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Coping with COVID-19 in Global South: Evidence from Pakistan and Ethiopia on use of technology by ECCE students and workforce

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ABSTRACT

While Early Childhood Care and Education is crucial for educational attainment, it has been at a particular disadvantage in the context of COVID-19 ensued school closures and distance learning. This study aims to understand the role that technology has played in helping pre-primary learners access remote learning, and to what extent have teachers/head teachers transferred the knowledge/guidance received from the government to the students and their families and have relied on tech-enabled mediums in doing so. We use a mixed-methods approach intended to produce policy-relevant evidence on the use of and effectiveness of technology in ensuring learning continuity for early years during Covid-19 and present insights drawn from primary data collected across the two countries of Pakistan (Punjab province) and Ethiopia. We find that there was limited usage of tech-enabled modes of distance learning coupled with limited access to distance learning in Pakistan and Ethiopia during the COVID-19 induced school closures. In addition to this, while there was limited level of engagement between ECCE workforce and caregivers/students during the school closures, governmental support through provision of general professional development training and/or guidance on different aspects of distance learning such as remote assessments and use of radio contribute positively towards generating higher level of engagement between ECCE workforce and caregivers.

1. Introduction

Early Childhood Care and Education (ECCE) is recognized as crucial for attaining education goals of the UN Sustainable Development Goals (United Nations, 2015, p. 19.), with evidence suggesting that: (1) it equips children with good language and literacy and numeracy skills in the early years, which are vital for success in school (Fricke et al. 2013) (2) prevents subsequent costs associated with grade repetition and 'churning' (Tracy Brunette, 2017), (3) and leads to large economic and social returns (Heckman 2006). While government policy and provision vary across countries, early learning is increasingly integrated into basic education; at least one year of pre-primary education is compulsory in about 50 countries[1]. The 2017/18 GEM Report found that in 2015, 69% of children worldwide participated in pre-primary or primary schooling in the year before primary entry age, with private ECE outstripping public enrollment[2]. However, little is currently known about how young children in low- and lower-middle-income countries (LMICs) access and progress through early childhood education. Existing research tends to focus on ECCE enrolment and access, rather than on quality, holistic learning and child wellbeing (Gove, 2017). Evidence on what works to improve child development, education and life outcomes is scarce, particularly in the context of emergencies and conflicts and for marginalized subgroups including children with disabilities. It is pertinent to mention that there is an ongoing discussion amongst the international community of researchers and practitioners regarding the definition of quality in ECE to be utilized across contexts. In

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[1] https://en.unesco.org/news/majority-countries-do-not-ensure-right-pre-primary-education-according-new-unesco-study

[2] http://data.uis.unesco.org/

the background paper on ECE quality for the Education for All Global Monitoring Report (2006), Robert Myers builds on the discussion of coherence versus diversity by Peter Moss, and presents an argument against a narrow perspective on quality. He suggests that both the structural and process quality is important as well as the contextual factors such as the relationship between centres and families. The successful expansion of non-state actors to provide early childhood education has also contributed to the ongoing debate on the matters of quality and equity within early years (Baum, 2020).

The COVID-19 pandemic is a shock to education systems without historical precedent (Global Education Monitoring Report, 2020) and there is a growing recognition in the policy community that early childhood care and education is at a particular disadvantage in the context of school closures and distance delivery. Even before the pandemic, only 21% of young children were enrolled in ECE in low-income countries, (Devercelli, 2020). Over 35 million children in the 3 to 5 years age group across the world are missing out on quality early development and learning opportunities (Gromada, Richardson & Rees, 2020). Taking lessons from the 2014-2016 Ebola crisis, the pandemic is likely to impact young children in grave ways, putting them more at risk of violence, abuse, and neglect as families struggle with threats to their lives and livelihoods (Devercelli, 2020). With countries across the world having quickly pivoted to remote forms of instruction through virtual classrooms, instruction delivered through TV and radio, and communications through WhatsApp and other mobile applications, the youngest children (3-7 years) are least able to independently take advantage of remote-learning opportunities. Moreover, households and families remain concerned with the disadvantages of (unattended) exposure of young children to digital devices (Alliance for Childhood, 2007). Yet at the same time, the basic facts that early learning experiences are critical to lifelong human capital formation remain unchanged. Therefore, knowledge on how to preserve priority for and availability of early learning opportunities for all children remains of utmost importance.

The ground realities of Global South have further exacerbated the disruptions caused by the school closures during the pandemic and their negative impact on ECCE students. Firstly, there is a lack of access to technology and quality internet services[3] which means that the majority of the population in the selected countries does not have a smartphone and computer with internet connection. Thus, there exists a significant level of digital divide within these countries which makes it difficult to implement standardized distance-learning programs across the board. Secondly, while poverty was already among the prime contributors towards children being out of school in the Global South, more families have been pushed into the vicious cycle of poverty due to the pandemic and are now forced to trade-off their children's education for income through child labor. Lastly, it is also of importance for pre-primary schools to maintain a continuous contact with children and their parents to stop the children from dropping out of school during COVID-19 related school closures. This, however, remains yet to be evaluated.

With this background in mind and as countries rebuild their education systems after the pandemic and look to ways to promote resilience to future shocks, the extent to which early learning has been affected by COVID-19 is an open question. The aim of this paper is to understand the role (if any) technology has played in helping pre-primary learners access distance/remote learning and to what extent ECCE workforce had employed technology to engage with the students and their families during the pandemic. Adopting a mixed methods design containing both quantitative and qualitative instruments, the study has

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[3] https://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=PK-ET-TZ

been conducted across Punjab province of Pakistan and Ethiopia that are a part of the Early Learning Partnership (ELP) systems research initiative (World Bank, 2016).

Ethiopia is in a phase of extensive and ongoing policy reform in the early learning sector, which started with the introduction of a National Policy Framework for Early Childhood Care and Education in 2010. Until 2010, pre-primary education was provided almost exclusively by the private sector in kindergartens, mainly concentrated in urban areas. It was after the introduction of O-class in 2010 (a one-year program attached to primary schools) which is financed by the government that the enrolment of early childhood education increased from 4.2% in 2008/09 to 45% in 2016/17 (MoE-EMIS, 2017). However, this massive influx of young children into the system has created substantial challenges in the provision of equitable access to quality ECE provision in the country (Kim et al., 2021; Rossiter et al., 2018; Teferra & Hagos, 2016). In the context of the COVID-19 pandemic, ensuring quality early learning became even more challenging due to the unequalising effects of the crisis. As a result of school closures, which began in Ethiopia in March 2020, approximately 26 million primary school students were out of school for at least six months. When the schools were closed nationwide, the Ministry of Education announced the Education Sector COVID-19 Preparedness and Response Plan on April 3, 2020. This plan aimed to support students' distance learning through a number of measures including lessons broadcast through radio and television. They placed special emphasis on supporting disadvantaged students stating, "…vulnerable and disadvantaged children are the most affected and hence will be given special emphasis during this complicated crisis" (MoE, 2020, p. 1). However, the provision of distance learning through available media channels focused on primary and secondary education only. As a result, many pre-primary students had little or no education during the closure period. Studies suggest distance learning did not reach all students, and those already facing the greatest disadvantages received the least support (Azevedo et al., 2020; Kim et al., 2020; Wieser et al., 2020).

In the case of Pakistan, due to Pakistan's proximity to China where the COVID-19 outbreak was first discovered, it was among the first countries to institute widespread school closures[4]. Schools began closing in Sindh province in February 2020, and by March 14, 2020 all schools were closed. Six months later, schools began a staggered reopening, with early childhood education starting up again on September 30, 2020. The rising COVID-19 cases resulted in the provincial governments again closing schools in November[5]. According to the Ministry of Federal Education & Professional Training (MoFE&PT)'s estimates, at least 40 million children across all grade levels were impacted by the pandemic[6]. The majority affected were the younger ECE/lower primary aged children who ended up being provided with far lesser options of distance learning and home schooling, as both teachers and parents were unprepared for the task of supporting children in ECE. While upper grades from primary schooling onwards were offered some distance learning opportunities as well as regular contacts by teachers for assignment/homework, such a systematic approach was lacking for ECE. At the federal level, the government offered tele-school to children staying at home during the pandemic. ECE-relevant shows were telecasted for an hour daily at 8 am on Pakistan's national television station. According to actors in the subsector, content on ECE was also offered on radio. However, households in many rural areas of the

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[4] Geven & Hasan, 2020
[5] Ejaz et al., 2021
[6] http://mofept.gov.pk/SiteImage/Misc/files/0_%20NERRP%20COVID-19%20MoFEPT%204%20May%202020%20Ver%2001.pdf

province could not avail these facilities and thus could not participate in distance learning mainly due to issues of technology access[7.] At the systems-level too, ECE ended up as a lesser prioritized area in comparison to primary and secondary learning. For instance, in the MoFE&PT's Resilience Plan for Education in June 2020, there was no mention of ECE and nor was there any concomitant increase in funding for ECE in the province. This had a larger impact with regards to how ECE teachers were supported, how parents were engaged, how home learning took place during lockdown, how a systems-level strategy was devised, and ultimately how the learning losses incurred in early years during the pandemic will be mitigated moving forward.

This research makes an important contribution to the upcoming GEM report 2023 by providing cross-country evidence on the uptake of tech-enabled distance learning measures in early years during COVID-19 and the extent to which ECCE workforce employed technology to engage with the students and their families during the school closures. Furthermore, this study analyzes the policy spectrum on education emergency responses in the selected countries and will be helpful in redesigning the framing of ECCE, its place, policy and practice on how to help teachers, parents and learners adapt to technology and distance learning during school closures in developing contexts. Anecdotal evidence suggests that ongoing research on the learning losses and uptake of distance learning measures in the Global South is focusing mainly on primary and secondary education. Whilst the research targeting primary and post-primary levels will generate useful insights for broader education reforms, we argue that the dynamics of the ECCE sector are unique. It is important to contextualize this sector within the challenges posed specifically by COVID-19. Our analysis helps fill key knowledge gaps in this area and contribute to the literature on the impact of COVID-19 on early childhood systems building in LMIC at the global, regional and national level. Complementing quantitative measurement with qualitative data drawn from various perspectives, this study is among the very first efforts to provide a comparative analysis on the impact of COVID-19 on ECCE, with an acute focus on the role of technology (if any) in reducing learning disruptions for pre-primary learners. Building on the GEM Report 2020 on Inclusion and Education, our research also engenders evidence on equity and inclusion through an assessment of the differences in the learning modes which were opted by the children with and without disabilities (primarily in Pakistan).

2. Literature Review

Over the years, as situations of migration, conflict, emergencies, and displacement have drastically grown around the world; *distance learning*, as a form of instruction, has emerged as a scalable and flexible solution to develop the cognitive capacities, socioemotional capabilities, and health outcomes of children at home. Distance learning, also known by various names such as distance education, e-learning, tech-enabled learning, or online learning not only addresses issues related to physical/geographical distance but also helps children access education in precarious situations where in-person attendance at classes is not feasible (Hrastinski 2008; Moore et al. 2011; Singh and Thurman 2019; Watts 2016; Yilmaz 2019).

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7 https://www.cgdev.org/sites/default/files/covid-19-pakistan-phone-survey-assess-education-economic-and-health-related-outcomes.pdf

Distance learning is commonly defined in contradistinction to F2F learning (Ryan et al., 2016), replacing physical classroom with the use of web/non-web modalities offering opportunities for out-of-class learning independent of time, place and pace (Bernard et al., 2014; Chigeza and Halbert, 2014; Northey et al., 2015; Israel, 2015; Potter, 2015). The definition of distance learning employed in this study is a relatively simple one: it is the use of information and communication technology (for example, internet, computer, telephone, radio, video, and others) to enable and enhance teaching and learning (Jenkins and Hanson, 2003).

The *uptake and effectiveness of distance/online learning* has always been a contested issue. In 1995, when online learning was at a nascent stage, Bates (1995) published his famous ACTIONS model which made a substantial impact on e-learning. According to him, the key aspects to be considered when choosing and assessing different technologies for education are: Access; Costs; Teaching and Learning; Interaction and user-friendliness; Organisation; Novelty; and Speed. Researchers such as Cavanaugh (2004) and Hooper (2008) have continued to identify factors which affect distance learning: equitable access by all students to the tools, reliability/consistency of access, adequate preparation time and training for school staff, frequency of communication between students and teachers and the adaptation of existing curricula, amongst others. Educational psychology also offers clues about what factors are important to creating successful learning environments in the context of distance learning. According to a recent research by Donohue et al. (2019), a typical distance learning environment will require students to be autonomous, self-regulated, and independent, to maintain a sustained effort throughout the class. Kaplan (2020) shares the same sentiments by emphasizing that most students require 'a sense of belonging and relatedness and a certain degree of independence and autonomy' when learning at home.

Limitations of online learning can vary depending on the instructors' and students' ability to access ICT devices and well-designed content. Boelens et al., (2017) identified four key challenges related to online learning: "Incorporating flexibility; facilitate students' learning processes; stimulate interaction; and fostering an affective learning climate". These limitations are evident for young children enrolled in ECE (aged 3-7) who most often do not have the technology skills necessary for online learning and therefore, require greater adult support and supervision to facilitate distance learning activities than do their older peers (Schroeder and Kelley 2010; Youn et al. 2012, Fedynich 2014; Wedenoja 2020). As mentioned above, online settings require a lot of self-regulation and an internal locus of control which early grade learners do not adequately possess, placing a responsibility on the teachers as well as the parents/caregivers to keep the child motivated and engaged. Moreover, young children need more physical interactions and play-based activities to develop their skills and learn compared to adult learners. There is a consensus in the existing literature that for the youngest children, the use of online learning/tools needs to come with caregiver-child interaction. Offir et al. (2004) and Barth (2004) discuss that the lack of face-to-face interaction between youngest students and teachers in a distance learning environment could have significant effects on both the teaching as well as the learning processes.

Additionally, a growing number of technology sceptics have also raised concerns regarding the *impact of use of digital devices on children's health and cognitive development* (Plowman et al., 2012; Lepinic & Samec, 2013; Jiang & Monk, 2016). There is a wide debate in the literature related to the consequences of children's use of technology devices before they reach school age. The Alliance for Childhood (2007)

argues that what is good for adults and older students is often inappropriate for young children. In the wake of rapid growth of screen technologies (e.g., computer, smartphones, television), parents too have expressed their uncertainty about whether exposure to ICT devices is beneficial or harmful for their children in the age group of 3-7 and the risks of unrestricted digital use (Radesky et al., 2016, Livingstone et al., 2015, Erogan et al., 2019). The European Union Kids Online project (Livingstone, 2015) involving a survey of internet use amongst young children revealed that parents with higher income and education had employed a wide range of practices to restrict the use of digital devices at home and had spent efforts to promote offline activities for children. Some parents offset the negative effects by setting rules and limits on the frequency and duration of using digital devices (Plowman, 2012, Hatzigianni & Margartts, 2014).[8]

Nevertheless, there are researchers and educators who believe that the use of *online learning in preprimary education* is necessary and that it can support both the teachers' and children's development (McPake et al., 2013; Edwards et al., 2018; Manches and Plowman, 2017). Studies demonstrate that the use of technology helps in improving the development of children if properly supervised and used with consistency. Colourful visuals, illustration and audio materials and funny characters compel children to engage for a good time and learn new things (Jayakaran et al. 2012). Across the world online programs have been developed and delivered to support young children with disabilities and/or living in remote or disadvantaged situations to provide learning flexibility (Kim, 2020, Smith et al., 2016, Zalaznick, 2019).

Despite such widespread use of information and technology to impart education and learning, especially when face to face learning is not possible, evidence supporting the positive impact of distance learning on early years is limited (Jamieson-Proctor, Burnett, Finger & Watson, 2006). A report by the Alliance for Childhood (2007) notes that the use of ICT devices in education have had no proven positive effects on children, and may even be physically, intellectually, and socially harmful, especially for kids under the age of 11. The Alliance argues that the benefits of using technology for preschool and primary/elementary students are vastly overstated and the costs—in terms of money spent, loss of hands-on learning opportunities, and damage to children's health/eyesight—are not accurately reported. In addition, a review of 150 distance education programs concluded that traditional, F2F means of learning continues to be reliable, sustainable, equitable and widely used than non-F2F methods of learning (Leary & Berge, 2006). A study by Graham and Banks (2000) on use of distance learning by primary grade students found that students would engage with the computer only in the presence of the teacher. The authors note: "If a teacher were present, lines of children would form at the computer…but if the teacher were absent or another more open-ended engaging activity was presented, one that involved the teacher, that is a more human interacting activity, not one child was interested in or used the computer". A study by Johnson et al. (2017) provides similar evidence stating that children only engage in distance learning if teachers/caregivers took an active role in spending time with children.

The COVID-19 pandemic has brought *the issue of the digital divide* to the forefront of the education policy agenda. Disparities in internet access for households with higher levels of poverty and in rural areas were documented well before the pandemic. However, as Chandra et al. (2020) demonstrate, the digital divide

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[8] https://nasbe.nyc3.digitaloceanspaces.com/2020/06/Hao_ECE-Remote-Learning-Final.pdf

became pronounced when teachers had to transition to remote instruction for nearly 50 million K–12 public school students during school closures. Emerging evidence highlights that the opportunities available for online teaching and learning remained unequal across different countries and subregions. A study conducted by Stelitano et al., (2020) indicates that teachers working in relatively high poverty schools were significantly more likely to report their students' lack of access to the internet and devices at home. Whilst empirical evidence on the mode of learning adopted by students in general and ECE students in general is very limited, anecdotal evidence suggests that many governments prioritized broadcasting learning materials via TV (especially for primary school students) as it is the most widely available medium accessible to families across all socioeconomic groups. Where infrastructure allowed, such broadcasts were paired with additional learning materials like text messaging to distribute schedules, guidance, and/or additional exercises. A survey of teachers in Chile revealed similar findings—teaching activities during the pandemic were mainly based on teachers sending homework (75%) for students to work on independently. On the other hand, merely 9% of teachers reported that 53% students had a habit of working on their own and only one-fourth believed that these students possessed the skills needed for distance education facilities (IIE, 2020). Similarly, a survey of nearly 4,000 teachers from preschool to secondary in 32 states of Mexico revealed that 85% of teachers engaged in distance education. However, in the poorest region of the country, only 64% of teachers were working remotely. There were also differences between public and private schools. The time spent on distance education varies considerably between teachers in private schools (24% of teaching staff spend seven hours or more a day) and public schools (64% spend two hours or less) (Corucera et al., 2020). ECLAC (2020a) also highlight that online classes and video recordings are much more common in private schools than in public schools. A qualitative study carried out in seven European states by Ferri et al., (2020) describes a very common challenge facing families with more than one child going to school: "Just think of families where there is more than one child in school with no or one computer. This means that in parallel only one child can take part in a digital online education course at a time". This is a serious equity issue that if every child does not have the opportunity to access the network on a regular basis, he/she risks being left behind, inevitably leading to the exclusion of some learners.

Teachers, as the spearhead of the implementation of online learning, have undoubtedly a huge role to play in making up for lost time in the classroom and supporting young children who might have fallen behind. Regardless of the type of medium used (radio, TV, mobile, online platforms, etc.) teachers need to adapt their practices and be creative to keep ECCE students engaged. During the COVID-19 pandemic, the effectiveness of online learning might have been hindered, in some cases, by the lack of basic digital skills among teachers, making them unprepared to adapt to the new situation so abruptly (OECD, 2020). According to a study from Brazil carried out in 2020 covering pre-primary and primary teachers, 83% of teachers considered themselves unprepared to teach remotely, 67% were anxious to do so, 38% felt tired, and less than 10% felt happy or satisfied[9]. Even in pre-pandemic times, evidence has shown that ECCE teachers do not have the skills or the knowledge to assess young students' learning effectively, or to adapt their teaching in response to the assessment. Given the current challenges and massive learning losses, it is critical for governments and education systems to ensure that ECCE teachers have adequate training

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[9] https://blogs.worldbank.org/education/changing-role-teachers-and-technologies-amidst-covid-19-pandemic-key-findings-cross

and access to appropriate tools and resources, including effective ways to communicate information and deliver instructional support to students and parents. Recent literature highlights that countries and school systems that have weathered COVID-19 more successfully have ensured their teachers (including pre-primary) have ample support, not just in terms of access to technology but also in other ways such as content, delivery and pedagogy. As schools closed in the Kyrgyz Republic, for instance, ECCE teachers were provided free SIM cards to access educational material online and WhatsApp. In Sierra Leone, where the main remote learning channel is radio, a 'live' and toll-free phone line was launched to help teachers connect with their students. Beyond providing guidelines and tools, some governments have leveraged existing professional development programs that worked before the pandemic. The state of Edo in Nigeria trained 11,000 primary school teachers who are part of the Edo-BEST program in the past two years to effectively use digital technologies in the classroom; during the pandemic, this in-service teacher training program transitioned from in-person to remote training. Similarly, in Uruguay, The Institute for in-Service Teacher Training took an existing coaching program online to provide remote pedagogical support and Ceibal strengthened its teacher training program and Open Educational Resources repository. These country examples highlight some good practices that the governments have adopted to support ECCE teachers, principals, and school staff in using technology to implement remediation and manage students' new academic and psychosocial needs.

In summary, there is a general tendency to do online/distance education all around the world. During the COVID-19 pandemic, the sudden shift to online learning has presented new opportunities for school systems, children and their parents. Previous research tells us more about the challenges and bottlenecks facing the governments and education systems in keeping students engaged through remote learning during and in the immediate aftermath of the pandemic. Lack of access to technology, absence of conducive home learning environment, non-willingness of parents, insufficient training of workforce and fragmentation of various kinds at the systems level emerge as common challenges. Few studies, however, have applied a deeper lens to document the experiences of young learner/early grade students and ECCE workforce in using technology to continue learning at home. At present, there is insufficient evidence on children's choice of engaging with modes of remote learning and the usage of technology by teachers in engaging with young children and their families. Our paper contributes to the literature by investigating these factors more comprehensively and systematically.

3. Research Questions

Our specific research questions are:

1) **What role (if any) did access to technology play in ECCE students' mode of learning choices during COVID-19?**

    This question explores the impact of access to technology on the uptake of distance learning measures in early years during COVID-19. More specifically, this question generates information on what forms of learning modalities (such as printed learning packages, radio, TV, voice/text/web-based instruction etc.) were reported to be used by the caregivers to continue

children's learning during school closures, and how does it vary with their access to technology (including computer, smartphone, tablet, feature phone, television and radio). In simple words, the question gives insights into caregivers' choice of engaging with the available option/learning mode. We will also examine how the usage of and choice for mode of remote learning is affected by a child's gender, disability status, socioeconomic status, parental support, mother's educational attainment and pre-lockdown enrollment status (in-school vs out of school) etc.

2) **What impact (if any) did the governmental support have on the level of engagement between pre-primary workforce and parents during COVID-19?**

This question probes the association between the support pre-primary workforce has received from the government and the level of their engagement with parents/children to support remote learning during the school closures. Support from the government could take various forms: support in the form of training/professional development on helping students learn at a distance, sharing information on COVID-19 and school reopening status, official guidelines on assessing students' remotely, financial support (increase in school grant, staff salaries), counselling etc. We seek to analyze if the guidance/support received by the teachers/head teachers from the government was reflected in their engagement with the students and parents/caregivers in the absence of any comprehensive teacher monitoring mechanisms and what contextual factors such as role, gender etc. impeded or facilitated the engagement between the pre-primary workforce and the learners/parents. Not only this, but we also use qualitative data from Pakistan to understand the type of professional development/support that was extended to the pre-primary workforce by the government and if any of this support was tech-related in order to facilitate engagement between the workforce and parents. Furthermore, we will also descriptively analyze the support (both tech and non-tech) which was made available to the pre-primary workforce in Ethiopia and if there is any relationship between the extended support and the engagement level between teachers/headteachers and caregivers.

4. Data[10]

Guided by quantitative and qualitative methodologies, primary and secondary data from multiple sources is being used and analyzed to inform the findings.

i. **Quantitative Data**

Quantitative component of the research includes primary data from telephonic surveys conducted with parents/caregivers, teachers and head teachers in Pakistan and Ethiopia from August 2020 through March 2021 with sample sizes varying between countries.

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[10] All data collection activities ensured ethically sound procedures, with approvals from relevant platforms and consent of all participants, and observance of strict COVID-19 SOPs during the FGDs and KIIs. Therefore, no harm was done while undertaking this research.

Country	Sample Size (Household/ Caregiver Survey)	Sample Size (Teacher/ Headteacher Survey)	Districts/Regions	Survey Time Period	Survey Method	Interview Time (approx.)
Pakistan	2004	312	Bahawalnagar, Chakwal, Chiniot, Faisalabad, Kasur, Multan, Lodhran, Sargodha	January to March 2021	Phone Interviews	25 Minutes for Households & 15 Minutes for Teachers
Ethiopia	480	96[11]	Addis Ababa, Amhara, Ben. Gumuz, Oromia, SNNP, Tigray	August to September 2020	Phone Interviews	45 Minutes

Table 1: Sample Information

Survey Instruments & Sample Selection

The data used in this paper was collected as part of the e Early Learning Partnership (ELP) Systems Research in September-December 2020. ELP is a multi-country research initiative (funded by the WB and supported by Foreign and Commonwealth Development Office) carried out in four countries of Pakistan, Ethiopia, Liberia and Tanzania, to (1) provide policymakers in a set of focus countries with actionable information to help guide the delivery of quality, equitable early learning at scale; and (2) to build the international evidence base in the emerging field of systems research in early childhood education. This paper presents findings from the research conducted across two of the four ELP focus countries: Pakistan and Ethiopia. ECE has emerged as a distinct subsector within Pakistan and Ethiopia. Over the past decade, there have been consistent reforms for ECE in the two countries as the subsector has been clearly recognized and accounted for in the educational policies, budgets, sector plans, and implementation strategies. This has allowed for an evidence-base to accumulate for ECE and effects of the pandemic on early years can be ascertained in these two countries. Furthermore, both countries have similar demographic profiles, which allows for a meaningful cross-country comparison.

- Pakistan

In Pakistan, data was collected by Idara-e-Taleem-o-Aagahi (ITA) Pakistan's team from eight districts (Bahawalnagar, Chakwal, Chiniot, Faisalabad, Kasur, Lodhran, Multan and Sargodha) in Punjab. These

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[11] Due to limited sample size, only descriptive analysis is carried out for the data from Headteachers/Teachers Survey in Ethiopia.

districts were randomly selected and ensured the representation of Central, Southern and Northern regions of the province. For each of these districts, 20 villages with ECCE schools were randomly picked and caregivers of 20 students from each ECCE school were selected to participate in the Caregiver survey. Following this, ECCE headteacher and one ECCE teacher from each of the sampled schools were interviewed for the Teachers/Headteachers survey.

The survey questionnaires were based on Measuring Early Learning Quality Outcomes (MELQO) initiative's modules which have been developed by a consortium led by UNESCO, UNICEF, the World Bank and the Center for Universal Education at the Brookings Institution. The MELQO project was first initiated in 2014 and has, since then, been rolled out in several countries. Its modules, including Measure of Development and Early Learning (MODEL) module and Measuring Early Learning Environments (MELE) module, are aimed at making early learning assessments accessible across the globe and cover a core set of items which have cross-country relevance; MODEL module is focused on "measuring child development and learning" while MELE module is focused on "measuring early learning environments".[12] For Pakistan, these modules were adapted to the local country context with regards to curriculum, early learning materials and early learning standards etc. In addition to these adapted modules, background information such as demographics and COVID-19-speciifc information were collected during both Caregivers' Survey and Teachers/Headteachers' Survey to better understand COVID-19's effect on ECCE.

For Caregiver's Survey at the household level, the adapted version of the MODEL module as described in the previous paragraph was employed to collect information from parents/caregivers. The survey instrument covered various themes including child's home learning environment, parental engagement in child's learning activities, socioeconomic characteristics of the household, access to government's health and social security schemes and impact of school closures on the psychosocial wellbeing of children and their parents. Furthermore, a shorter version of Washington Group on Disability Statistics' Child Functioning module (CFM) was also developed and incorporated in the survey questionnaire to better understand the prevalence of functional difficulties in five domains[13] among the ECCE students and the varying impact of COVID-19 and school closures on children with functional difficulties. The CFM is not originally a part of the MODEL module: a shorter version of CFM was included in the survey questionnaire only to better understand the disability prevalence in the sampled children.

At the school level, selected items from MELE module and COVID-19 related questions were used to form the survey questionnaire which was then used to survey teachers and headteachers. This survey instrument included questions on professional development and financial support extended to the teachers/headteachers; the use of technology in communicating/engaging with children/caregivers; and support received by teachers/headteachers from their respective supervisors.

- Ethiopia

In Ethiopia, data used in this paper was collected from six regions (Addis Ababa City Administration and primarily rural areas of Amhara, Benishangul-Gumuz, Oromia, SNNP, and Tigray) by the Ethiopian Policy Studies Institute, Addis Ababa University, and the REAL Center at University of Cambridge. These regions

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[12] https://learningportal.iiep.unesco.org/en/library/overview-melqo-measuring-early-learning-quality-and-outcomes
[13] Seeing, Hearing, Walking, Communication, Learning

have been selected from the total seven regions which were included in ELP Systems Research Program Phase 1 in Ethiopia. Moreover, the selected sample of Caregivers/Parents and Principals/Teachers is a subsample of the 2019/2020 ELP Systems Research Program Phase 1 and is not representative of the selected regions.

The Caregiver Survey included core set of items from the MELQO module and other pertinent questions with regards to country-specific context, familial experiences during COVID-19, experiences of ECCE-aged (both enrolled and out of school) children, access to information/resources that caregivers have had, caregivers' engagement in child's learning activities during school closures and caregivers perspectives on reopening of schools.Similarly, adapted versions of relevant MELQO items and selected items from the RISE (Research for Improving Systems of Education) Covid-19 Survey were used to interview a selected sample of teachers and principals in the context of pre-primary education on the available support, guidance received from the government/supervisors and communication with parents/children, among other things.

> RISE COVID-19 survey investigates the effects of COVID-19 on children's holistic learning. Literacy and numeracy assessments were conducted in 2019 with pupils typically aged 7 to 11 in Grades 1 and 4 across six regions in Ethiopia. Data on social emotional learning were also captured from approximately 4,000 Grade 4 learners in 168 government primary schools between May and June 2019.
>
> Source: https://www.educ.cam.ac.uk/centres/real/publications/Effects%20of%20COVID-19%20on%20principals%20and%20teachers_Ethiopia.pdf

In both Pakistan and Ethiopia, the aforementioned surveys had to be conducted over phone calls due to the COVID-19 related restrictions. This has proven to be challenging with regards to motivating the responders to complete the survey, response rate and availability of responders. However, it has also provided the researchers with an opportunity to adapt the data collection strategies and to benefit from this unique yet challenging situation across the world.

ii.   Qualitative Data

Primary qualitative data informing this research was collected from three districts (Chiniot, Multan, Lodhran) in Punjab (Pakistan) through structured key informant interviews (KIIs) and focus group discussions (FGDs) with system-level stakeholders (officials from provincial school education department, district education authorities and other relevant sectors such as health and ECCE workforce – teachers/headteachers) and parents/caregivers to better understand the impact of COVID-19 pandemic on early childhood education. These interviews covered various themes including governance, accountability and financing, home-based distance learning for early years students, (tech-enabled) communication among ECCE workforce and caregivers, parental engagement in children's learning activities, support available for ECCE workforce and caregivers, availability of feedback loops and future plans to mitigate learning losses occurred due to school closures.

Informants were sampled from subnational levels e.g., officials from School Education Department (SED) Punjab, Programme Monitoring and Implementation Unit (PMIU) and Quaid-e-Azam Academy for Educational Development (QAED). District level informants include officials from the District Education Authority including Chief Executive Officer (CEO) Education and Assistant Education Officers (AEOs) etc.

A total of 103 parents participated in the FGDs, of which an overwhelming majority was that of mothers. In addition to these, several interviews were conducted from other key stakeholders such as representatives from school education department, district education authorities and ECCE workforce.

Descriptive Statistics for Regression Analysis

i.   Household/Caregiver Survey

Several studies have looked at the factors that contribute to a students' choice for a particular mode of education. However, the existing research has mostly focused on the tertiary level of education (Al-Fadhli 2009; Bailey et. al. 2015 and Peytcheva-Forsyth et. al. 2018) and have identified demographics, personal, access to technology, experience of using technology, learning support, learning environment, available guidance and logistics as the potential factors which influence students' choice of mode of education. Since little information exists on the factors contributing towards the choice of engaging with a particular mode of learning at the ECCE level, we use multiple factors (demographics, personal, experience of using technology, learning support, learning environment, available guidance and logistics etc.) in general and access to technology in particular to understand their effect on the choice of engaging with modes of learning for preschool-aged children. Table 2 below provides descriptive statistics for the variables that we use in our regression analysis for each country and shows the number of observations (N), mean value (Mean), standard deviation (SD), minimum value (Min) and maximum value (Max) for each variable in each country).[14] Since data was collected using different sets of questions in each country, we do not have the exact same variables for each country. However, main variables of interest for us (including mode of access to distance learning and access to technology) are similar across both countries.

In Pakistan, we can see that the average age of children in our sample was 5.196 years and that over 53% of our sample consisted of girls. Moreover, only 43.8% of mothers had primary or above level of education and almost 86% caregivers or children were in contact with the teachers during school closures. In addition to this, over 76% children in our sample were coming from households with five or more members.

In Ethiopia, over 50% of our sample consisted of girls, approximately 79% of children were enrolled in ECCE and over 52% of caregivers were literate while 62.9% children had medium/high parental support.

Country	VARIABLES	(1) N	(2) Mean	(3) SD	(4) Min	(5) Max
PAKISTAN	Child's Age (Years)	2,004	5.196	1.122	3	8
	Child's Gender (Girl)	2,004	0.534	0.499	0	1
	Mother's Education (Primary or above)	1,797	0.438	0.496	0	1

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[14] See Table A1 in annexure for description of the variables.

	Child/Caregiver in Contact with Teacher	1,781	0.860	0.347	0	1
	Household Members (5 or above members)	1,857	0.764	0.425	0	1
	Functional Difficulty Level	1,973	1.191	0.680	1	4
	Mode of Access	2,004	2.922	1.333	1	5
	Access to Tech	2,004	2.175	1.257	1	4
	Wealth Quartile	1,932	2.471	1.109	1	4
ETHIOPIA	Child's Gender (Girl)	480	0.502	0.501	0	1
	Caregiver is Literate	480	1.521	0.500	1	2
	Child Enrolled in ECCE	480	0.790	0.408	0	1
	Biggest Challenge in Engaging w/ Learning	468	2.122	1.411	1	5
	Mode of Access	480	1.617	0.733	1	3
	Parental Support (Medium/High)	480	0.629	0.484	0	1
	Access to Tech	480	3.223	1.057	1	4
	Wealth Quartile	480	2.269	1.038	1	4

Table 2: Descriptive Statistics (Household/Caregiver Survey)

ii.   Teacher/Headteacher Survey in Pakistan

As mentioned earlier, ECCE was not a high priority area for the government at the start of the pandemic. Nonetheless, the situation started to improve with the passage of time and some members of ECCE workforce were provided with trainings on psychosocial aspects and general COVID-19 SOPs. Thus, we use the variables given in Table below to see how the level of engagement between ECCE workforce and parents/caregivers varies with respect to governmental support extended to the ECCE workforce.

Table 3 highlights that 58.3% of our sample consisted of female ECCE workforce, over 90% had regular meetings with their supervisors, only 45.8% received some form of professional development, 40% had used some strategies to reach hard to reach students and 83% had referred parents to government's financial or other support programs during the school closures.

Variable	(1)	(2)	(3)	(4)	(5)
	N	Mean	SD	Min	Max
Role	312	1.500	0.501	1	2
Type of School	304	2.112	0.841	1	3
Interviewee's Gender	312	0.583	0.494	0	1

Have regular meetings with supervisor	312	0.901	0.300	0	1
Received Professional Development and other support	306	0.458	0.499	0	1
Used strategies to reach hard to reach students	290	0.407	0.492	0	1
Referred HHs to govt. launched financial/other support	301	0.831	0.376	0	1
Level of Engagement with Parents	312	2.093	0.811	1	3

Table 3: Descriptive Statistics (Teacher/Headteacher Survey in Pakistan)

5. Estimation Methodology

Since the type of data that we have for each country is cross-sectional in nature, including the Teachers/Headteachers Survey for Pakistan, we utilize each dataset independently of the others and use the following specifications to understand and provide answers for our research questions.

a. Access to Technology and Mode of Learning of the Child

Our aim is to explore the impact that access to technology may have had on preschool-aged children's mode of learning during the school closures. For this purpose, we regress the Mode of Learning on access to technology, interaction term between access to technology and gender, interaction term between access to technology and functional difficulty level and a set of control variables. To put it simply, we want to understand if and how access to technology affects the choice for a mode of distance learning while ensuring that we control for the effect of other variables. As the mode of learning which the children engaged in during the school closures is a categorical variable (i.e. variable with different discrete categories), we use multinomial logistic regression. The reason for doing so is that a categorical dependent variable violates the assumption of linearity in the ordinary least squares regression which is dealt with through logarithmic transformation in logistic regression. Moreover, multinomial logistic regression is suitable to be used in this case as it uses maximum likelihood estimation to predict the odds/log-odds of a choice relative to the base category of the dependent variable and does not assume homoscedasticity or normality. The regression specifications for each of the two countries are mentioned below:

Pakistan:

$$Mode_i = b_0 + b_1 ChildAge_i + b_2 ChildGender_i + b_3 Functioning_i + b_4 MotherEdu_i + b_5 HouseholdMembers_i + b_6 Wealth_i + b_7 AccesToTech_i + b_8 ContactTeacher_i + b_9 District_i + b_{10} AccessToTech*ChildGender_i + u_i \quad \textbf{(1)}^{15}$$

Ethiopia:

$$Mode_i = b_0 + b_1 ChildGender_i + b_2 CaregiverLiterate_i + b_3 ECCE\_Enrolled_i + b_4 ParentalSupport_i + b_5 Wealth_i + b_6 AccessToTech_i + b_7 ChallengeInHomeLearning_i + u_i \quad \textbf{(2)}^{16}$$

where
$Mode_i$ = Mode of Learning engaged with for child "i"
$ChildAge_i$ = Age of child "i"
$ChildGender_i$ = Gender of child "i"

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[15] Using Likelihood Ratio Test postestimation, we find that adding the interaction term results in a statistically significant improvement in model fit

[16] Using Likelihood Ratio Test postestimation, we find that adding the (*Access To Tech*Caregiver Literate_i*) and (*Access To Tech*Girl_i*) interaction terms either together or on their own do not result in a statistically significant improvement in model fit. Therefore, we do not add these to our model specification.

Functioning$_i$ = Functional Difficulty Level of child "i"
MotherEdu$_i$ = Highest educational attainment of mother of child "i"
HouseholdMembers$_i$ = Number of household members in home of child "i"
Wealth$_i$ = Wealth quartile of Household of child "i"
AccessToTech$_i$ = Access to technology of child "i"
ContactTeacher$_i$ = If Parents/caregivers of child "i" have been in contact with their teacher
District$_i$ = District of child "i"
CaregiverLiterate$_i$ = Literacy status of caregiver of child "i"
ECCE_Enrolled$_i$ = ECCE enrolment status of child "i"
ParentalSupport$_i$ = Level of parental support available for child "i"
ChallengeInHomeLearning$_i$ = Biggest challenge faced by caregivers of child "i" in engaging with learning at home
u$_{ij}$ = Error term

The interaction terms such as that between access to technology and gender would help us in capturing the impact of one independent variable i.e. access to technology on Mode of Learning might be different at different levels of the other independent variable i.e. gender. Furthermore, the selection for the control variables is based on the existing literature on the subject matter as mentioned previously: available research identifies demographics, personal, access to technology, experience of using technology, learning support, learning environment, available guidance and logistics as the potential factors which influence students' choice of mode of education.

   b.   *Governmental Support and Engagement between ECCE workforce and parents/children*

We use the data from Teachers/Headteachers survey in Pakistan to understand how the varying levels of governmental support to the ECCE workforce may affect the level of engagement between ECCE workforce and parents/children. In this regard, we create a categorical variable to capture the level of engagement between the workforce (headteachers/teachers) and the parents/children from the information covered in the head teachers'/teachers' survey. As our dependent variable i.e. level of engagement between ECCE workforce and parents/children is an ordinal categorical variable (i.e. variable with discrete categories which are ordered from lowest to highest), we use the following ordered logistic specification[17] to regress our dependent variable on different indicators of governmental support and a set of control variables:

$$Level_i = b_0 + b_1 \, Gender_i + b_2 \, Role_i + b_5 \, SchoolType_i + b_6 \, UpdateSchoolOperating_i + b_7$$
$$RegularMeetingSupervisor_i + b_8 \, ReceivedProfessionalDevelopment_i + b_9 \, StrategiesHardtoReach_i$$
$$+ b_{10} \, ReferredHHs_i + b_{11} \, District_i + u_i \qquad \textbf{(3)}^{\textbf{18}}$$

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[17] Reasons for preferring ordinal logistic regression over other specifications are the same as mentioned for specification 1 and 2. Furthermore, we also run the Brant Test of Parallel Regression Assumption postestimation and find that the parallel regression assumption is not being violated which means that usage of ordinal logistic regression is suitable in this case.

[18] Using Likelihood Ratio Test postestimation, we find that adding *(SchoolType*ReceivedProfessionalDevelopment$_i$*

), (Role*ReceivedProfessionalDevelopment$_i$) and (Gender*ReceivedProfessionalDevelopment$_i$) interaction terms

where

Level$_i$ = Level of Engagement between head teacher/teacher "i" and parents/children
Gender$_i$ = Gender of head teacher/teacher "i"
Role$_i$ = Role in School of head teacher/teacher "i"
SchoolType$_i$ = Type of School of head teacher/teacher "i"
UpdateSchoolOperating$_i$ = Head teacher/teacher "i" received updates on school operating status
RegularMeetingSupervisor$_i$ = Head teacher/teacher "i" had regular meetings with supervisor

ReceivedProfessionalDevelopment$_i$ = Head teacher/teacher "i" had received professional development trainings
StrategiesHardtoReach$_i$ = Head teacher/teacher "i" used strategies to reach hard to reach students

ReferredHHs$_i$ = Head teacher/teacher "i" referred households to government launched financial and other support
District$_i$ = District of Head teacher/teacher "i"

SchoolType*ReceivedProfessionalDevelopment$_i$ = Interaction Term between type of school and whether the teacher/headteacher has received professional development and other support
Gender*ReceivedProfessionalDevelopment$_i$ = Interaction Term between teacher's/headteacher's gender and whether the teacher/headteacher has received professional development and other support
Role*ReceivedProfessionalDevelopment$_i$ = Interaction Term between teacher's/headteacher's role and whether the teacher/headteacher has received professional development and other support
u$_i$ = Error term

The qualitative data collected through KIIs and FGDs from Pakistan provides ~~further~~ necessary insights into answering our research questions and in triangulating the findings from graphical and regression analysis. Some of the key themes investigated by the qualitative research are distance learning for early years, parental engagement, teacher support, communication across districts, development of feedback loops and intersectoral coordination for early years during pandemic. In the context of this study, we particularly employ qualitative data to better understand the level of parental engagement, mediums used by children for distance learning, nature of professional development provided to ECCE staff during COVID-19, teacher support and digitization, and teacher engagement with caregivers/parents and children during school closures.

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either together or on their own do not result in a statistically significant improvement in model fit. Therefore, we do not add these to our model specification

6. Findings & General Discussion

This section covers the findings and aims at providing answers to our research questions in the context of each country.

Key Findings

Our findings suggest that:

- ECCE students had limited usage of tech-enabled modes of distance learning coupled with limited access to distance learning in Pakistan and Ethiopia during the COVID-19 induced school closures.
- Digital divide, inequity and inclusivity gaps exist among students with regards to gender, socioeconomic background and abilities of children in terms of their access to technology and usage of tech-enabled modes of distance learning.
- Children were more likely to engage in tech-enabled modes of distance learning if they had access to more than one technology devices at home.
- ECCE workforce had a limited level of engagement with caregivers/students during the school closures.
- Governmental support for ECCE workforce including provision of general professional development training and/or guidance on different aspects of distance learning such as remote assessments and use of radio contributed positively towards generating higher level of engagement between ECCE workforce and caregivers.

    i. **Impact of access to technology on mode of distance learning**
        a. *Country-Specific Findings*

             ▪ **Pakistan**

As reflected in Figure A1, we see variation in the responses for Mode of Distance Learning which was engaged with by the children: over two out of every three children were either using printed material (34.98 %) and/or radio/TV (33.23 %) to access distance learning material in order to continue with their education while only 4.29 % children were relying on SMS due to its limited user-friendliness. Contrary to popular belief that rural areas have very limited access to technology (specially computer, tablet or smartphone), our data suggests that a sizeable proportion of children were using computer/smartphone/tablet for distance learning. This variation in responses means that Mode of Distance Learning is suitable to be used as a dependent variable in our regression analysis for Pakistan.
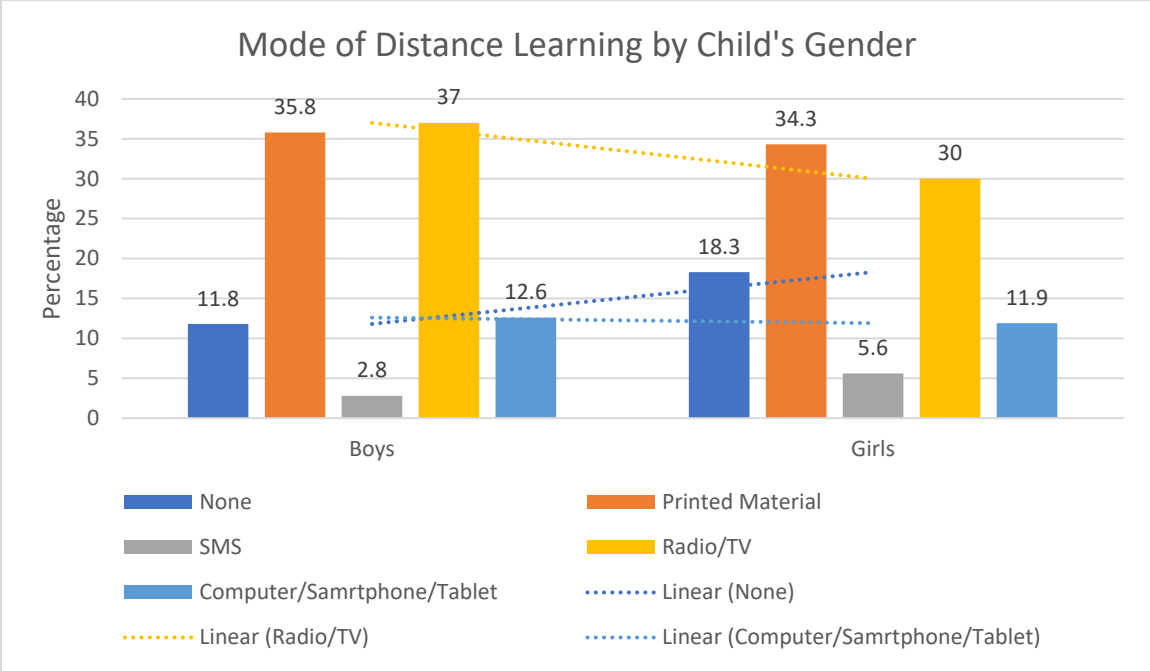
Figure 1: Mode of Distance Learning by Child's Gender (Pakistan)

As depicted in Figure 1, almost one in every five girls was not using any mode of distance learning while the same was true for almost one in every ten boys. This is in line with the existing research on how girls' education may not be priority for many families in rural households. For those girls who were engaged in distance learning, printed material was the most popular mode (34.3%) whereas more boys were using tech-enabled modes such as radio/TV (37%) and computer/smartphone/tablet (12.6%).

Moreover, higher percentage of boys was using computer/smartphone/tablet relative to that of girls (12.6% vs. 11.9%) which again shows digital divide across genders.

Usual of the rural areas in Pakistan, approximately half of the children from either gender had no access to technology (Figure 2) while others had access to only feature phone or radio/tv or a combination of either two from feature phone, radio/tv and smartphone/computer/tablet. This shows that while digital divide may exist between urban and rural areas, the differences in terms of access to technology become narrow in the same rural area due to concentration of similar households in each rural locality.

With respect to child's age, one would expect that as a child becomes older, they would be more engaged in distance learning activities relative to younger children simply because of having better understanding about use of different modes. However, our data suggests that this may not be the case in rural Punjab: a greater percentage of children aged 5 years and above was not using any mode for distance learning in comparison to 3 and 4 years old.
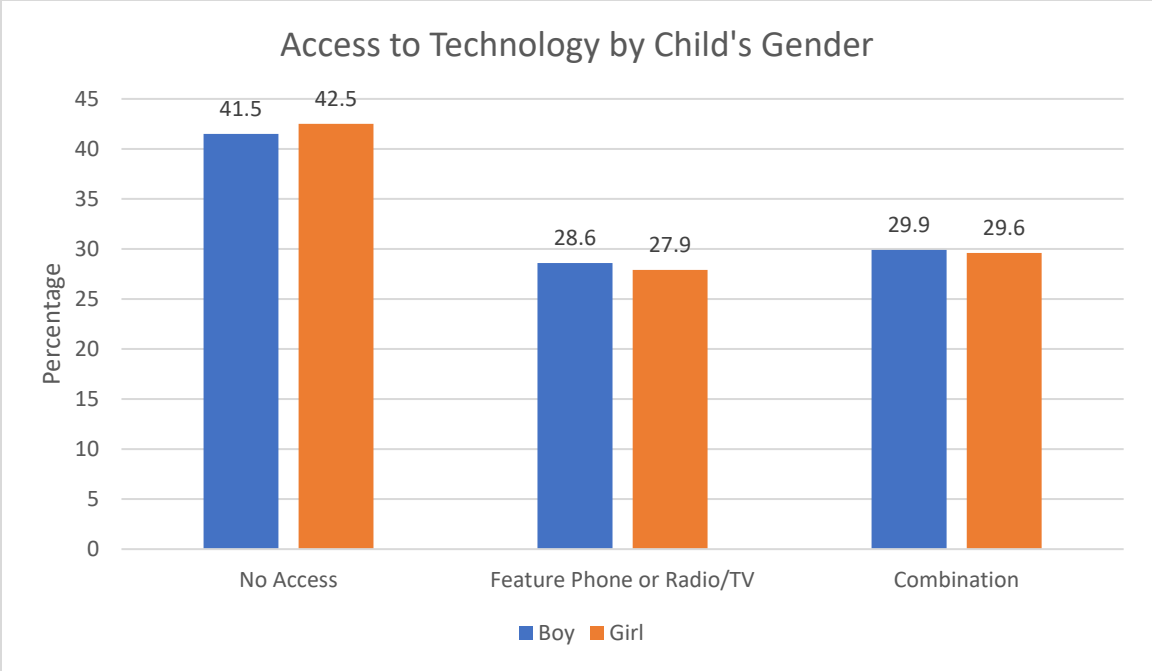
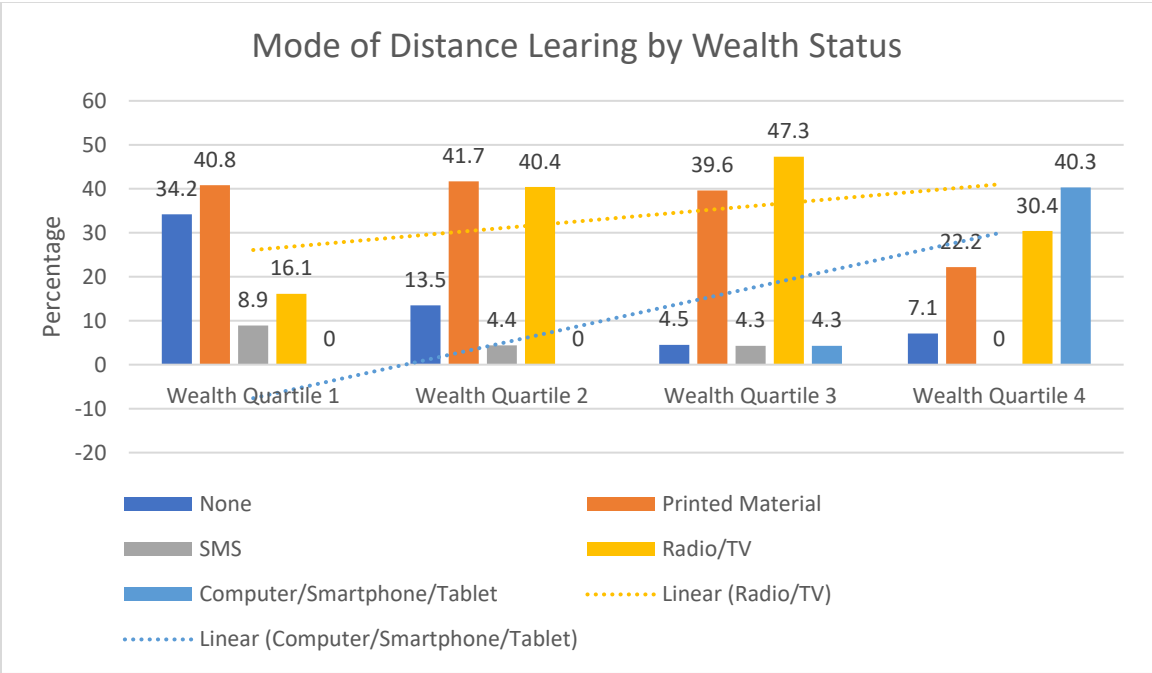*Figure 2: Access to Technology by Child's Gender (Pakistan)*

Figure 3: Mode of Distance Learning by Household's Wealth Status (Pakistan)

Wealth status also plays a role in child's engagement with different modes of distance learning. Firstly, it has a relationship with the overall uptake of distance learning as children from relatively poorer households were five times more likely to be disengaged with the distance learning when compared with

children from wealth quartile 4. Secondly, tech-enabled options such as radio/TV and computer/smartphone/tablet were more popular as modes for distance learning among children from relatively wealthier households. This is shown in Figure 3 above.
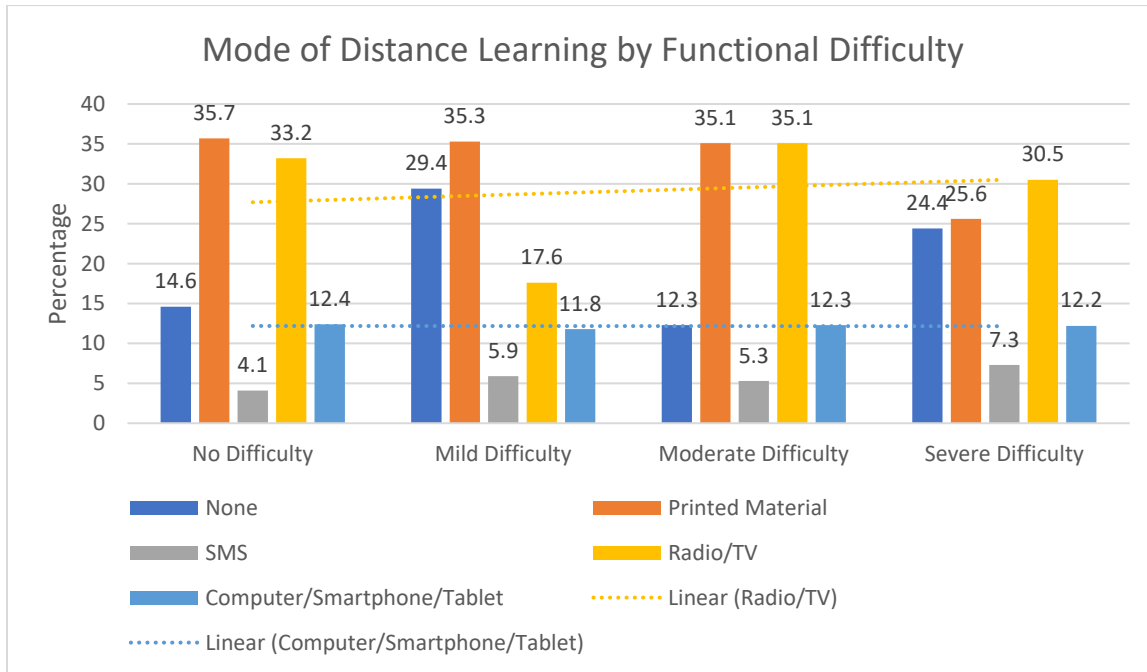

Figure 4: Mode of Distance Learning by Child's Functional Difficulty Level (Pakistan)

As mentioned previously, we have used an adapted version of Washington Group on Disability Statistics' Child Functioning Module to assess the functional difficulty level of children from surveyed households. In terms of functional difficulties, a higher percentage of girls had moderate or severe difficulties and higher percentage of boys had mild difficulties. Therefore, more girls were suffering from at least one type of disability (moderate and severe difficulties) relative to boys and were in need for additional support to make their engagement with the learning materials possible. Findings suggest that uptake of the most tech-enabled mode i.e. computer/smartphone/tablet was approximately three times lower relative to radio/tv among children with moderate and severe difficulties(Figure 4). Nonetheless, trends vis a vis popular modes of distance learning are similar for children facing any difficulties (mild, moderate, severe) and those who are facing no difficulty. This provides evidence for our assumption that parents were unaware of any specialized needs that children with difficulties had and thus were not providing any additional support.

Access to Technology	Mode of Distance Learning					
	None	Printed Material	SMS	Radio/TV	Computer/ Smartphone/ Tablet	Total
None	141	346	0	118	237	842
Feature Phone or Radio/TV	96	188	73	209	0	566
Combination of Two (Feature Phone, Radio/TV, Computer/Smartphone/Tablet)	69	167	13	339	8	596
Total	306	701	86	666	245	2004

Table 4: Mode of Distance Learning by Access/Availability of Technology (Pakistan)

Interestingly, among children with no access to technology (row) over 40 percent were reportedly using radio/TV and/or computer/smartphone/tablet (column) as a mode for distance learning as reflected in Table 4. This lends support to the evidence from KIIS and FGDs where it was claimed that some children were using distance learning resources available at their teachers' and/or at other peoples' (including relatives) homes for continuation of education. The following excerpt from the interview of a father of an ECCE student from Bahawalpur provides more details in this regard:

"Since the schools closed down, our child has not been learning much. There is not much homework. However, his teacher informed us that some kind of education might be available if we can use internet, but we don't have this facility as I am a daily labourer and cannot afford anything like this. So, every 2 days we take our child to his teacher's house where she shares her mobile with children who are then taught online"

The following table provides regression estimates in log-odds for the impact of access to technology on mode of distance learning:

VARIABLES	(1) Printed Material	(2) SMS	(3) Radio/TV	(4) Computer/ Smartphone/ Tablet
Child's Age	-0.02	-0.08	0.15	0.38**
	(0.10)	(0.15)	(0.10)	(0.16)
Girl	-1.75***	-1.49	-1.48***	-0.65
	(0.32)	(3,368.61)	(0.39)	(0.45)
In Contact with Teacher	1.45***	-0.14	3.47***	-0.99*
	(0.25)	(0.45)	(0.37)	(0.58)
5 or above Household members	-1.30***	-0.32	-0.88**	-2.08***
	(0.36)	(0.55)	(0.38)	(0.45)
Mild Difficulty	-2.21**	0.77	-3.27**	-4.05**
	(0.97)	(1.74)	(1.39)	(1.63)
Moderate Difficulty	0.07	0.34	0.27	0.05
	(0.69)	(1.03)	(0.72)	(1.05)
Severe Difficulty	-0.93*	-0.18	-0.46	0.49
	(0.51)	(0.78)	(0.55)	(1.13)
Feature Phone or Radio/TV	-1.99***	17.52	-0.45	-19.40
	(0.38)	(2,026.82)	(0.43)	(1,387.91)
Combination of two (Feature Phone,	-1.27***	0.44	1.42***	-0.73

Radio/TV, Smartphone/Computer/Tablet)				
	(0.48)	(3,108.00)	(0.50)	(0.68)
Second Wealth Quartile	0.96***	-0.17	1.69***	3.45
	(0.26)	(0.46)	(0.29)	(1,627.03)
Third Wealth Quartile	1.11***	0.16	1.66***	19.07
	(0.33)	(0.50)	(0.35)	(1,347.64)
Fourth Wealth Quartile	0.16	-15.31	2.12***	20.95
	(0.31)	(2,208.91)	(0.35)	(1,347.64)
Mother has Primary or above education	18.87	20.80	19.35	22.59
	(1,277.79)	(1,277.79)	(1,277.79)	(1,277.79)
Feature Phone or Radio/TV * Girl	3.27***	3.82	3.51***	4.14
	(0.52)	(3,368.61)	(0.57)	(2,054.81)
Combination of two (Feature Phone, Radio/TV, Smartphone/Computer/Tablet) * Girl	1.53***	17.78	0.60	-17.56
	(0.56)	(4,110.86)	(0.60)	(1,167.78)
Constant	1.90**	-18.09	-3.76***	-20.16
	(0.78)	(2,026.82)	(0.90)	(1,347.64)
Observations	1,653	1,653	1,653	1,653

Base Category: None (Mode of Distance Learning)
Controlling for Districts
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Impact of Access to Technology and other covariates on Mode of Distance Learning (Pakistan)

We find that one year increase in child's age improves the chances of a child using computer/smartphone/tablet by over 59% (0.38 units increase in log-odds)which means that older children are more likely to use computer/smartphone/tablet than not use any mode for distance learning. Secondly, girls are at a greater risk of falling in the base category group i.e. not using any mode of distance learning relative to boys and have lower chances (over 85% less likely to use printed material and over 81% less likely to use radio/tv) of using printed material and radio/TV in comparison to boys as the log-odds of using printed material or radio/tv as modes for distance learning decrease by 1.75 units and 1.48 units, respectively, for girls relative to boys..

The likelihood of using printed material or radio/TV for those children who themselves and/or their caregivers have been in contact with teacher increase by 81% (1.45 units increase in log-odds) and 97% (3.47 units increase in log-odds), respectively, relative to not using any mode for distance learning.

"Our older children were given regular homework by their teachers but not this child (aged 5) as there is no proper syllabus. Her teacher told us to come meet her and introduced us to this program on PTV (national broadcaster) which is for younger children. The program had a lot of colors and cartoons which my daughter enjoyed. They were teaching alphabets. We were told that by showing her daily, we can help her learning. So far, we've tried to make sure that she watches the show."
-Mother of an ECCE girl in Chakwal district.

However, the probability of using computer/smartphone/tablet decrease by 72% (0.99 units decrease in log-odds) for such students relative to not using any mode. Similarly, likelihood of using printed material, radio/TV and computer/smartphone/tablet decrease by 78% (1.30 units decrease in log-odds), 71% (0.88

units decrease in log-odds) and 89% (2.08 units decrease in log-odds), respectively, for children who have five or above household members relative to not using any mode of distance learning.

Moreover, chances of engaging with printed material or radio/TV or computer/smartphone/tablet decrease by 90% (2.21 units decrease in log-odds), 96% (3.27 units decrease in log-odds) and 98% (4.05 units decrease in log-odds), respectively, for children with mild difficulties in comparison to not using any mode of distance learning. For children with severe difficulties, the chances of using printed material decrease by 71% (0.93 units decrease in lod-odds) relative to the base category.

Furthermore, the probability of using printed material for children from households with feature phone or radio/tv decreases by 88% (1.99 units decrease in log-odds) relative to not using any mode of distance learning. Similarly, the probability of using printed material decrease by 78% (1.27 units decrease in log-odds) for children from households with access to either two of feature phone, radio/tv and smartphone/computer/tablet. On the contrary, the chances of engaging with radio/TV increase by 80% (1.42 units increase in log-odds) for the same children relative to the base category.

In addition to this, chances of using printed material or radio/tv also increase for children belonging to households from second and third wealth quartiles while the probability of using radio/tv increase for children belonging to households from fourth wealth quartile relative to the base category. The magnitude of these changes in terms of percentages increases as we move from relatively poorer (wealth quartile 2) households to relatively wealthier households (wealth quartile 4).

The chances of utilizing printed material or radio/Tv increase by approx. two times (3.27 units and 3.51 units increase in respective log-odds i.e. 96% and 97% increase, respectively) relative to using no mode for girls from households with feature phones or radio/TV. Similarly, the probability of using printed material also increases 1.82 times (1.53 units increase in log-odds i.e. 82% increase) relative to the base category for girls from households with combination of either two from feature phone, radio/TV and smartphone/computer/tablet.

The qualitative data also provides us pertinent insights into the mode of distance learning, access to technology and effects of school closures on children's education. KIIs with education officials reveal that some form of distance learning was offered to students in the primary grades to complement the regular interaction with teachers for homework/assignments. However, a similar approach was lacking for ECCE students during the early days of school closures.

Furthermore, the KIIs with education officials and FGDs with parents support our findings that access to distance learning remained limited for ECCE students. Children's access to distance learning was also made limited in the rural areas because of children's socio-economic background and lack of digital infrastructure. As one of the government officials pointed out:

"ECCE in general has been on the backburn when it comes to distance learning. This is not a specific policy choice but because early learning has its own demands. We hadn't prepared fully for incorporating something like early learning into our distance education mechanisms".

Similarly, one of the parents also shared that they are *"already unaware of all these technologies"*. There is limited infrastructure for digital learning, particularly in rural areas. Another parent remarked that *"how*

can we be expected to help our children with 'online' learning when we don't have the means to do it. The government must give us internet and other technologies so we can utilize it".

- **Ethiopia**

More than half of the surveyed children in Ethiopia did not engage with any mode of distance learning. Of those who did participate, only 15% have used tech-enabled mediums such as radio/TV/Online or Mobile-based Learning Apps as a mode while remaining 31.67% relied on non-tech options including reading books, completing assignments and/or having sessions with tutor. Consequently, we find that technology-enabled modes of distance learning were not popular among children and parents in Ethiopia (Figure A2). Nonetheless, varying responses mean that Mode of Distance Learning is suitable to be used as a dependent variable in our regression analysis for Ethiopia.
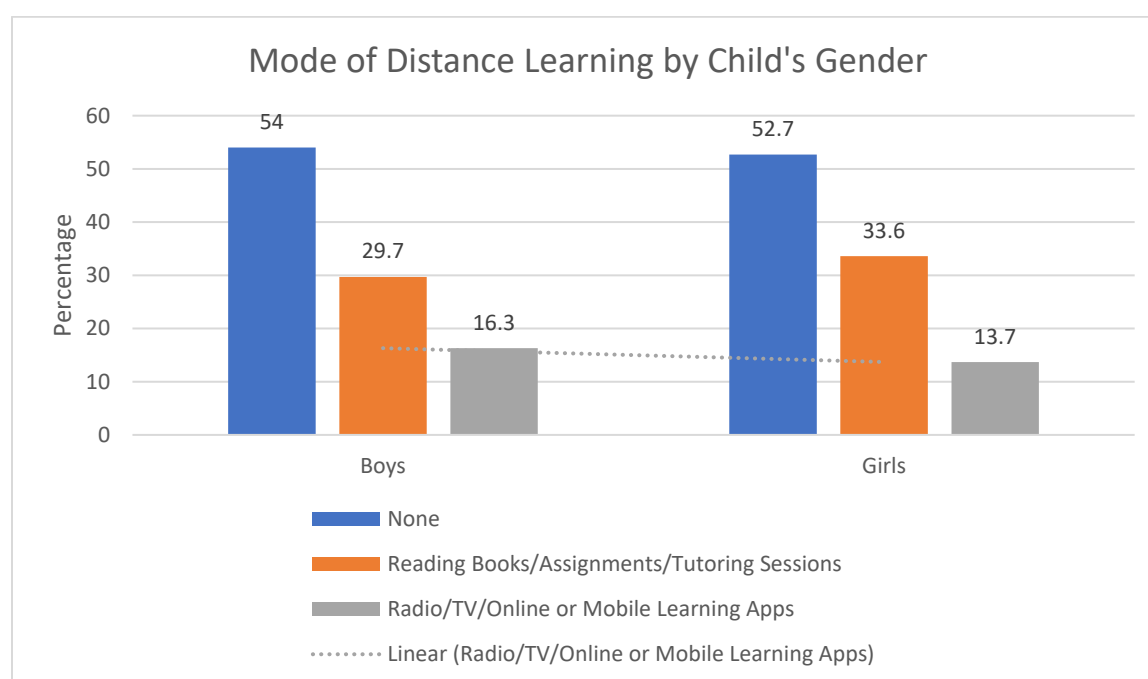
Figure 5: Mode of Distance Learning by Child's Gender (Ethiopia)

Contrary to the situation in Punjab (Pakistan), over half of the e boys in Ethiopia were not using any mode of distance learning (54% vs. 52.7%) as shown in Figure 5. Non-Tech modes (reading books/assignments completion and/or tutor sessions) remain most popular irrespective of child's gender with 33.6% girls and 29.7% boys using them. However, a greater percentage of boys i.e. 16.3% was using tech-based modes relative to that of girls (13.7%). While it shows that a higher percentage of children was using technological solutions in Ethiopia in comparison to Pakistan, digital divide across genders persists.

In addition to this and as expected, almost two out of every three out of school ECCE children were not using any distance learning mode (66.3%). Still, 15.8% of out of school ECCE children were reportedly using tech-based modes for learning during school closures including radio/TV/online or mobile-based learning apps. This percentage is one percentage point higher in comparison to that for the ECCE enrolled children (14.8%).

Furthermore, over one out of every three ECCE enrolled children have been found to be relying primarily on non-tech modes including reading books, assignments completion and/or tutor sessions (35.4%) which is approximately twice much as that was out of school ECCE children's uptake of non-tech modes (17.8 %). Data also shows that 94.6 % of parents of children, who were enrolled in ECCE prior to schools' closure, are willing to send their children back to school once the schools reopen. On the other hand, 5.4% have no plans of doing the same which means that these children may be forced to drop out.Of those parents who intend to send their children back to school, nearly 50% children have not used any mode for distance learning which could potentially result in learning losses. Others have either used non-tech modes (36.4%) or tech-enabled modes (16.5%). Interestingly the percentage difference in utilization of tech-enabled modes of distance learning by children is within one percentage point (16.5% vs. 15.8%) for those parents who plan on sending their children back to school versus those who do not.
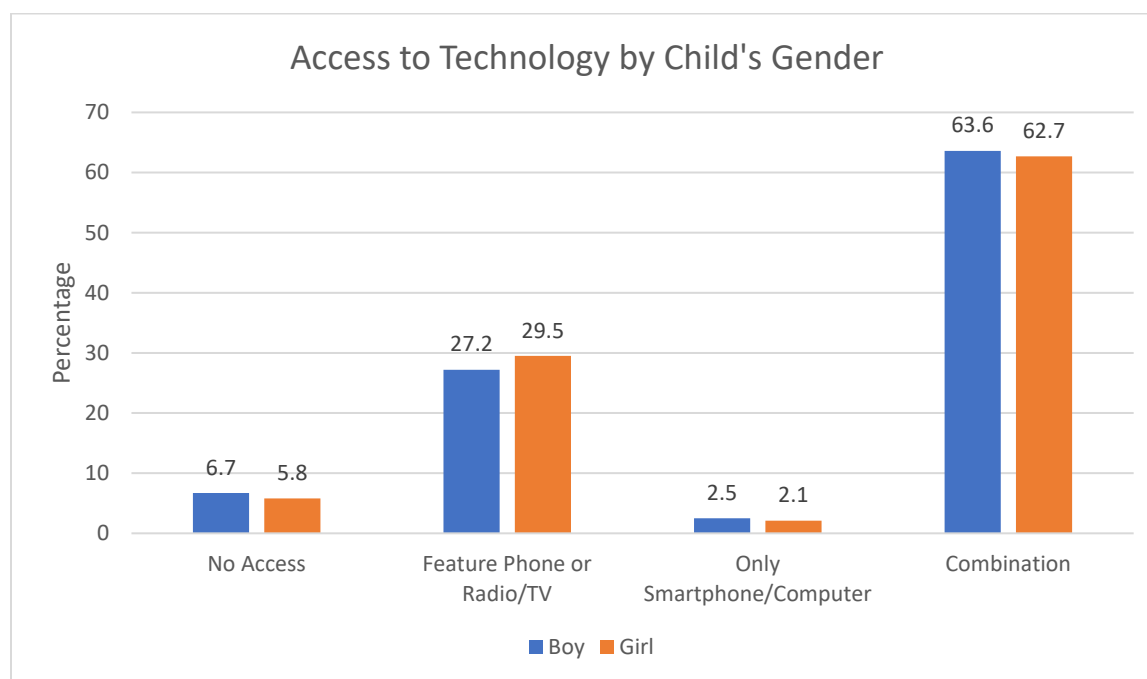

Figure 6: Access to Technology by Child's Gender (Ethiopia)

As depicted in Figure 6, over 60% of children across both genders had access to a combination of any two from feature phone, radio/tv and smartphone/computer (63.6% boys and 62.7% girls). Others had limited access i.e. 2.5% boys and 2.1% girls had access to smartphone/computer which increases to 27.2% for boys and 29.5% for girls when it comes to access to either feature phone or radio/tv.
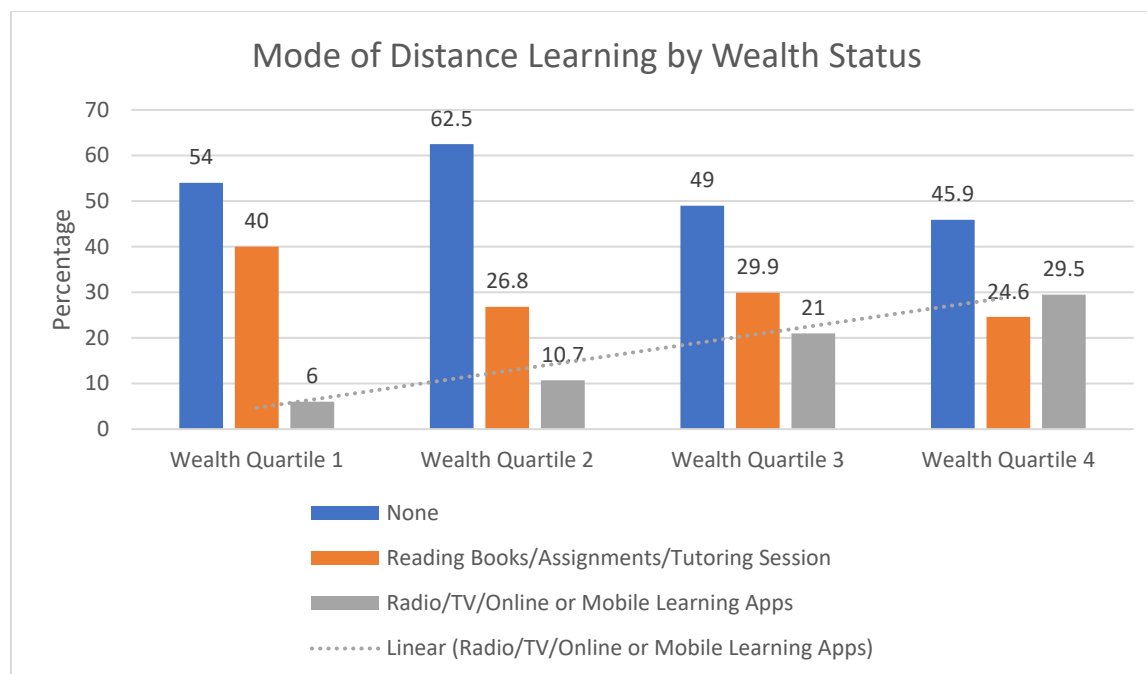
Figure 7: Mode of Distance Learning by Household's Wealth Status (Ethiopia)

Since access to technology is easier for children from relatively wealthier households, we see the manifestation of this claim in Figure 7. The uptake of tech-enabled options for distance learning such as radio/TV/online or mobile-based learning for distance learning increases with an increase in the wealth status of the household ranging from 6% for wealth quartile 1 to 29.5% for wealth quartile 4.

Access to Technology	Mode of Distance Learning			
	None	Reading Books/Assignments Completion /Tutor Session	Radio/TV/Online or Mobile Learning Apps	Total
None	18	9	3	30
Feature Phone or Radio/TV	83	45	8	136
Smartphone/Computer	7	3	1	11
Combination of two (Feature Phone, Radio/TV,Smartphone/Computer)	148	95	60	303
Total	256	152	72	480

Table 6: Mode of Distance Learning by Access/Availability of Technology (Ethiopia)

Table 6 shows that while almost one in every two children have not engaged with any mode of distance learning, even those who had access to technology-enabled modes have preferred non-tech modes. This could mean that despite having access, either the learning material was not available through those modes (which we will see below is not the case as it wasn't the biggest challenge reported by over half of caregivers) or the students were unable to utilize it due to different reasons such as lack of digital skills.

Thus, it also tells us that having access to a particular mode of learning may not suffice if the consumer doesn't have adequate skills to use that mode.

In addition to the information provided in Table 6, we find that, two in every three children across both genders had access to a combination of any two from feature phone, radio/tv and smartphone/computer (63.6% boys and 62.7% girls). Others had limited access i.e. 2.5% boys and 2.1% girls had access to smartphone/computer which increases to 27.2% for boys and 29.5% for girls with respect to access to either feature phone or radio/tv. Interestingly, we observe that a lower percentage of children with illiterate parents had no access to technology when compared with the literate ones (4.3% vs. 8%). Apart from this, both groups have by and large similar access to technology. Therefore, parents' education may not be a contributing factor when it comes to access to technology.

In terms of the biggest challenge that the caregivers faced while engaging with distance learning, main concern for nearly half of the caregivers was the lack of home learning environment for both boys (53.2%) and girls (52.3%). This was followed up by absence of radio/TV/tablet to support distance learning (15% for boys and 14% for girls) and lack of information/knowledge on parenting (14.6% for boys and 14% for girls). Others pointed out lack of radio/TV educational programs (8.2% for boys and 10.6% for girls) or lack of time due to economic activities (9% for boys and 8.9% for girls) as the biggest challenge that they faced. It is important to highlight that lack of educational programs on radio/TV and inaccessibility to technology devices were not the biggest challenges for almost nine out of ten parents across both genders. Nonetheless, these may still have been among issues which hindered the uptake of distance learning by caregivers and children.

Similarly, lack of conducive home learning environment has been reported as the biggest challenge faced by majority of caregivers in engaging with distance learning as per their respective literacy status (54.9% for illiterate caregivers and 50.8% for literate caregivers). However, a relatively higher percentage of literate caregivers have reported lack of radio/TV educational programs in comparison to illiterate caregivers (13.2% vs 5.3%).

Lack of home learning environment remains the biggest challenge faced by caregiver in engaging with distance learning even when we disaggregate our results by households' wealth status. For caregivers from poorer households, lack of radio/TV/tablet to support learning and lack of information on parenting are the biggest challenges after the aforementioned one while for caregivers from relatively wealthier households lack of radio/TV educational programs is the second most reported biggest challenge in engaging with distance learning. Moreover, lack of time due to economic activities is also among the biggest challenges reported by caregivers from wealth quartile 3 (10.4%) and caregivers from wealth quartile 4 (12.1%). On the other hand, only 8.1% caregivers from wealth quartile 1 and 6.5% from wealth quartile 2 have reported lack of time as the biggest challenge that they faced.

Table 7 below provides regression estimates in log-odds for the impact of access to technology on mode of distance learning in the context of Ethiopia. We find that the chances of relying on reading books/assignments completion/tutor sessions increase by over 1.7 times (1.03 units increase in log-odds i.e. 74% increase) relative to not engaging in any distance learning for children who were enrolled in ECCE class prior to the school closure due to COVID-19. Similarly, the probability of reading books/assignments completion/tutor sessions or using radio/TV/Online or Mobile-based learning apps increase by 65% and 75% respectively (0.64 units and 1.09 units increase in respective log-odds), relative to the base category for children with medium/high level of parental support. Furthermore, the likelihood of using

radio/TV/Online or Mobile-based learning apps increase by 85% (1.78 units in log-odds) relative to the base category for children with access to a combination of either two from feature phone, radio/TV and smartphone/computer.

Moreover, the likelihood of using reading books/assignments completion/tutor sessions as a mode of distance learning decrease by 63% (0.53 units decrease in log-odds) relative to not engaging in any distance learning for children belonging to households from second wealth quartile. This means that such children have more chances of not engaging in any mode of distance learning than opting for reading books/assignments completion/tutor sessions. For children belonging to the households from third wealth quartile, the likelihood of using radio/TV/Online or Mobile-based learning apps increase by 74% (1.06 units increase in log-odds) in comparison to the base category. Likewise, the probability of using radio/TV/Online or Mobile-based learning apps increase by 88% (1.98 units increase in log-odds) in comparison to the base category for children belonging to the households from fourth wealth quartile.

Furthermore, the chances of reading books/assignments completion/tutor sessions as a mode of distance learning decrease by 67% (0.69 units decrease in log-odds) relative to not engaging in any distance learning for children of caregivers who reported their biggest challenge to be the absence of radio/TV/tablet to support learning. In contrast, the chances of using radio/TV/Online or Mobile-based learning apps increase by 77% (1.21 units increase in log-odds) in comparison to the base category for the same group of children.

For children whose caregivers' biggest challenge with regards to distance learning has been lack of radio/TV educational program, the likelihood of reading books/assignments completion/tutor sessions decrease by 0.76 units (68%) relative to the base category. Similarly, the log-odds of reading books/assignments completion/tutor sessions decrease by 0.81 units (69%) relative to the base category for those children whose caregivers' biggest challenge with regards to distance learning has been lack of information/knowledge on parenting.

Lastly, the log-odds of reading books/assignments completion/tutor sessions as a mode of distance learning decrease by 68% (0.76 units decrease in log-odds) relative to not engaging in any distance learning for children of caregivers who reported their biggest challenge to be the lack of time due to economic activities. However, the likelihood of using radio/TV/Online or Mobile-based learning apps increase by 73% (1.01 units increase in log-odds) in comparison to the base category for such children.

VARIABLES	(1) Reading Books/Assignments Completion/Tutor Sessions	(2) Radio/TV/Online or Mobile-based Learning Apps
Girl	0.21	-0.08
	(0.22)	(0.29)
Caregiver is Literate	0.26	-0.28
	(0.22)	(0.31)
Child enrolled in ECCE	1.03***	-0.22
	(0.31)	(0.36)
Medium/High Parental Support	0.64***	1.09***

	(0.23)	(0.35)
Access to Feature Phone/Radio/TV only	-0.15	0.65
	(0.61)	(0.87)
Access to Smartphone/Computer only	0.31	0.09
	(0.96)	(1.37)
Access to Combination of two (Feature Phone, Radio/TV, Smartphone/Computer)	0.15	1.78**
	(0.56)	(0.73)
Second Wealth Quartile	-0.53*	0.33
	(0.29)	(0.49)
Third Wealth Quartile	-0.48	1.06**
	(0.31)	(0.46)
Fourth Wealth Quartile	-0.55	1.98***
	(0.50)	(0.59)
Biggest Challenge (No Radio/TV/Tab)	-0.69*	1.21***
	(0.36)	(0.42)
Biggest Challenge (No Radio/TV Edu Program)	-0.76*	0.04
	(0.41)	(0.48)
Biggest Challenge (No Info on Parenting)	-0.81**	-0.42
	(0.33)	(0.50)
Biggest Challenge (Lack of Time)	-0.76*	1.01**
	(0.45)	(0.47)
Constant	-1.37**	-4.16***
	(0.68)	(0.93)
Observations	468	468

Base Category: None (Mode of Distance Learning)
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Impact of Access to Technology and other covariates on Mode of Distance Learning (Ethiopia)

b. Comparative Analysis

- More than half of children in Ethiopia were not using any mode for distance learning (53.33%) in contrast to Pakistan where three out of every four children were using either printed material and/or radio/TV/SMS to continue their education during the school closures.
- In both countries, a fewer percentage of girls was using tech-enabled modes of distance learning in comparison to boys.
- We find that as the wealth status of a household increases, the uptake of tech-enabled options for distance learning also increases.
- While in Pakistan, nearly half of the children had no access to technology, nine out of every ten children in Ethiopia had some kind of access to technology. However, one in every three children who had access to technology in Ethiopia still preferred to use non-tech modes.
- We find that access to a combination of tech-enabled devices increases the chances of children engaging in tech-enabled modes of distance learning relative to not using any mode across both countries.

For comparison purposes, we have also categorized the surveyed districts in Punjab, Pakistan and regions in Ethiopia into high human development, medium human development and low human development on the basis of their respective human development index values.[19] This categorization suggests that no district in Punjab falls under the high human development category while no Ethiopian region can be categorized under medium human development. Bahawalnagar, Lodhran and Sarghoda from Punjab and Amhara, Ben. Gumuz, Oromia, SNNP and Tigray from Ethiopia are in the low human development category while Chakwal, Chiniot, Faisalabad, Kasur and Multan from Punjab are in the medium human development category and Addis Ababa from Ethiopia is in the high human development category. Figure 8 shows the mode of access by human development category of the district/region. In low human development category, we find that a significantly large percentage of children in Ethiopia did not use any mode to access distance learning (58.2%) relative to only 14.7% in Punjab. Interestingly, a similar trend is seen even when we compare the high human development region in Ethiopia (Addis Ababa) with medium human development districts in Punjab, Pakistan: 28.7% children in Addis Ababa did not access distance learning materials through any medium whereas the same is true for only 15.5% of children in medium human development districts of Punjab, Pakistan. Correspondingly, the percentage of children who did access distance learning material through tech-enabled modes was significantly higher for those from Punjab, Pakistan relative to Ethiopia in each category.
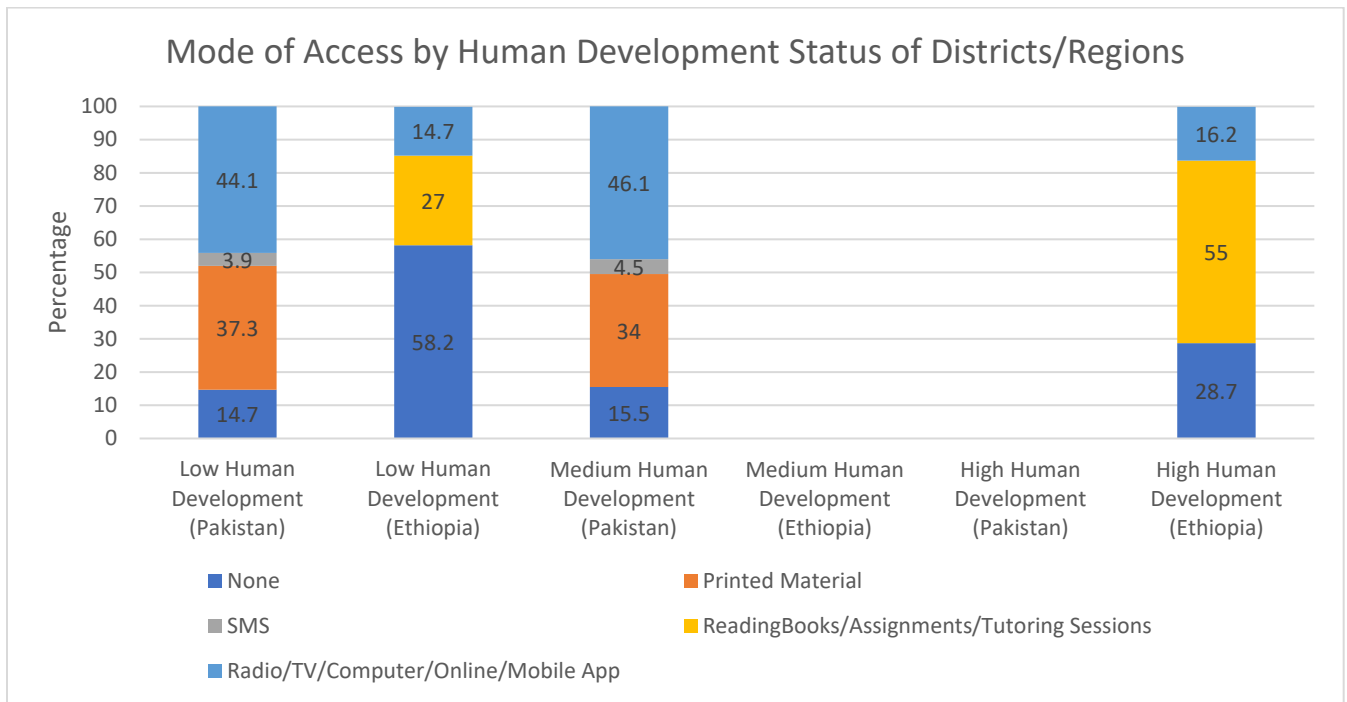

Figure 8: Mode of Access by Human Development Status of Districts/Regions

Similar to our previous findings, Figure 9 shows that majority of children in Ethiopia in either of the two regional categories (low and high human development) had some form of access to technology. Nonetheless, this access was not translated into the usage of available technology for distance learning which begs further evaluation of the probable causes.

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[19] UNDP Human Development Report's criteria for categorization was used for this purpose. Sub-National HDI values for Ethiopia can be accessed here while for Pakistan the same are available here.
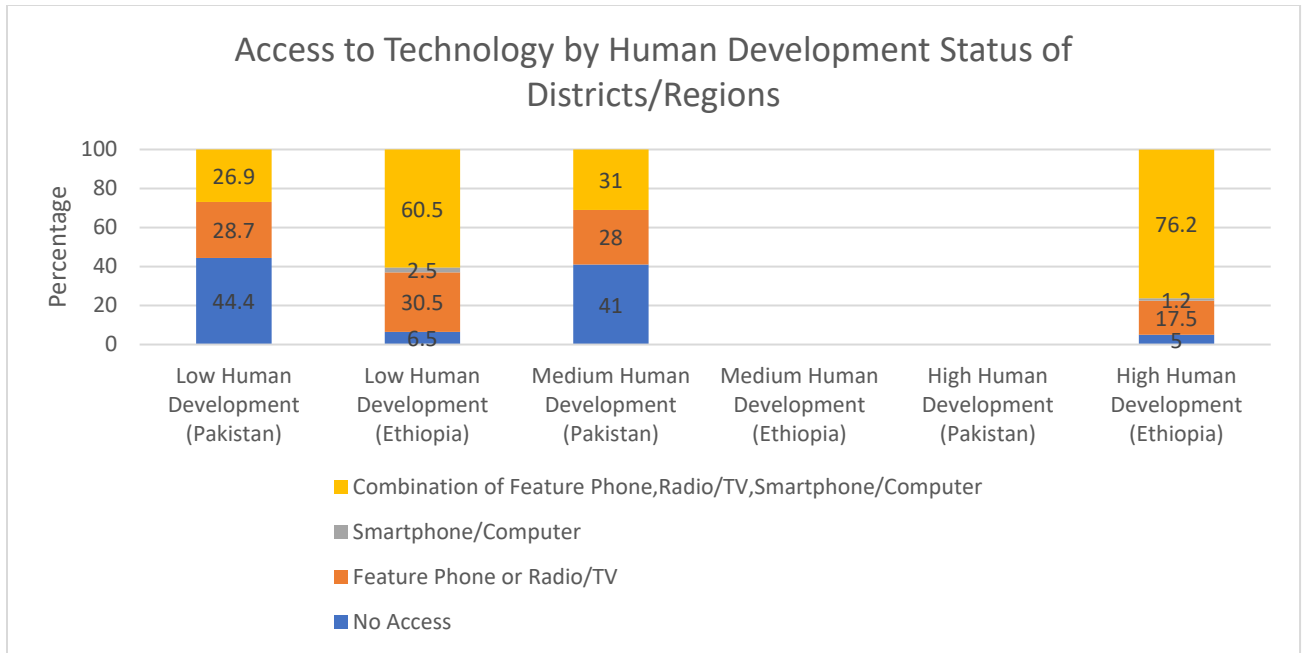
Figure 9: Access to Technology by Human Development Status of Districts/Regions

ii.   **Impact of governmental support on the level of engagement between ECCE workforce and caregivers**

a.   *Country-Specific Findings*

▪   **Pakistan**

Figure A3 shows the distribution of level of engagement between ECCE workforce and caregivers. We find that 28.53% of ECCE workforce did not have any or had only low levels of engagement with the caregivers whereas the others had medium (33.65%) or high (37.82%) level of engagement with caregivers.
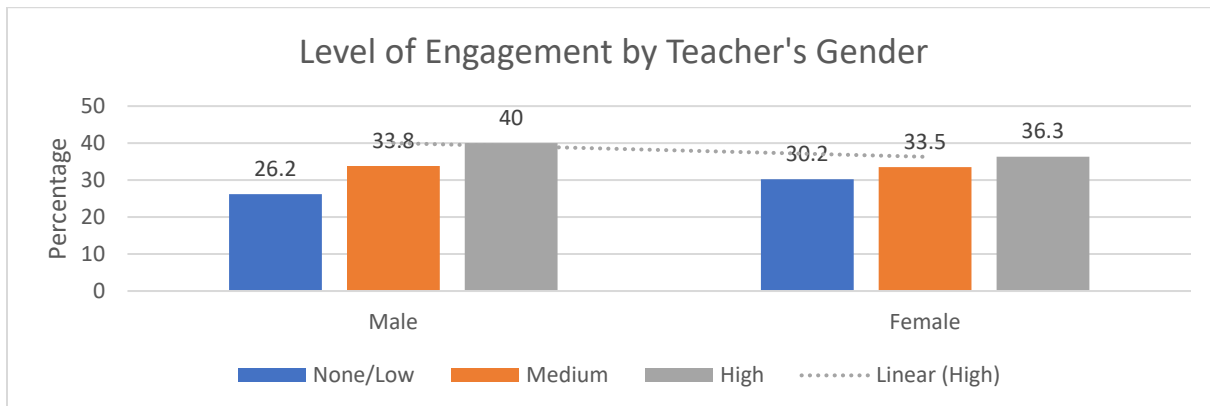
Figure 10: Level of Engagement by Teacher's Gender (Pakistan)

Disaggregating the level of engagement between ECCE workforce and caregivers over ECCE worker's gender, we find that more female teachers/headteachers were relatively disengaged with the caregivers

when compared with their male colleagues (30.2% vs 26.2%). Similarly, a higher percentage of male ECCE workers had a relatively higher engagement level (40%) with caregivers in comparison to their female colleagues (36.3%). Amongst other things, it is quite possible that this difference exists because of household responsibilities that female teachers may have had to fulfil during lockdown and school closures e.g. taking care of their own children, doing household chores etc.) This is shown in Figure 10 above.

Furthermore, over half of headteachers had none/low level of engagement with the caregivers (55.1%) whereas majority of teachers had either medium (35.9%) or high (62.2%) level of engagement with caregivers. This is in line with our expectations as teachers are the ones who usually interact with the caregivers while headteachers or principals are tasked with staff management.

In addition to this, two out of five ECCE workers from boys only schools had a high level of engagement with caregivers (40.7%). On the other hand, two out of five ECCE workers from girls only school had a medium level of engagement with the caregivers of ECCE students (39.1%). For co-educational schools, 38.9% ECCE workforce had a high engagement level, 34.9% had a medium engagement level and 26.2% had none/low engagement level which is the lowest among the three school types and shows that co-educational institutes might have some factors which help in establishing a better level of engagement between teachers/headteachers at the ECCE level.
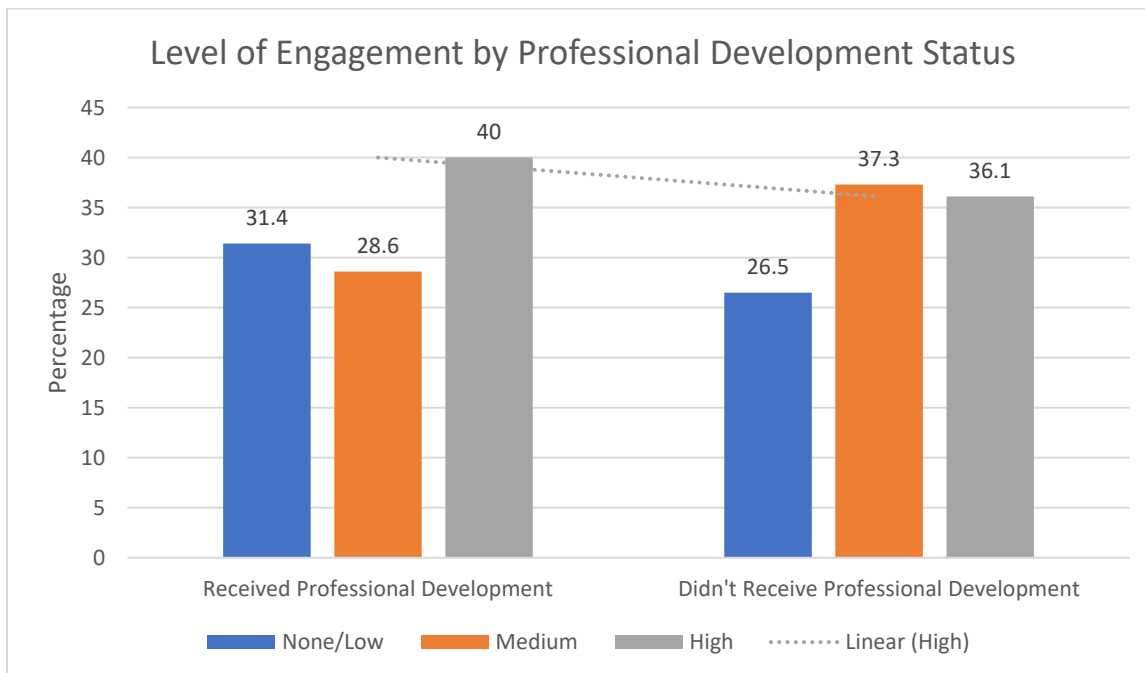

Figure 11: Level of Engagement by Professional Development Status (Pakistan)

Since our data also captures if the ECCE worker had received any professional development training during schools' closure, we are able to check for the variation in engagement level with respect to professional development. As shown in Figure 11 above, we get mixed results in this regard: while 40% and 37.3% of ECCE workforce, who had received professional development training, were engaging with caregivers at a high level and medium level respectively, a relatively higher percentage of ECCE workers with professional development had no/low engagement with caregivers in comparison to those who did not get any professional development training (31.4% vs. 26.5%). Therefore, professional development has

not helped in increasing the level of engagement as a higher percentage of ECCE workforce with no professional development was engaging with the caregivers at a medium or high level than that of those who were trained.

We also collected information on whether the ECCE workers used strategies to reach hard to reach students or not. This allows us to see if the level of engagement vary by ECCE workers' use (or lack off) strategies to reach hard to reach students: a higher percentage of teachers/headteachers who used strategies to reach hard to reach students had a high level of engagement with caregivers relative to those who did not (44.1% vs. 37.2%).

Table 8 provides the regression estimates in log-odds for the Impact of governmental support on the level of engagement between ECCE workforce and caregivers. We find that the likelihood of being at higher level of engagement with caregivers decrease by 66% (0.65 units decrease in log-odds) if the teacher's/headteacher's gender is female, given that all of the other variables in the model are held constant. Similarly, the likelihood of being at higher level of engagement with caregivers decrease by 97% (3.43 units reduction in log-odds) in case of ECCE headteachers. The chances of being at higher level of engagement with caregivers also decreases by 75% (1.09 units decrease in log-odds) for cases in which ECCE workers were aware of government launched financial/other support programs and referred households to such programs. Lastly, the probability of achieving a higher level of engagement with caregivers increases by 84% (1.66 units increase in log-odds) for those ECCE workers who had used strategies to reach out to hard-to-reach students.

VARIABLES	(1) Level of Engagement with Caregivers
Boys only school	0.15
	(0.36)
Co-Education school	0.02
	(0.32)
Female	-0.65**
	(0.29)
Have regular meetings with supervisor	0.07
	(0.50)
Received professional development during lockdown	-0.11
	(0.27)
Used strategies to reach hard to reach students	1.66***
	(0.32)
Aware & referred HHs to govt. launched financial/other support	-1.09**
	(0.42)
Role (Headteacher)	-3.43***
	(0.36)
Observations	266

Controlling for Districts
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Impact of Government Support on Engagement Level between ECCE workforce and caregivers (Pakistan)

The qualitative data through KIIs and FGDs also provides insights pertaining to the government support which was extended to ECCE workforce and if this support was transferred to the caregivers by the ECCE workforce. Our informants from affiliated entities of provincial school education department in Punjab (QAED and PMIU) have stated that virtual trainings were organized for ECCE staff members. Under these trainings, over 4000 ECCE workers including headteachers and teachers were provided trainings on COVID-19 protocols for health, hygiene and social distancing. However, it is unclear if any substantial training on improving ECE-specific learning outcomes was provided. The key informants from QAED also noted that ECCE involved play-based learning and not the formative/summative assessments. Therefore, it was difficult to track the academic performance of the students remotely. KIIs and FGDs have highlighted that provision of relevant trainings at the district level was fragmented. Interviews with headteachers from two districts (Multan and Chiniot) reveal that some of the ECCE workers received the trainings whereas others did not.

As per the information shared by the education officials, the ECCE workforce was trained on two modules. Under the first module, 15,000 headteachers from all established ECCE classrooms in the province were provided training on mental health and resilience of children, families and school staff during the pandemic. This, however, was not an ECCE-focused training and dealt with general aspects of learning for children of all age groups. In addition to this, another 4-day regular training of ECCE workforce was conducted just before the outbreak of COVID-19 and the consequent school closures. Afterwards, this training was condensed and was provided to over 6000 ECCE workers on how to provide psycho-social support to ECCE students during school closures. In this regard, ECCE teachers have claimed that this particular training was more discussion-based and lacked any relevant activity-based exercise. Thus, there was no ECCE-specific training which focused on technology or imparting of relevant digital skills for distance learning to be facilitated by the ECCE workforce.

While ECCE workforce was provided with certain types of trainings, FGDs with parents reveal that they faced challenges in staying with contact with the schools during school closures and that a significant number of students were unable to regularly interact with their respective teachers.
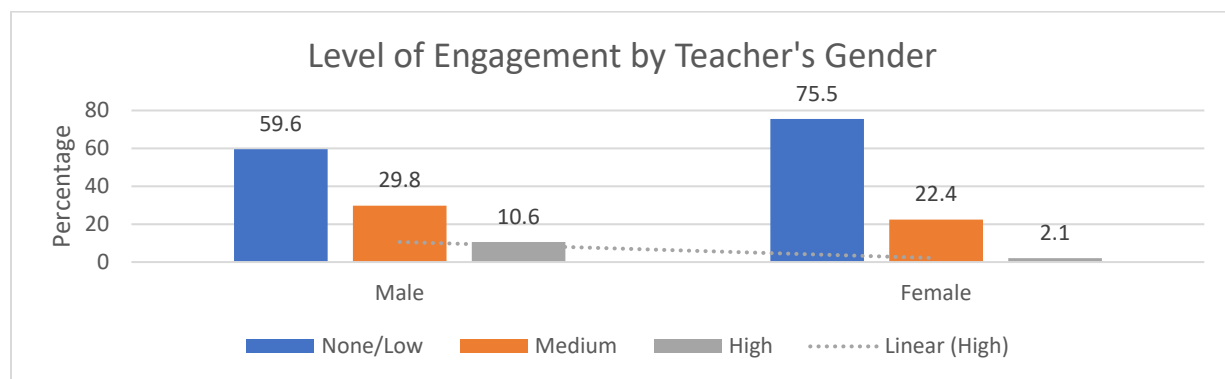
- **Ethiopia**

Figure 12: Level of Engagement by Teacher's Gender (Ethiopia)

Contrary to Pakistan, we find that a significant majority of ECCE workforce across both genders had no/low engagement with the caregivers with three out of every five male and three out of every four female ECCE

teachers/headteachers having none/low interaction with the caregivers. Consequently, the high level of engagement between ECCE workforce and caregivers stood at 10.6% for male and only 2% for female teachers/headteachers. As shown in Figure 12, we find that male teachers/headteachers had better engagement with the caregivers relative to their female colleagues.

It is also interesting to find that more head teachers were engaged with the caregivers in comparison to teachers. Usually, the teachers are responsible for interacting with the caregivers of students but in this case that is not true. Over 43.7% headteachers were engaged with caregivers at medium or high level of engagement whereas only 20.9% of teachers were able to do so. It could mean that headteachers were given the lead role of engaging with the caregivers during lockdown while teachers were only interacting with the caregivers on need-basis.
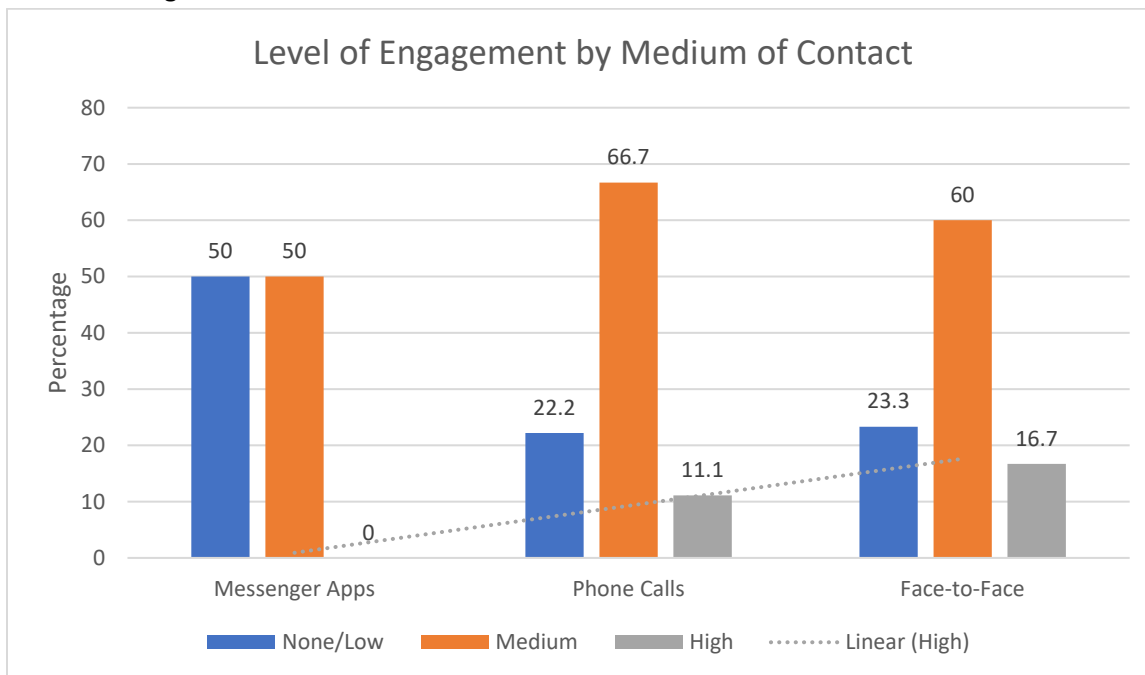

Figure 13: Level of Engagement by Medium of Contact (Ethiopia)

Figure 13 reflects the engagement level by medium used to contact caregivers by teacher/headteacher. We find that nearly three out of every four teachers/headteachers who employed in-person interaction had a medium or high level of engagement with the caregivers. On the other hand, none of those who used messenger apps such as WhatsApp, Telegram, Viber etc. had high level of engagement and 11.1% of teachers/headteachers who contacted caregivers through phone calls had a high level of engagement with the caregivers. In fact, 50% of teachers who used messenger apps had none/low level of engagement with caregivers which shows the importance of direct interaction e.g. through phone calls or in-person.
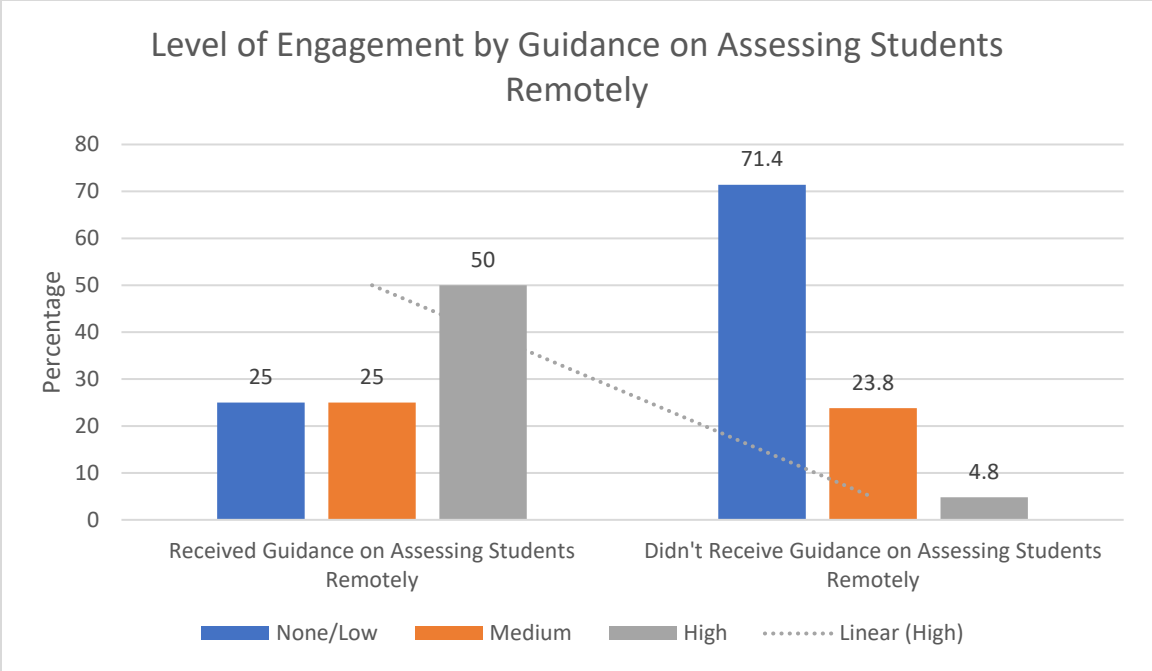
Figure 14: Level of Engagement by Guidance on Assessing Students Remotely (Ethiopia)

Of those teachers/headteachers who had received guidance on assessing students remotely, 50% had a high engagement level with caregivers. This is in stark contrast to those who did not receive any such guidance as 71.4% of them had none/low engagement level and only 4.8% has a high level of engagement with caregivers. Therefore, relevant trainings such as training on remote assessments may prove to be helpful in improving the engagement level between ECCE workforce and caregivers.
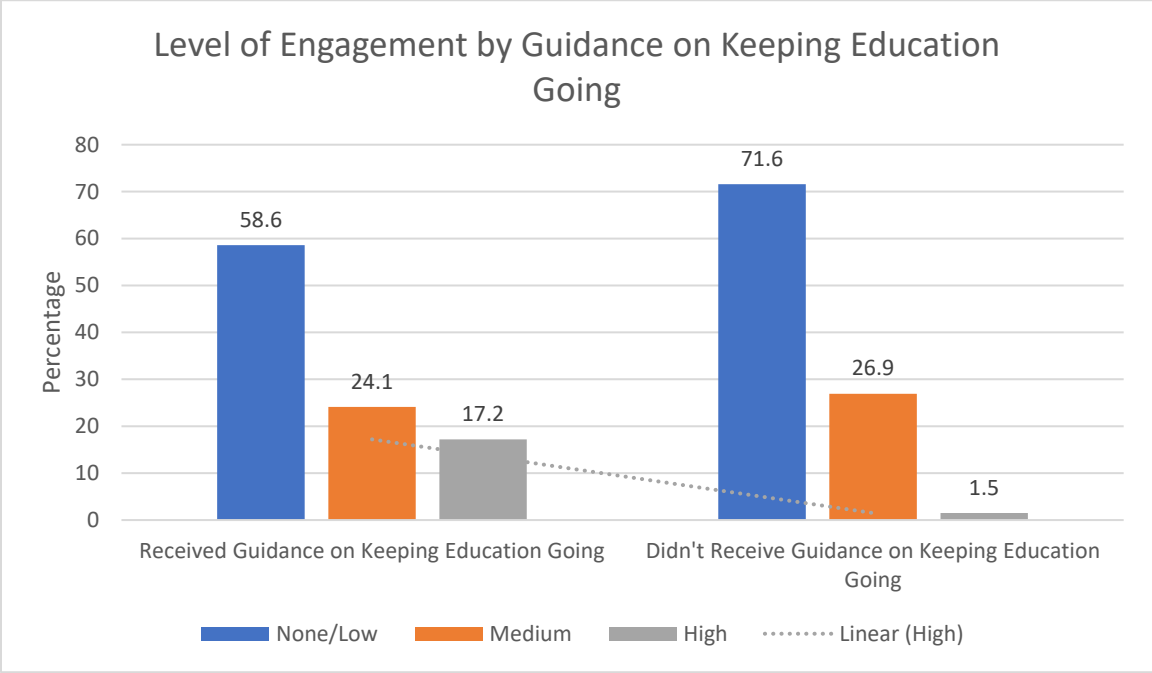

Figure 15: Level of Engagement by Guidance on Keeping Education Going (Ethiopia)

Similarly, 71.6% of such teachers/headteachers who did not receive guidance on how to keep education going for children had no/low level of engagement with the caregivers and only 1.5% had a high level. In contrast, 17.2% of teachers/headteachers who received this guidance were able to achieve the high level of engagement with caregivers. Still, 58.6% of these teachers had no/low level of engagement which means that even if teachers/headteachers are trained on how to keep education going for children, the effort and impact may not be transferred to the caregivers and their children.
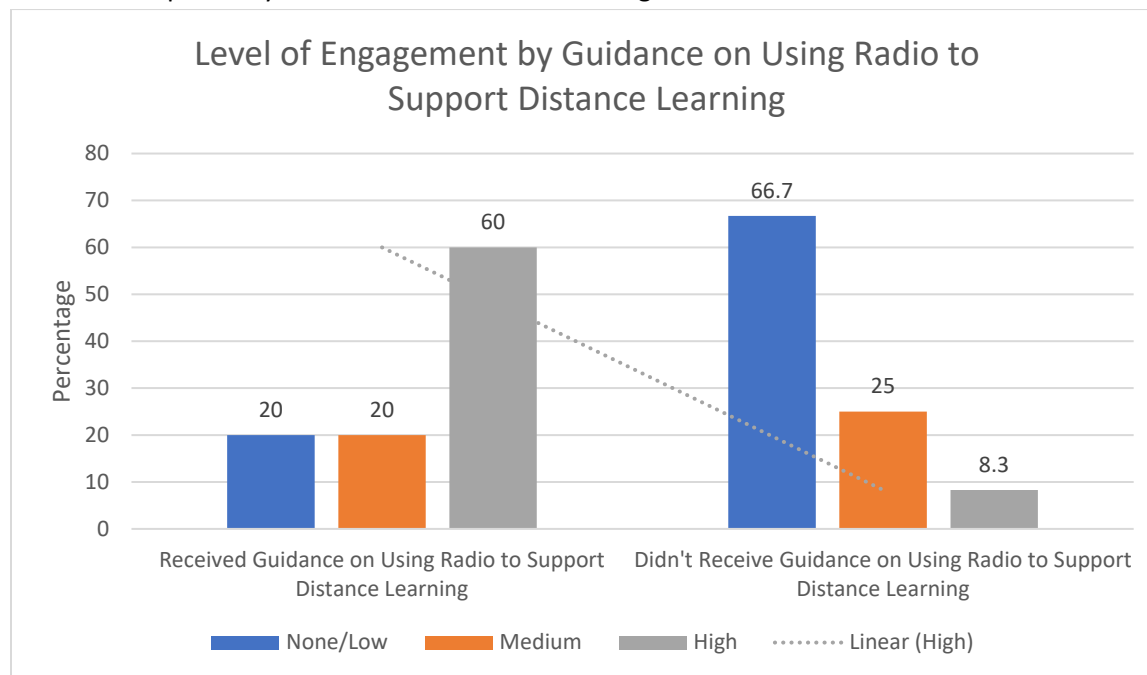

Figure 16: Level of Engagement by Guidance on Using Radio to Support Distance Learning (Ethiopia)

Figure 16 shows that of those teachers/headteachers who had received training on usage of radio to support distance learning, four out of every five teachers/headteachers had a high or medium level of engagement with caregivers. On the contrary, almost three out of five of those teachers who did not receive this guidance had none/low engagement with caregivers, 25% had medium level of engagement and only 8.3% had a high level of engagement.

Lastly, we have also found that no surveyed teacher/headteacher had received guidance on how to use TV to support distance learning of children. Yet, 17.2% of teachers/headteachers had high engagement level, 24.1% had medium level of engagement and 58.6% had no/low engagement with the caregivers of ECCE students.

While the data available to us does not provide sufficient evidence on how teachers were supported for (and in turn supported) distance learning measures in Ethiopia, a study from Ethiopia conducted by Real Center shows that discrepancies in flows of information and support effected school-level stakeholders' response to school closures and impacted their ability to support students' distance learning. Findings indicate that "stakeholders – especially those at school-level – did not receive sufficient information and support to enable them to respond effectively. This was primarily due to an over-reliance on a cascade flow of information and support from the Ministry of Education to the Regional Education Bureau, the Woreda Education Office and then to school principals and teachers. Information was lost from one level

to the next, meaning that school-level stakeholders were least likely to receive the information and support that they needed". The aforementioned study shows that less than half of teachers in the sample were engaged in providing distance support for students' learning, with rural teachers less likely to indicate that they were providing support. There were other challenges too such as limited access to technical equipment and limited workforce capacity to deliver and support distance learning (Yorke et al, 2021).

b. *Comparative Analysis*

- Almost 80% teachers and 56% headteachers in Ethiopia had none or low level of engagement with the caregivers and students in contrast to Pakistan where only 28.53% of the overall ECCE workforce had none or low level of engagement with the caregivers.
- A higher percentage (40.4% in Ethiopia and 73.8% in Pakistan) of male ECCE workers had high level of engagement with caregivers relative to their female colleagues (24.5% in Ethiopia and 69.8% in Pakistan) in both countries.
- Descriptive analysis shows that governmental support in terms of receiving general professional development training (as in the case of Pakistan) and/or receiving guidance on different aspects of distance learning such as remote assessments and use of radio (as in the case of Ethiopia) contribute towards generating higher level of engagement between ECCE workforce and caregivers.

As mentioned in the previous section, we have categorized the surveyed districts in Punjab, Pakistan and regions in Ethiopia into high human development, medium human development and low human development on the basis of their respective human development index values and that no district in Punjab falls under the high human development category while no Ethiopian region can be categorized under medium human development. Bahawalnagar, Lodhran and Sarghoda from Punjab and Amhara, Ben. Gumuz, Oromia, SNNP and Tigray from Ethiopia are in the low human development category while Chakwal, Chiniot, Faisalabad, Kasur and Multan from Punjab are in the medium human development category and Addis Ababa from Ethiopia is in the high human development category.

Figure 17 below showcases the level of engagement between ECCE workforce and parents by human development status of their respective regions/districts. We find that majority of ECCE workforce in Ethiopia (irrespective of regional human development status) had none/low engagement with parents in comparison to Pakistan. In fact, Addis Ababa (the only region under high human development in our sample) had the least percentage of ECCE workers engaging with parents at medium of high level. This suggests that level of engagement between parents and ECCE workforce may not depend on the human development level of a district.
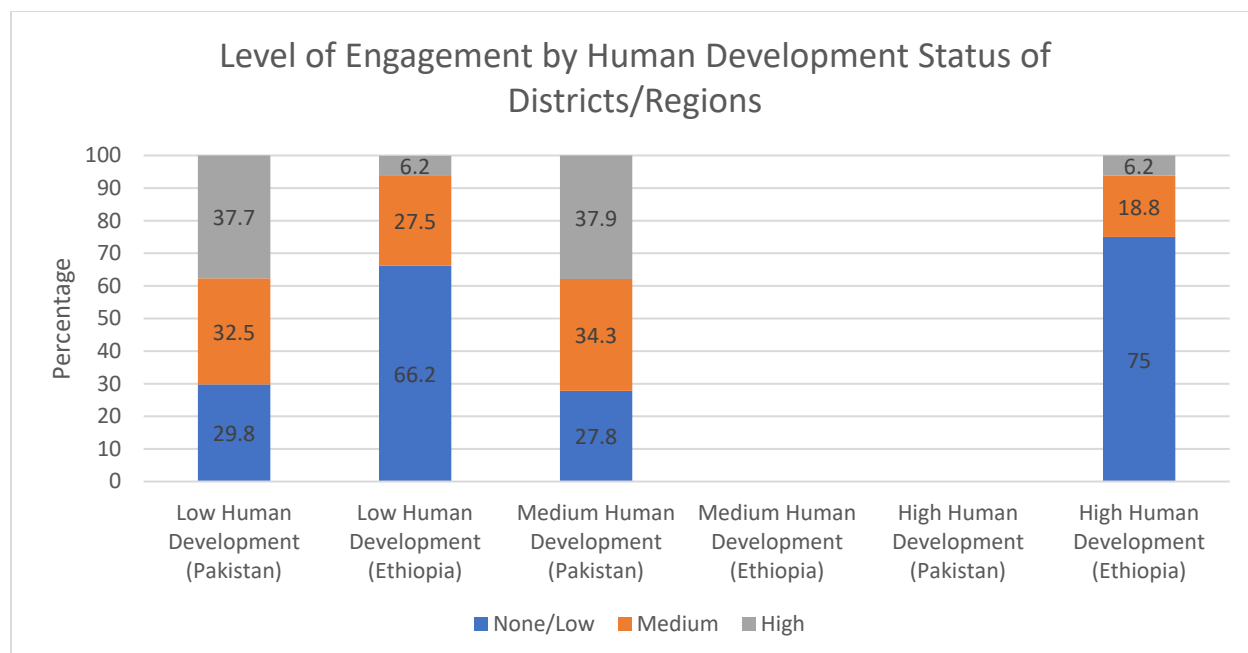
Figure 17: Level of Engagement by Human Development Status of Districts/Regions

7. Policy Implications

The COVID-19 pandemic caught every education system in the world by surprise and resulted in a historic interruption in education services for 1.6 billion children from 167 countries (UNESCO, 2020). The ECE sub-sector was perhaps the hardest hit, given that its political commitment and funding levels are still low compared to primary and secondary education. The analysis of the evidence gathered in the current study sheds some light on the role (if any) technology has played in helping pre-primary learners access distance learning and how ECE teachers utilized technology to engage with students and their families during the COVID-19 crisis in resource-constrained circumstances. Presented below are a few policy recommendations emerging from the study:

- **First, the gap in prioritisation of pre-primary education** in the Government's response strategy needs to be addressed urgently
  In the case of Pakistan and Ethiopia, the government actors have over the past few years worked well to make transform ECE up to modern standards, however our findings show that there are still some major milestones to achieve. The limited prioritization of ECE during the pandemic and the learning losses shown in our findings would highlight the need to develop more coherent, entrenched, and formalized ECE-specific strategies at a systems' level that can mitigate the negative impact of emergency situations and ensure high outcomes in other times.

- Explore a **broader range of viable options** and solutions to address learning for early years

Interviewees in this study were aware that limited and inequitable access to ICT devices was a significant limitation of the distance learning strategies. The key issue is with the framing of COVID-19 response exclusively in terms of technology and the role that it played in enabling learning during the time. Data from our research and literature hints at two sobering realities. First, children in early years are less likely to utilize technology for education. More than half (53.33%) of children in Ethiopia were not using any mode for distance learning in contrast to Pakistan where 68.21% of the children were using either printed material and/or radio/TV to continue their education during the school closures. In both countries, a fewer percentage of girls was using tech-enabled modes of distance learning in comparison to boys. Secondly, ECCE is available to only a proportion of all children aged 3-7. And as the data highlights, only a small percentage among those children can access technology-based learning. Subsequently, technology by itself cannot substitute for what are larger structural problems in ECCE. Therefore, low-tech interventions need to be considered by the policy makers and service providers (state and non-state).

- More attention to children **(e.g., accelerated or remedial course)** who skipped ECE
  There is growing [evidence](#) that accelerated learning opportunities at primary/post-primary levels help children cope with loss of schooling and increase in age-appropriate learning outcomes. Multiple [TaRL (Teaching at the Right Level)](#) models have been tested for both in-school and out-of-school children and have been found to work well at scale. Similar mechanisms need to be adopted for children who have skipped ECE or are at the risk of dropping out in the post-lockdown situation.

- Deployment of tech-based solutions to be more cognizant of **system-level issues**
  At the school level, work on ECCE-specific curricula, assessment, monitoring, implementation mechanisms, advocacy, and workforce development is an ongoing endeavor. In this scenario, the turn towards technology must not be a stop-all solution. Stakeholders in both countries and in Global South will necessarily need to level the playing field in access to resources (books, technology, etc.) and information flow (communication with schools), particularly in rural areas, for poorer households, and where mothers are not literate. This implies that the deployment of tech-based learning has to be coherent with work on other systems-level issues in ECCE. The findings have shown the importance of ensuring all teachers have access to timely information and guidance to support students. ECCE professionals and workforce have been and will always be at the core of any effective response to the pandemic; therefore any interventions developed to support distance education should include a robust, well-coordinated and iterative communication plan. The exchange of information will assist in quickly learning and adjusting any distance-learning approach to ensure it meets the needs of students.

- Incorporating insights from local researches in Global South to bring in **locally rooted ideas** and solutions in global policy debates
  The global policy debates need to be informed by local researches and field commentaries emerging from the Global South. Teachers, community volunteers, caregivers/parents and

practitioners have played a phenomenal role in ensuring that learning continues for the young children during the school closures. Their voices, experiences and ideas which allow regional comparisons and help zone in on specific socioeconomic contexts need to be incorporated for a more evidence-based policy making at the global level.

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ANNEXURE

Variable	Country	
	Pakistan	Ethiopia
Child's Gender	= 1 if child is a girl, 0 otherwise i.e. boy	= 1 if child is a girl, 0 otherwise i.e. boy
Mode of Access	Categorical variable showing the mode which has been used by the child to access learning material: 1 = None, 2 = Printed Material, 3 = SMS, 4 = Radio/TV, 5 = Computer/Smartphone/Tablet	Categorical variable showing the mode which has been used by the child to access learning material: 1 = None, 2 = Reading Books from School/Completed Assignment from Teacher/Completed Assignment from Parent/Session with Tutor, 3 = Radio/TV/Online or Mobile Learning Apps
Access to Technology	Categorical Variable showing the access to a particular type of technology that the household has where 1 = No Access, 2 = Either Feature Phone or Radio/TV, 3 = Combination of Two from Feature Phone, Radio/TV, Smartphone/Compute/Tablet	Categorical Variable showing the access to a particular type of technology that the household has where 1 = No Access, 2 = Either Feature Phone or Radio/TV, 3 = Only Smartphone/Computer/Tablet, 4 = Combination of Two from Feature Phone, Radio/TV, Smartphone/Compute/Tablet
Wealth Quartile	Categorical variable showing household's rank in the assets-based wealth index: 1 = Wealth Quartile 1, 2 = Wealth Quartile 2, 3 = Wealth Quartile 3, 4 = Wealth Quartile 4	Categorical variable showing household's rank in the assets-based wealth index: 1 = Wealth Quartile 1, 2 = Wealth Quartile 2, 3 = Wealth Quartile 3, 4 = Wealth Quartile 4
Caregiver in Contact with Teacher	= 1 if Yes, 0 otherwise	= 1 if Yes, 0 otherwise
Child's Age	Age of the Child in Years	
Mother's Education	Dummy variable showing if Mother's Educational Attainment is Primary or Above i.e. 1 = Primary or Above and 0 = Below Primary	
Number of Household Members	Dummy variable showing if the number of household members is 5 or above in child's home i.e. 1 = 5 or	

	above members and 0 = Below 5 members	
Functional Difficulty Level	Categorical variable showing the functional difficulty level of a child where 1 = No Difficulty, 2 = Mild Difficulty, 3 = Moderate, 4 = Severe	
Caregiver is Literate		Binary variable showing whether caregiver is literate or not: 1 = Illiterate, 2 = Literate
Child Enrolled in ECCE		= 1 if Yes, 0 otherwise
Biggest Challenge in Engaging with Learning		Categorical variable showing the biggest challenge that caregivers have faced in engaging with child's learning: 1 = Lack of home learning environment, 2 = Lack of Radio, TV, Tablet to Support learning, 3 = Lack of radio/TV educational programmes, 4 = Lack of information/knowledge on parenting, 5 = Lack of time due to economic activities
Parental Support		Dummy variable showing the support in learning provided by parents to children where 0 = None/Low and 1= Medium/High

Table A 1: Description of Variables from Household/Caregiver Survey

Variable	Description
Role	Binary variable showing the role of the interviewee in school: 1 = Teacher, 2 = Headteacher
Type of School	Categorical variable showing the type of school: 1 = Girls Only, 2 = Boys Only, 3 = Co-Education
Interviewee's Gender	= 1 if female, 0 otherwise i.e. male
Have regular meetings with supervisor	= 1 if Yes, 0 otherwise
Received Professional Development and other support	= 1 if Yes, 0 otherwise
Used strategies to reach hard to reach students	= 1 if Yes, 0 otherwise
Referred HHs to govt. launched financial/other support	= 1 if Yes, 0 otherwise
Level of Engagement with Parents	Categorical variable showing the level of engagement that teachers/headteachers have had with the parents: 1 = None/Low, 2 = Medium, 3 = High

Table A 2: Description of Variables from Teacher/Headteacher Survey in Pakistan
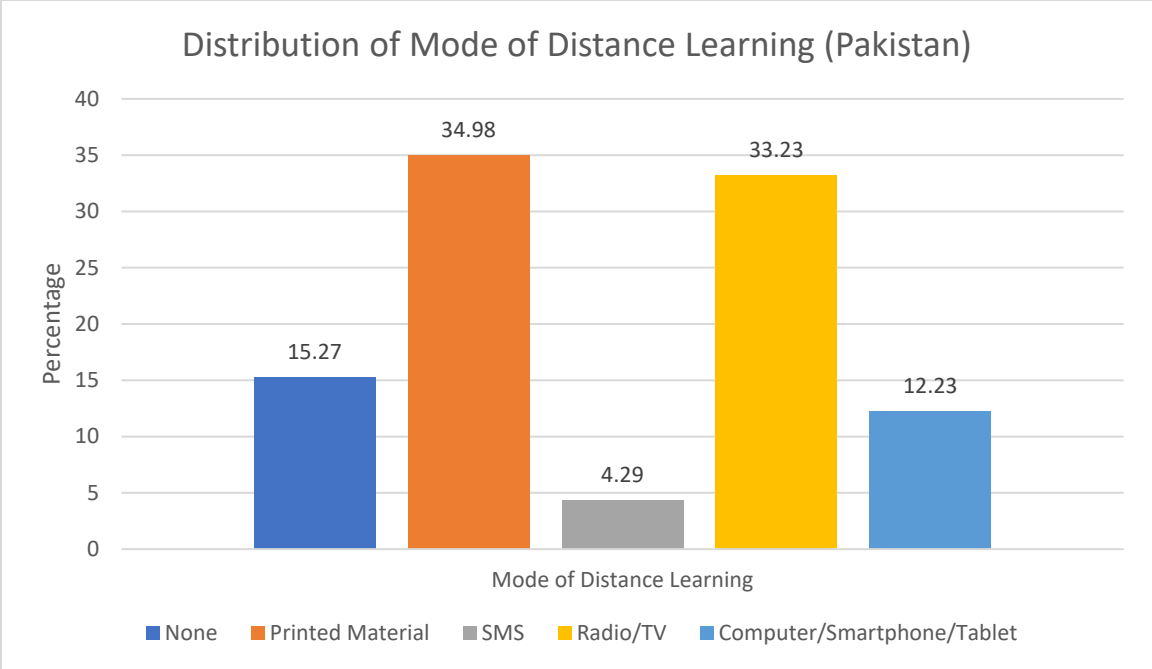
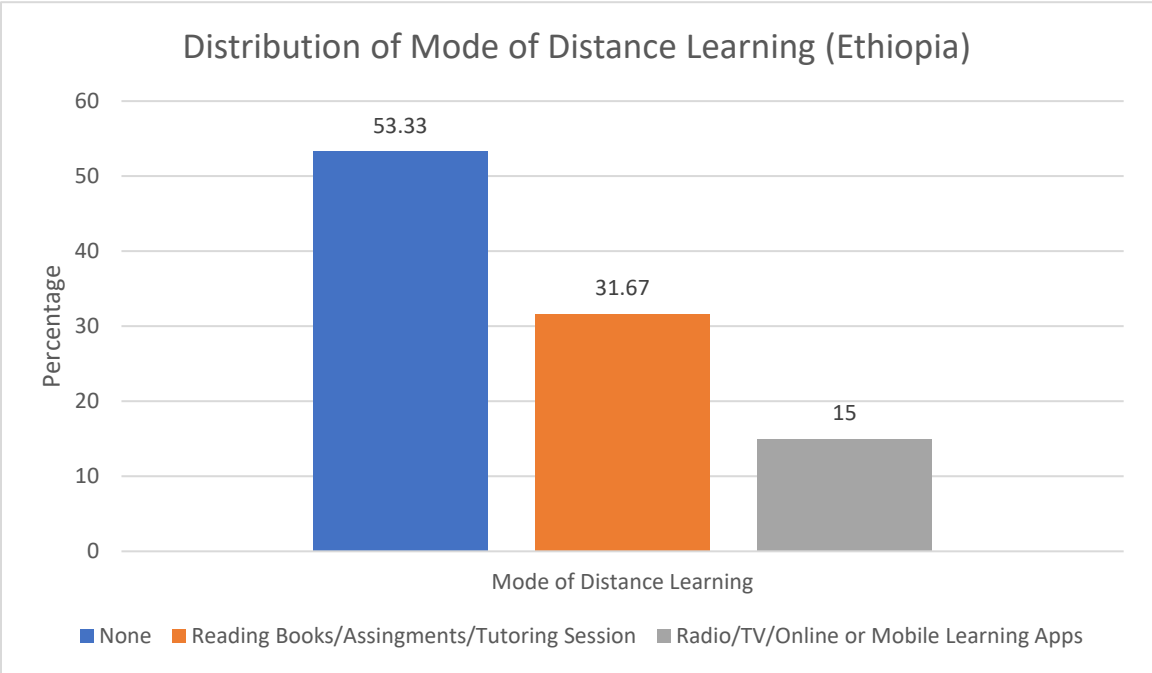*Figure A 1: Distribution of Mode of Distance Learning (Pakistan)*

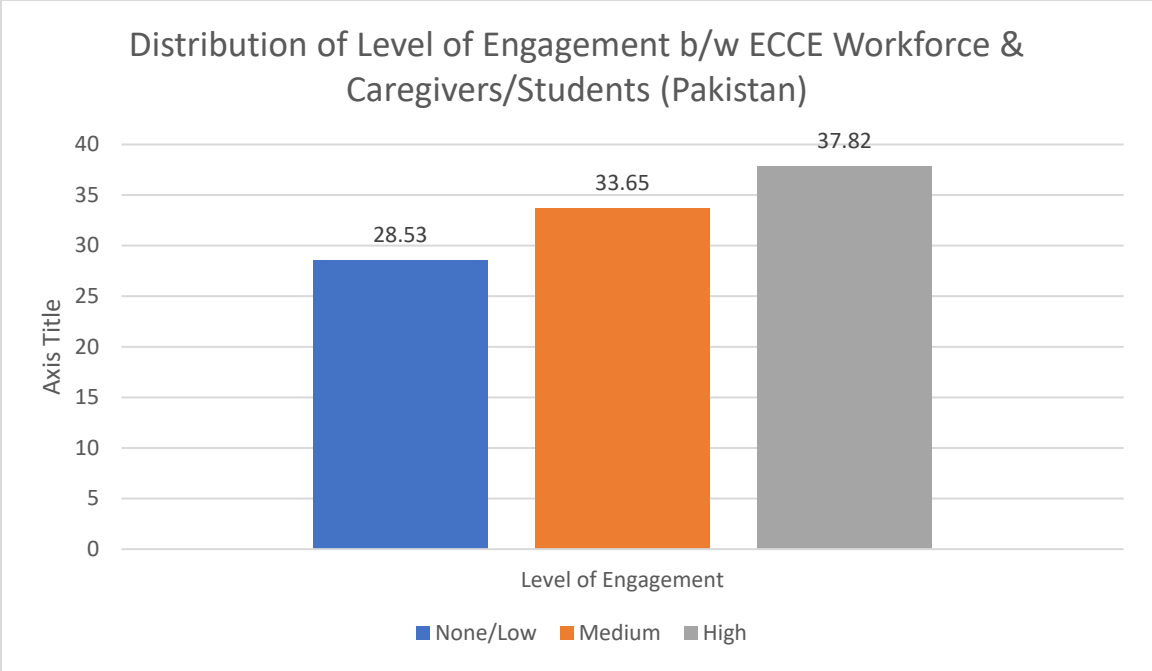*Figure A 2: Distribution of Mode of Distance Learning (Ethiopia)*

Figure A 3: Distribution of Level of Engagement b/w ECCE Workforce & Caregivers/Students (Pakistan)