *Psychology and Education Journal, 57*(9). DOI: https://doi.org/10.17762/pae.v57i9.623.

Devercelli, A. E., Bendini, M. M., Hasan, A., & Le Mottee, S. A. (2022). *Learning During the Early Years: What is it? Why Does it Matter? And How Do We Promote it?* Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/099425203102220416/P16951303b956d040083410ab7f69343a45.

Dizon-Ross, R. (2019). Parents' Beliefs about Their Children's Academic Ability: Implications for Educational Investments. *American Economic Review*, 109 (8): 2728-65. DOI: 10.1257/aer.20171172

Galevski, M., Adona, V. J. A., Barbosa, B. B., Ben Yahmed, Z., Currimjee, A., Ibrahim, R., Song, C., Tazi, S. & Yacoub, R. (2021). *COVID-19 and the Early Years: A Cross-Country Overview of Impact and Response in Early Childhood Development.* World Bank, Washington, DC. https://documents1.worldbank.org/curated/en/807711625809488690/pdf/COVID-19-and-the-Early-Years-A-Cross-Country-Overview-of-Impact-and-Response-in-Early-Childhood-Development.pdf

Geven, K., Fasih, T., & Hasan, A. (2020). *COVID-19 Impact on School Age Girls and Adolescents in Punjab, Pakistan – First Insights from the SMS Girl Impact Evaluation.* World Bank. https://thedocs.worldbank.org/en/doc/620491611349287738-0310022021/original/SMSGIRLDec22020FirstResults.pdf

Geven, K., and A. Hasan. (2020). *Learning Losses in Pakistan Due to COVID-19 School Closures: A Technical Note on Stimulation Results.* Washington, DC: World Bank. https://openknowledge.worldbank.org/bitstream/handle/10986/34659/Learning-Losses-in-Pakistan-Due-to-COVID-19-School-Closures-A-Technical-Note-on-Simulation-Results.pdf?sequence=1#:~:text=We%20estimate%20that%20school%20closures,quality%20of%20the%20school%20system.

Hasan, A., Nakajima, N., Rangel, M. A. (2020). Mama Knows (and Does) Best: Maternal Schooling Opportunities and Child Development in Indonesia. *World Bank Policy Research Working Paper No. 9355.* https://openknowledge.worldbank.org/bitstream/handle/10986/34352/Mama-Knows-and-Does-Best-Maternal-Schooling-Opportunities-and-Child-Development-in-Indonesia.pdf?sequence=1&isAllowed=y

Hattangadi, N., Cost, K.T., Birken, C.S. et al, 2020 Parenting stress during infancy is a risk factor for mental health problems in 3-year-old children. *BMC Public Health 20,* 1726. https://doi.org/10.1186/s12889-020-09861-5.

Hentschel, E., Yousafzai, A., Aboud, F. (2021). *The nurturing care framework: indicators for measuring responsive care and early learning activities.* The World Health Organization. https://nurturing-care.org/assessing-responsive-caregiving-and-early-learning-activities/

Hentschel, E., Siyal S., Aboud F., McCoy, D., Tiemeier, H., Yousafzai, A. K. (*In preparation*). The Development, Reliability, and Validity of the Early Learning Indicator Tool.

Howard, L. M., Molyneaux, E., Dennis, C. L., Rochat, T., Stein, A., & Milgrom, J. (2014). Non-psychotic mental disorders in the perinatal period. *Lancet (London, England)*, *384*(9956), 1775–1788. https://doi.org/10.1016/S0140-6736(14)61276-9Huang, W., Weinert, S., von Maurice, J., & Attig, M. (2022). Specific parenting behaviors link maternal education to toddlers' language and social competence. *Journal of Family Psychology*. doi: 10.1037/fam0000950. Epub ahead of print.

Idara-e-Taleem-o-Aagahi (ITA). (2021, August). *Policy Discussion: Early Learning Partnership Phase II COVID-19 Interim Research 2021.* Lahore, Pakistan. https://itacec.org/Reports-and-Publications.

Khan, S., Zaheer, S. & Safdar, N.F. (2019). Determinants of stunting, underweight and wasting among children <5 years of age: evidence from 2012-2013 Pakistan demographic and health survey. *BMC Public Health 19(*358). https://doi.org/10.1186/s12889-019-6688-2

Lassi ZS, Kumar R, Bhutta ZA. (2016, April) Community-Based Care to Improve Maternal, Newborn, and Child Health. In: *Black RE, Laxminarayan R, Temmerman M, et al., editors. Reproductive, Maternal, Newborn, and Child Health: Disease Control Priorities, Third Edition (Volume 2).* Washington (DC): The International Bank for Reconstruction and Development. doi: 10.1596/978-1-4648-0348-2_ch14

Liu, G., Wang, S., Liao, J., Ou, P., Huang, L., Xie, N., He, Y., Lin, J., He, H. G., & Hu, R. (2021). The Efficacy of WeChat-Based Parenting Training on the Psychological Well-being of Mothers With Children With Autism During the COVID-19 Pandemic: Quasi-Experimental Study. *JMIR mental health*, *8*(2), e23917. https://doi.org/10.2196/23917

Lu, C., Black, M. M., & Richter, L. M. (2016). Risk of poor development in young children in low-income and middle-income countries: an estimation and analysis at the global, regional, and country level. *The Lancet. Global health*, *4*(12), e916–e922. https://doi.org/10.1016/S2214-109X(16)30266-2

Maselko, J., Sikander, S., Bangash, O., Bhalotra, S., Franz, L., Ganga, N., Rajan, D.G., O'Donnell, K., & Rahman, A. (2016). Child mental health and maternal depression history in Pakistan. *Social Psychiatry and Psychiatric Epidemiology, 51*(1):49-62. doi: 10.1007/s00127-015-1143-x. Epub 2015 Nov 11. PMID: 26561398; PMCID: PMC6658413.

McCoy, D. C., Seiden, J., Waldman, M., & Fink, G. (2021). Measuring early childhood development: considerations and evidence regarding the Caregiver Reported Early Development Instruments. *Annals of the New York Academy of Sciences*, *1492*(1), 3–10. https://doi.org/10.1111/nyas.14598MNHSRC

(Ministry of National Health, Services, Regulations and Coordination) Nutrition Wing. (2018). *National Nutrition Survey 2018 Volume I*. http://phkh.nhsrc.pk/sites/default/files/2021-03/National%20Nutrition%20Survey%20Key%20Findings%20Volum%201%20UNICEF%202018.pdf.

NICHD Early Child Care Research Network (2007). Age of Entry to Kindergarten and Children's Academic Achievement and Socioemotional Development. *Early education and development*, *18*(2), 337–368. https://doi.org/10.1080/10409280701283460

Nieto, A., (2019). The Power of Play in Building Resilience Among Children and Families.https://arnec.net/search-content?keyword=The%20Power%20of%20Play%20in%20Building%20Resilience%20Among%20Children%20and%20Families. Accessed 06 June 2022.

Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., Chisholm, D., Collins, P. Y., Cooper, J. L., Eaton, J., Herrman, H., Herzallah, M. M., Huang, Y., Jordans, M., Kleinman, A., Medina-Mora, M. E., Morgan, E., Niaz, U., Omigbodun, O., Prince, M., … UnÜtzer, J. (2018). The Lancet Commission on global mental health and sustainable development. *Lancet (London, England)*, *392*(10157), 1553–1598. https://doi.org/10.1016/S0140-6736(18)31612-X

Pinquart M. (2017). Associations of parenting dimensions and styles with externalizing problems of children and adolescents: An updated meta-analysis. *Developmental psychology*, *53*(5), 873–932. https://doi.org/10.1037/dev0000295

Rahman, A., Malik, A., Sikander, S., Roberts, C., & Creed, F. (2008). Cognitive behaviour therapy-based intervention by community health workers for mothers with depression and their infants in rural Pakistan: a cluster-randomised controlled trial. *Lancet (London, England)*, *372*(9642), 902–909. https://doi.org/10.1016/S0140-6736(08)61400-2 Sabates, R., & Dex, S. (2012). Multiple risk factors in young children's development. Centre for Longitudinal Studies, Institute of Education, University of London. Online at https://cls.ucl.ac.uk/wp-content/uploads/2017/04/CLS-WP-2012-1.pdf.

Sesame Street.(2019). Findings from an Evaluation of Sesame Workshop's Play Every Day. . https://www.sesameworkshop.org/sites/default/files/2022-04/play-every-day-evaluation-results.pdf . Accessed 06 June 2022.

Sikander, S., Ahmad, I., Atif, N., Zaidi, A., Vanobberghen, F., Weiss, H. A., Nisar, A., Tabana, H., Ain Q. U., Bibi, A., Bilal, S., Bibi T., Liaqat, R., Sharif, M., Zulfiqar, S., Fuhr, D. C., Price, L. N., Patel, V., & Rahman, A. (2019). Delivering the Thinking Healthy Programme for perinatal depression through volunteer peers: a cluster randomized controlled trial in Pakistan. *The lancet. Psychiatry, 6(2),* 128-139. https://doi.org/10.1016/S2215-0366(18)30467-X

Sikander, S. (2020). A letter from Pakistan. *The Lancet Psychiatry, 7*(10). DOI:https://doi.org/10.1016/S2215-0366(20)30387-4.

Taylor, R. D., Oberle, E., Durlak, J. A., & Weissberg, R. P. (2017). Promoting Positive Youth Development Through School-Based Social and Emotional Learning Interventions: A Meta-Analysis of Follow-Up Effects. Special Section. *Child Development, 88*(4). https://doi.org/10.1111/cdev.12864.

Tomlinson, H. B., Hentschel, E., Chowdry, M. T., Ansari, A., Zamand, M., Yousafzai, A. K., Hasan, A. (forthcoming). Fostering Early Childhood Development. In Pakistan Human Capital Review. Washington, DC: World Bank.

Tseng, K.K., Park, S.H., Shearston, J.A., Lee, L., & Weitzman M. (2017). Parental Psychological Distress and Family Food Insecurity: Sad Dads in Hungry Homes. *Journal of Developmental and Behavioral Pediatrics, 38*(8):611-618. doi: 10.1097/DBP.0000000000000481. PMID: 28742541.

UNESCO. (2017). *Overview of MELQO: Measuring Early Learning Quality Outcomes.* Jointly published by UNESCO, UNICEF, World Bank & Brookings Institution. Paris: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000248053

UNICEF. (2017). Formative Research on behavioral determinants of stunting in Ghotki, Khairpur and Nosheroferoze districts, Sindh Province. Islamabad: UNICEF Pakistan. https://www.unicef.org/pakistan/media/3231/file/Formative%20Research%20On%20Behavioral%20Determinants%20of%20Stunting.pdf

UNICEF. (2019). A WORLD READY TO LEARN: Prioritizing quality early childhood education Advocacy Brief: United Nations Children's Fund (UNICEF). Online at https://www.unicef.org/media/57931/file/A-world-ready-to-learn-advocacy-brief-2019.pdf.

UNICEF. (2020). Guidance on the Importance of Quality in Early Childhood Learning and Education in Latin America and the Caribbean. Retrieved from: https://www.unicef.org/lac/media/11066/file/Importance-Quality-ECE-LAC.pdf.

UNICEF. (2021). *Young Children and the Pandemic: UNICEF Early Childhood COVID-19 Response in East Asia and Pacific.* Bangkok: United Nations Children's Fund (UNICEF). https://www.unicef.org/eap/young-children-and-pandemic

World Bank. (2019). Early Learning Partnership Systems Research: Phase I (2017-19): Summary Brief. Washington, DC: World Bank.

World Bank. (2021a). *Pakistan-Macro Poverty Outlook (English). Macro Poverty Outlook (MPO).* Washington, DC: World Bank Group. Online at https://documents1.worldbank.org/curated/en/304441623940931868/pdf/Pakistan-Macro-Poverty-Outlook.pdf.

World Bank. (2021b). School enrollment, primary (gross), gender parity index (GPI). World Bank Open Data. Washington, DC: World Bank. https://data.worldbank.org/indicator/SE.ENR.PRIM.FM.ZS.

World Bank. (2022). The World Bank in Pakistan: Economic update and outlook. Washington, DC: World Bank. Online at: https://www.worldbank.org/en/country/pakistan/overview.

World Health Organization, United Nations Children's Fund, World Bank Group. Nurturing care for early childhood development: a framework for helping children survive and thrive to transform health and human potential. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO. https://apps.who.int/iris/bitstream/handle/10665/272603/9789241514064-eng.pdf

Yousafzai, A. K., Rasheed, M. A., & Bhutta, Z. A. (2013). Annual Research Review: Improved nutrition--pathway to resilience. *Journal of Child Psychology and Psychiatry, 54*(4):367-77. doi: 10.1111/jcpp.12019.

Yousafzai, A. K., Rasheed, M. A., Rizvi, A., Armstrong, R., & Bhutta, Z. A. (2014). Effect of integrated responsive stimulation and nutrition interventions in the Lady Health Worker programme in Pakistan on child development, growth, and health outcomes: a cluster-randomised factorial effectiveness trial. *Lancet. 384*(9950):1282-93. doi: 10.1016/S0140-6736(14)60455-4.

Yousafzai, A. K., Rasheed, M. A., & Siyal, S. (2018). Integration of parenting and nutrition interventions in a community health program in Pakistan: an implementation evaluation. *Annals of the New York Academy of Sciences, 1419*(160-178). doi: 10.1111/nyas.13649.

Yoshikawa, H., Wuermli, A. J., Britto, P. R., Dreyer, B., Leckman, J. F., Lye, S. J., Ponguta, L. A., Richter, L. M., & Stein, A. (2020). Effects of the Global Coronavirus Disease-2019 Pandemic on Early Childhood Development: Short- and Long-Term Risks and Mitigating Program and Policy Actions. *The Journal of pediatrics*, *223*, 188–193. https://doi.org/10.1016/j.jpeds.2020.05.020