

# Learning Losses during the COVID-19 Pandemic in Ethiopia: Comparing Student Achievement in Early Primary Grades before School Closures, and after They Reopened

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## Introduction

The outbreak of COVID-19 pandemic has disrupted the education sector in unprecedented ways. As with many other countries around the world, the Ethiopian government closed schools following the first identified case in the capital city, Addis Ababa, on the 16th of March 2020. Across the country, these closures resulted in more than 26 million<sup>1</sup> learners staying at home for almost eight months (UNESCO, 2021).<sup>2</sup> In addition to this hiatus in their education, pupils were promoted automatically to the next grade with only 45 days of catch-up classes (Ministry of Education, 2020). In other words, those attending a specific school grade in March 2020 were then promoted to the next grade when school resumed in October 2020.

For a significant proportion of Ethiopian pupils, learning during school closures was extremely limited despite the government's efforts to create educational programmes via national television and radio stations (Kim et al., 2021a; Yorke et al., 2020). School closures, combined with barriers to accessing remote educational resources, meant potential learning losses for a significant number of pupils.

Several studies have already indicated that COVID-19 resulted in learning losses, especially among the poorest

## Key Points

- In comparison with the 2018-19 cohort, students entering Grade 1 after schools reopened began the year with lower foundational numeracy achievements and made slower progress in foundational numeracy during the year. As a consequence, they ended the year with an even wider difference in foundational numeracy compared to the pre-COVID cohort.
- Similarly, Grade 4 students in the 2020-21 cohort started the year with lower numeracy achievements than those in Grade 4 in 2018-19. Their learning progress over the school year was also lower by about 12 points (SD=0.12), widening the difference in numeracy achievement between the two cohorts by 22 points (SD=0.22) at the end of the school year.
- The differences in educational achievement remain evident in both grades even when adjusting for the duration of instructional time and are estimated to be equivalent to more than one-third of an academic year lost.
- Pupils from rural areas and those from the poorest households remain within the lowest numeracy achievement levels. There are also variations by gender for Grade 4 pupils, where boys showed relatively higher progress than girls by the end of the school year.
- Overall, our results continue to suggest the need for targeted support for low-performing students, particularly in rural areas and for those from the poorest backgrounds, so that a further widening in learning inequalities can be prevented.

<sup>1</sup> <https://www.unicef.org/ethiopia/stories/ethiopia-keeping-children-learning-during-covid-19>

<sup>2</sup> In total, schools were closed for 31 weeks. Of this, all schools were closed for 21 weeks, with a phased reopening resulting in up to 10 additional weeks of closure for some schools.

and most disadvantaged groups. A study in Indonesia found that pupils lost 11 points on the PISA<sup>3</sup> reading scale due to the four-month school closure from March to July 2020 (Yarrow, Masood & Afkar, 2020). It was also estimated that Grade 4 pupils in South Africa experienced losses equivalent to more than 60 percent of an academic year (Ardington, Wills & Kotze, 2021), while pupils in the UK lost a third of their expected learning during pandemic-related school closures (Major, Eyles & Machin, 2021).

It is anticipated that school closures in Ethiopia could similarly result in learning losses and challenges for pupils to catch up with their learning, particularly for those from disadvantaged backgrounds. Our related emerging findings in Ethiopia have indicated that school closures exacerbated pre-existing inequalities in education, where progress was much lower for rural students compared to those in urban areas who were tracked from Grade 4 to Grade 6 (Kim et al., 2021b; Bayley et al., 2021).

Building on this work in Ethiopia, this Insight Note provides a new perspective on numeracy achievements of Grade 1 and Grade 4 pupils by comparing learning at the start of each academic year and the gains over the course of the year across two academic years: 2018-19 and 2020-21. During the 2018-19 academic year, the Research on Improving Systems of Education (RISE) Ethiopia programme collected data on students' numeracy achievement from 168 schools. After schools reopened in October 2020, and with additional support from the Bill and Melinda Gates Foundation, data on students' numeracy achievements were collected for two new cohorts of pupils in Grades 1 and 4 in the same schools using the same instruments. This has enabled us to compare learning patterns between two cohorts in the same grades and schools before and during the pandemic. More specifically, in this Insight Note, we aim to:

1. Compare foundational numeracy levels of pupils entering Grade 1 in the 2020-21 academic year relative to those in 2018-19.
2. Compare progress in foundational numeracy for Grade 1 pupils over the course of the 2020-21 academic year relative to that seen during the 2018-19 academic year.
3. Compare numeracy levels of pupils entering Grade 4 in the 2020-21 academic year relative to those entering the same grade in 2018-19.
4. Compare progress in numeracy for Grade 4 pupils over the course of the 2020-21 academic year relative to the progress seen during the 2018-19 academic year.
5. Estimate the magnitude of learning loss attributable to the pandemic by calculating the difference in numeracy levels and progress between the two cohorts.

## Data and Methods

### Data

We use a repeated cross-section study design to compare the numeracy achievements of two cohorts of pupils in Grades 1 and 4. As part of the RISE Ethiopia programme, a large-scale data collection exercise was undertaken during the 2018-19 academic year. It included data on literacy and numeracy tests for pupils in Grades 1 and 4 and their related household and school information. Pupils' literacy and numeracy levels were assessed at the beginning and at the end of the school year. Data were collected from 168 schools across seven regions of Ethiopia (Addis Ababa, Amhara, Benishangul-Gumuz, Oromia, SNNP, Somali and Tigray).

When schools reopened in October 2020, the research team received approval from the Ethiopian Ministry of Education (MoE) to collect data in the same schools that had been part of the initial round of RISE assessments. We collected data on literacy and numeracy attainment for two new cohorts of pupils in Grades 1 and 4 at the beginning and end

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<sup>3</sup> Administered by the Organisation for Economic Co-operation and Development (OECD), PISA—Programme for International Student Assessment—evaluates the educational systems of member countries by measuring 15-year-old school pupils' learning outcomes in reading, maths and science.

of the 2020-21 academic year to mirror previous rounds of data collection. We also collected information related to learning during school closures and household data. For security reasons, we were unable to collect data in all the twenty schools in the Tigray region, four schools in the Oromia region, and six schools in the Benishangul-Gumuz region. Therefore, information for the 2020-21 academic year was obtained from 138 schools located in the remaining six regions.<sup>4</sup>

Figure 1: Components and overall RISE Ethiopia research description

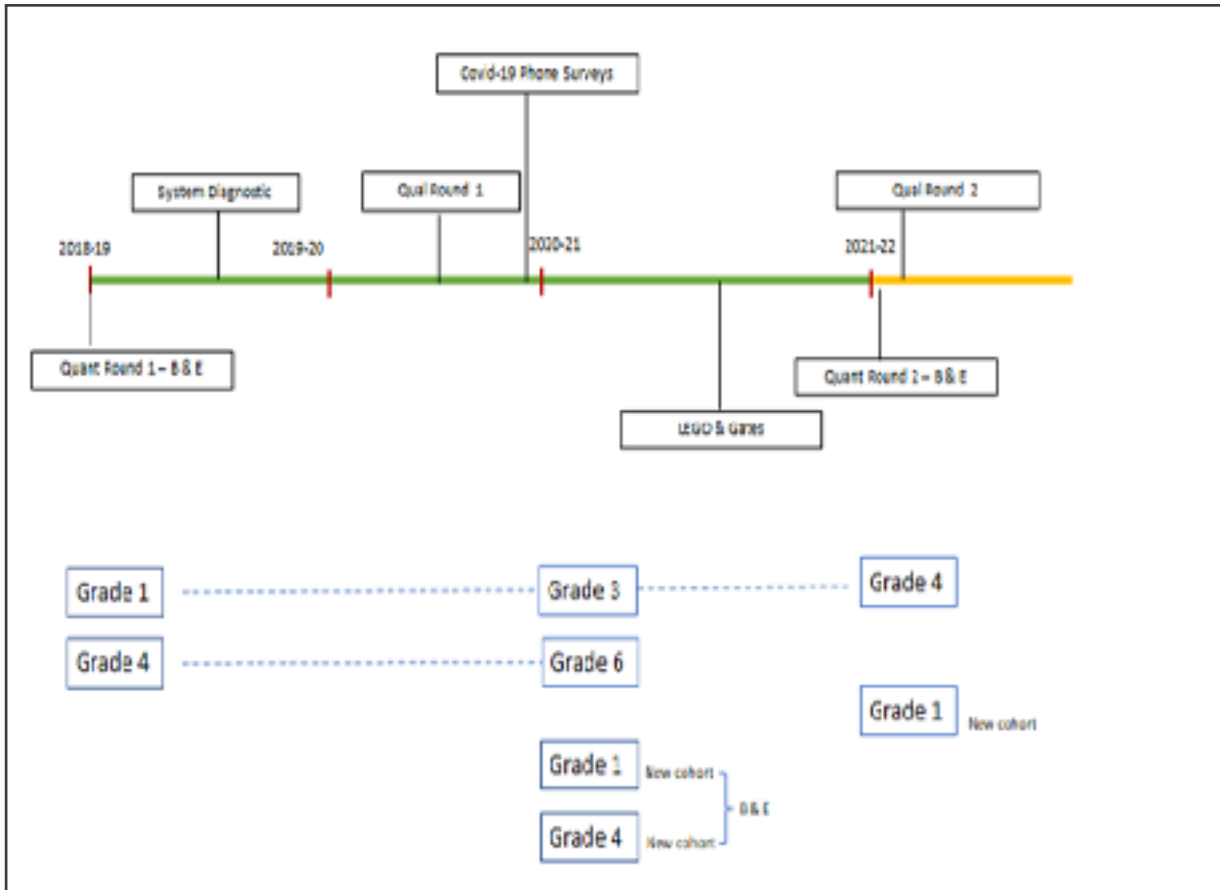


Figure 1 depicts the components of the RISE Ethiopia research. The pre-COVID cohorts surveyed in the academic year of 2018-19 are indicated in the middle of Figure 1, while the 2020-21 cohorts surveyed after schools reopened (following pandemic-related closures)—are shown at the bottom of the Figure. Actual learning data from the two cohorts enable us to determine whether there are any differences in educational achievement between children who were in school during the 2018-19 academic year and those in the 2020-21 academic year. It is important to note that the length of the academic years is somehow different. For this, we also made some adjustments to check whether the differences in educational achievement remain evident.

**Sampling**

The RISE Ethiopia school survey sample includes schools offering the first and second primary cycles, i.e. Grades 1-8. The number of schools in each of the seven selected regions is approximately proportionate to the population in each region. The selection of schools in each region followed the original RISE Ethiopia research design requirements, which included: (a) incorporating schools from the Young Lives School Surveys (2012-13 and 2016-17); (b) incorporating schools targeted in the first phase of the General Education Quality Improvement Programme for Equity (GEQIP-E) reforms; and finally, (c) a random selection of other schools to represent both urban and rural populations in each region

<sup>4</sup> In the 2018-19 academic year, we collected data from 7 regions of Ethiopia, including Tigray. However, in the 2020-21 academic year, we could not undertake the RISE school survey in Tigray due to violent conflicts.

(see Hoddinott et al., 2019 for more details).

In each school, 28 Grade 1 and 28 Grade 4 pupils were randomly selected from up to two classes. The process of pupil selection in each grade for this exercise was a replication of that used in 2018-19. Table 1 presents the sample by cohort and region for each grade. Nearly half of the sample for both cohorts are girls. More than two-thirds of the schools are in rural areas of the country.

Table 1: RISE sample size of the pre-COVID and post-reopening cohorts

	Grade 1				Grade 4			
	Pre-COVID Cohort		Post-reopening cohort		Pre-COVID Cohort		Post-reopening cohort	
	2018/19		2020/21		2018/19		2020/21	
	Start Grade	End Grade	Start Grade	End Grade	Start Grade	End Grade	Start Grade	End Grade
Addis Ababa	531	477	555	545	530	464	554	540
Amhara	643	488	701	641	627	516	700	662
Benishangul	474	321	394	387	468	371	387	384
Oromia	1,042	743	1,029	865	1086	851	1033	905
SNNP	539	398	612	584	569	435	608	581
Somali	390	243	543	538	342	281	505	502
Total (N)	3,619	2,670	3,834	3560	3622	2918	3787	3574
Attrition (N)		949		274		704		213
Attrition %		26.2		7.14		19		6

Attrition is high, particularly for the pre-COVID cohort: 26.2 percent for Grade 1 and 19 percent for Grade 4. Dropouts and absenteeism during the endline survey are significant contributors, accounting for 70.8 percent in Grade 1 and 68.7 percent in Grade 4. A significant proportion of pupils were also prevented from attending school or reluctant to do so due to civil conflicts, accounting for attrition rates of 20.7 percent and 16.2 percent in Grades 1 and 4, respectively. Other pupils could not be resurveyed due to a lack of information in school records, accounting for 8.5 percent and 15 percent of attrition in Grades 1 and 4, respectively (Weldesilassie, Hoddinott & Woldehanna, 2021). Compared to the pre-COVID cohort, the attrition rates after schools reopened are much lower, at 7.14 percent and 6 percent for Grades 1 and 4, respectively. Dropout and class absenteeism were the main reasons for attrition in this cohort.

To address selection and non-response biases, we assessed the data by constructing two weights: 1) sampling and 2) attrition weights. Sampling weights are necessary because the selection of 28 pupils per school does not take into account the size of the school. To deal with this issue, we first calculated the probability of selecting a classroom in a school, as the pupils were randomly selected from up to two classrooms. We then generated the probability of randomly selecting a student from the randomly selected classroom in the first stage. Lastly, we generated a weight by combining the two weights to make the selected pupils representative of the selected school.

As indicated above, we also had considerable sample attrition between the baseline and endline surveys, particularly for the pre-COVID cohort. We thus reweighted the sampling weight by generating attrition weights for both cohorts. To do this, we used predictive values generated from models that estimate the probability of attrition. We then used these to generate non-response weights (following the approach in Fitzgerald, Gottschalk & Moffitt, 1998).

For the analytical purposes of this research, we included pupils who responded to surveys at the start and the end of the academic years. This means that we have data on 2,670 Grade 1 and 2,918 Grade 4 pupils from the pre-COVID cohort; and 3,560 Grade 1 and 3,574 Grade 4 pupils from the post-reopening cohort. All analyses use the weights constructed to deal with sampling and attrition bias.

### Measurement for numeracy outcomes

Foundational numeracy for Grade 1 pupils comes from the Measuring Early Learning and Quality Outcomes (MELQO) test, adapted to the Ethiopian context. The test is designed “to promote feasible, accurate, and useful measurement of pupils’ development and learning at the start of primary school, and the quality of their pre-primary learning environments” (UNESCO, UNICEF, Brookings Institution & World Bank, 2017). Results are presented in terms of the percent of correct responses in the test. Since the same test was used at the beginning and the end of the school year, progress in numeracy is measured by the change in the correct responses during the academic year (Kim et al., 2022).

Numeracy for Grade 4 pupils in 2018-19 was adapted from the tools used in the Young Lives School Survey in 2012. The numeracy assessment included 25 multiple-choice items in each round, i.e., at the beginning and the end of the school year. The test contained fifteen common or anchor items and ten that were unique. Using Item Response Theory (IRT), our analysis of item fit indicated that overall, the items functioned well between the baseline and endline surveys with acceptable item difficulty and item discrimination indices. Therefore, we generated an index with a mean value of 500 and a standard deviation (SD) of 100. Since the same numeracy tests were used during 2020-21, we replicated the IRT analyses to obtain comparable measures between the two cohorts.

### Analysis

For the analysis, we use both descriptive and inferential statistics. We employed the following linear regression model for our pooled Ordinary Least Squares (OLS) estimates:

$$y_{is} = a + b_1 COVID + \dots + B_n X_{is} + e_{is}$$

where  $Y_i$  is a test score of pupil  $i$  in school  $s$ , COVID refers to the COVID-19-related school closure and equals 0 for the pre-COVID cohort and 1 for the post-reopening cohort.  $X_{is}$  refers to covariates of a pupil in school  $s$ , including socioeconomic background, pupil’s characteristics, locality (urban vs rural) and regional location.  $e_{is}$  is the error term of the model. Since it may be possible that pupils’ achievement in the same school is clustered due to the influence of unmeasured school characteristics, such as school leadership, we included school fixed effects in the above model (Clarke et al., 2010). The revised equation for estimating learning difference is given by

$$y_{is} = \alpha + \beta_1 COVID + \dots + B_n X_{is} + \sum_{s=1}^s \phi D_s + \varepsilon_{is}$$

Where  $D_s$  is a dummy for school  $s$  with a coefficient  $\phi$  ( $s = 1, \dots, s$ ).

It is important to note that for the 2020-21 data collection exercise, the MoE only allowed us to collect data after pupils had completed the 45 days of catch-up classes, which aimed to cover aspects of the curriculum students had missed during school closures. This implies, as mentioned before, the period of learning time for the post-reopening cohort in Grade 4 was shorter by at least 45 days compared with the pre-COVID cohort. We consider these factors when interpreting our findings.

## Findings

The results are divided by grade, starting with foundational numeracy in Grade 1, followed by Grade 4. Within each section, we first present results on the differences in numeracy achievement at the start of the academic year, followed

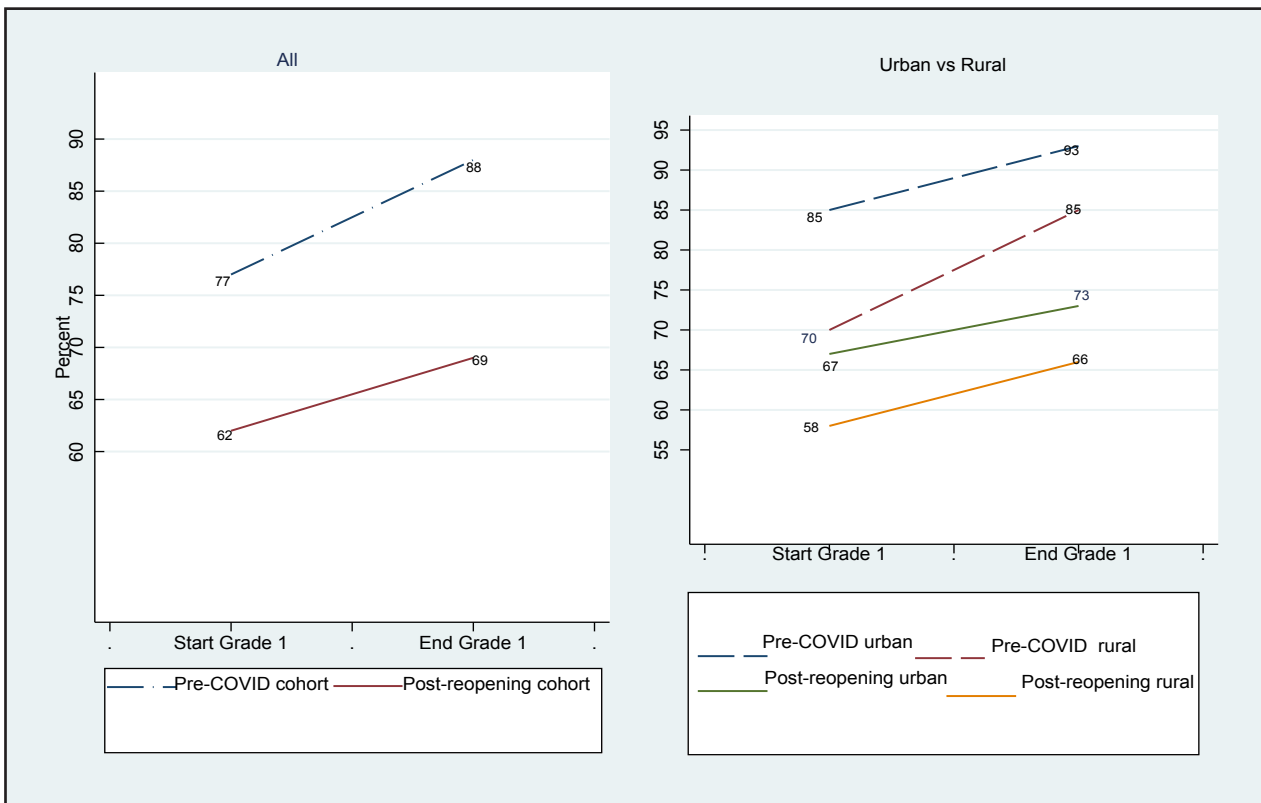
by differences in progress over the course of the academic year. We examine different aspects of equity within each section, including gender, locality, region and wealth, and also highlight key messages for each section.

**Foundational numeracy for Grade 1 pupils**

**Key message: At the start of the 2020-21 academic year, foundational numeracy for Grade 1 pupils (previously affected by school closures) is lower than for the pre-COVID cohort.**

Figure 2 presents the average percent of correct responses for foundational numeracy scores at the start of the year for both cohorts. Pupils who started Grade 1 after schools reopened in October 2020 scored significantly lower on foundational numeracy tests than those in 2018-19. The pre-COVID cohort scored, on average, 77 percent correct responses, while the post-reopening cohort scored only 62 percent. The difference of 15 percentage points is statistically significant at the 1 percent level. There is also a noticeable learning difference between urban and rural children, where children in rural schools achieved much lower foundational numeracy than their urban counterparts.

*Figure 2: Percent of correct responses in the foundational numeracy tests for Grade 1 students pre-pandemic and after schools reopened (%)*



**Key message: There are differences in foundational numeracy scores by locality, region and wealth, but not by gender.**

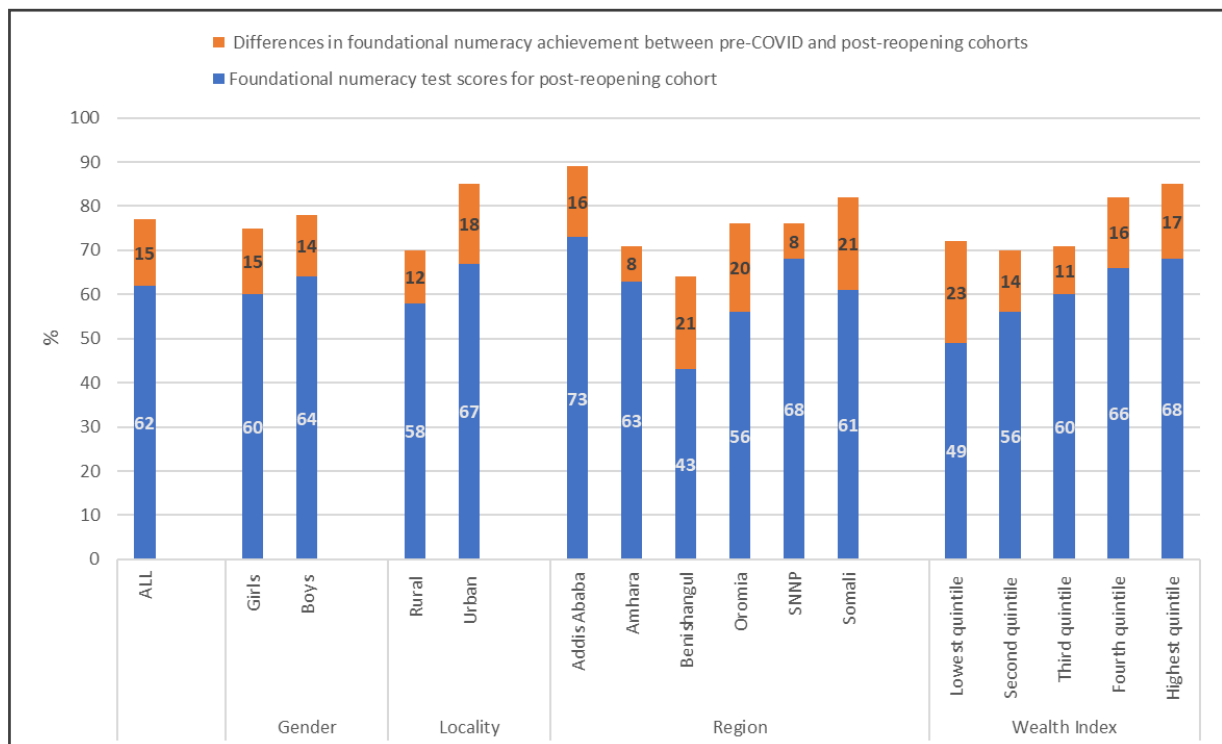
On average, foundational numeracy scores at the beginning of the academic year (after schools reopened) were 15 percentage points lower than those at the start of the academic year in 2018-19. Figure 3 shows this average difference for the overall sample (left-hand bar). The cumulative bar (blue and orange) is the score (77 percent) at the beginning of the academic year for the pre-COVID cohort, while the blue bar represents the score (62 percent) after schools reopened. The orange bar represents the difference in score achievement between the two cohorts (15 percentage points). To the right of Figure 3, we present the results for boys and girls, students in rural and urban schools, by region and by wealth quintiles.

Regarding gender, we found that scores were lower by 14 and 15 percentage points after schools reopened for boys and girls, respectively, reflecting little statistical difference by gender at Grade 1. With respect to locality (rural vs urban), there were substantial disparities: at the start of the 2020-21 academic year, pupils in rural areas continued to perform below those in urban areas. However, there was a slight narrowing of the rural-urban gap. We found scores were 12 percentage points lower for pupils in rural schools after schools reopened, compared with an estimated 18 percentage point reduction in urban areas. This difference is statistically significant at the 1 percent level.

There were also statistically significant differences between foundational numeracy scores at the start of the academic year by region. Our results showed that scores for pupils in Benishangul-Gumuz, Oromia and Somali regions were 20 percentage points lower than those of their pre-COVID counterparts. Regions like Benishangul-Gumuz and Somali are two of the 'emerging' regions recognised by the government as needing additional support. In other regions, such as Amhara and SNNP, the difference was only 8 percentage points.

Finally, in terms of wealth, we find a clear gradient in foundational numeracy whereby children from the wealthiest households achieved, on average, higher scores than those from the poorest backgrounds. Notably, the gap in foundational numeracy before the pandemic, compared with the 2020-21 cohort, was 23 percentage points for children in the poorest wealth quintile and around 17 percentage points for those in the wealthiest quintile. The lowest difference was for children in the middle quintile, with 11 percentage points. Differences by wealth are statistically significant.

*Figure 3: Differences in foundational numeracy between pre-COVID and post-reopening cohorts at the start of Grade 1, by gender, locality, region and wealth.*



Note: the cumulative bar (blue and orange) shows the pre-pandemic cohort's scores at the beginning of the academic year. The blue bar represents the scores after schools reopened. The orange bar represents the differences between them.

**Key message: Foundational numeracy gains over a school year were lower after schools reopened than those seen in 2018-19. This was particularly the case for children in rural schools. Though increasing from a lower level, learning gains were greater for children from the poorest households than those from the richest.**

We also calculated foundational learning gains for the two cohorts, measured by the changes in the percentage of correct responses between the start and the end of the academic year. Figure 4 presents the average gains by gender, locality and wealth (a multivariate analysis that includes regions is presented below). The cumulative bar (blue and orange) is each cohort’s score at the end of the academic year. The blue bar represents the baseline mean score, while the orange bar represents “learning gain” or “progress” over the school year.

Progress in foundational numeracy over the school year was higher for the pre-COVID cohort than for the 2020-21 cohort. On average, the former group achieved an 11 percentage point increase in foundational numeracy over the academic year, compared with 7 percentage points for the latter (statistically significant at 1 percent). Thus, the initial difference of 15 percentage points at the beginning of the school year increased to 19 percentage points by the end of the school year.

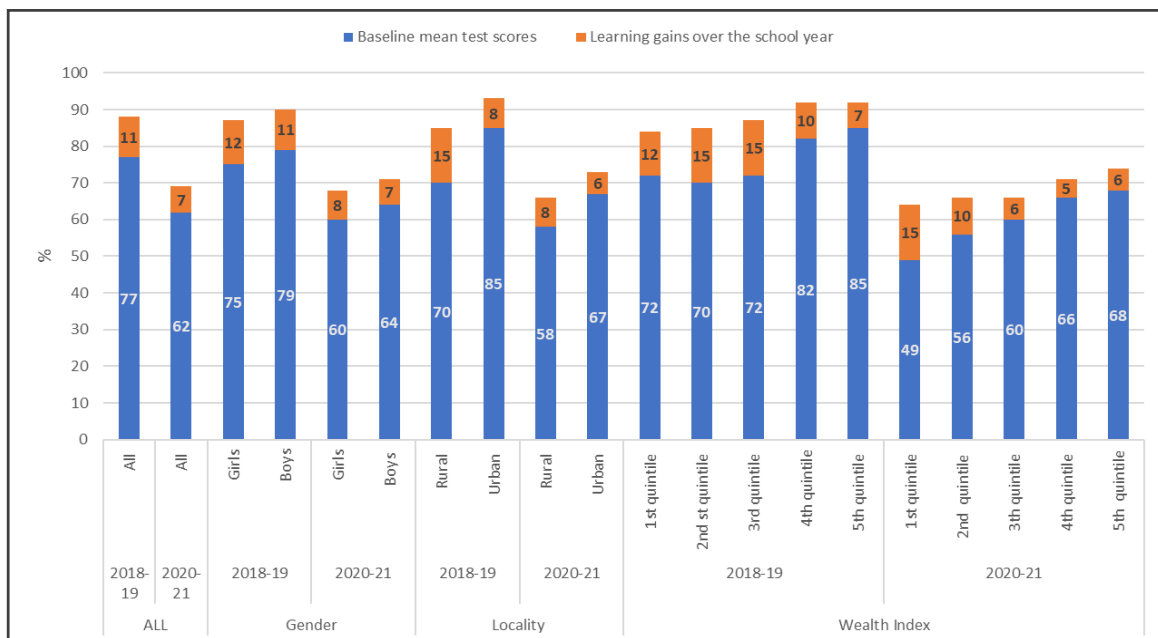
As such, not only did Grade 1 pupils start the academic year after schools reopened with lower achievement levels (15 percentage points), but their progress was also slower. Taken together, assuming 11 percentage points is the gain over the “typical” pre-pandemic academic year, an increase of only 7 percentage points from a lower starting point, could be translated into a loss of one-third of the academic year.

By gender, there was a similar pattern to that of the average sample. For boys, progress during the 2018-19 academic year was 11 percentage points compared with only 7 percentage points during 2020-21. For girls, progress was 12 percentage points during 2018-19 compared with 8 percentage points during 2020-21. There were no statistically significant differences in the relative gains of boys and girls over the school year.

By locality, children in urban areas achieved similar progress over the course of the academic year for both the 2018-19 and 2020-21 cohorts—8 percentage points and 6 percentage points, respectively. However, for children in rural areas, there was a significant difference—15 percentage points pre-COVID and only 8 percentage points after schools reopened, making it statistically significant at the 1 percent level.

By wealth quintiles, though from a lower base, children in the lowest quintiles achieved greater progress relative to those in the richest during both academic years, resulting in a narrowing of the wealth gap. For children in the poorest quintile, there was more progress—3 percentage points—after schools reopened. Learning gain for children in the wealthiest quintile in both academic years was very similar (statistically insignificant). It is still important to highlight that the progress of children from the poorest wealth quintile is achieved from a lower baseline, as reported in Figure 3.

Figure 4: Progress in foundational numeracy for Grade 1 for pre-COVID and post-reopening cohorts, by gender, locality and wealth





Note: the cumulative bar (blue and orange) shows the scores at the end of the academic year. The blue bar represents the baseline mean scores, while the orange bar represents “learning gain” or “progress” over the school year (i.e., the sum of the baseline mean scores [blue bar] and gains [orange bar] over the school year, equals the endline mean scores.

**Key message: Grade 1 foundational numeracy scores after schools reopened remain statistically significantly lower than those for the pre-COVID period when pupils’ socioeconomic status and other child characteristics are taken into account.**

We estimated pooled OLS regressions to check whether the differences in foundational numeracy test scores between the pre-COVID and post-reopening cohorts remained robust when socioeconomic background and child characteristics were considered (Table 2). By the end of the school year, the learning levels of the post-reopening cohort, on average, were 18.7 percentage points lower than those of the pre-COVID cohort (Column 1). The differences also remain statistically significant when conditioned to baseline test scores (Column 2). Furthermore, we included school fixed effects to take account of potential school variations. Similar to the other two regressions, the learning levels of the post-reopening cohort were lower by 13.5 percentage points than the pre-COVID cohort in the school fixed effect model (Column 3). Overall, the statistically significant estimated results across the three models showed that learning levels were lower for the cohort that began Grade 1 after school reopened; and the descriptive analysis discussed above remained robust once we controlled for other factors.

Table 2: The impact of COVID-19 shock on foundational numeracy for Grade 1 pupils

	(1)	(2)	(3)
	Pooled OLS	Pooled OLS (conditional to baseline score)	School fixed effects (conditional to baseline score)
COVID-19 shock (=1 for post-reopening cohort)	-18.69***	-14.14***	-13.47***
	(-41.12)	(-31.55)	(-33.37)
Baseline score		0.303***	0.284***
		(30.85)	(30.37)
Control variables <sup>+</sup>	YES	YES	YES
School fixed effect	NO	NO	YES
Observations	6144	6144	6144
R-squared	0.331	0.421	0.350

+Note: control variables include the child’s gender, age, primary caregiver’s literacy, household wealth quintile, rural-urban location, and regional dummies.

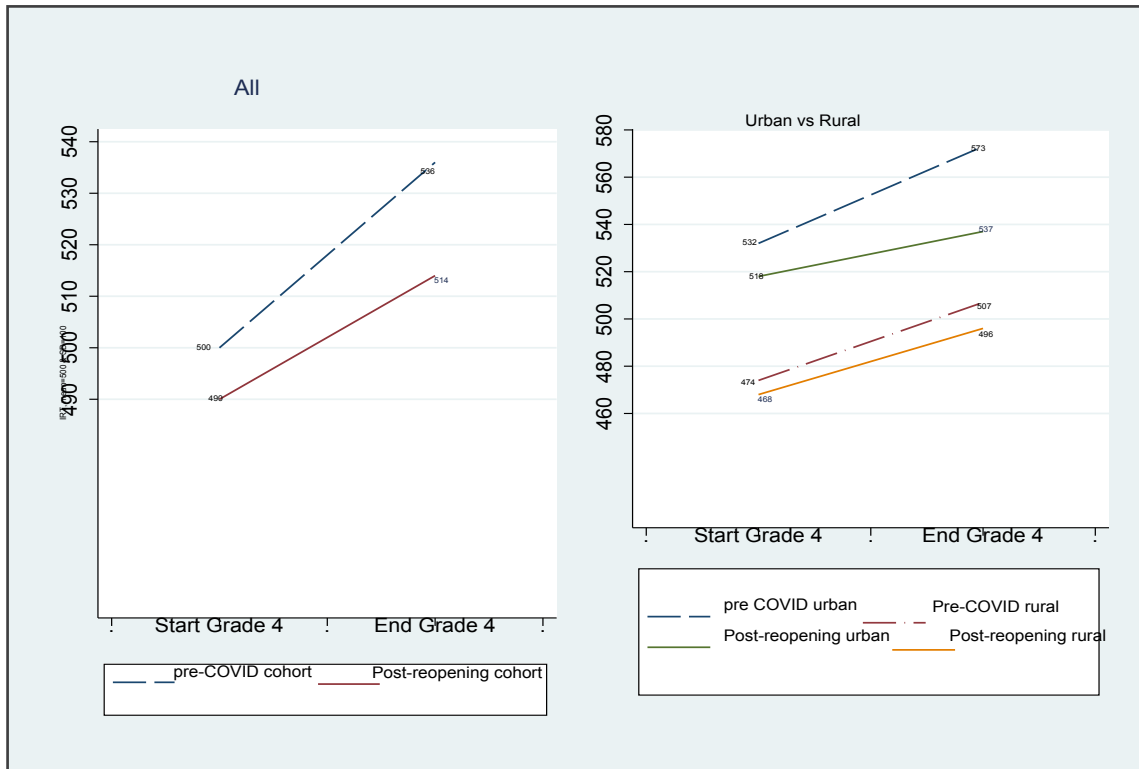
### Numeracy for Grade 4 pupils

**Key message: Numeracy scores for Grade 4 students at the start of the school year were lower after schools reopened than those of pre-COVID students.**

At the start of the school year, after schools reopened, numeracy scores for pupils in Grade 4 were lower than those of their counterparts in the pre-COVID period (Figure 5). The difference in the average value of the two test scores was about 10 points, which is statistically significant at the 5 percent level. Furthermore, the learning gap seen at the beginning of the Grade 4 more than doubled by the end of the school year (see again, Figure 5), implying that the adverse effects of the pandemic on learning remained strong over the course of the school year. There was also a substantial difference in learning levels between urban and rural pupils in each cohort, where numeracy scores were

much lower for those in rural schools.

Figure 5: Differences in numeracy levels between the pre-pandemic and post-reopening cohorts by urban-rural category (IRT, mean=500 & SD=100)



**Key message: Differences in numeracy scores once schools reopened vary by gender, locality, region and wealth.**

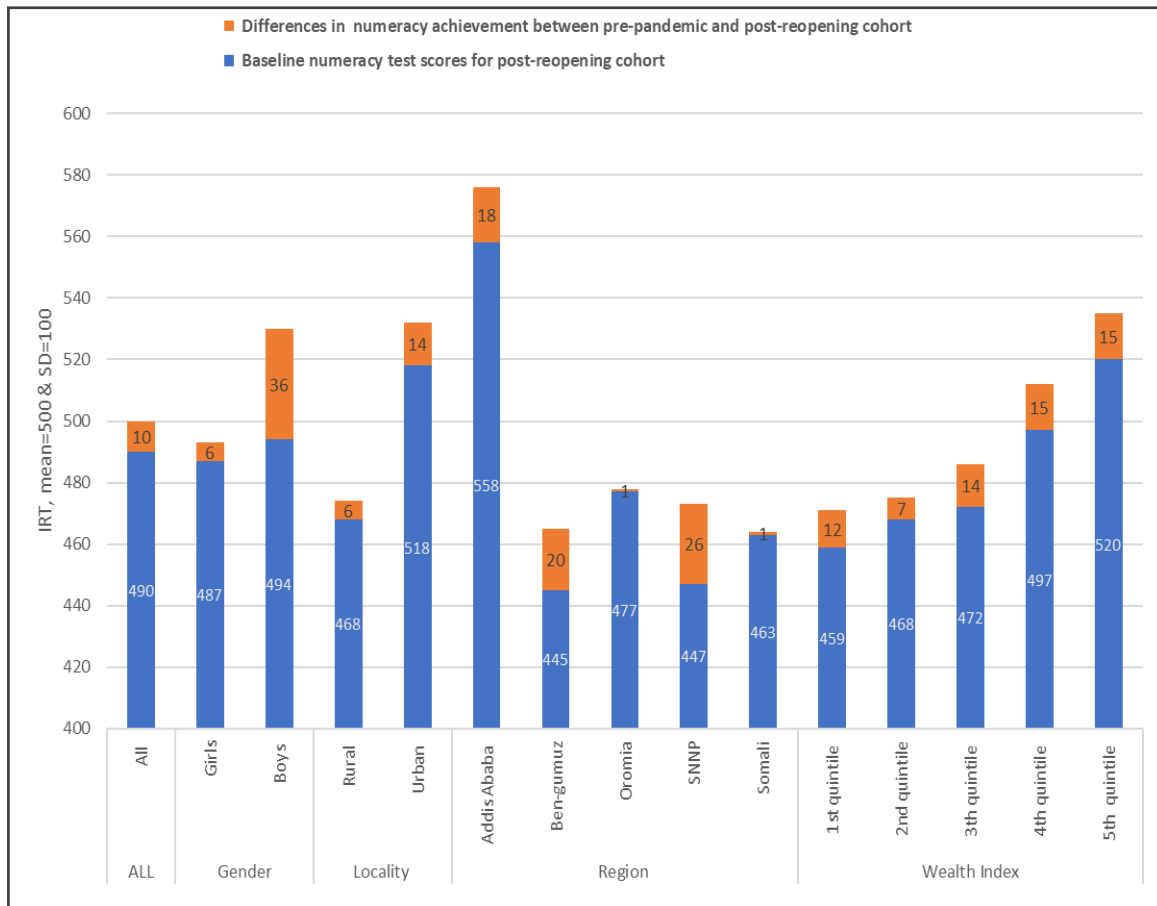
Figure 6 (below) presents the differences in numeracy achievement at the start of Grade 4 for the pre-COVID and post-reopening cohorts, estimated at 10 points. There was significant variation by gender. Between both cohorts, boys had the largest difference in numeracy scores at the start of the academic year, estimated to be 36 points lower after schools reopened. Girls showed a small reduction between the two cohorts of only 6 points. Yet, girls in both cohorts started the school year with much lower numeracy levels than boys. As a result, boys' performance continues to be higher than girls' after schools reopened, but with a narrowing of the gap.

Similarly, while pupils in urban schools continued to perform better in numeracy tests than their rural counterparts after schools reopened, their scores significantly declined—by 14 points—relative to the pre-COVID scores. In rural schools, the difference was just 6 points over the same period. As such, the rural/urban gap was slightly narrowing, but it remains wide. Region-wise, the reduction in the average numeracy scores at the start of Grade 4 was also evident, standing at 26, 20 and 18 points for pupils in SNNP, Benishangul-Gumuz, and Addis Ababa City, respectively. The relative differences by region were also statistically significant. Given the higher scores in Addis Ababa before school closures, students in that location continued to perform considerably higher than those in other regions once schools reopened. However, the relatively large reductions in Benishangul-Gumuz and SNNP are expected, given the low scores in those regions even before the pandemic.

At the start of the academic years, pupils from poorer households scored lower in numeracy than their wealthier counterparts across both cohorts. But after school reopened, children from the top wealth indexes experienced a relatively higher drop albeit from a higher level of learning. While children from the fifth and fourth wealth quintiles experienced 15 points reduction compared with their counterparts in the pre-COVID cohort, children from the first

and second wealth quintiles experienced a decrease of 12 and 7 points, respectively, compared with their pre-COVID counterparts. Nevertheless, pupils from poorer households largely continue to have lower scores than their wealthier counterparts, with little change in the overall gap between the sub-groups.

Figure 6: Learning differences at the start of Grade 4 for pre-pandemic and post-reopening cohorts



Note: the cumulative bar (blue and orange) shows the scores at the beginning of the academic year for the pre-COVID cohort. The blue bar represents the scores after schools reopened, while the orange bar represents the differences between them.

**Key message: numeracy gains over a school year were lower for Grade 4 pupils once schools reopened, with boys achieving greater progress relative to girls. Progress was slower in urban schools compared with rural schools, and gains were greater for pupils from poorer households, albeit from a lower starting point.**

In terms of learning progress in numeracy over the school year, the pre-COVID cohort, on average, gained 36 points, while the post-reopening cohort gained only 24 points, reflecting an estimated difference of 12 points (Figure 7). When the amount of in-person instructional time over the academic year is taken into account, the difference declines to about 10 points and remains statistically significant. After schools reopened, Grade 4 pupils started the academic year 10 points lower in terms of achievement than those who started before the pandemic; their progress over the school year was also lower. Taken together - assuming that 36 percentage points are the gain over the “typical” academic year before the pandemic - an increase of 24 points from a lower starting point could be translated into a loss of one-third of the academic year.

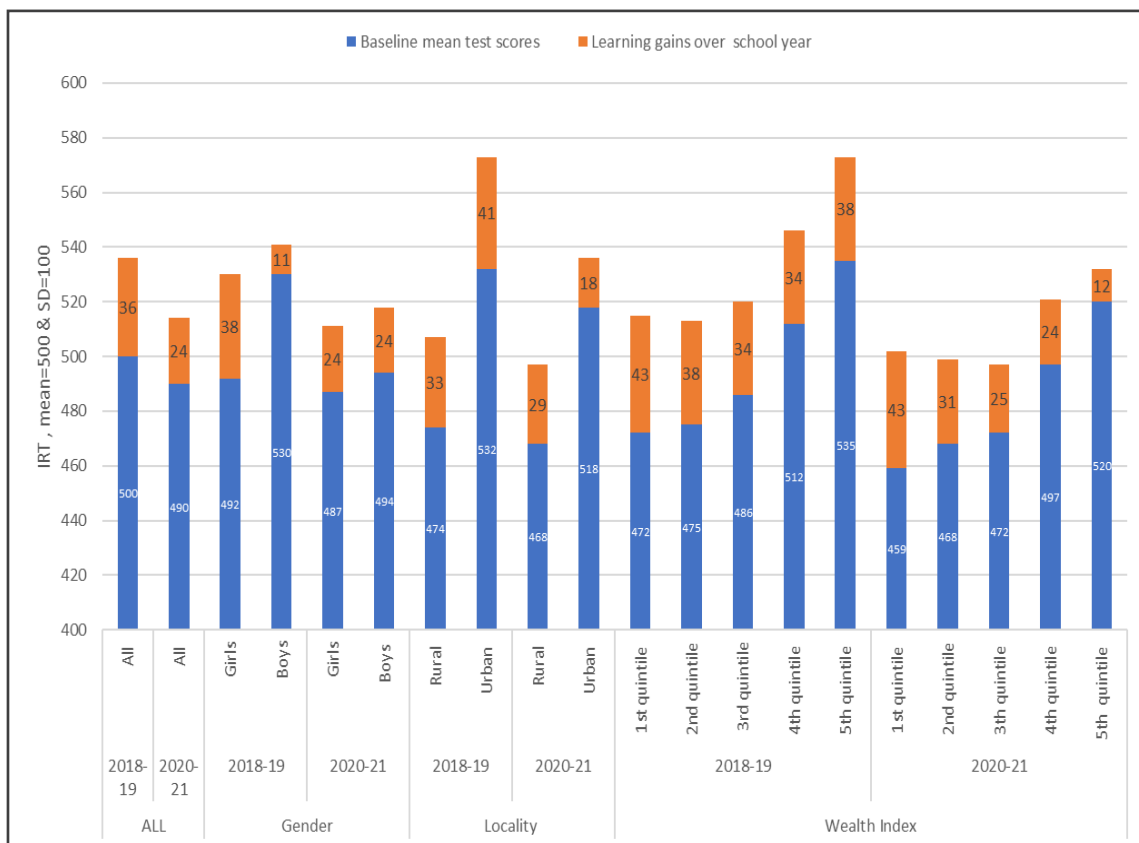
Figure 7 also shows that there were significant differences by gender. Girls from the pre-COVID cohort showed numeracy progress of 38 points compared with 24 points for girls from the post-reopening cohort (a difference of 14 points). Before the pandemic, boys’ numeracy progress was only 11 points, whereas after schools reopened, the estimated progress

was higher, at 24 points. Girls achieved greater progress relative to boys over the school year before the pandemic, but after schools reopened, their progress was similar to boys, although their overall numeracy scores remained lower than boys' as they began the academic year with a lower numeracy level relative to boys.

By locality, pupils in rural schools had lower numeracy scores on average than their urban counterparts and there was relatively similar progress in both school years, i.e. 33 points in 2018-19 and 29 points in 2020-21. But progress over the school year for urban pupils was lower after schools reopened than before the pandemic, standing at 18 and 41 points, respectively. The relative differences in numeracy progress over the academic year by locality are statistically significant. However, a wide rural-urban gap remained after schools reopened.

With respect to wealth, pupils from the poorest households in both cohorts showed similar learning gains over their respective school years, progressing by 43 points before the pandemic and after schools reopened. For pupils from the wealthiest households, numeracy progress before the pandemic was 38 points but declined to 12 points after schools reopened. This means the poorest group made relatively greater progress over the school year but from a lower base at the start of the academic year (459 points for the poorest vs 520 points for the richest). The differences in progress over the academic year by wealth are statistically significant. Overall, the gap between the richest and poorest students seemed to be narrowing, but the level of learning measured by the numeracy scores remained much higher for pupils from the wealthiest households.

Figure 7: Comparison of numeracy gains between Grade 4 pre-pandemic and post-reopening cohorts



Note: the cumulative bar (blue and orange) shows each cohort's scores at the end of the academic year. The blue bar represents the baseline mean score, while the orange bar represents "learning gains" or "progress" over the school year. Therefore, the sum of baseline mean scores (blue bar) and gains (orange bar) equals the endline mean scores for each cohort.

**Key message: Learning gaps remained when socioeconomic status and child characteristics were taken into account.**

To check whether the differences in test scores remained robust when socioeconomic status and child characteristics were taken into account, we estimated a (conditional) pooled regression model on numeracy scores at the end of the academic year. To account for the possibility of school effects, we also estimated a conditional fixed effect model that accounts for numeracy scores at the start of the academic year as a control variable.

Results showed that learning losses remained evident even once these factors were considered. Pupils from the 2020-21 cohort had lower scores than the 2018-19 cohort by the end of the school year (Table 3). Column 1 shows that pupils in Grade 4 after schools reopened scored 18.6 points less than the pre-COVID cohort. When conditioning pupils' test scores at the start of the academic year, the difference between the two cohorts declined to 12.8 points but remained statistically significant (column 2). We also find similar results from the conditional school fixed effects model (column 3). Taken together, the significant learning loss by the end of Grade 4 for the 2020-21 cohort—even when conditioning to the baseline test scores in both the pooled OLS and school fixed-effect models—implies that pupils from the post-reopening cohort didn't make sufficient learning gains over the school year to compensate for their initial low test scores obtained at the start of the school year.

Table 3: The Impact of COVID-19 shock on numeracy achievements of Grade 4 pupils

	(1)	(2)	(3)
	Pooled OLS	Pooled OLS (conditional to baseline score)	School fixed effects (conditional to baseline score)
COVID 19 shock (=1 for post-reopening cohort )	-18.65***	-12.80***	-14.64***
	(-8.24)	(-6.85)	(-8.10)
Initial score		0.627***	0.611***
		(55.16)	(53.10)
Control variables	YES	YES	YES
School fixed effect	NO	NO	YES
Observations	6450	6450	6450
R-squared	0.212	0.465	0.535

t statistics in parentheses; \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

Note: control variables include the child's gender, age, the primary caregiver's literacy levels, household wealth quintile, rural-urban location, and regional dummies.

## Concluding Remarks

This Insight Note looks into the adverse impacts of the COVID-19 pandemic on pupils' educational achievement in selected Ethiopian primary schools. We used two repeated cross-sectional data from Grade 1 and Grade 4 pupils, collected in 2018-19 and 2020-21. The two datasets were collected from the same schools using the same instruments and are deemed suitable for estimating learning loss over time, which could be attributed to the pandemic (among other factors).

In our analysis, we first compared pupils' learning achievements at the start of the school year and then examined their learning gains over the course of the academic year.

In both Grades 1 and 4, we observed a significant decline in the test scores for the cohort that started school in October 2020, after schools had reopened. At the start of the school year, the foundational numeracy achievement of Grade 1

pupils was 15 percentage points lower for this cohort than those who started before the pandemic (2018-19). Grade 1 pupils from rural areas and the poorest households began the school year with much lower learning levels than their urban counterparts and those from the wealthiest households. We did not find evidence of learning differences by gender for Grade 1 at the start of the school year.

For pupils in Grade 4, numeracy achievements at the start of the 2020-21 academic year were lower than those in Grade 4 in the 2018-19 academic year. On average, when schools reopened in October 2020, pupils scored 10 points lower than those in Grade 4 in 2018-19. We also observed considerable learning differences by gender, wealth and locality. After schools reopened, girls and those in rural schools demonstrated much lower learning levels. Similarly, we consistently found that numeracy levels in children from the poorest households were worse than those from the wealthiest households across the 2018-19 and 2020-21 cohorts.

We also measured progress in numeracy over the course of the academic year for pupils in both grades and found that, on average, numeracy progress was slower during the 2020-21 academic year than before the pandemic. This is even considering that the academic year in 2020-21 was at least 45 days shorter than the typical academic year before the pandemic.

For Grade 1 pupils, we observed significant differences in learning progress over the course of the academic year by locality and wealth. Not only did children from rural schools start the school year from a lower base compared to those in urban schools, but they also showed less progress in foundational numeracy by the end of the school year relative to those in urban schools. Although their overall numeracy achievement remained significantly lower than for richer pupils, children from the poorest households achieved relatively greater progress after schools reopened than during the 2018-19 academic year. We found no (relative) differences by gender in Grade 1.

In Grade 4, we found that boys achieved relatively higher progress than girls, and by the end of the school year, they outperformed girls in numeracy. In terms of locality and wealth, while children in rural schools and those from the poorest wealth quintile started the academic year from a lower numeracy base, they demonstrated similar levels of progress after schools reopened. Pupils from the top wealth quintiles experienced a higher drop in learning gains after schools reopened though their overall numeracy scores remained much greater than those at the bottom and middle wealth quintiles.

It is important to understand these results comprehensively. Most children in our sample started the academic year in 2020-21 with a lag in numeracy skills. The opportunity to learn was also reduced by about 45 days as children had spent time in the catch-up learning programme introduced by the Ministry of Education in October 2020. While, on average, children failed to achieve the same level of numeracy progress during this shorter academic year than that achieved during a “typical” year before the pandemic, there are signs that some learners managed to achieve learning progress similar to that seen before the pandemic. This result is encouraging, with learners starting from a lower learning base able to progress at a faster rate, narrowing the gap between more advantaged and less advantaged groups in relation to gender, location and wealth. The analyses here suggest that these measures of numeracy losses could have been even worse had there not been a catch-up class for 45 days at the start of the 2020 academic year. However, despite the relative progress, girls, pupils in rural areas, and the poorest continue to have lower scores. As such, there is a need to continue to pay particular attention to these groups while ensuring that progress for all groups is accelerated.

Overall, and based on a comparison of the progress made by children in Grades 1 and 4 before the pandemic, we estimate that there was a numeracy loss equivalent to at least one-third of the academic year in both grades. This is a conservative estimate, which does not consider other factors which may influence learning across genders, wealth, location or region. Of course, there is an indication that children are catching up, yet those who are doing so are starting from a very lower numeracy base. In this regard, the equity aspect of the current educational reforms in Ethiopia continues to be central in supporting learning for those with the greatest needs.

## References

- Ardington, C., Wills, G., and Kotze, J. 2021. COVID-19 learning losses: Early grade reading in South Africa. *International Journal of Educational Development*. 86, 102480. <https://doi.org/10.1016/j.ijedudev.2021.102480>
- Bayley, S., Wole, D., Ramchandani, P., Rose, P., Woldehanna, T. and Yorke, L. 2021. Socio-Emotional and Academic Learning Before and After COVID-19 School Closures: Evidence from Ethiopia. RISE Working Paper Series. 21/082. [https://doi.org/10.35489/BSG-RISE-WP\\_2021/082](https://doi.org/10.35489/BSG-RISE-WP_2021/082).
- Clarke, P., Crawford, C., Steele, F., and Vignoles, A. F. 2010. The choice between fixed and random effects models: some considerations for educational research. Discussion Paper Series. IZA DP. 5287. Available from <https://www.iza.org/publications/dp/5287/the-choice-between-fixed-and-random-effects-models-some-considerations-for-educational-research> [Accessed 18 July 2022].
- Fitzgerald, J., Gottschalk, P., and Moffitt, R. 1998. An analysis of sample attrition in panel data. *Journal of Human Resources*. 33(2), 251-299.
- Hoddinott, J., Iyer, P., Sabates, R. and Woldehanna, T. 2019. Evaluating Large-Scale Education Reforms in Ethiopia. RISE Working Paper Series. 19/034. [https://doi.org/10.35489/BSG-RISE-WP\\_2019/034](https://doi.org/10.35489/BSG-RISE-WP_2019/034)
- Kim, J., Araya, M., Ejigu, C., Hagos, B., Hoddinott, J., Rose, P., Teferra, T., and Woldehanna, T. 2022. Early Learning in Ethiopia: Effects of pre-primary education on school readiness. Early Learning Partnership Ethiopia Phase 2 report. REAL Centre, University of Cambridge, UK. Available from: <https://www.educ.cam.ac.uk/centres/real/publications/Early%20Learning%20in%20Ethiopia-%20Effects%20of%20pre-primary%20education%20on%20school%20readiness.pdf> [Accessed 18 July 2022].
- Kim, J. H., Araya, M., Hailu, B. H., Rose, P. M., and Woldehanna, T. 2021a. The Implications of COVID-19 for Early Childhood Education in Ethiopia: Perspectives from Parents and Caregivers. *Early Childhood Education Journal*. 49, 855–867. <https://doi.org/10.1007/s10643-021-01214-0>.
- Kim, J., Rose, P., Tiruneh, D. T., Sabates, R., and Woldehanna, T. 2021b. Learning Inequalities Widen Following COVID-19 School Closures in Ethiopia. RISE Blog. Available from: <https://riseprogramme.org/blog/learning-inequalities-widen-COVID-19-Ethiopia> [Accessed 18 July 2022].
- Major, E., Eyles, A., and Machin, S. 2021. Learning loss since lockdown: variation across the home nations. Centre for Economic Performance. No.023. Available from: [https://cep.lse.ac.uk/\\_new/publications/abstract.asp?index=8228](https://cep.lse.ac.uk/_new/publications/abstract.asp?index=8228) [Accessed 18 July 2022].
- Ministry of Education. 2020. Concept Note for Education Sector COVID 19-Preparedness and Response Plan. Ministry of Education. Addis Ababa, Ethiopia. Available from: [https://planipolis.iiep.unesco.org/sites/default/files/ressources/ethiopia\\_concept\\_note\\_for\\_education\\_sector\\_covid\\_19-preparedness\\_and\\_response\\_plan.pdf](https://planipolis.iiep.unesco.org/sites/default/files/ressources/ethiopia_concept_note_for_education_sector_covid_19-preparedness_and_response_plan.pdf) . [Accessed 19 July 2022]
- UNESCO. 2021. Education: from school closure to recovery. Available from: <https://en.unesco.org/covid19/educationresponse>. [Accessed 22 September 2021].
- UNICEF. 2020. In Ethiopia: Keeping pupils learning during COVID-19. Available from: <https://www.unicef.org/ethiopia/stories/ethiopia-keeping-children-learning-during-covid-19>. [Accessed 18 July 2022]
- UNESCO., UNICEF., Brookings Institution., and World Bank. 2017. Overview: Measuring Early Learning Quality and Outcomes (MELQO). UNESCO; Paris.
- Woldeselassie, A., Hoddinott, J., and Woldehanna, T. (forthcoming) Survey Attrition in the RISE Ethiopia Baseline Quantitative Surveys. RISE Ethiopia School Survey. Unpublished material.
- Yarrow, N., Masood, E., and Afkar, R. 2020. Estimates of COVID-19 Impacts on Learning and Earning in Indonesia: How to Turn the Tide. World Bank, Washington DC. Available from: <https://openknowledge.worldbank.org/handle/10986/34378>. [Accessed 15 May 2022]

Yorke, L., Rose, P., Hagos, B., and Woldehanna, T. 2020. The effects of COVID-19 on primary education in Ethiopia: Perspectives of school principals and teachers. Research and Policy Paper No. 20/10. REAL Centre, University of Cambridge. Available from: [https://www.educ.cam.ac.uk/centres/real/publications/Effects%20of%20COVID-19%20on%20principals%20and%20teachers\\_Ethiopia.pdf](https://www.educ.cam.ac.uk/centres/real/publications/Effects%20of%20COVID-19%20on%20principals%20and%20teachers_Ethiopia.pdf). [Accessed 20 June 2022]



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