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Remote learning in the times of COVID-19

INSIGHTS FROM RURAL INDIA

Mayank Bhushan, Pratibha Joshi, and Sudhanshu Sharma,
Central Square Foundation

In this study, we explore a large dataset from a phone-based survey of rural households in six Indian states to evaluate their readiness for remote learning.

Executive Summary

The COVID-19 pandemic resulted in school closures in India and around the globe. Estimates suggest that worldwide, over 1.2 billion children are currently out of their classrooms. As a result, education has changed dramatically, with the distinctive rise of remote learning. Central and state governments in India, as well as private schools, have devised and implemented various response programs involving remote learning.

Access to digital infrastructure is necessary for remote learning. Despite significant improvements in smartphone and internet penetration in India in recent years, equitable access to remote learning remains a challenge. The present report uses data[1] from 38,507 students of 183 Satya Bharti Schools operating in the rural areas of six Indian states to understand the dynamics of remote learning during the COVID-19 pandemic.

Key findings
of our study sample

We found no difference in daily **time spent** on the phone between boys and girls

Less than a quarter of all households in our sample owned a radio, but television penetration was higher and, therefore, **could be a useful medium to advance remote learning**

78%

On average, 78% of the sample households had at least **one WhatsApp-enabled phone** and were in sync with the ASER findings

In the household, fathers were more likely **to have** a WhatsApp-enabled phone than mothers. This was true for all six states in our study

Children tended to get more screen time when the mother had a phone in a household rather than only the father having a phone. **Device ownership mattered**

Low-tech and easy-to-adopt solutions are likely to play an **important role** in remote learning in rural India

The average number of hours of phone access was **almost equal for boys and girls** across states in our sample

30 Minutes

A high school student has access to a phone for **30 minutes more** than a pre-primary student

A secondary school student and a senior secondary school student get an additional **1 hour, 16 minutes, and 2 hours** of phone access, respectively, compared to a pre-primary school student

A child in a rural household spends an additional **1 hour and 16 minutes on the phone** if she/he is attending classes on both WhatsApp and phone calls, compared to a child without any access to a remote learning device

When a father has a WhatsApp-enabled phone, it increases the child's phone access by 24 minutes (compared to a father without a phone). **The same increase in phone access is observed when a mother has a WhatsApp-enabled phone**, compared to a mother not having a phone at all
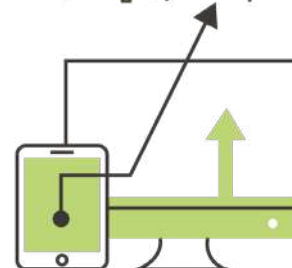
Desktop availability in the household increases the amount of phone screen time for the child by **54 minutes**. Whereas, having a tablet results in **1 hour, 26 minutes** of additional phone access for the child, compared to not having any computing devices (desktop/ laptop/ tablet) at home.

Introduction

As COVID-19 has disrupted education worldwide, governments and organizations are exploring remote learning and education technology models to provide children with access to learning and mitigate learning loss. School closures around the world have made remote learning the de-facto mode of education. It has also brought to the fore the issue of equitable access to EdTech, because without equitable access, the benefits of EdTech might accrue only to those with the means to take advantage of it.

Access is sine qua non for leveraging EdTech. Hence, remote learning solutions are only meaningful for those with access to a radio, TV or a digital device (mobile, tablet, laptop) along with a stable and consistent internet connection for online learning. Access to digital infrastructure is a challenge in rural India. A study by KPMG-ICEA[2], reveals that smartphone penetration in rural India rose from 9% in 2015 to 25% in 2018.

However, there is great variation in smartphone penetration between states, as well as between rural and urban areas in those states. Mobile-internet penetration in rural India remains as low as 18% according to a report[3] by the Internet and Mobile Association of India (IAMAI). Widespread access to phones, as well as the internet, will be required before rural areas can take full advantage of EdTech in schools.

In this study, we explore a large dataset from a phone-based survey of rural households in six Indian states to evaluate their readiness for remote learning.

Specifically, we examine who gets access to a device and for how long, and we also study the associated factors. A broader objective of this study is to bring data from rural India to inform the debate on equitable access to technology for rural households.

[2] Contribution of Smart Phones to Digital Governance in India
[3] Mobile internet penetration in rural India is just 18%: report

Data
Overview

The data for this study comes from a phone-based survey of households whose children attend the Satya Bharti Schools, a flagship program of the Bharti Foundation. This program focuses on the holistic development of children with an active involvement of the community and parents. A phone-based survey was conducted in June 2020, with parents of 38,507 students from 183 schools spread across six states **(see Figure 1).**

Phone-based survey of parents of 38,507 students from 183 Satya Bharti schools spread across six states in India

The surveys were conducted by the teachers of Satya Bharti schools using a centrally designed template. The respondents were predominantly rural women. The aim of the survey was to understand access to technology in rural households in light of the home-based education program implemented in response to school closures due to the COVID-19 pandemic.

Figure 1: Number of schools and students surveyed per school by state
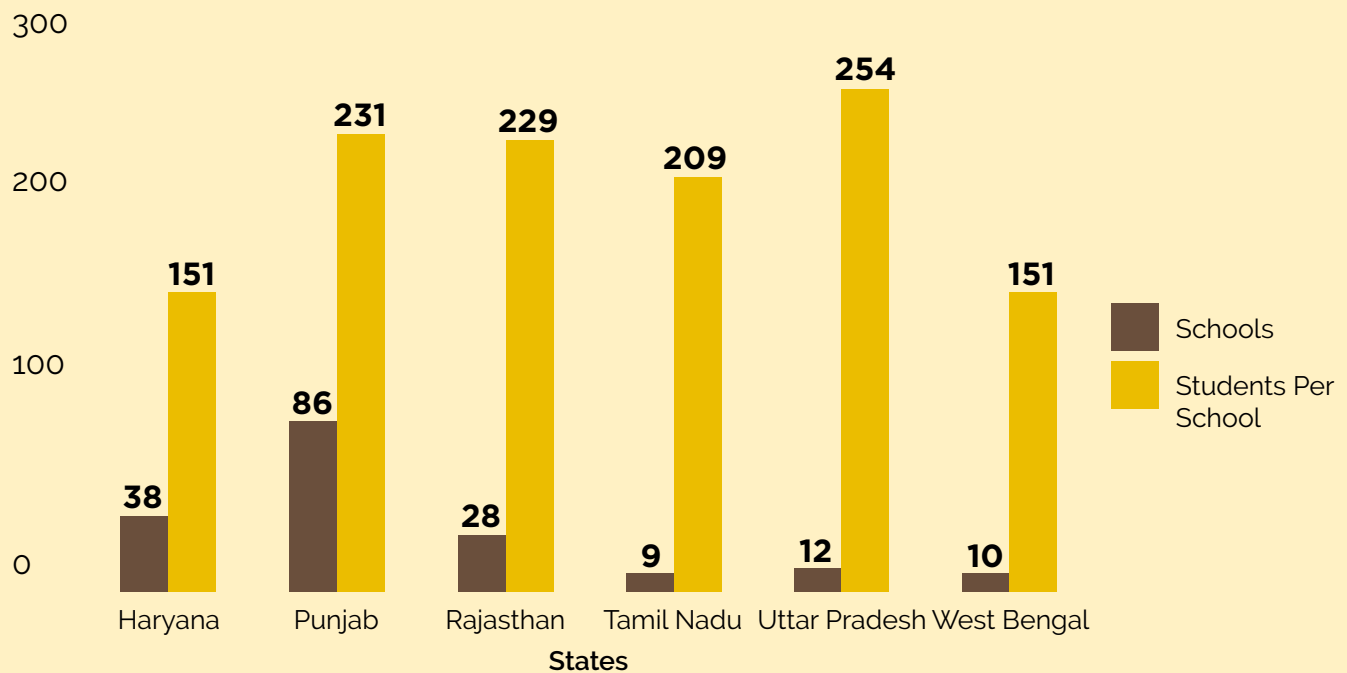
Figure 2: Number of schools and students surveyed per school type
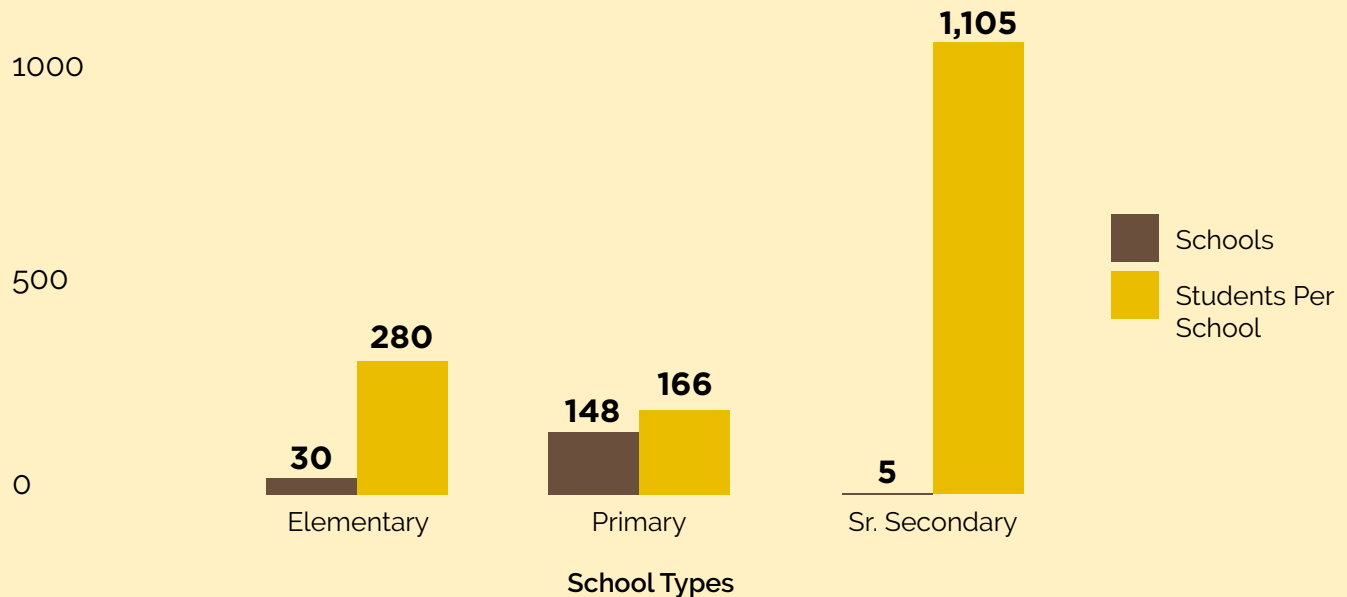
Source: Authors' calculations using Bharti Foundation data

Of the 183 Satya Bharti schools, 148 schools are primary schools[4], 30 are elementary schools[5] and five are senior secondary schools[6]. These schools are spread over three districts in Punjab, five districts in Haryana, two each in Rajasthan and Uttar Pradesh, and one district each in Tamil Nadu and West Bengal. Given these characteristics of the sample, it is important to note that the data from the surveys conducted by the Satya Bharti schools is not representative at the state level.

[4] Primary schools have grades from pre-primary to Grade 5
[5] Elementary schools have grades from pre-primary to Grade 8
[6] Senior secondary schools have grades from pre-primary to Grade 12

As shown in **Figure 2,** senior secondary schools with a large number of students per school (1,105) were surveyed. This was in part due to the fact that senior secondary schools have more grades (than primary and elementary schools) and, therefore, more students overall.

Table 1 shows that senior secondary schools also had more students who were surveyed per school in every grade compared to both primary and elementary schools.

Table 1[7]: Students per class by school type

Class\School Type	Elementary	Primary	Sr.Secondary
Pre-primary	24	27	57
Class 1	29	30	58
Class 2	33	31	57
Class 3	45	32	57
Class 4	31	28	55
Class 5	31	19	57
Class 6	31	0	135
Class 7	30	0	138
Class 8	26	0	141
Class 9	0	0	136
Class 10	0	0	93
Class 11	0	0	84
Class 12	0	0	39
Grand Total	**280**	**167**	**1,107**

Source: Authors' calculations using Bharti Foundation data

As per the sample, data was collected only from primary schools in Haryana, Tamil Nadu, Uttar Pradesh and West Bengal. Data from Rajasthan was collected from primary as well as elementary schools. The data from Punjab came from five senior secondary schools, in addition to primary and elementary schools.

[7] A class can have multiple sections

Figure 3: Number of schools and students surveyed per school by state and school type
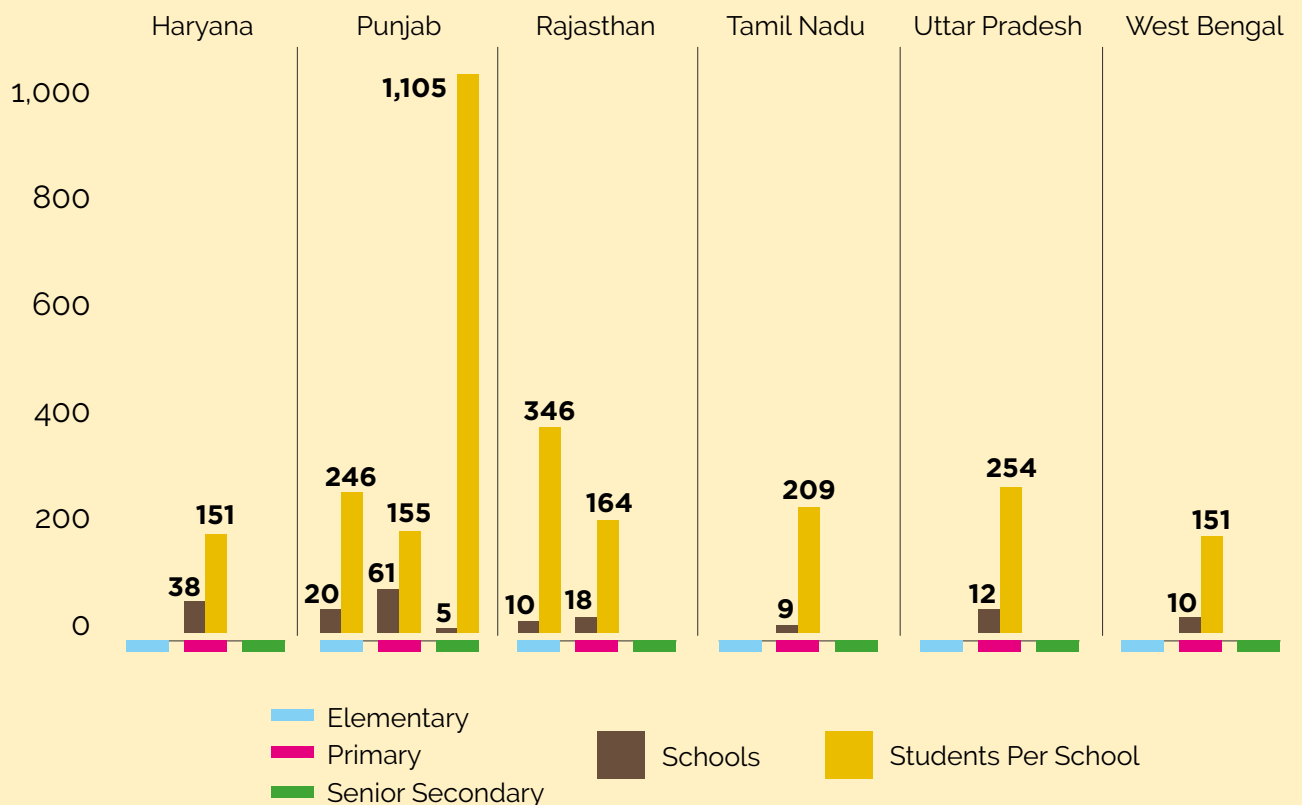
Source: Authors' calculations using Bharti Foundation data

The number of boys and girls surveyed were roughly the same in each grade. Major differences can be seen in Grades 10, 11 and 12, which had 55%, 62% and 58% girls, respectively.

Figure 4: Percentage of surveyed boys and girls by grade
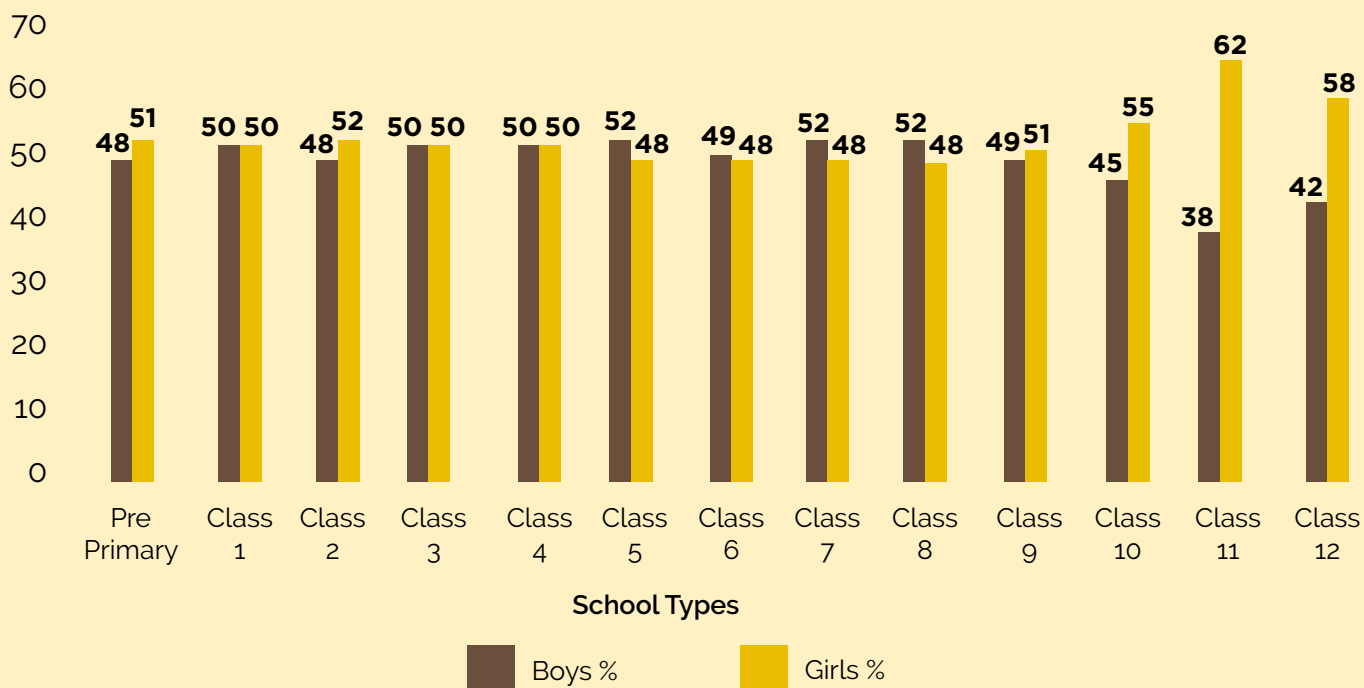
Source: Authors' calculations using Bharti Foundation data

Findings

Device availability in rural households

We began by analyzing device availability in the rural households of the study sample, including radio, TV, and smartphones.

Radio

As part of the survey, parents were asked if they had a radio at home. The data suggests **(see Table 2)** that Uttar Pradesh, Punjab and Rajasthan have households with the highest availability of radios. Interestingly, less than 25% of households in all the surveyed states had a radio at home, which indicates that fewer people might be owning standalone radios these days.

Less than 25% of households in all the surveyed states had a radio at home

Table 2: Availability of radio in the household

State	Yes	No	Not filled details
UTTAR PRADESH	21.8%	69.5%	8.7%
PUNJAB	19.6%	76.4%	4.0%
RAJASTHAN	17.9%	82.0%	0.1%
TAMIL NADU	6.3%	92.7%	1.0%
HARYANA	3.7%	93.7%	2.6%
WEST BENGAL	2.4%	88.7%	8.9%

Source: Authors' calculations using Bharti Foundation data

Television

Parents were asked if they were cable/ pay TV subscribers. If yes, they were asked to specify the type of TV connection they had at home. In states like Punjab, Haryana and Tamil Nadu **(see Table 3)**, more than 80% of the households either had a local cable connection or a DTH connection. In these states, distance learning can be made available at least by broadcasting educational television programs. In contrast, a large percentage of households in Uttar Pradesh (51.1%) and Rajasthan (65.2%) did not possess a television.

In Punjab, Haryana and Tamil Nadu, more than 80% of the households had a TV and cable connection. But a large %age in Uttar Pradesh and Rajasthan did not possess a TV.

Table 3: Availability of television in the household

State	TV available	TV not available	Not filled details
TAMIL NADU	97.1%	2.0%	0.9%
HARYANA	88.8%	8.4%	2.8%
PUNJAB	86.7%	8.8%	4.5%
WEST BENGAL	54.1%	33.0%	12.9%
UTTAR PRADESH	40.1%	51.1%	8.8%
RAJASTHAN	34.7%	65.2%	0.1%

Source: Authors' calculations using Bharti Foundation data

There is no disparity in availability of local cable or DTH at home when there is a girl in the household, compared to when there is a boy in the household **(see Table 4)**.

No disparity in availability of local cable or DTH

Table 4: Access to television in the household by gender

Gender	TV available	TV not available	Not filled details
Boy	74.2%	21.7%	4.1%
Girl	73.5%	22.6%	3.9%

Source: Authors' calculations using Bharti Foundation data

Desktops/ Laptops/ Tablets

Access to devices like laptops, desktops and tablets is really low in the six survey states **(see Table 5)** as more than 99% of households do not have access to them. This finding is not surprising, given that the cost of these devices is quite high for the average income levels of rural households.
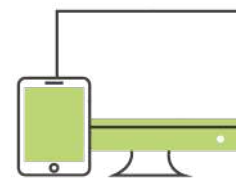
More than 99% of households do not have access to Desktops/ Laptops/ Tablets

Table 5: Access to desktops/ laptops/ tablets in the household

State	Desktop	Laptop	Tablet	None of the above
HARYANA	0.1%	0.2%	0.0%	99.7%
PUNJAB	0.9%	0.5%	0.1%	98.5%
RAJASTHAN	0.2%	0.3%	0.0%	99.5%
TAMIL NADU	0.1%	0.2%	0.0%	99.7%
UTTAR PRADESH	0.0%	0.5%	0.0%	99.5%
WEST BENGAL	0.1%	0.0%	0.0%	99.9%

Source: Authors' calculations using Bharti Foundation data

Using phones for distance learning

Throughout India, schools and educational institutions were closed in the wake of the COVID-19 pandemic. School closures disrupted regular learning models and to mitigate this learning loss, schools had to explore distance learning options that students could access from home. As part of the survey, parents were asked the medium of instruction through which their children were attending classes from home.

More than 60% of households in Haryana, Tamil Nadu, Punjab and West Bengal had a child learning through WhatsApp **(see Table 6)**. In states like Rajasthan and Uttar Pradesh, phone calls were the primary medium of remote learning in rural households. Uttar Pradesh had the largest percentage of households (18.1%) where children were not connected to any of these mediums and were, therefore, losing out on remote learning opportunities. The data suggests that low-tech EdTech solutions that rely on WhatsApp or phone calls are likely to be most accessible in rural India; but even then, some sections of the rural population will remain disconnected from remote learning opportunities due to lack of access.

More than 60% of households in Haryana, Tamil Nadu, Punjab and West Bengal had a child learning through WhatsApp

18.1% households in Uttar Pradesh were not connected to any of these mediums and were, therefore, losing out on remote learning opportunities

Table 6: Mode of accessing remote learning

State	WhatsApp	Phone Calls	WhatsApp+Phone Calls	Not Connected
HARYANA	88.0%	8.7%	0.2%	3.1%
TAMIL NADU	69.1%	28.1%	0.5%	2.3%
PUNJAB	65.7%	10.2%	20.1%	4.0%
WEST BENGAL	65.0%	25.0%	0.3%	9.7%
RAJASTHAN	31.3%	43.1%	21.7%	3.9%
UTTAR PRADESH	29.3%	44.3%	8.3%	18.1%

Source: Authors' calculations using Bharti Foundation data

For most states, these figures are in line with the ASER 2020[8] report, which finds WhatsApp to be the most common medium through which learning activities and materials were received.

Phone availability

The survey captures information on the availability and type of phones owned by fathers, mothers or other relatives in the household. We found that at least one household member (father/ mother/ other relative) from more than half the surveyed households in Haryana, Punjab, Tamil Nadu, West Bengal and Rajasthan had a WhatsApp-enabled phone[9] **(see Table 7)**. However, only 38% of households surveyed in Uttar Pradesh had access to a WhatsApp-enabled phone.

More than half the surveyed households had a WhatsApp-enabled phone

Table 7: Availability of a WhatsApp-enabled phone in the household

State	At least one household member has a WhatsApp-enabled phone	No household member has a WhatsApp-enabled phone
HARYANA	88%	12%
PUNJAB	85%	15%
TAMIL NADU	80%	20%
WEST BENGAL	67%	33%
RAJASTHAN	65%	35%
UTTAR PRADESH	38%	62%
Overall	**78%**	**22%**

Source: Authors' calculations using Bharti Foundation data

[8] Annual Status of Education Report (Rural) 2020 Wave 1
[9] A WhatsApp-enabled phone is any phone that can run the WhatsApp application

According to the ASER (Rural) 2020 Wave 1 Report[10] released in October last year, more than 60% of enrolled school children live in families with at least one smartphone. This proportion has seen a drastic increase over the last two years, going from 36.5% to 61.8% among enrolled school children. Estimates from our sample suggest that, on an average, 78% of rural households had at least one WhatsApp-enabled phone and were in sync with the ASER findings.

Our analysis of device availability in rural households has implications for the designing of EdTech programs, especially for optimal technology deployment. On an average, radio availability in rural households remains quite low. With improvements in income levels, it is likely that rural households have upgraded from radio to television over time. This is corroborated by higher levels of TV availability in rural households than radio sets. Devices like computers and tablets are mostly unavailable in rural households. However, the availability of smartphones is much higher, perhaps because of their relative affordability. Overall, on the basis of device availability, television and smartphone-based EdTech solutions are likely to be most accessible for children in rural India.

More than 60% of enrolled school children live in families with at least one smartphone

61.8%

36.5%

This has seen a drastic increase over the last two years, going from 36.5% to 61.8% among enrolled school children

- ASER (Rural) 2020 Report

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[10] Annual Status of Education Report (Rural) 2020 Wave 1

Connectivity
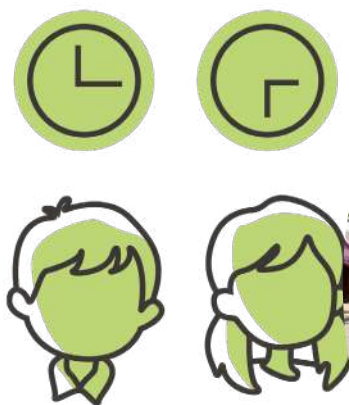
4G seems to be the most prevalent mode of connectivity for rural households. In Punjab, around three-fourths of the surveyed households used a 4G network connection **(see Table 8)**. Broadband has almost no users in these states, except for Tamil Nadu, where 11.7% of the households had a broadband connection. It should be noted, however, that respondents may not always know the type of connectivity on their phones.

In Punjab, around three-fourths of the surveyed households used a 4G network connection

Table 8: Mode of connectivity for rural households

State	4G	3G	2G	Broadband	Not filled details
PUNJAB	75.6%	9.5%	7.8%	0.3%	6.8%
HARYANA	71.3%	14.5%	10.0%	0.8%	3.4%
WEST BENGAL	65.6%	0.4%	16.9%	0.0%	17.1%
TAMIL NADU	43.0%	17.6%	20.8%	11.6%	7.0%
RAJASTHAN	39.5%	13.8%	16.5%	0.0%	30.2%
UTTAR PRADESH	39.0%	0.0%	3.5%	0.0%	57.5%

Source: Authors' calculations using Bharti Foundation data

Of the total households where at least one family member (father/ mother/ other relative) had a WhatsApp-enabled phone, approximately 80% were connected via a 4G phone **(see Table 9)**. This was followed by 3G, which was used by 12% of the households surveyed.

Table 9: Mode of connectivity in households with at least one WhatsApp-enabled phone

Household type	Broadband	4G	3G	2G	Not filled details
No household member has a WhatsApp-enabled phone	1.2%	9.3%	3.9%	24.2%	61.5%
At least one of father/ mother/ relative has a WhatsApp-enabled phone	0.7%	79.7%	12.1%	6.2%	1.2%

Source: Authors' calculations using Bharti Foundation data

Monthly recharge

Punjab led the surveyed states in terms of average monthly mobile phone recharge amount, with households spending approximately INR 226 on average per month **(see Table 10)**. Punjab was followed by Haryana and Tamil Nadu, whose rural households also spent more than INR 200 per month on mobile recharge (INR 216 and INR 205, respectively). Households in Uttar Pradesh, Rajasthan and West Bengal spent less than INR 200 per month on mobile phone recharge.

Punjab led states with avg monthly phone recharge amount, with households spending ~INR 226/ month on an average

Table 10: Average monthly mobile recharge amount of households

State	Average Monthly Recharge Amount (INR)
PUNJAB	226
HARYANA	216
TAMIL NADU	205
RAJASTHAN	196
UTTAR PRADESH	195
WEST BENGAL	190

Source: Authors' calculations using Bharti Foundation data

Phone ownership in rural households
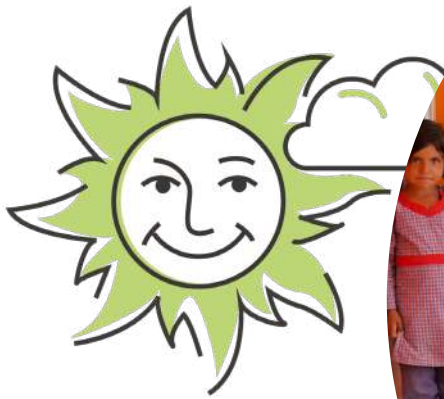
A child's access to a phone could depend upon a host of factors beyond mere availability of phones and types of connectivity in the household. Who owned the phone—the mother or father—and the type of phone owned, could all have a bearing on a child's access and usage of the mobile device. Some of these factors are discussed in detail below:

Father's phone

With the exception of Uttar Pradesh, among the households surveyed across the six states, the fathers were found to own a WhatsApp-enabled phone in more than 50% of the households **(see Table 11)**. This number was highest in Haryana, where the fathers in ~81% of the households had a WhatsApp-enabled phone. In Uttar Pradesh, the fathers in only 33.3% of the households had a WhatsApp-enabled phone.

Barring Uttar Pradesh, the fathers were found to own a WhatsApp-enabled phone in more than 50% of the households

This number was highest in Haryana, where the fathers in ~81% of the households had a WhatsApp-enabled phone

In Uttar Pradesh, the fathers in only 33.3% of the households had a WhatsApp-enabled phone

Table 11: Father's phone ownership by phone type

State	WhatsApp-enabled Phone	Basic Phone	Phone Not Available
HARYANA	80.5%	14.7%	4.8%
PUNJAB	67.5%	21.5%	11.0%
TAMIL NADU	62.9%	29.4%	7.7%
RAJASTHAN	59.1%	35.9%	5.0%
WEST BENGAL	55.9%	27.7%	16.4%
UTTAR PRADESH	33.3%	46.8%	19.9%

Source: Authors' calculations using Bharti Foundation data

Mother's phone

The mothers were found to have a WhatsApp-enabled phone in 50% of the households in Tamil Nadu, followed by 30.3% in Punjab **(see Table 12)**. In all other states, less than 20% of the households had mothers with a WhatsApp-enabled phone, i.e., ~17% in Rajasthan, ~11% in Haryana and West Bengal, and 2.5% in Uttar Pradesh.

The mothers were found to have a WhatsApp-enabled phone in 50% of the households in Tamil Nadu, followed by 30.3% in Punjab

Table 12: Mother's phone ownership by phone type

State	WhatsApp-enabled Phone	Basic Phone	Phone Not Available
TAMIL NADU	50.0%	37.3%	12.7%
PUNJAB	30.3%	24.5%	45.2%
RAJASTHAN	16.9%	39.5%	43.6%
HARYANA	10.8%	17.6%	71.6%
WEST BENGAL	10.6%	22.5%	66.9%
UTTAR PRADESH	2.5%	8.4%	89.1%

Source: Authors' calculations using Bharti Foundation data

Analyzing the distribution of the types of phones owned by the fathers and mothers from our sample states suggest that:

(i)   availability of phones for both fathers and mothers varies significantly across the states, and

(ii) fathers are more likely to own a smartphone than the mothers, even in states with high smartphone penetration.

At-home learning is playing a critical role during the COVID-19 pandemic and is likely to play an important role in the future. State governments are introducing various initiatives to encourage digital learning; for example, tablet or smartphone distribution programs have been announced by the governments of Delhi, Haryana, Punjab, and West Bengal. Device ownership at the household level can have important implications for program designing, targeting and implementation of these initiatives. In this context, **Tables 7 and 8** provide indicative data on phone ownership in rural India, which can be helpful for policy design.

Number of hours of phone access for rural children

Parents from the survey households were asked for how much time their phones were available to their children. Their responses were captured in terms of the number of hours. In this section, we look at how the number of hours the phone is available to a child differs across states, by mother's and father's phone type and by the child's gender.

By State

Students in West Bengal had access to their household phone for an average of five hours **(see Table 13)**. Punjab and Haryana came a distant second with children getting 2 hours and 18 minutes of phone access per day. According to the survey results, children in Tamil Nadu and Rajasthan had the least amount of phone access per day (1 hour and 18 minutes). Moreover, the average number of phone hours was almost equal for boys and girls across states in our sample study.
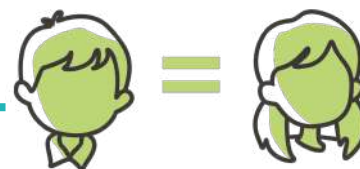
The average number of phone hours was almost equal for boys and girls across states in our sample study

Table 13: Average time spent on the phone by children

State	Average no. of hours phone is available with child **Overall**	Average no. of hours phone is available with child **Boys**	Average no. of hours phone is available with child **Girls**
WEST BENGAL	4.9	5.0	4.9
PUNJAB	2.3	2.2	2.4
HARYANA	2.2	2.2	2.2
UTTAR PRADESH	1.7	1.7	1.6
TAMIL NADU	1.3	1.3	1.3
RAJASTHAN	1.3	1.3	1.3

Source: Authors' calculations using Bharti Foundation data

By ownership of father and/or mother

Another way we look at this data is by comparing it across the combinations of phone types owned by mothers and fathers. We divide the data set into four combinations:
(i) only mothers had WhatsApp-enabled phoned,
(ii) both parents had WhatsApp-enabled phones,
(iii) only fathers had WhatsApp-enabled phones, and
(iv) none of the parents had WhatApp-enabled phones **(see Table 14)**.

We find that the phone is available with the child for the most number of hours (2 hours and 42 minutes) when only the mother has a WhatsApp-enabled phone. This is followed by a household situation where both parents have a WhatsApp-enabled phone.

Phone is available with the child for the most number of hours (2 hours and 42 minutes) when only the mother has a WhatsApp-enabled phone

Table 14: Average child time on the phone by phone ownership

Household situation	Average no. of hours phone is available with child	Number of households
Only Mother has WhatsApp-enabled phone	2.7	2,996
Both parents have WhatsApp-enabled phone	2.6	5,905
Only Father has WhatsApp-enabled phone	2.3	18,990
No parent has WhatApp-enabled Phone	1.4	10,616

Source: Authors' calculations using Bharti Foundation data

We find the same trends when we compare this against the gender of the child **(see Table 15)**, although a girl child gets 12 additional minutes of phone access compared to a boy when only the mother in the household has a WhatsApp-enabled phone. For both boys and girls, phone access (in number of hours) is longer when only the mother has a WhatsApp-enabled phone compared to a household where only the father has a WhatsApp-enabled phone.

For both boys and girls, phone access (in number of hours) is longer when only the mother has a WhatsApp-enabled phone compared to a household where only the father has a WhatsApp-enabled phone.

Table 15: Average child time on the phone by phone ownership and gender

Household situation	Average no. of hours phone is available with child	Average no. of hours phone is available with child
	Boy	**Girl**
Only Mother has WhatsApp-enabled phone	2.6	2.8
Both parents have WhatsApp-enabled phone	2.5	2.8
Only Father has WhatsApp-enabled phone	2.3	2.3
No parent has WhatApp-enabled Phone	1.4	1.5

Source: Authors' calculations using Bharti Foundation data

Regression

To examine the relationship between how long children have access to a phone and their household attributes, we used the survey data to estimate a multiple regression model:

$$Y_i = a + b_1 X_{1i} + b_2 X_{2i} + ... + b_k X_{ki}$$

The dependent variable, Yi, is the number of hours a day spent on the phone by a child. The household attributes we used for this regression were the student's gender, caste, type of phone used by father, mother and relative, medium of attending classes, grade, type of internet connectivity and monthly recharge amount.

Table 16 presents the results of the regression. Models 1– 4 differ in the way the standard errors are handled. Our preferred model is Model 3 where standard errors are clustered at the cluster level[11]. Model 5 is run on a restricted sample of households where the child attends Grade 8 or lower. The estimates are robust across specifications.

We find that the grade in which the child is studying is positively correlated with the number of hours she/he gets to spend on the phone. A child in high school has a phone available to him/her for 30 minutes longer than a child in the pre-primary section. In addition, a child in secondary or senior secondary school gets an additional 1 hour, 16 minutes, and 2 hours of phone access, respectively, than a child in pre-primary school. These results are statistically significant. Interestingly, phone usage by a child seems equitable in our sample: there are no statistically significant differences between the daily usage of phones between boys and girls, or between different caste groups.

Table 16 also shows that a child in a rural household spends an additional 1 hour and 16 minutes on the phone if she/he is attending classes on both WhatsApp and phone calls compared to a child who is not connected, i.e., not accessing remote learning. The regression shows that when a father has a WhatsApp-enabled phone, it increases his child's phone access by 24 minutes, compared to a child whose father does not have a phone. The same increase in phone access is observed when a mother has a WhatsApp-enabled phone compared to a child whose mother does not have a phone.

Availability of desktops and tablets has a significantly positive effect on a child's phone access. Desktop availability in the household increases the amount of phone screen time for the child by 54 minutes, whereas having a tablet results in 1 hour and 26 minutes of additional phone access for the child, compared to households with no computing devices (desktop/ laptop/ tablet).

[11] Schools in the same cluster are likely to be subject to similar implementation of educational policies

Table 16: Time spent on phone by child and household factors

VARIABLES	Daily time spent on phone (in hours)				
	Model 1 (robust std errors)	Model 2 (Std error cluster at school level)	Model 3 (Std error cluster at cluster level)	Model 4 (Std error cluster at district level)	Model 5 (restricted sample, class>8 dropped)
Gender					
Girl	0.0294*	0.0294	0.0294	0.0294	0.0239
	(0.0168)	(0.0189)	(0.0184)	(0.0209)	(0.0188)
Socio-religious status					
Scheduled Caste	-0.0917***	-0.0917	-0.0917*	-0.0917*	-0.0855*
	(0.0239)	(0.0684)	(0.0467)	(0.0437)	(0.0455)
Scheduled Tribe	-0.0618	-0.0618	-0.0618	-0.0618	-0.0747
	(0.122)	(0.198)	(0.159)	(0.165)	(0.167)
Other Backward Class	-0.00561	-0.00561	-0.00561	-0.00561	-0.00872
	(0.0253)	(0.0562)	(0.0524)	(0.0444)	(0.0439)
Muslim	-1.280***	-1.280***	-1.280***	-1.280***	-1.273***
	(0.0530)	(0.253)	(0.242)	(0.187)	(0.171)
Not Specified	-0.216**	-0.216	-0.216	-0.216	-0.194
	(0.0914)	(0.231)	(0.229)	(0.238)	(0.251)
Class					
Primary	0.148***	0.148	0.148	0.148	0.142
	(0.0218)	(0.0961)	(0.107)	(0.104)	(0.0985)
High School	0.497***	0.497***	0.497***	0.497**	0.484**
	(0.0279)	(0.135)	(0.147)	(0.177)	(0.167)
Secondary	1.269***	1.269***	1.269***	1.269***	
	(0.0991)	(0.452)	(0.458)	(0.240)	

Table 16: Time spent on phone by child and household factors (contd.)

VARIABLES	Daily time spent on phone (in hours)				
	Model 1 (robust std errors)	Model 2 (Std error cluster at school level)	Model 3 (Std error cluster at cluster level)	Model 4 (Std error cluster at district level)	Model 5 (restricted sample, class>8 dropped)
Senior Secondary	2.003***	2.003***	2.003***	2.003***	
	(0.154)	(0.628)	(0.636)	(0.472)	
School type					
Primary	-0.194***	-0.194*	-0.194	-0.194	-0.191
	(0.0206)	(0.113)	(0.129)	(0.129)	(0.135)
Senior	1.113***	1.113***	1.113***	1.113***	1.135***
	(0.0391)	(0.214)	(0.220)	(0.147)	(0.152)
Medium for distance learning					
Phone calls	1.130***	1.130***	1.130***	1.130**	1.183**
	(0.0547)	(0.228)	(0.377)	(0.417)	(0.440)
WhatsApp	1.134***	1.134***	1.134***	1.134**	1.229**
	(0.0608)	(0.244)	(0.375)	(0.434)	(0.460)
WhatsApp and Phone calls	1.270***	1.270***	1.270***	1.270**	1.280**
	(0.0625)	(0.252)	(0.382)	(0.430)	(0.451)
Connectivity					
2G	0.0394	0.0394	0.0394	0.0394	0.0974
	(0.0325)	(0.115)	(0.122)	(0.114)	(0.106)
3G	0.247***	0.247**	0.247**	0.247***	0.260***
	(0.0282)	(0.0972)	(0.0924)	(0.0672)	(0.0684)
4G	-0.261***	-0.261	-0.261	-0.261	-0.225

Table 16: Time spent on phone by child and household factors (contd.)

VARIABLES	Daily time spent on phone (in hours)				
	Model 1 (robust std errors)	Model 2 (Std error cluster at school level)	Model 3 (Std error cluster at cluster level)	Model 4 (Std error cluster at district level)	Model 5 (restricted sample, class>8 dropped)
	(0.0571)	(0.177)	(0.180)	(0.170)	(0.156)
Broadband	0.202***	0.202	0.202	0.202	0.265
	(0.0644)	(0.334)	(0.351)	(0.377)	(0.395)
Father's phone type					
Basic phone	0.247***	0.247*	0.247***	0.247***	0.242***
	(0.0442)	(0.133)	(0.0522)	(0.0519)	(0.0560)
WhatsApp-enabled ph.	0.396***	0.396***	0.396***	0.396***	0.341***
	(0.0441)	(0.151)	(0.0754)	(0.0789)	(0.0682)
Mother's phone type					
Basic phone	0.0265	0.0265	0.0265	0.0265	0.0314
	(0.0201)	(0.100)	(0.0675)	(0.0899)	(0.0730)
WhatsApp-enabled ph.	0.396***	0.396***	0.396***	0.396***	0.391***
	(0.0264)	(0.101)	(0.0702)	(0.115)	(0.110)
Relative's phone type					
Basic phone	0.174***	0.174	0.174	0.174	0.172
	(0.0531)	(0.127)	(0.109)	(0.109)	(0.106)
WhatsApp-enabled ph.	0.0713***	0.0713	0.0713	0.0713	0.0808
	(0.0266)	(0.0852)	(0.0772)	(0.0896)	(0.0914)
Phone not available	-0.0706*	-0.0706	-0.0706	-0.0706	-0.135
	(0.0401)	(0.145)	(0.171)	(0.164)	(0.143)

Table 16: Time spent on phone by child and household factors (contd.)

VARIABLES	Daily time spent on phone (in hours)				
	Model 1 (robust std errors)	Model 2 (Std error cluster at school level)	Model 3 (Std error cluster at cluster level)	Model 4 (Std error cluster at district level)	Model 5 (restricted sample, class>8 dropped)
Computer available					
Desktop	0.899***	0.899***	0.899***	0.899***	0.608***
	(0.214)	(0.297)	(0.303)	(0.133)	(0.142)
Laptop	0.223**	0.223	0.223	0.223	0.194
	(0.111)	(0.208)	(0.211)	(0.177)	(0.214)
Tablet	1.428***	1.428***	1.428***	1.428***	1.079**
	(0.372)	(0.199)	(0.199)	(0.177)	(0.380)
Monthly phone recharge amount					
INR 100-200	0.130***	0.130	0.130*	0.130**	0.126*
	(0.0289)	(0.101)	(0.0719)	(0.0599)	(0.0589)
INR 200-300	0.179***	0.179	0.179*	0.179*	0.157
	(0.0336)	(0.114)	(0.0989)	(0.0902)	(0.0936)
INR 300-400	0.213***	0.213	0.213	0.213	0.182*
	(0.0589)	(0.157)	(0.158)	(0.148)	(0.102)
INR 400-500	0.141	0.141	0.141	0.141	0.164
	(0.101)	(0.214)	(0.205)	(0.165)	(0.169)
INR 500-600	0.204	0.204	0.204	0.204	0.0390
	(0.129)	(0.254)	(0.244)	(0.262)	(0.169)
More than INR 600	1.341***	1.341***	1.341***	1.341***	1.391***
	(0.0593)	(0.258)	(0.282)	(0.284)	(0.255)

Table 16: Time spent on phone by child and household factors (contd.)

VARIABLES	Daily time spent on phone (in hours)				
	Model 1 (robust std errors)	Model 2 (Std error cluster at school level)	Model 3 (Std error cluster at cluster level)	Model 4 (Std error cluster at district level)	Model 5 (restricted sample, class>8 dropped)
Data Not available	-0.451***	-0.451	-0.451	-0.451	-0.509
	(0.0660)	(0.339)	(0.423)	(0.441)	(0.456)
State					
Rajasthan	-0.484***	-0.484***	-0.484***	-0.484***	-0.487***
	(0.0255)	(0.117)	(0.136)	(0.0995)	(0.102)
Haryana	0.567***	0.567***	0.567***	0.567***	0.579***
	(0.0247)	(0.132)	(0.171)	(0.121)	(0.108)
Uttar Pradesh	0.554***	0.554**	0.554**	0.554***	0.539***
	(0.0303)	(0.217)	(0.253)	(0.0985)	(0.0964)
Tamil Nadu	-0.294***	-0.294**	-0.294**	-0.294**	-0.298**
	(0.0298)	(0.145)	(0.123)	(0.131)	(0.131)
West Bengal	3.399***	3.399***	3.399***	3.399***	3.367***
	(0.115)	(1.183)	(0.0867)	(0.0806)	(0.0717)
Radio availability					
Yes	0.234***	0.234***	0.234**	0.234*	0.312**
	(0.0211)	(0.0892)	(0.0971)	(0.115)	(0.109)
Not specified	-1.967***	-1.967	-1.967	-1.967	-2.190
	(0.218)	(1.386)	(1.663)	(1.810)	(2.002)
TV subscription					
Local cable	-0.116***	-0.116	-0.116	-0.116	-0.150
	(0.0391)	(0.244)	(0.294)	(0.313)	(0.322)

Table 16: Time spent on phone by child and household factors (contd.)

VARIABLES	Daily time spent on phone (in hours)				
	Model 1 (robust std errors)	Model 2 (Std error cluster at school level)	Model 3 (Std error cluster at cluster level)	Model 4 (Std error cluster at district level)	Model 5 (restricted sample, class>8 dropped)
DTH	-0.132***	-0.132	-0.132	-0.132	-0.173
	(0.0265)	(0.141)	(0.165)	(0.172)	(0.180)
Not specified	1.519***	1.519	1.519	1.519	1.854
	(0.249)	(1.538)	(1.677)	(1.807)	(2.012)
	0.00226	0.00226	0.00226	0.00226	-0.0188
Constant	(0.0687)	(0.259)	(0.345)	(0.415)	(0.436)
Observations	38,507	38,507	38,507	38,507	36,748
R-squared	0.327	0.327	0.327	0.327	0.313

Robust standard errors in parentheses. Boy is the reference category for Gender. General is the reference category for Caste. Pre-primary is the reference category for Class. Elementary school is the reference category for School type. Not connected is the reference category for Medium of distance learning. Not connected is the reference category for connectivity. Phone not available is the reference category for Father's and Mother's phone type. Not using relative's phone is the reference category for Relative's phone type. None is the reference category for Computer availability. Rupees 0-100 per month is the reference category for monthly phone recharge amount. Punjab is the reference category for State. Radio not available is the reference category for Radio Availability. TV not available is the reference category for TV Subscription.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: Authors' calculations using Bharti Foundation data

Access to digital infrastructure is a necessary condition for remote learning

Conclusion

The COVID-19 pandemic has brought renewed focus on EdTech. Prolonged school closures due to the pandemic can have lasting impact on the learning levels of young students. To mitigate potential loss of learning, Central and state governments, as well as private schools have devised and implemented various response programs that involve remote learning.

Access to digital infrastructure is a necessary condition for remote learning. In fact, the type of remote learning solutions that can be deployed is dependent on the quality of access, i.e., type of device and internet access. Despite significant improvements in smartphone and internet penetration in recent years, equitable access to EdTech remains a challenge. While the trends in digital access to and usage of EdTech in urban India are well understood, the same is not the case for rural India. Through this descriptive study, we document the readiness of rural households in six Indian states for remote learning in the context of COVID-19 induced school closures. Our findings suggest that although the availability of electronic devices like TV and radio varies across states, access to smartphones is consistently high for most states (with the exception of Uttar Pradesh). Children and their parents connect with teachers and learning material primarily through phone calls or through WhatsApp. This suggests that low-tech and easy-to-adopt solutions are likely to play an important role in remote learning for children in rural India.

While our findings are indicative of the promise held by remote learning for rural India, it is pertinent to note that they emerge from a specific context— Satya Bharti Schools in 14 districts spread across six states in India—and cannot be generalized.

All images used in this report are archive images from pre-COVID times, courtesy of Bharti Foundation.

Remote Learning in the times of COVID-19: **Insights from Rural India**