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ABSTRACT

Inequality in Internet Access in India: Implications for Learning during COVID

During COVID school closures, learning become mostly restricted to young people who had internet access at home. This paper examines internet access in India using National Sample Survey 2017-18. It probes the extent of inequality in young people's internet access across gender, caste, religion, rural-urban sector, private-public schools, and income group. Our triple-hurdle model of internet use shows that, ceteris paribus, there is a very significant digital divide across many of the social and economic groups. Additionally, intra-household analysis using family fixed effects estimation shows that girls have significantly lower ability to use internet vis-à-vis their brothers within the household.

JEL Classification: I21, I24, I25

Keywords: schooling, internet, equality, COVID-19, India

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1. Introduction

Under COVID-19 students of all incomes, castes, genders, religions and areas (rural and urban) suffered significant loss in education. While the World Bank monetised the economic value of these school closures and loss of learning as US$ 400 billion lesser of future earnings[1], to our knowledge, there is no systematic estimate in India about the number of children excluded from education during the COVID period, nor any study that examines the extent of the digital divide between children from different socio-economic groups based on a large nationally representative dataset.

The existing literature on the schooling/learning effects of the COVID lockdown consists of a variety of reports on different angles, some based on desk reviews analysing the response of governments to the COVID school closures (for example, KPMG, 2021); on interviews and focus group discussions with small samples of teachers (e.g., UNESCO, 2021); or on the budgetary implications for various aspects of schooling post COVID (Kundu and Sonawane, 2020). One study is based on a phone survey of parents after six months of COVID school closures (ASER, 2020) which looks at whether learning continued, and via what modes, in different school types. There are also some journalistic analyses of the impact of COVID on EdTech start-ups in India. To our knowledge, there is no academic study on the topic for India that rigorously examines the implications of the digital divide for learning during COVID, across gender and socio-economic groups.

The current paper provides econometric evidence based on an analysis of National Sample Survey (NSS) data, which allows us to examine the extent to which children in different socio-economic groups and of different genders were excluded from learning during COVID due to the lack of access to internet at home, or the lack of ability to use the internet.

During COVID-19 lockdown starting March 2020, many Indian schools and educational institutions shifted their teaching to a variety of virtual platforms, some using online classes using various video-conferencing platforms such as Google Meet, Zoom, Microsoft Teams, etc., and others sending home learning material to parents through platforms such as Whatsapp or videos of teachers teaching the lessons. Despite this, education is likely to have greatly suffered during the COVID period: even if we ignore that schools using online teaching have reduced their syllabuses (as advised by their respective exam boards), anecdotal, journalistic and survey evidence suggests that only a small fraction of schools were able to employ any online teaching strategies (ASER, 2020). This would have been partly due to supply-side problems, such as the lack of any prior training of teachers in imparting online education in most schools, and partly due to a demand-side problem: a high proportion of schools were able to implement online teaching strategies or would have implemented them only patchily due to many *parents* lacking devices or lacking internet connectivity to receive the benefit of online lessons.

Indeed, whether to receive instruction from a school teacher (or virtual other teacher), or for self-study, an individual needs not only an appropriate device but also an internet connection at home, the ability to use the internet and finally, to actually use the internet.

Though the situation changed rapidly post pandemic, before COVID the penetration of internet in India was low. The Household Social Consumption Education Survey part of the National Sample Survey (NSS) 75th round shows that only 35.8% households (24.8% rural and 51.3% urban) had access to internet in 2017-18. In rural parts, these figures were as low as 11% in Odisha, 12% in Assam and 13% in Karnataka and West Bengal.

In the school/college going age group, apart from access to internet, there is great disparity in 'ability to use internet', not only along the rural-urban dimension, but also by gender: 38% of males but only 28% of females report being able to use the internet. This inequality is also seen by religion, where ability to use internet is ten percentage points lower among Muslim students than others. It also varies strongly by caste: ability to use the internet was 22% among scheduled tribes (ST), 28% among the scheduled castes (SC), 34% among the Other Backward Castes (OBC) and 46% among the remaining 'General' caste persons. Finally, students

[1] https://www.hindustantimes.com/india-news/school-closure-over-covid-19-may-cost-over-usd-400-billion-to-india-world-bank/story-hxzbNLnXV46hi0bPyOvfVJ.html

studying in government schools and private schools also display a substantial gap: 31% of government but 48% of private school students report being able to use internet.

These disparities raise serious concern about equity in access to learning, particularly during the pandemic period when traditional modes of learning via a physical school are unavailable. They raise the question, to what extent is India able to make education and learning available to children, in the context of a widespread lack of access to technology and the internet?

India had achieved nearly universal access to basic education by about 2010 but during the pandemic period this achievement was undone. The state's inability to guarantee children's right to education during the pandemic stemmed from its inability to guarantee internet access, which according to India's Supreme Court, has the nature of a 'fundamental right' under article 19 of the Constitution. In a judgement of January 2020, the Supreme Court stated that *"The freedom of speech and expression and the freedom to practice any profession or carry on any trade, business or occupation* ***over the medium of internet*** *enjoys constitutional protection under Article 19(1)(a) and Article 19(1)(g)."*

In the same vein, the Kerala High Court ruled in September 2019 that the right to have access to the internet is part of the fundamental right to education under Article 21 of the Constitution[2]. Even before all these, in 2016, the United Nation Human Rights Council upheld internet access as a human right.

When confined within the home, e.g. when schools are closed due to a pandemic, an individual may be denied access to online learning in the following three ways:

1. The individual does not have internet access at home (ACCESS)
2. Conditional on having internet access, the person does not have the ability to use internet (ABILITY)
3. Conditional on having internet access and ability to use, s(he) does not actually use internet (USE)

The third one requires some elaboration: here it is useful to recognise that despite having internet access at home and ability to use it, one could be prevented from using it, for example, if there is a digital gender divide. For instance, conservative parents may debar daughters but not sons from using the home internet, to protect them from the perceived dangers of social media. Thus, to ensure universal access to education, all the above three conditions have to be satisfied for citizens, particularly for all school and college age persons.

This paper explores internet access, ability and use in Indian states. It uses a hurdle model approach to investigate the extent of disparity in internet usage across different groups. Although the number of smartphone users[3] has substantially risen in recent times from 300 million at the end of 2017 to 502 million at the end of 2019 (average growth rate approximately 33.67% per year, due to the expansion of 4G network, low data price, and budget smartphones), the extent of disparity in usage remains a big question, which we assess empirically.

2. Methodology

To address the issues of disparity in internet usage across gender, caste, religion, sector (rural/urban), school-type (public/private) and income categories, a three stage hurdle model is used. There are a number of decision stages preceding determination of the actual use of internet at home.

Does the individual have internet access at home? (I=1 or I=0)

Conditional on having internet access at home (I=1), does the individual have the ability to use internet? (A=1 or A=0)

Conditional on having internet access at home (I=1) and also having ability to use internet (A=1), did the individual actually use internet? (U=1 or U=0)

[2] This judgment is dated 19 Sept. 2019 in WP (C) No. 19716 of 2019 (L).

[3] We assume that all the smartphone users have internet access on their smartphones.

Conditional on **X** (set of explanatory variables), we assume independence between the decision to have internet access at home, the ability use internet and the actual use of internet, and thus write:

$$P(I=0|X) = 1 - \Phi(X'\gamma) \quad (1)$$

$$P(A=0|X) = 1 - \Phi(X'\theta) \quad (2)$$

$$P(U=0|X) = 1 - \Phi(X'\eta) \quad (3)$$

where Φ represents a standard normal distribution function. Equation (1) indicates the probability of an individual having internet Access at home, Equation (2) the probability of being Able to use internet, Equation (3) the probability of actually Using internet. The maximum likelihood estimators (MLE) of γ, θ and η are simply the probit estimates of the parameter vectors in the Access to internet at home, Ability to use internet and actual Use of internet.

Joint consideration of the coefficients in each of the three stages on the relevant variables allows us to extract the unconditional expectation in the Hurdle Model. We can write conditional and unconditional expectation of actual use of internet in the last 30 days as follows.

$$E(U|X, I=1, A=1, U=1) = \Phi(X'\eta) \quad (4)$$

$$E(U|X) = \Phi(X'\gamma)\,\Phi(X'\theta)\,\Phi(X'\eta) \quad (5)$$

Given the $\hat{\gamma}$, $\hat{\theta}$ and $\hat{\eta}$ it is easy to calculate the unconditional expectations. It is then possible to calculate the marginal effect of a change in any continuous independent variable X_i on using internet in last 30 days, *U*, in unconditional expressions by differentiating equation (5):

$$\frac{\partial E(U|X)}{\partial x} = \gamma\varphi(X'\gamma)\,\Phi(X'\theta)\,\Phi(X'\eta) + \theta\varphi(X'\theta)\Phi(X'\gamma)\,\Phi(X'\eta) + \eta\varphi(X'\eta)\Phi(X'\gamma)\,\Phi(X'\theta) \quad (6)$$

As before, Φ represents the standard normal distribution function, while φ represents the standard normal density function. However, the variables of primary interest to us in these individual-level regressions are the six socio-economic indicators of gender, caste, religion, sector, school-type, and income category. We define these as dichotomous variables, as follows:

Male (male=1; female=0)

Caste (schedule caste, schedule tribe, or other-backward-castes =1; general caste=0)

Sector (rural=1; urban=0)

Religion (muslim=1; non-muslim=0)

School-type (attends private school=1; public school=0), and

Income category (low income=1; non-low income =0).

We wish to calculate the marginal effect of each of these dichotomous variables. Since taking the derivatives of a binary variable is problematic, we instead evaluate the unconditional expectation of actual use of internet for the dummy variable =1 and then for the dummy variable=0, substituting in mean values for the remaining dependent variables, and then take the difference between the two, i.e. to estimate the marginal effect of Male, we would take:

$$E(U|\, x_i = 1, x_{-i} = \bar{x\imath}\,) - E(U|\, x_i = 0, x_{-i} = \bar{x\imath}\,) \quad (7)$$

Where, x_i refers to the *male* dummy, and x_{-i} to all remaining explanatory variables. The unconditional marginal effect of actual use of internet is a scalar, therefore the significance level of this value will be obtained using a bootstrapping methodology with 500 iterations. This same procedure is followed for each of the dummy variables of our interest to compute the unconditional marginal effects.

3. Data

To carry out the above exercise, we need a data source with information on the following:

1. Does the individual have internet facility at home (ACCESS)?
2. Does the individual have the ability to use internet (ABILITY)?
3. Did an individual actually use the internet, in some recent given period (USE)?

India's National Sample Survey (NSS) 75th round 2017-18, titled Household Social Consumption and Education Survey, records information on the above three questions. It collected data from 113,757 households (64,519 rural households from across 8,097 villages, and 49,238 urban households from across 6,188 urban blocks). It sampled 513,366 persons (305,904 rural and 207,462 urban).

We limit our analysis to 10-24 year olds, that is, the school and college going age-group, i.e. potential internet users who could have benefitted from internet access for continuing their education during the COVID-19 period. This yielded a sub-sample of 95,591 young people in rural areas and 65,697 young people in urban areas, i.e. a total of 161,288 persons. We omitted the 5-9 year age group as they typically do not access internet for education without support from others.

4. Descriptive Statistic Results

We present the results of this paper in two sections. Section 4 explores disparities in internet ACCESS, ABILITY, and USE across various groups via descriptive statistics. Section 5 analyses the same via a three stage hurdle model.

We use 'internet access' to denote that an individual has access to internet at home (ACCESS);

We use 'internet ability' to denote that the individual has ability to use internet (ABILITY); and

We use 'internet usage' to represent actual use of internet by the individual in the past month (USAGE).

Descriptive statistics are presented in Tables 1 to 3.6. Table 1 shows the national percentage of persons who have internet access at home (Access), percentage with ability to use internet (Ability) and the percentage who actually used internet (Usage), in the 10-24 age group, i.e. the school and college going ages, whom we shall call 'young people'. Column (3) shows that nationally only 25% of young people had internet Access at home, 33% had internet Ability, and 28% actually Used internet[4]. These national figures mask very considerable inter-state variation. Appendix Table A1 shows that internet Access ranges from 11% in Odisha to 61% in Himachal Pradesh, internet Ability varies from 20% in Odisha to 79% in Kerala, and internet Usage goes from 16% in Odisha to 68% in Delhi.

Insert Table 1 here

So far we have reported the figures of 2017-18 as per the NSS survey, but from 2017-18 to 2020, the use of internet would have substantially increased due to a significant rise is smart phone use and also due to the lowering cost of mobile data over the period. Smartphone ownership in India increased by 33.6% between 2017 and 2019 (Wikipedia source given in the Note to Table 1) but since population growth over the period was 1.03%[5], real growth of smartphone usage was 32.6 per cent. We have used this 32.6% figure to extrapolate the above mentioned figures to 2020. Due to lack of more nuanced data, we presume that Access to internet at home increased at the same rate as smartphone ownership (32.6 per cent) across states and groups[6]. Similarly, Ability to use internet and actual Usage of internet will also rise, due to growth in internet

[4] NSS asked the question: "Did the individual use internet at least once in the in last 30 from the date of survey?"

[5] Author's estimates

[6] In this calculation, we have assumed that having a smartphone is equivalent to having internet access at home. Since we do not have the state wise figure of growth of smartphone use, we have also assumed that in all the states and all the groups,

access at home, and our basis for projecting these to 2020 is given in the note to Table 1. Our estimates suggest that in 2020 only 33% young people (i.e. persons aged 10-24) had internet access at home (see column 6 of Table 1) which is 8 percentage points higher than the 2017-18 figure. Similarly only 38% of young people had the Ability to use internet, and only 33% actually Used internet in 2020[7]. If we convert all these percentage terms into absolute numbers (columns 7 to 9), it shows that only around 125 million young people had internet access at home, only 143 million had the ability to use internet and finally only 123 million had actually used internet in 2020. These actual figures are substantially lower than what they would have needed to be, to permit universal access to online education since the 2020 total population of 10-24 year olds was 379 million.

Significant inter-state variation is observed in all the three parameters – Access, Ability and Usage – in 2020, as seen in Appendix Table A1. The performance of northern and central Indian states such as Rajasthan, Uttar Pradesh, Bihar, North-East States, Assam, West Bengal, Jharkhand, Odisha, Chhattisgarh and Madhya Pradesh is considerably below the national average in 2020 in all three outcomes (access, ability and usage), except Rajasthan and North-East States in access to internet at home (See Appendix Tables A1 & A1.1 for state-wise figures).

Insert Table 2 here

Next we discuss the status of internet Access, Ability and Usage of school- and college-going students in 2020, based on projected numbers. We have divided the sample of young people into three age categories i.e. 10 to 14 years (upper-primary-school age), 15 to 19 (secondary and higher-secondary school age) and finally 20 to 24 years (college/university age). Our estimates in Table 2 suggest that in these three age groups, 24%, 36% and 41% respectively had internet Access in 2020. In 2017-18, the figures were 18%, 27% and 31% respectively.

Table 2 shows that only 16%, 48% and 51% of persons in the 10-14, 15-19 and 20-24 age groups respectively had Ability to use internet in 2020. Only 13%, 41% and 46% of the three age groups respectively had actually Used internet (in the past month). These figures indicate that a high proportion of young people will have been excluded from education during the pandemic.

Disparity in Internet Access across groups, by Age

The Introduction mentioned disparity in internet Access, Ability and Usage across gender, caste, religion, income category, type of school and (rural/urban) location. This section examines this disparity by age-group. Successful online education/digital integration requires fulfilment of three conditions:

- Active internet connection at home (Access)
- Conditional on having internet Access, individual has the Ability to use internet (Ability)
- Conditional on having internet Access and Ability, the individual actually Uses internet (Usage)

In this section we evaluate the above three conditions for each gender and socio-economic group by age.

Gender

Table 3.1 shows a statistically significant gender gap in all the three age categories in all three outcomes: internet Access, Ability and Use. In internet Access at home, the size of the gender gap increases as we move to the higher age groups. In Ability to use internet and actual Use of internet, we observe a similar trend. In the 10-14 years age category, male students are 3 percentage points more likely to have internet Ability than female students but this gender gap increases to 13 points and 18 points for the 15-19 and 20-24 year age

number of smartphone users has increased at the national rate. There could be variation across states and poorer states may have witnessed lower growth in smartphone users than the richer states.

[7] These rise on ability to use internet and actual use of internet is precisely based on rise in internet access at home. The actual rise in ability to use and actual use of internet will be higher than the estimated figures, because these can also increase due to other factors. We did not consider the other factors in our analysis. Therefore, these estimated figures of ability to use and actual use of internet are little under estimated.

categories respectively. The trend is identical in the actual Use of internet. Unconditional estimates show the presence of substantial gender gaps in internet Use across Indian states (Appendix table A3.1).

Insert Table 3.1 here

When we look at the *conditional* estimates of Ability to use internet, i.e. conditional on having internet Access, the gender gap increases significantly in all three age groups. However, in the conditional estimates of actual Use of internet, the size of the gender gap in all age groups reduces greatly, though it still remains statistically significant.

In summary, both conditional and unconditional estimates suggest *a sharp gender divide in internet Access, Ability and Use*. Conservatism towards girls' exposure to the outside world may lead families to place restrictions on girls' use of the internet, which would discourage girls from even developing the Ability to use internet. Denying girls equal opportunity to use the internet is consistent with other known pro-boy biases, especially in education and health expenditure by Indian households, for example, see Lancaster et al. (2008), Rout (2010), Zimmermann (2012), Saha (2013), Azam and Kingdon (2013) and Batra et al. (2014). Datta and Kingdon (2019) showed that while girls now have almost equal access to schooling, they are significantly less likely to be admitted in private schools than the boys. While our results about girls' inferior Ability to use the internet are not surprising, they are of concern for their education, since education remained online for a long time. A significant proportion of girls would have been left out despite having internet access at home, simply because of inability to use internet.

Religion

Disparity in internet Access is also observed across religions. Table 3.2 shows that internet Access, Ability and Use are significantly lower among Muslims compared to the other religions combined. Like gender, the religion gap increases as we move to the higher age categories. Muslims aged 15-19 years and 20-24 years are respectively 11 and 13 percentage points less likely to have the ability to Use internet than non-Muslims, whereas this is only 3 points among 10-14 year olds. An identical relationship is observed when it comes to the actual Use of internet.

Insert Table 3.2 here

The situation improves significantly when it comes to the conditional estimates of internet Ability and Use. Conditional on having internet Access at home, the Muslim non-Muslim gap in Ability to use internet falls to 7 percentage points (though that is still substantial), and the religion-gap completely disappears in the actual Use of internet, if one has both internet Access at home and also the Ability to use internet (bottom row of Table 3.2). Significant state-wise variation is observed in all the three parameters for both conditional and unconditional estimates (table A3.2).

Caste

There are four major castes in India: Schedule Caste (SC), Schedule Tribe (ST), Other Backward Castes (OBC) and General Caste. We compare outcomes for General caste and other, i.e. non-General caste, persons. Table 3.3 shows that, in all three age groups, persons belonging to SC, ST or OBC castes have significantly lower internet Access at home compared to General caste persons. Caste disparity in unconditional Ability to use internet ranges from 14 to 21 percentage points depending on the age group. Similarly, caste disparity in unconditional actual Use of internet is 13, 20 and 18 percentage points in the 10-14, 15-19 and 20-24 age groups.

Like before, in all age groups, the caste-gap in conditional Ability to use internet (conditional on having internet Access at home) drops significantly from the unconditional case. This caste-gap also reduces as we move to higher age groups. However, conditional on having both internet Access at home and having Ability to use internet there is hardly any caste-disparity in actual internet Use (Table A3.3 has state-wise variation).

Insert Table 3.3 here

Rural-urban gaps

There is significant disparity between rural and urban areas in our three outcomes of interest (internet Access, Ability and actual Use). As expected *a priori*, urban areas are considerably ahead of rural areas in all three parameters. The second column of Table 1 suggests that in 2017-18, 44% of urban but only 18% of rural young people had internet Access at home; 56% of urban young people had Ability to use internet, only 25% of rural ones did; and urban areas are almost two and half times ahead of rural areas in actual internet Use. These extremely large rural-urban gaps in Access, Ability and Usage of internet would have seriously challenged equality in educational access during the COVID-induced compulsion of online education.

Beneath these national figures, there is considerable inter-state variation in the rural-urban gaps (Appendix Table A1). In internet Access at home, the rural-urban gap ranges from as high as 31 percentage points in Assam and Rajasthan (some of the poorest states) to as low as 4 points in Delhi. Similarly, as far as internet Ability and actual Usage are concerned, the rural-urban gap is as low as 2 and 4 percentage points respectively in Kerala, and as high as 32 and 31 points respectively in Madhya Pradesh.

Table 3.4 further explores disparity in internet Access across rural and urban areas at the national level. Rural areas are very substantially behind urban areas in internet Access, Ability and actual Use. The unconditional gap between rural and urban areas in all three parameters is larger than the gaps by gender, religion and caste. However, conditional on having internet access at home, these gaps reduce significantly in the two higher age groups. Similarly, when it comes to the conditional estimates of actual internet Use, these gaps become narrower though they do not disappear, unlike with religion and caste. In other words, Rural-Urban disparity in internet Use persists even if rural households are provided with internet connection and with adequate training to equalise their Ability to use internet. Appendix Tables A1 and A1.1 provide state-wise data on the rural-urban disparity in internet Access, Ability and Usage.

Insert Table 3.4 here

Type of School

Here we ask whether there are differences in internet access between persons studying in private and non-private educational institutions. Data show that young people studying in private educational institutions have far better access to internet than students in non-private institutions (see Table 3.5). The private non-private school disparity in unconditional internet Access, Ability and actual Use increases as we move to the higher age groups.

Insert Table 3.5 here

Data in Table 3.5 show that in all age groups, conditional on internet access at home, the private non-private school disparity in internet Ability is significantly lower than unconditional disparity, and bigger drops in this private-public school disparity (when moving from unconditional to conditional Ability) are observed in the higher age groups. Conditional on both Access and Ability, the private-public school gap in actual Usage of internet is close to zero. The private public gap in internet access, ability and usage is simply because in general private school students have wealthier home backgrounds (Appendix Tables A3.4 provides state-wise data).

Income Level

In this section, we examine the extent of disparity in internet access between students belonging to the top and bottom income quartiles in the country. We also want to know whether the extent of the poor non-poor gap in internet Use is eliminated (or greatly reduced) if poor people are provided with internet connection at home and given the Ability (adequate training) to use internet, i.e. whether the poor non-poor disparity disappears when we look at the conditional Use of internet, conditional on Access and Ability.

Unsurprisingly, Table 3.6 shows a huge inequality in internet Access between the rich and the poor. However, the situation improves substantially if poor students are provided with internet connection home and given adequate training to develop the Ability to use internet. Estimates suggests that conditional on having internet

connection at home and having the ability to use internet, the rich-poor gap in actual Use of internet virtually disappears in the lower age group (bottom row of Table 3.6), but it still persists at a low level in the remaining two age groups (Appendix Table A3.5 shows the state-wise variation).

Insert Table 3.6 here

In summary, our descriptive statistic analysis suggests that internet penetration in India is low and that there is widespread inequality in internet access and usage across different age groups, genders, religions, castes, sectors (rural/urban), school-types and income groups. The differences in internet access/usage by income group, rural-urban location and caste are very large indeed. The low access to internet at home generally, as well as the large digital divide (in internet access, ability and usage) across the different socio-economic groups, implies that access to education during the COVID pandemic has been both low and unequal. Boys, higher income persons, urban dwellers, general caste people, non-Muslim persons and private schoolers will have had significantly greater access to education during the COVID-19 period than their opposite numbers.

In the next section, we consider the digital divide again, this time with the aid of regression analysis, where it will be possible to see the digital disadvantage of people in a particular social category while holding constant other factors, for example, seeing whether non-General (i.e. lower) caste persons have poorer digital access even after controlling for factors such as income level, location, type of school, etc.

5. Social Disparity in Internet Access: Hurdle Model Results

The previous section used descriptive statistics to provide a preliminary picture of the Access/Ability/Use of internet in India in the school and college going ages, looking at both unconditional and conditional internet access concepts.

In this section, following the hurdle method, we estimate three probit equations (Access to internet; Ability to use internet; and actual Use of internet) for different categories namely gender, sector (rural and urban), religion (Muslim and Others), caste (non-general and general), type of educational institution (private and non-private) and income (top and bottom income quartile) using individual level data obtained from NSS 75th round of 2017-18. We fit the following equations:

(i) a binary probit of Access to internet at home or not (ACCESS);
(ii) a binary probit of whether the individual has the Ability to use internet or not, conditional on having internet access at home (ABILITY); and
(iii) a binary probit of whether the individual actually Used internet in the previous month, conditional on having internet access at home and having the ability to use internet (USE).

5.1 Disparity in internet ACCESS, ABILITY and USAGE, controlling for other factors

Table 4 presents the results of these three probits. Only the marginal effects on the socio-economic variables of interest are reported; results for the other control variables in the probit equations, i.e. household head's highest education level, log of household's monthly per capita expenditure ('smoothed income'), and log of household size, are not reported. The results present marginal effects rather than coefficients from the probits.

The first column shows the marginal effects in the probit of internet ACCESS; the second column shows the marginal effects in the probit of ABILITY to use internet, conditional on internet access at home; the third column shows the marginal effects in the probit of the actual USE of internet, conditional on both having both internet access and ability; the last column is the result of a calculation based on the marginal effects of the first three columns in the way shown in Equation 7 in the Methodology section above.

For example, in the first row (MALE=1), the last (fourth) column under each age group reports the calculated unconditional marginal effect of MALE in the USE of internet from the hurdle model, calculated in the way laid out in equation 7 above. This calculated unconditional marginal effect of MALE in the first row is a

scalar (reported in columns 4, 8 and 12 of Table 4), so to know whether it is statistically significantly different from zero, we obtained bootstrapped standard error in 500 replications of each equation.

Similarly, the second row shows the marginal effect of 'Non-general Caste' in the probit of ACCESS (first column), conditional ABILITY (second column), conditional USE (third column) and the unconditional marginal effect of CASTE in the USE of internet from the hurdle model, calculated according to equation 7. Row 3 (Muslim=1) shows the marginal effect of Muslim religion in the probits of ACCESS, conditional ABILITY, conditional USAGE and unconditional USE, and so on.

Let us first consider gender, for which results are shown in the first row of Table 4. We compare the ceteris paribus gender gap figures in Table 4 with the raw gender gaps seen in the descriptive statistics in Table 3.1. In the age group 10-14, Table 3.1 showed no significant gender difference in ACCESS to internet at home, an 8 percentage point pro-male gender gap in conditional ABILITY, and a 5 point pro-male gender gap in conditional USE of internet. When we control for socio-economic characteristics in the probit equation in Table 4, we find that the gender gap in conditional ABILITY is somewhat reduced to 7.2 points, and the gap in conditional internet USE is greatly reduced to a ceteris paribus gap of 0.1 points. In the 15-19 age group, Table 3.1 showed raw gender gaps of 3 percentage points in ACCESS, 16 points in conditional ABILITY and of 5 points in conditional USE. Table 4 shows that, ceteris paribus, these gender gaps are 3, 6.2 and 0.3 percentage points, respectively. Finally, in the 20-24 age group, the raw gender gaps of 3 points, 21 points and 4 points in ACCESS, conditional ABILITY and conditional USE change to ceteris paribus gender gaps of 4.6 percentage points, 5.3 points and 0 points, respectively. In each of the three age groups, the greatest change in the gender gap – when moving from raw to ceteris paribus calculation – is in the conditional ABILITY to use internet. This suggests that, when we look at households that are alike in their socio-economic characteristics, the gender gap in ability to use internet is much lower. This finding warrants further investigation; since gender is an individual-specific rather than a household-level variable, we explore the gender gap in internet access, ability in more detail below in Sections 5.2 and 5.3.

Insert Table 4 here

Caste

The caste dummy variable NON-GEN takes the value of 1 if an individual belongs to SC (Schedule Caste), ST (Schedule Tribe) or OBC (Other Backward Caste) and takes the value of 0 otherwise. The probit equations include controls for gender, income, location, religion, household size and head's education level. The results are reported in row 2 of Table 4. They show that compared to a person of General caste, a person of SC, ST or OBC category is less likely to have internet access at home in all three age groups. In the 10-14 age group, non-General caste pupils are 4.2 percentage points less likely to have internet ACCESS at home (down from a 17 percentage point raw caste difference in Table 3.3), whereas in the 15-19 and 20-24 years age groups, non-general caste pupils are 5.8 and 5.5 points less likely to have internet ACCESS at home (compared to the raw caste difference of 18 and 17 points in Table 3.3) respectively.

The raw caste disparity in conditional ABILITY to use internet is 14, 11 and 7 percentage points in the three age groups in Table 3.3, but ceteris paribus in the probits, it is only 6.6, 1.9 and 1.0 points respectively. Most importantly, when it comes to conditional USE of internet (conditional on having both internet access and ability), caste disparity disappears in all three age groups. The unconditional internet use reported in the 4th column under each age group suggests that – compared to a General caste person – an individual belonging to non-general caste is 2.1 points, 6.3 points and 6.1 points less likely to actually USE internet in the 10-14, 15-19 and 20-24 year age groups respectively. Although caste disparity in both conditional internet ability and use diminishes with age-group, the unconditional estimates of actual use of internet (in the fourth column under each age group) increases with age-group, indicating that it primarily arises from the caste disparity in ACCESS to internet at home. This suggests that disadvantage in internet *access* at home is the main hurdle for internet use among underprivileged young people.

Religion

The religion dummy variable MUSLIM takes the value of 1 if an individual belongs to the Muslim community and 0 otherwise. The probit results are reported in row 3 of Table 4. Unlike caste, we do not notice any statistical significant religion-based disparity in internet ACCESS at home in any of the three age groups. However, a Muslim person of 10-14 age group has 9.6 percentage points lower conditional ABILITY to use internet than a non-Muslim, conditional on having internet connection at home. Though the religion based disparity in conditional ABILITY reduces as we move to higher age groups, the Muslim-non-Muslim disparity in conditional internet USE either disappears (from 10-14 and 15-19 age groups) or substantially reduces (in 20-24 years age group). Our unconditional internet USE calculations show that in the 10-14 age group, Muslims are 1.1 percentage points less likely to use internet actually, and this goes up to 2.7% for 15-19 age group, but disappears in the 20-24 years age bracket. For the Muslim community, the disparity originates primarily from the level of ABILITY to use internet, and not from disadvantage in ACCESS to internet at home. Even if internet access is provided at home, pupils from the Muslim community are less likely to be ABLE to use internet; however they catch up as age increases.

Type of School

Since students of private educational institutions belong to relatively wealthier families compared to students from public institutions, we tested the hypothesis that they would also have better access, ability and use of internet. The private school dummy PVT_SCHL takes the value 1 if an individual is studying in a private educational institute and 0 otherwise. Unsurprisingly, our results suggest that the private school advantage in unconditional actual USE of internet increases with age. In the 10-14 group, a private schooler is 2.8 percentage points more likely, in the 15-19 group, 12.3 points more likely and in the 20-24 group15.1 points more likely to actually USE the internet than a public school attendee (row 4 of Table 4). The results also suggest that this primarily originates from the differential ACCESS to internet at home among private and public schoolers, as the ceteris paribus difference between private and public schoolers in ACCESS to internet at home is 8.0, 11.6 and 12.8 percentage points higher in the 10-14, 15-19 and 20-24 year age groups respectively. This corroborates that students studying in private educational institute belong to relatively wealthier families. However, public schoolers catch up when they are provided ACCESS to internet facilities at home, since private-public disparity in conditional ABILITY to use internet is lower in all the three age groups. This disparity narrows further (for 15-19 and 20-24 age groups) or disappears in the 10-24 age group when it comes to the conditional actual USE of internet.

Rural Areas

The sector dummy variable RURAL takes the value of 1 for rural location and 0 for urban location. The results are reported in Table 4, row 5. It is seen that rural-urban disparity in unconditional estimate of actual use of internet (columns 4, 8, 12) increases with age. Rural individuals are 2.7, 8.6 and 9.8 percentage points less likely to actually use internet than their urban counterparts of the same age bracket. In the 10-14 age group, the rural-urban disparity partly originates from ACCESS to internet at home and partly from ABILITY to use internet conditional on internet access, while in 15-19 and 20-24 age groups it originates primarily from ACCESS to internet at home. Our analysis suggests that in the 10-14, 15-19 and 20-24 age groups, rural persons are 5.2, 8.0 and 9.2 percentage points less likely to have internet ACCESS at home as compared to persons from urban areas of same age bracket. While the location disparity in conditional internet ABILITY is 9.3 percentage points in the 10-14 age group, it declines sharply for the latter two age groups. Moreover, location disparity in conditional actual USE of internet goes even below 0.01 percentage points for the higher two age groups and it disappears from the lowest age group. This suggests that rural students catch up when provided adequate internet facilities. This could be simply because of inadequate infrastructure of telecom in rural areas and low per capita income.

Income Categories

The income dummy variable LOW_INC takes the value of 1 if an individual belongs to the bottom income quartile (whom we shall call “the poor”) and takes the value 0 if an individual belongs to the top income quartile (whom we shall call “the rich”). Our results suggest that poor persons are starkly less likely than the

rich to have internet access at home. Compared to the rich, a poor person aged 15-19 is 24.2 percentage points less likely to have internet ACCESS at home (see column 1 and 9 of row 6 of Table 4 for estimates of the other two age groups). But most interestingly, this gap either disappears or the magnitudes are extremely low, when these poor students are provided with internet access at home, as all our conditional estimates in almost all the age groups are either statistically insignificant or the magnitudes are close to zero, or not precisely estimated (t-stat is not significantly high). This analysis brings some new insights about the understanding of internet access among the poor. It suggests that low income no longer remain a barrier for the poor to use internet when they are provided with internet access at home, as the other two hurdles of ability to use and actual use of internet do not play a significant role.

To summarise, this section gives some important insights about disparities in internet use (which we call the 'digital divide') among various socio-economic groups. Firstly, the apparent size of the digital divide is much lower when we 'control for' household background characteristics in the probit equations in Table 4, compared with when we look at raw data in Tables 3.1 to 3.6. Secondly, we observe that the digital divide is the greatest between low- and high-income groups, between private and public school attendees (which is likely to be well correlated with income), and between rural and urban dwellers, as seen in the fourth columns under each age-group. Thirdly, and importantly, the main stage for the digital divide (e.g. between rural and urban, or between low- or high-income, or between low- and high-caste persons, etc.) is at the stage of ACCESS to internet connection at home, and typically to only a lesser extent in the ABILITY to use internet, conditional on having internet access at home. Among those with both internet access and ability, there is virtually no disparity in actual USE of internet. In fact, when it comes to the older two age groups, conditional on internet ACCESS at home, there is no disparity between the rich and poor in internet ability or use. Thus, disadvantage in internet *access* (connection) at home is the major hurdle for internet use among underprivileged young people, though ability plays a more modest role too in some cases.

5.2 Is there Gender Bias in ACCESS, ABILITY and USE ?

In this section, we pay particular attention to gender disparity in internet access, ability and use. Until now, we looked at the gender gap in internet outcomes in the sample as a whole, but a deeper interrogation of the gender gap requires that we see whether the gender gap varies by socio-economic group. For example, is it the case that in particular caste or religion groups, the extent of gender gap is different compared to that in other groups.

We report probit estimates for seven categories: rural and urban sectors, general and non-general caste, Muslim and non-Muslim religion, and the seventh category is the overall total sample of all these groups. Thus, we estimate 63 different probit equations: 3 outcomes (ACCESS, ABILITY, USE), for each of 3 different age groups, across seven socio-economic categories (7 categories * 3 age groups * 3 equations). We do not actually present all 63 probit regressions; instead, in Table 5, from these 63 equations, we have only reported the marginal effect on the gender dummy variable MALE.

Table 5 reports the results by age group, so it has three major columns, the first set is for ages 10-14, the second set of columns is for the age group 15-19, and the final set of columns is for the age group 20-24. The marginal effect of MALE from the unconditional probit of ACCESS is reported in the first column under each age-group. The second column under each age group reports the marginal effect on MALE in the conditional probit of ABILITY to use internet, conditional on having internet access at home; and the third column under each age group reports the marginal effect of MALE in the conditional probit of USE conditional on both having access and ability to use internet. The last (fourth) column under each age group reports the calculated unconditional marginal effect of MALE in the USE of internet from the hurdle model, calculated in the way laid out in equation 7 above. Since this unconditional marginal effect of MALE is a scalar (reported in columns 4, 8 and 12 of Table 5), we need to know whether this unconditional estimate is statistically significantly different from zero, so we obtained bootstrapped standard error in 500 replications of each equation.

Discussion of Table 5

Our results in Table 5 show statistically significant gender gap in ACCESS to internet at home in the 15-19 and 20-20 age groups but not in the 10-14 age group. In the 15-19 age bracket, boys are 3.1 per cent more likely to have internet access at home than girls, and this figure rises to 4.6% in the 20-24 age bracket. But when it comes to the conditional estimates of ABILITY to use internet, we notice a reverse order, i.e. the size of the gender gap increases as we move from higher to lower age brackets. Our estimates suggest that conditional on having internet access at home, boys are 7.2 percentage points more likely to be able to use internet than girls in the 10-14 age group, whereas it reduces to 6.2 and 5.3 points in the 15-19 and 20-24 age groups respectively. By contrast, the gender gap in the conditional USE of internet is less than 1 per cent in all the three age groups. Though even this small gender gap is statistically significant, in 10-14 age group it not precisely estimated as the z-stat is only 2.4 as compared to 11.49 and 12.65 in the 15-19 and 20-24 age groups respectively.

Ultimately one is interested in the gender gap in unconditional internet USE, and this is reported in columns 4, 8 and 12. These show that the gender gap in internet USE widens with age. It is only 0.8 points in the 10-14 age group but grows to 5.5 and 8.2 points in the 15-19 and 20-24 year age groups. This originates both from the gender gap in ACCESS to internet at home and from the gender gap in the ABILITY to use internet conditional on internet access at home – the two reinforce each other.

Insert Table 5 here

Gender gap in internet access across different groups

In this analysis, we also wanted to capture the extent of gender bias in internet access across different social groups, i.e. by sector (rural & urban), caste (general and non-general), and religion (Muslim and others). Table 5 shows no gender gap in internet ACCESS at home across sector, caste or religion in the 10-14 age group but is omnipresent and is mostly highly statistically significant in the conditional probit of ABILITY to use internet, and also in the probit of conditional USE of internet. However, there are variations in the size of the gender gap across groups. In the 10-14 age group, there is a statistically significant gender gap in conditional ABILITY among all social groups except the Muslim community. For others, there are large gender gaps in ABILITY, ranging from 5.8 percentage points in urban areas to 7.8 points in non-general caste category. In conditional USE, there is no gender gap in rural areas, among non-Muslims and among either of the two caste categories. When it comes to the unconditional USE of internet, surprisingly, Muslim community shows the lowest gender gap of only 0.07 points (with a low t-stat of 2.47) and urban areas shows the highest gender gap of 1.9 points which is highly statistically significant.

Moving to the 15-19 age group, it is seen that statistically significant gender bias in unconditional USE of internet is pervasive across all social groups. Table 5 Column 8 shows that girls' disadvantage vis-à-vis boys is high – ranging from 3.3 percentage points among general castes, to 4.9 points among non-Muslims. Column 5 shows that gender gap in ACCESS is statistically significant and of roughly the same magnitude across all groups, hovering around 3 percentage points. However, in conditional ABILITY, there are stark differences in the size of the gender gap across social groups: in rural areas, the gender gap in conditional ABILITY is ten times as high as in urban areas – 0.8 points versus 9.0 points! And again the gender gap is as low as 0.6 points among the General caste, and as high as 7.1 percentage points among the non-General caste (sometimes referred to as the "lower" castes). Though gender gap in conditional internet USE is statistically significant across all groups, the size of the coefficients are less than 0.2 percentage points, which indicates a virtual absence of gender gap in use of internet when girls are provided with internet connection and taught how to use it. Therefore, the noticeable gender gap in unconditional USE of internet (in column 8) primarily generates partly from girls' lower ACCESS to internet at home and partly from the conditional ABILITY to use internet.

The size of gender gap in actual USE of internet increases as we move to the higher age group of 20-24 year olds. Colum 12 of Table 5 shows that size of gender gap in 20-24 age group is larger among all the social groups as compared to the gender gap in the 15-19 age group. Almost all the results of the 20-24 age group are roughly identical to the previous age group.

In summary, our results show that the size of gender gap in internet use across all social groups increases as we move to the higher age categories. They indicate that the major barriers for girls is not so related to lack of internet access at home, as to not getting enough encouragement from family to learn to use the internet (developing the ability to use internet), possibly because of strongly gendered roles within the family and a conservative attitudes towards girls' exposure to the outside world via a smartphone. When the barrier of not having internet connection at home is lifted and there is equal encouragement from parents to use internet, the gender gap in internet access disappears and this phenomenon is true across all social groups, though some groups may respond faster rate than others. In the next section, we explore whether the gender gap in internet access is an intra-household phenomenon.

5.3 Family Fixed Effects estimates : Is there Gender Bias in ACCESS, ABILITY and USE

Our exploration of the gender gap in internet access in India thus far has relied on across-household estimation. However, it is not certain that we can give this gender inequality the interpretation of 'gender bias' because household size and gender composition of the household are endogenous, being based on parental preferences.

Jensen (2002) suggests that gender inequality in outcomes (such as education expenditure or internet use) could arise even in the absence of any parental bias against daughters. If parents' fertility behavior displays differential stopping rules after the birth of sons and daughters (prior gender bias before birth), then, even if parents treat all *born* children equally, girls will have worse outcomes in the population as a whole simply because of across-household differences in household size, that is, because girls have more siblings and thus live in larger households. If this is true, the male-female differences in internet ACCESS, ABILITY and USE observed so far may not represent parental bias per se. Since household size—an outcome of parental preferences—is endogenous in this situation, even controlling for household size as we have done so far, will not control adequately for this effect. However, the inclusion of family fixed effects in internet access/ability/use outcome equations provides a powerful control for household unobserved factors such as parental preferences. With family fixed effects, identification of the marginal effect on MALE comes from gender differences in internet access *within* the household and not across households. Thus, if the marginal effect of MALE is significant in a family fixed effects probit for a given outcome, it is a clear indication of the existence of parental gender bias in that outcome.

For family fixed effects analysis for each age group, we have taken the subset of only those households in which there is at least one girl and one boy in that age group. We estimated family fixed effects probits only for the conditional ABILITY and conditional USE of internet outcomes, and not for the ACCESS outcome because the question on having internet access at home is asked in NSS survey at the household level and not at the level of the individual, i.e. there is no within-household variation in the ACCESS binary variable.

Insert Table 6 here

The results of family fixed effects analysis are reported in Table 6. The results for the whole sample (all socio-economic groups taken together) are presented in the first row, entitled "Overall (all groups)". The gender gap in conditional ABILITY to use internet is seen in columns 1, 3 and 5. Column 1 suggests that in the 10-14 years age group, a son is 17.7 percentage points more likely than a daughter to have ABILITY to use internet. However, the gender gap is dramatically reduced with age, girls catch up and this gap goes even lower than 0.01 points in the higher age groups, though it remains statistically significant.

When it comes to the conditional actual USE of internet (conditional on having internet access at home and having the ability to use internet), the gender gap is virtually zero in all the three age groups. Though the estimated marginal effects are statistically significant, their sizes are extremely low in all the three age groups.

The results show that gender difference in conditional ABILITY to use internet (conditional on internet access at home) is indeed a within-household phenomenon but only in the upper primary school age group of 10-14 year olds, i.e. there is pro-boy gender bias in imparting the ability to use internet in this junior school age

group. Among households that have internet access at home, in the age group 10-14 there is a large gender gap in ABILITY to use internet, but in the older two age groups, there is only a tiny – scarcely discernible – gender gap.

The presence of a large gender gap in the lower age group and its virtual disappearance in the older two age groups could occur if parents are more able to shelter younger children and keep them under their eye than in the older age groups, or it could be because in the younger (10-14 year) age group they give devices (smart phone, tablet, laptop) to sons and not to daughters, but that in the older age group, both sons and daughters get devices, realising the importance/benefits of using internet.

Intra-household gender bias within socio-economic groups

Until now we asked whether there is any within-household gender bias in internet access/ability/use in the sample as a whole, taking all social groups together. Next we investigate whether such within-household gender bias varies across socio-economic groups. The results are presented in the bottom six rows of Table 6, where the first two rows pertain to location or sector (Rural and Urban), the next two rows to caste (Non-General and General caste) and the final two rows pertain to religion (Muslim and Non-Muslim).

Sector: It is useful to recall (as shown in Table 3.4) that among 10-14 year olds in households with internet access at home, 60% of urban children but only 38% of rural children had ability to use internet, i.e. there was a 22 point gap in the conditional ability to use internet. The family fixed effects results by sector (Table 6) show that in the 10-14 year age group, in urban areas boys are 36.6 percentage points more likely than girls to have conditional ABILITY to use internet, whereas in rural areas this male advantage is only 2.2 points.

Caste**:** Recall that as per Table 3.3, among 10-14 year olds in households that have internet access at home, 57% of General caste and 43% of non-General caste children had conditional ability to use internet. In the family fixed effects estimates (Table 6), we observe a 24.6 percentage point gender gap in conditional ABILITY to use internet among the General castes, while in the Non-General castes, this male advantage is (a much lower but still high) 11.5 points.

Religion**:** Somewhat contrary to popular perceptions, the Muslim community exhibits the lowest level of gender bias, with boys' conditional ABILITY to use internet being only 4.7 percentage points higher than girls', whereas among non-Muslims, this gender gap is 19.7 points (Table 6). Again, it is useful to recall that as per the descriptive statistic Table 3.2, in households that have internet access at home, among 10-14 year olds 44% of Muslim and 50% of non-Muslim children had ability to use internet.

Thus, we have the very interesting finding that, among the subset of all households that have internet access at home, relatively backward (rural) areas and more deprived social groups (e.g. lower castes and Muslims) have much lower levels of gender bias in ABILITY to use internet, compared to urban and more advantaged social groups.

However, when it comes to the probit of conditional USE of internet (column 2 of Table 6), the gender gap is below 0.01 percentage points, though still statistically significant for most groups. In both 15-19 and 20-24 age groups, the gender gap in both conditional ABILITY and conditional USE of internet is close to zero in all social groups, the highest marginal effect of MALE being 0.68, i.e. less than one percentage points in the conditional ABILITY probit for Muslims aged 15-19. That is, although the marginal effect on MALE is always statistically significant, its size is very small. We surmise that the gender gap in conditional internet ability/use virtually disappears by age 15 and above.

In summary, our analysis overall shows female disadvantage in online learning by showing pervasive high gender bias in the upper primary school age-group, i.e. in ages 10-14. While across-households analysis showed that girls have lower internet ACCESS in all age groups, our within-household analysis shows that in the age-group 10-14, girls have significantly lower access to online learning since even their conditional ABILITY to use internet is very substantially and statistically significantly lower, conditional on having internet access at home.

This analysis adds to the literature on intra-household gender bias in India which hitherto had focused on gender differences in nutrition, education and healthcare outcomes. The present analysis shows, perhaps unsurprisingly, that female disadvantage extends to the virtual learning space too.

6. Conclusion

The Covid-19 pandemic which seriously disrupted every aspect of life, impacted education everywhere and its effects are likely to have been particularly strong in India which suffered extremely prolonged school closures, with most children having been away from school for over 500 days. In such a context of school closures, learning became mostly restricted to young people who apart from a digital device, had internet connectivity at home and also the ability to use the internet. This paper examined internet access in India using the National Sample Survey NSS 75th round Household Social Consumption and Education Survey 2017-18. It asked how far India was from achieving full digital integration of the young (school- and college-going age) population, and probed the extent of inequality in internet access across gender, caste, religion, sector, income, which would prevent achieving everyone's right to the internet, which the Supreme Court of India declared to be a fundamental right.

Though internet access has rapidly increased in India in recent times due to the low cost of smartphones and reducing data costs, internet penetration is very low compared to developed countries. Our analysis suggests that a significant proportion of pupils do not have internet access at home. A large proportion do not know how to use internet, and more than half of the pupil do not use internet, even after having the ability to use internet. Also the data shows considerable variation across states, age groups, caste, religion, gender, location/sector, school-type and income level. Therefore, a considerable number of students are out of ambit of the internet and thus likely to have been largely deprived of education for about 1.5 years. Low internet penetration and its uneven distribution shows that India has a long way to go before achieving the government's avowed aim of digital integration of even the school age population, let alone of all citizens.

Our hurdle model of internet use showed that the size of the digital divide is lower when we 'control for' household background characteristics, compared with when we look at raw data. The digital divide is the greatest between low- and high-income groups, between private and public school attendees (which is likely to be well correlated with income), and between rural and urban dwellers. Importantly, the hurdle model showed that the main reason for the digital divide across socio-economic groups is due to major disparities in ACCESS to internet connection at home, and typically only to a lesser extent is it due to disparities in the ABILITY to use internet among those with internet access at home. It showed that in the 15-24 age group, among those with internet access at home, there is no disparity between the rich and poor in internet ability or actual use. Thus, disadvantage in internet *access* (connection) at home is the major hurdle for internet use among underprivileged young people, and ability to use internet plays a modest role in some cases.

We explored the gender gap in internet-use more closely, using the triple hurdle model. Our results showed that the major barrier for girls is not so related to lack of internet ACCESS at home as to lack of ABILITY to use internet, possibly because of strongly gendered roles within the family and conservative attitudes towards girls' exposure to the outside world via a smartphone. We found that the gender gap in actual use of internet increases as we move to the higher age groups and that it also differs across caste, religion, sector and income levels. When the barrier of not having internet connection at home is lifted and there is equal encouragement from parents to learn to use internet, the gender gap disappears and this phenomenon is true across all social groups.

The household fixed effect analysis showed that the gender gap in internet access is an intra-household phenomenon, suggesting that within a household, parents encourage boys to use internet but not so much the girls. While across-households analysis showed that girls have lower internet access in all age groups, the within-household analysis showed that in the age-group 10-14, girls have pervasive and strongly lower access to online learning since it is not only their ACCESS to internet but even their ABILITY to use internet is very substantially and significantly lower, conditional on having internet access at home.

This paper adds to the literature on intra-household gender bias in India which hitherto had focused on gender differences in nutrition, education and healthcare outcomes. The present analysis shows, perhaps unsurprisingly, that female disadvantage extends to the virtual learning space too.

To the best of our knowledge, our analysis is the first to address several issues regarding internet access in India. The Indian smartphone market is rapidly growing, which is the primary source of accessing internet. In this analysis, we have used 2017-18 data and made some projections for 2020, but considering the rapid growth of smartphones in the Indian market, further research with more recent data is desirable to get more accurate estimates of the penetration of, an inequality in, digitally enabled learning.

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Table 1: State of internet access in India by rural and urban sector, among persons aged 10 – 24 years old

Items	Share in NSS 2017-18			Projected Share in 2020			Projected Numbers in 2020 (crore persons)		
	Rural	Urban	Overall	Rural	Urban	Overall	Rural	Urban	Overall
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Access to Internet at Home	0.18	0.44	**0.25**	0.24	0.58	**0.33**	6.46	6.05	**12.51**
Ability to Use Internet	0.25	0.56	**0.33**	0.28	0.63	**0.38**	7.73	6.57	**14.30**
Actually Used Internet in past 30 days	0.20	0.49	**0.28**	0.23	0.57	**0.33**	6.33	5.93	**12.27**

Note: Projected actual numbers in 2020 are in crores.

Source: The data in the first column is obtained from the NSS 2017-18. The projected shares in 2020 are obtained considering the real growth of smartphone ownership in India from December 2017 to December 2019 (Smartphone Growth: https://en.wikipedia.org/wiki/List_of_countries_by_smartphone_penetration). The smart phone growth between 2017 and 2019 is 33.67% and the rate of growth of population in the same period is 1.03%. Therefore, the real growth of smart phone ownership is 32.64% (33.67% - 1.03%). We assume that owing a smart phone is equivalent to having internet connection at home, a reasonable assumption as 4G mobile network coverage has substantially increased and mobile data has become much cheaper (US$ 0.09 in India vis-à-vis US$ 12.55 in USA). We have estimated the 2020 projected share of 'access to internet' at home by extrapolating the figures of NSS 2017-18 considering the real growth of internet access 32.64%. The 2020 projected share of 'ability to use internet' and of 'actually used internet' are obtained by considering the elasticity of 'Ability to use internet', with respect to 'access to internet at home', and considering the elasticity of 'actually used internet' with respect to 'access to internet at home' respectively, which are obtained from the aggregated data of village level of NSS 2017-18. Finally the actual numbers in 2020 (in the last three columns) are obtained by considering the total population of India in 2020.

Table 2: State of internet access in India by age category

Items	Share in NSS 2017-18				Projected Share in 2020				Projected Actual Numbers in 2020 (crore persons)			
	10 to 14	15 to 19	20 to 24	Overall	10 to 14	15 to 19	20 to 24	Overall	10 to 14	15 to 19	20 to 24	Overall
Access to Internet at Home	0.18	0.27	0.31	**0.25**	0.24	0.36	0.41	**0.33**	3.14	4.46	4.94	**12.54**
Ability to Use Internet	0.15	0.42	0.45	**0.33**	0.16	0.48	0.51	**0.38**	2.11	5.96	6.23	**14.30**
Actually Used Internet	0.11	0.35	0.39	**0.28**	0.13	0.41	0.46	**0.33**	1.65	5.08	5.57	**12.30**

Note: Projected actual numbers in 2020 are in crore. Source: Same as Table 1

Table 3.1: Status of internet access, by Gender

Items	Aged 10 to 14				Aged 15 to 19				Aged 20 to 24			
	Male	Female	Diff	T-stat	Male	Female	Diff	T-stat	Male	Female	Diff	T-stat
	Unconditional											
Internet Access at Home	0.19	0.18	0.01	1.64	0.28	0.25	0.03	**3.88**	0.32	0.29	0.03	**4.16**
Ability to Use Internet	0.16	0.13	0.03	**6.27**	0.47	0.35	0.13	**15.89**	0.53	0.36	0.18	**18.12**
Actually Used Internet	0.13	0.10	0.03	**6.66**	0.41	0.28	0.13	**16.92**	0.48	0.30	0.19	**20.14**
	Conditional											
Ability to Use Internet	0.52	0.44	0.08	**4.31**	0.91	0.75	0.16	**12.85**	0.94	0.73	0.21	**18.32**
Actually Used Internet	0.92	0.87	0.05	**3.16**	0.97	0.92	0.05	**5.64**	0.98	0.95	0.04	**6.42**

Note: The last two rows show conditional quantities, i.e. Ability to use internet conditional on having internet access at home; and Actual use of internet (in the past month) conditional on having internet connection at home and on having the ability to use internet.

Table 3.2: Status of internet access, by Religion

Items	Aged 10 to 14				Aged 15 to 19				Aged 20 to 24			
	Other	Muslim	Diff	T-stat	Other	Muslim	Diff	T-stat	Other	Muslim	Diff	T-stat
	Unconditional											
Internet Access at Home	0.19	0.16	0.03	**3.54**	0.28	0.23	0.05	**5.13**	0.32	0.26	0.05	**4.85**
Ability to Use Internet	0.15	0.12	0.03	**3.94**	0.43	0.32	0.11	**10.90**	0.47	0.33	0.13	**11.44**
Actually Used Internet	0.12	0.09	0.03	**3.96**	0.36	0.27	0.09	**9.05**	0.41	0.30	0.11	**9.56**
	Conditional											
Ability to Use Internet	0.50	0.44	0.06	**2.27**	0.85	0.78	0.07	**4.04**	0.85	0.79	0.07	**3.59**
Actually Used Internet	0.90	0.89	0.01	0.50	0.95	0.93	0.02	1.48	0.97	0.96	0.01	1.27

Note: Same as Table 3.1. 'Other' category consists of all religions other than the Muslim faith.

Table 3.3: Status of internet access, by Caste

Items	Aged 10 to 14				Aged 15 to 19				Aged 20 to 24			
	Gen	Non-Gen	Diff	T-stat	Gen	Non-Gen	Diff	T-stat	Gen	Non-Gen	Diff	T-stat
	Unconditional											
Internet Access at Home	0.31	0.14	0.17	**21.41**	0.40	0.23	0.18	**19.47**	0.43	0.26	0.17	**17.71**
Ability to Use Internet	0.26	0.11	0.14	**19.29**	0.57	0.37	0.21	**21.93**	0.58	0.40	0.18	**17.40**
Actually Used Internet	0.21	0.09	0.13	**18.35**	0.50	0.30	0.20	**21.16**	0.53	0.35	0.18	**17.67**
	Conditional											
Ability to Use Internet	0.57	0.43	0.14	**7.56**	0.91	0.80	0.11	**9.80**	0.89	0.82	0.07	**6.37**
Actually Used Internet	0.91	0.89	0.02	1.23	0.96	0.94	0.02	**2.06**	0.97	0.97	0.01	1.00

Note: Same as Table 3.1. Also, 'Gen' stands for General caste. 'Non-gen' consists of schedule caste (SC), schedule tribe (ST) and Other Backward Castes (OBC).

Table 3.4: Status of Internet access by Rural and Urban sector

Items	Aged 10 to 14				Aged 15 to 19				Aged 20 to 24			
	Urban	Rural	Diff	T-stat	Urban	Rural	Diff	T-stat	Urban	Rural	Diff	T-stat
	Unconditional											
Internet Access at Home	0.36	0.12	0.24	**32.42**	0.46	0.20	0.25	**30.56**	0.49	0.22	0.26	**25.82**
Has Ability to Use Internet	0.32	0.09	0.23	**31.87**	0.66	0.33	0.34	**42.22**	0.66	0.35	0.32	**32.79**
Actually Used Internet	0.26	0.06	0.20	**29.18**	0.59	0.26	0.33	**40.38**	0.61	0.29	0.31	**29.79**
	Conditional											
Has Ability to Use Internet	0.60	0.38	0.22	**12.33**	0.91	0.78	0.13	**11.90**	0.90	0.79	0.11	**10.40**
Actually Used Internet	0.91	0.88	0.03	**2.08**	0.97	0.93	0.03	**4.64**	0.98	0.95	0.03	**5.10**

Note: Same as Table 3.1.

Table 3.5: Status of internet access by School Type (Private and Public)

Items	Aged 10 to 14				Aged 15 to 19				Aged 20 to 24			
	Pvt. Schl.	Other	Diff	T-stat	Other	Pvt. Schl.	Diff	T-stat	Other	Pvt. Schl.	Diff	T-stat
	Unconditional											
Internet Access at Home	0.34	0.13	0.21	**24.64**	0.45	0.24	0.21	**18.68**	0.61	0.29	0.32	**19.03**
Has Ability to Use Internet	0.26	0.11	0.15	**19.62**	0.67	0.37	0.30	**27.28**	0.89	0.42	0.47	**38.95**
Actually Used Internet	0.22	0.08	0.14	**19.75**	0.58	0.30	0.28	**24.58**	0.85	0.37	0.48	**36.77**
	Conditional											
Has Ability to Use Internet	0.56	0.43	0.13	**7.02**	0.90	0.82	0.08	**7.02**	0.97	0.83	0.14	**13.94**
Actually Used Internet	0.91	0.89	0.03	**1.83**	0.97	0.94	0.02	**3.25**	0.99	0.97	0.03	**5.47**

Note: Same as Table 3.1.

Table 3.6: Status of Internet access by Income Quartile

Items	Aged 10 to 14				Aged 15 to 19				Aged 20 to 24			
	High Inc.	Low Inc.	Diff	T-stat	High Inc.	Low Inc.	Diff	T-stat	High Inc.	Low Inc.	Diff	T-stat
	Unconditional											
Internet Access at Home	0.51	0.08	0.44	**36.44**	0.59	0.13	0.46	**38.74**	0.59	0.15	0.44	**26.92**
Has Ability to Use Internet	0.47	0.05	0.41	**34.61**	0.81	0.23	0.58	**55.35**	0.80	0.23	0.57	**49.89**
Actually Used Internet	0.39	0.04	0.54	**30.63**	0.74	0.18	0.55	**50.21**	0.74	0.20	0.54	**37.18**
	Conditional											
Has Ability to Use Internet	0.67	0.33	0.34	**12.34**	0.95	0.70	0.25	**12.04**	0.94	0.68	0.26	**12.92**
Actually Used Internet	0.91	0.89	0.01	0.59	0.98	0.93	0.04	**4.05**	0.98	0.95	0.04	**3.82**

Note: Same as Table 3.1. High income category is the top income quartile, and low income category is the bottom income quartile.

Table 4: Probit equations of internet ACCESS, ABILITY and USAGE, by age group

Sl. No.	Items	Age 10 to 14 (Marginal Effect)				Age 15 to 19 (Marginal Effect)				Age 20 to 24 (Marginal Effect)			
		Probit of ACCESS to Internet at home	Probit of ABILITY to use internet, conditional on access	Probit of internet USE, conditional on access & ability	Un-conditional actual USE of internet in past 30 days	Probit of ACCESS to Internet at home	Probit of ABILITY to use internet, conditional on access	Probit of internet USE, conditional on access & ability	Un-conditional actual USE of internet in past 30 days	Probit of ACCESS to Internet at home	Probit of ABILITY to use internet, conditional on access	Probit of internet USE, conditional on access & ability	Un-conditional actual USE of Internet in past 30days
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	Male = 1	-0.00116	**0.07232***	**0.00144***	**0.00883***	**0.03071***	**0.06212***	**0.00345***	**0.05489***	**0.04572***	**0.05321***	**0.00015***	**0.08163***
		(-0.31)	(6.96)	(2.40)	(5.84)	(6.61)	(23.24)	(11.49)	(10.50)	(9.09)	(29.47)	(12.65)	(13.62)
(2)	Non-Gen. caste =1	**-0.04205***	**-0.06644***	-0.00002	**-0.02091***	**-0.05777***	**-0.01883***	-0.00043	**-0.06284***	**-0.05544***	**-0.01008***	-0.00001	**-0.06093***
		(-8.62)	(-5.33)	(-0.04)	(-8.22)	(-9.96)	(-6.66)	(-1.44)	(-9.68)	(-9.08)	(-5.86)	(-1.27)	(-11.23)
(3)	Muslim = 1	0.00279	**-0.09626***	0.00030	**-0.01110***	-0.01068	**-0.04041***	-0.00076	**-0.02677***	-0.00274	**-0.01172***	**-0.00005***	-0.01150
		(0.48)	(-5.75)	(0.33)	(-5.63)	(-1.43)	(-9.00)	(-1.71)	(-4.14)	(-0.34)	(-4.51)	(-2.93)	(-1.81)
(4)	Pvt. School = 1	**0.08025***	**0.04385***	0.00063	**0.02843***	**0.11553***	**0.02896***	**0.00078***	**0.12253***	**0.12833***	**0.03496***	**0.00007***	**0.15135***
		(15.95)	(3.60)	(0.95)	(9.10)	(19.20)	(10.44)	(2.73)	(17.29)	(17.48)	(17.84)	(7.43)	(18.23)
(5)	Rural = 1	**-0.05246***	**-0.09275***	-0.00145	**-0.02727***	**-0.08003***	**-0.02470***	**-0.00097***	**-0.08583***	**-0.09209***	**-0.01312***	**-0.00006***	**-0.09769***
		(-11.42)	(-7.29)	(-1.88)	(-10.49)	(-14.61)	(-8.60)	(-3.19)	(-18.53)	(-15.57)	(-7.20)	(-5.56)	(-16.04)
(6)	Low Income =1	**-0.159***	**-0.074***	-0.001	**-0.046***	**-0.242***	0.000	**-0.000***	**-0.232***	**-0.185***	0.000	0.000	**-0.217***
		(-17.55)	(-2.53)	(-1.18)	(-5.33)	(-18.06)	(-1.12)	(-2.08)	(-18.89)	(-11.71)	(0.05)	(-0.04)	(-20.14)

Note: The first row of the table shows the Marginal Effect on MALE dummy variable in the probit equation of internet ACCESS, ABILITY and actual USE, controlling for different socio-economic variables. Similarly for the other rows. For example, the second row shows the Marginal Effect on the 'Non-General-Caste' dummy variable in the probit equations in the first three columns under each age group. t-stats are reported in parenthesis. * shows that the Marginal Effect is statistically significant at the 5% or higher level. The fourth column under each age group is the calculated unconditional marginal effect of a given variable, calculated from the parameters estimated in the first three columns, in the way shown in Equation 7 in the Methodology section.

Table 5: Marginal Effect of MALE in probit equations of internet ACCESS, ABILITY and USAGE : (Male = 1)

Items		Age 10 to 14				Age 15 to 19				Age 20 to 24			
		Marginal Effect (ME) of MALE				Marginal Effect (ME) of MALE				Marginal Effect (ME) of MALE			
		Probit of ACCESS to Internet at home	Probit of ABILITY to use internet, conditional on Access	Probit of internet USE, conditional on Access & Ability	Un-conditional actual USE of Internet in past 30 days	Probit of ACCESS to Internet at home	Probit of ABILITY to use internet, conditional on Access	Probit of internet USE, conditional on Access & Ability	Un-conditional actual USE of Internet in past 30 days	Probit of ACCESS to Internet at home	Probit of ABILITY to use internet, conditional on Access	Probit of internet USE, conditional on Access & Ability	Un-conditional actual USE of Internet in past 30 days
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Overall		-0.00116	**0.07232***	**0.00144***	**0.00883***	**0.03071***	**0.06212***	**0.00345***	**0.05489***	**0.04572***	**0.05321***	**0.00015***	**0.08163***
		(-0.31)	(6.96)	(2.40)	(5.84)	(6.61)	(23.24)	(11.49)	(10.50)	(9.09)	(29.47)	(12.65)	(13.62)
Sector	Rural	-.00121	**0.06931***	0.00054	**0.00153***	**0.02454***	**0.08999***	**0.00159***	**0.04152***	**0.04362***	**0.07487***	**0.00014***	**0.07018***
		(-0.67)	(5.47)	(1.72)	(4.63)	(5.39)	(20.81)	(9.92)	(19.44)	(7.70)	(25.71)	(10.99)	(19.66)
	Urban	0.00304	**0.05805***	**0.00068***	**0.01913***	**0.02943***	**0.00801***	**0.00021***	**0.03391***	**0.03722***	**0.00785***	**0.00000***	**0.04331***
		(0.35)	(4.04)	(2.44)	(4.00)	(3.85)	(11.10)	(6.27)	(8.02)	(5.25)	(15.83)	(6.60)	(12.68)
Caste	Non-Gen.	0.00253	**0.07804***	0.00077	**0.00602***	**0.02932***	**0.07051***	**0.00200***	**0.04734***	**0.04559***	**0.05099***	**0.00004***	**0.07067***
		(0.82)	(6.28)	(1.87)	(6.79)	(5.90)	(21.15)	(10.21)	(18.18)	(7.93)	(24.83)	(9.97)	(20.15)
	Gen. Caste	-0.01784	**0.06359***	0.00033	**0.00931***	**0.02928***	**0.00614***	**0.00008***	**0.03388***	**0.03825***	**0.00389***	**0.00000***	**0.04313***
		(-1.74)	(3.53)	(1.91)	(2.94)	(2.97)	(10.09)	(5.43)	(8.84)	(4.22)	(15.72)	(5.77)	(9.32)
Religion	Muslim	-0.00211	0.04632	**0.00102***	**0.00067***	**0.02955***	**0.05360***	**0.00056***	**0.04434***	**0.03662***	**0.02542***	**0.00002***	**0.04487***
		(-0.64)	(1.89)	(2.78)	(2.47)	(3.01)	(11.43)	(7.86)	(9.10)	(2.84)	(14.45)	(7.12)	(10.69)
	Non-Muslim	0.00061	**0.07128***	0.00043	**0.00914***	**0.03006***	**0.05074***	**0.00158***	**0.04931***	**0.04582***	**0.03903***	**0.00005***	**0.07229***
		(0.15)	(6.22)	(0.84)	(3.79)	(5.96)	(20.35)	(9.37)	(16.49)	(8.40)	(25.82)	(10.74)	(19.97)

Note: t-stats are reported in parenthesis. * shows that the Marginal Effect of MALE is statistically significant at 5% or higher level. Unconditional actual USE of internet in last 30 days is a binary variable which takes the value of 1 if the individual reported using the internet at least once in the last 30 days, and of 0 otherwise.

Table 6: Marginal Effect of MALE in Family Fixed Effects probit equations of internet ACCESS, ABILITY and USAGE : (Male = 1)

Items		Age 10 to 14		Age 15 to 19		Age 20 to 24	
		ME of MALE in the Probit of ABILITY to use internet, conditional on Access	ME of MALE in the Probit of internet USE, conditional on Access & Ability	ME of MALE in the Probit of ABILITY to use internet, conditional on Access	ME of MALE in the Probit of internet USE, conditional on Access & Ability	ME of MALE in the Probit of ABILITY to use internet, conditional on Access	ME of MALE in the Probit of internet USE, conditional on Access & Ability
		(1)	(2)	(3)	(4)	(5)	(6)
Overall	(All groups)	**0.17674***	**0.00003***	**0.00008***	**0.00000***	**0.00006***	**0.00000***
		(7.71)	(4.13)	(22.77)	(9.47)	(25.19)	(11.46)
Sector	Rural	**0.02155***	0.00003	**0.00149***	**0.00000***	**0.00174***	**0.00000***
		(5.07)	(1.63)	(19.42)	(7.40)	(21.25)	(9.39)
	Urban	**0.36604***	**0.00001***	**0.00000***	**0.00000***	**0.00000***	**0.00000***
		(5.96)	(3.36)	(11.86)	(5.80)	(13.32)	(6.51)
Caste	Non-General	**0.11476***	**0.00007***	**0.00052***	**0.00000***	**0.00029***	**0.00000***
		(6.90)	(3.25)	(20.96)	(7.34)	(21.85)	(9.90)
	General Caste	**0.24609***	**0.00000***	**0.00000***	**0.00000***	**0.00000***	**0.00000***
		(3.48)	(2.56)	(9.04)	(5.85)	(12.51)	(5.77)
Religion	Muslim	**0.04745***	0.00125	**0.00681***	**0.00000***	**0.00133***	**0.00000***
		(4.42)	(1.79)	(12.04)	(5.29)	(11.59)	(5.54)
	Non-Muslim	**0.19659***	**0.00001***	**0.00005***	**0.00000***	**0.00003***	**0.00000***
		(6.42)	(3.72)	(19.36)	(8.05)	(22.30)	(9.95)

Note: In the parenthesis z-stat/t-stat is reported. * are significant at 5% level or above. ME stands for “Marginal Effect”.

Appendix

Table A1: State of Internet Access, Ability to Use Internet, and Actual Use of Internet in India states, by Rural and Urban Sector

States	Share in NSS 2017-18									Projected Share in 2020								
	Access to Internet at Home			Ability to Use Internet			Actually Used Internet			Access to Internet at home			Ability to Use Internet			Actually Used Internet		
	Rural	Urban	Overall	Rural	Urban	Overall	Rural	Urban	Overall	Rural	Urban	Overall	Rural	Urban	Overall	Rural	Urban	Overall
Jammu & Kashmir	0.36	0.65	0.42	0.34	0.58	0.39	0.30	0.54	0.36	0.48	0.87	0.56	0.39	0.69	0.45	0.35	0.65	0.42
Himachal Pradesh	0.60	0.76	0.61	0.58	0.74	0.59	0.54	0.71	0.56	0.79	1.00	0.81	0.68	0.86	0.70	0.64	0.86	0.66
Punjab	0.41	0.61	0.48	0.57	0.70	0.61	0.50	0.65	0.55	0.54	0.81	0.64	0.64	0.79	0.69	0.58	0.76	0.64
Uttarakhand	0.37	0.59	0.42	0.50	0.73	0.55	0.42	0.64	0.48	0.48	0.78	0.56	0.55	0.80	0.61	0.47	0.72	0.53
Haryana	0.39	0.56	0.44	0.43	0.63	0.49	0.36	0.59	0.43	0.52	0.74	0.58	0.50	0.71	0.56	0.42	0.68	0.50
Delhi	0.54	0.58	0.57	0.54	0.71	0.70	0.54	0.69	0.68	0.72	0.76	0.76	0.66	0.80	0.80	0.66	0.79	0.78
Rajasthan	0.23	0.54	0.30	0.22	0.51	0.29	0.18	0.48	0.25	0.30	0.71	0.40	0.25	0.59	0.33	0.21	0.56	0.29
Uttar Pradesh	0.15	0.39	0.20	0.17	0.42	0.22	0.14	0.39	0.19	0.20	0.52	0.26	0.20	0.49	0.25	0.16	0.45	0.22
Bihar	0.16	0.43	0.19	0.20	0.44	0.22	0.16	0.41	0.18	0.22	0.57	0.25	0.23	0.51	0.26	0.19	0.48	0.22
North-East States	0.21	0.50	0.28	0.26	0.51	0.32	0.19	0.42	0.25	0.28	0.66	0.37	0.31	0.58	0.38	0.23	0.49	0.29
Assam	0.15	0.46	0.17	0.26	0.58	0.29	0.21	0.51	0.23	0.19	0.61	0.23	0.30	0.64	0.33	0.24	0.58	0.27
West Bengal	0.09	0.37	0.16	0.17	0.49	0.26	0.13	0.43	0.21	0.12	0.50	0.22	0.21	0.57	0.30	0.16	0.50	0.25
Jharkhand	0.15	0.44	0.21	0.17	0.49	0.24	0.14	0.42	0.20	0.20	0.58	0.28	0.20	0.56	0.28	0.16	0.49	0.23
Odisha	0.08	0.29	0.11	0.16	0.44	0.20	0.12	0.37	0.16	0.10	0.38	0.14	0.18	0.49	0.22	0.14	0.42	0.18
Chhattisgarh	0.14	0.32	0.17	0.17	0.42	0.21	0.14	0.39	0.19	0.19	0.43	0.23	0.20	0.48	0.25	0.17	0.46	0.22
Madhya Pradesh	0.10	0.36	0.16	0.14	0.46	0.22	0.12	0.43	0.19	0.13	0.48	0.21	0.17	0.52	0.25	0.14	0.49	0.22
Gujarat	0.25	0.52	0.35	0.29	0.59	0.40	0.24	0.53	0.34	0.33	0.68	0.46	0.34	0.67	0.46	0.28	0.61	0.40
Maharashtra	0.23	0.52	0.35	0.34	0.63	0.46	0.27	0.56	0.39	0.31	0.68	0.47	0.39	0.69	0.52	0.31	0.64	0.45
Andhra Pradesh	0.14	0.32	0.20	0.29	0.52	0.36	0.24	0.45	0.31	0.19	0.43	0.27	0.34	0.58	0.41	0.28	0.51	0.35
Karnataka	0.12	0.28	0.18	0.28	0.54	0.37	0.21	0.45	0.30	0.15	0.38	0.23	0.32	0.60	0.42	0.25	0.51	0.34
Kerala	0.57	0.63	0.60	0.78	0.80	0.79	0.64	0.68	0.66	0.75	0.84	0.79	0.85	0.86	0.85	0.72	0.77	0.74
Tamil Nadu	0.20	0.31	0.25	0.45	0.65	0.54	0.32	0.51	0.41	0.26	0.40	0.33	0.50	0.72	0.61	0.37	0.58	0.47
Telangana	0.14	0.45	0.28	0.26	0.57	0.41	0.22	0.51	0.36	0.18	0.60	0.38	0.32	0.63	0.46	0.27	0.58	0.41
INDIA	**0.18**	**0.44**	**0.25**	**0.25**	**0.56**	**0.33**	**0.20**	**0.49**	**0.28**	**0.24**	**0.58**	**0.33**	**0.28**	**0.63**	**0.38**	**0.23**	**0.57**	**0.33**

Note: Same as table 1.

Table A1.1: State of Internet access in India states by Sector (Actual numbers, in Lakhs)

States	Projected Actual Numbers in 2020								
	Access to Internet at Home			Ability to Use Internet			Actually Used Internet		
	Rural	Urban	Overall	Rural	Urban	Overall	Rural	Urban	Overall
Jammu & Kashmir	13.45	6.57	20.03	10.97	5.23	16.19	9.96	4.93	14.88
Himachal Pradesh	13.42	1.91	15.34	11.54	1.64	13.17	10.93	1.64	12.57
Punjab	25.71	20.15	45.86	30.33	19.70	50.03	27.58	18.99	46.57
Uttarakhand	10.41	5.47	15.88	11.80	5.64	17.44	10.11	5.03	15.14
Haryana	28.95	17.69	46.64	27.71	16.95	44.66	23.76	16.10	39.86
Delhi	1.94	39.26	41.20	1.78	41.24	43.03	1.78	40.57	42.36
Rajasthan	58.97	42.17	101.14	48.86	34.79	83.65	41.25	33.11	74.36
Uttar Pradesh	122.55	80.25	202.80	120.29	75.32	195.61	101.35	70.00	171.36
Bihar	66.25	19.61	85.86	71.13	17.68	88.81	56.54	16.35	72.89
North-East States	9.52	7.18	16.71	10.78	6.28	17.06	7.89	5.27	13.16
Assam	16.73	5.25	21.98	25.62	5.50	31.12	20.43	4.97	25.40
West Bengal	23.52	34.94	58.46	41.76	39.82	81.59	31.76	34.98	66.74
Jharkhand	16.97	13.01	29.98	17.22	12.57	29.79	13.94	10.86	24.80
Odisha	10.58	6.81	17.39	18.56	8.76	27.32	14.72	7.57	22.29
Chhattisgarh	12.96	6.05	19.00	13.60	6.76	20.36	11.65	6.45	18.11
Madhya Pradesh	24.34	28.72	53.06	31.33	30.96	62.29	25.75	29.02	54.77
Gujarat	36.25	42.00	78.24	36.86	40.96	77.83	30.22	37.25	67.47
Maharashtra	55.77	91.01	146.78	71.18	92.42	163.60	57.12	84.54	141.65
Andhra Pradesh	17.14	18.59	35.73	30.44	25.36	55.79	25.42	22.25	47.67
Karnataka	15.87	21.94	37.81	32.80	35.11	67.91	25.27	29.72	54.98
Kerala	33.98	31.43	65.41	38.35	32.19	70.53	32.53	28.85	61.37
Tamil Nadu	25.33	35.51	60.84	48.66	63.07	111.74	35.42	51.15	86.57
Telangana	9.39	26.22	35.61	16.24	27.47	43.71	13.86	25.09	38.95

Note & Source: Same as Table 1. All figures are in lakhs.

Table A2: State of Internet access in India states by Age Group

States	Share in NSS 2017-18												Projected Share in 2020											
	Access to Internet at Home				Ability to Use Internet				Actually Used Internet				Access to Internet at Home				Ability to Use Internet				Actually Used Internet			
	10-14	15-19	20-24	All	10-14	15-19	20-24	All	10-14	15-19	20-24	All	10-14	15-19	20-24	All	10-14	15-19	20-24	All	10-14	15-19	20-24	All
J & Kashmir	0.31	0.46	0.49	0.42	0.16	0.48	0.53	0.39	0.14	0.43	0.49	0.36	0.41	0.62	0.65	0.56	0.18	0.56	0.62	0.45	0.16	0.51	0.58	0.42
Himachal	0.49	0.69	0.67	0.61	0.33	0.74	0.74	0.59	0.30	0.71	0.69	0.56	0.65	0.91	0.89	0.81	0.37	0.88	0.85	0.69	0.34	0.86	0.81	0.66
Punjab	0.41	0.51	0.52	0.48	0.43	0.71	0.69	0.61	0.37	0.65	0.64	0.55	0.54	0.67	0.69	0.64	0.49	0.80	0.76	0.68	0.42	0.75	0.73	0.64
Uttarakhand	0.41	0.44	0.40	0.42	0.31	0.70	0.69	0.55	0.27	0.58	0.62	0.48	0.55	0.59	0.53	0.56	0.34	0.78	0.76	0.61	0.30	0.66	0.68	0.54
Haryana	0.37	0.46	0.49	0.44	0.25	0.60	0.59	0.49	0.21	0.52	0.55	0.43	0.49	0.61	0.65	0.58	0.28	0.68	0.67	0.55	0.23	0.61	0.63	0.50
Delhi	0.57	0.64	0.53	0.57	0.61	0.83	0.67	0.70	0.56	0.81	0.66	0.68	0.75	0.85	0.70	0.76	0.70	0.94	0.72	0.78	0.65	0.94	0.72	0.77
Rajasthan	0.19	0.34	0.37	0.30	0.08	0.37	0.41	0.29	0.07	0.33	0.37	0.25	0.26	0.45	0.49	0.40	0.09	0.43	0.48	0.33	0.07	0.38	0.43	0.29
Uttar Prad.	0.12	0.22	0.27	0.20	0.08	0.27	0.33	0.22	0.06	0.24	0.29	0.19	0.16	0.29	0.36	0.26	0.09	0.32	0.39	0.26	0.07	0.28	0.34	0.23
Bihar	0.15	0.25	0.20	0.19	0.11	0.36	0.28	0.22	0.07	0.30	0.25	0.18	0.20	0.33	0.27	0.25	0.12	0.42	0.32	0.26	0.08	0.35	0.29	0.21
N-E States	0.23	0.29	0.33	0.28	0.12	0.43	0.47	0.32	0.07	0.32	0.40	0.25	0.30	0.38	0.44	0.37	0.13	0.51	0.56	0.38	0.08	0.39	0.48	0.29
Assam	0.12	0.19	0.21	0.17	0.11	0.38	0.38	0.29	0.08	0.29	0.33	0.23	0.16	0.25	0.28	0.23	0.12	0.43	0.42	0.32	0.08	0.34	0.37	0.27
West Bengal	0.12	0.16	0.21	0.16	0.13	0.33	0.31	0.26	0.10	0.25	0.27	0.21	0.15	0.21	0.28	0.22	0.15	0.38	0.37	0.30	0.11	0.30	0.32	0.25
Jharkhand	0.14	0.24	0.26	0.21	0.09	0.34	0.32	0.24	0.06	0.28	0.28	0.20	0.19	0.32	0.35	0.28	0.09	0.40	0.39	0.28	0.07	0.33	0.34	0.23
Odisha	0.07	0.12	0.13	0.11	0.05	0.27	0.28	0.20	0.03	0.21	0.24	0.16	0.09	0.16	0.18	0.14	0.05	0.30	0.32	0.22	0.04	0.24	0.27	0.18
Chhattisgarh	0.13	0.18	0.23	0.17	0.08	0.26	0.32	0.21	0.07	0.22	0.29	0.19	0.17	0.24	0.30	0.23	0.09	0.30	0.37	0.25	0.08	0.26	0.34	0.22
Madhya Prad.	0.13	0.16	0.20	0.16	0.09	0.25	0.33	0.22	0.07	0.23	0.29	0.19	0.17	0.22	0.26	0.21	0.09	0.29	0.39	0.25	0.08	0.26	0.34	0.22
Gujarat	0.26	0.34	0.42	0.35	0.18	0.50	0.50	0.40	0.14	0.42	0.44	0.34	0.35	0.45	0.56	0.46	0.20	0.57	0.56	0.45	0.15	0.49	0.51	0.39
Maharashtra	0.28	0.36	0.40	0.35	0.24	0.55	0.56	0.46	0.19	0.46	0.50	0.39	0.37	0.48	0.53	0.47	0.27	0.62	0.64	0.52	0.21	0.54	0.57	0.45
Andhra Prad	0.13	0.22	0.25	0.20	0.13	0.49	0.47	0.36	0.10	0.42	0.40	0.31	0.17	0.29	0.33	0.27	0.14	0.54	0.52	0.40	0.11	0.48	0.44	0.35
Karnataka	0.11	0.15	0.25	0.18	0.13	0.47	0.52	0.37	0.09	0.35	0.45	0.30	0.15	0.21	0.33	0.23	0.14	0.52	0.58	0.41	0.09	0.40	0.51	0.34
Kerala	0.53	0.62	0.64	0.60	0.55	0.90	0.93	0.79	0.39	0.74	0.85	0.66	0.71	0.82	0.85	0.79	0.60	0.95	0.96	0.83	0.44	0.83	0.91	0.72
Tamil Nadu	0.16	0.29	0.30	0.25	0.23	0.66	0.73	0.54	0.16	0.48	0.58	0.41	0.21	0.38	0.39	0.33	0.25	0.70	0.77	0.58	0.17	0.54	0.63	0.45
Telangana	0.17	0.32	0.38	0.28	0.12	0.59	0.57	0.41	0.11	0.50	0.51	0.36	0.23	0.43	0.50	0.38	0.13	0.66	0.64	0.45	0.12	0.58	0.59	0.41

Note: same as table 2.

Table A2.2: State of Internet access in India states by Age-Group (Actual numbers, in Lakhs)

States	Projected Actual Numbers in 2020											
	Access to Internet at Home				Ability to Use Internet				Actually Use of Internet			
	10 to 14	15 to 19	20 to 24	Overall	10 to 14	15 to 19	20 to 24	Overall	10 to 14	15 to 19	20 to 24	Overall
Jammu & Kashmir	4.95	7.21	7.87	20.03	2.20	6.51	7.45	16.16	1.92	5.97	7.01	14.90
Himachal Pradesh	4.42	5.63	5.29	15.34	2.53	5.44	5.04	13.00	2.30	5.34	4.80	12.44
Punjab	12.75	15.21	17.90	45.86	11.48	18.07	19.68	49.23	10.00	17.13	18.90	46.04
Uttarakhand	5.77	5.71	4.40	15.88	3.62	7.59	6.30	17.51	3.16	6.42	5.67	15.25
Haryana	12.53	16.96	17.15	46.64	7.20	18.88	17.83	43.91	5.95	16.87	16.72	39.54
Delhi	10.80	13.83	16.56	41.20	10.07	15.26	16.91	42.23	9.39	15.17	17.01	41.57
Rajasthan	21.78	40.12	39.24	101.14	7.29	38.27	38.09	83.65	6.15	33.89	34.65	74.69
Uttar Pradesh	43.87	77.91	81.03	202.80	23.22	87.57	87.46	198.25	19.37	76.93	77.73	174.03
Bihar	30.88	32.63	22.35	85.86	19.24	41.61	26.75	87.60	12.87	34.91	24.42	72.20
North-East States	5.30	5.70	5.71	16.71	2.33	7.51	7.24	17.09	1.41	5.72	6.17	13.30
Assam	5.21	7.56	9.22	21.98	3.86	12.69	14.14	30.69	2.72	10.14	12.41	25.27
West Bengal	13.66	19.52	25.28	58.46	12.89	34.75	33.56	81.19	9.92	27.36	29.32	66.60
Jharkhand	7.67	11.27	11.03	29.98	3.76	14.06	12.34	30.16	2.82	11.62	10.72	25.16
Odisha	3.95	6.27	7.17	17.39	2.17	12.17	12.65	26.99	1.58	9.68	10.90	22.16
Chhattisgarh	5.05	6.59	7.36	19.00	2.70	8.47	9.01	20.19	2.25	7.43	8.38	18.06
Madhya Pradesh	14.32	18.42	20.31	53.06	8.14	24.84	29.76	62.74	6.84	22.03	26.42	55.29
Gujarat	18.47	26.33	33.44	78.24	10.67	33.17	33.38	77.22	8.12	28.43	30.60	67.15
Maharashtra	35.35	51.30	60.12	146.78	25.17	66.41	72.40	163.98	19.87	57.45	65.45	142.77
Andhra Pradesh	7.66	12.54	15.53	35.73	6.35	23.46	24.46	54.27	5.06	20.77	20.80	46.63
Karnataka	8.09	9.75	19.97	37.81	7.48	24.75	34.60	66.83	5.04	18.79	30.54	54.38
Kerala	20.16	22.51	22.74	65.41	17.07	26.04	25.64	68.75	12.48	22.85	24.28	59.61
Tamil Nadu	12.95	21.78	26.12	60.84	15.42	40.24	51.31	106.97	10.52	30.90	42.19	83.61
Telangana	8.21	11.15	16.25	35.61	4.69	17.27	20.84	42.81	4.28	15.15	19.10	38.52

Note: all figures are in lakhs.

Table A3.1: State of Internet access (access to internet at home, ability to use internet and actual use of internet) in India states by Gender

States	Share in NSS 2017-18								
	Access to Internet at Home			Ability to Use Internet			Actually Used Internet		
	Female	Male	Overall	Female	Male	Overall	Female	Male	Overall
Jammu & Kashmir	0.40	0.44	0.42	0.31	0.45	0.39	0.27	0.42	0.36
Himachal Pradesh	0.60	0.62	0.61	0.55	0.63	0.59	0.51	0.60	0.56
Punjab	0.44	0.50	0.48	0.55	0.66	0.61	0.47	0.62	0.55
Uttarakhand	0.41	0.43	0.42	0.50	0.60	0.55	0.43	0.52	0.48
Haryana	0.44	0.44	0.44	0.42	0.54	0.49	0.36	0.48	0.43
Delhi	0.59	0.56	0.57	0.67	0.72	0.70	0.66	0.70	0.68
Rajasthan	0.29	0.31	0.30	0.22	0.35	0.29	0.18	0.32	0.25
Uttar Pradesh	0.19	0.20	0.20	0.15	0.28	0.22	0.13	0.25	0.19
Bihar	0.18	0.20	0.19	0.16	0.27	0.22	0.13	0.22	0.18
North-East States	0.28	0.27	0.28	0.31	0.34	0.32	0.23	0.26	0.25
Assam	0.17	0.18	0.17	0.23	0.34	0.29	0.17	0.28	0.23
West Bengal	0.15	0.17	0.16	0.22	0.30	0.26	0.17	0.25	0.21
Jharkhand	0.19	0.23	0.21	0.16	0.30	0.24	0.12	0.26	0.20
Odisha	0.10	0.11	0.11	0.15	0.24	0.20	0.11	0.21	0.16
Chhattisgarh	0.15	0.20	0.17	0.15	0.26	0.21	0.13	0.24	0.19
Madhya Pradesh	0.15	0.17	0.16	0.17	0.26	0.22	0.14	0.24	0.19
Gujarat	0.34	0.35	0.35	0.32	0.47	0.40	0.26	0.41	0.34
Maharashtra	0.35	0.35	0.35	0.39	0.52	0.46	0.33	0.45	0.39
Andhra Pradesh	0.19	0.21	0.20	0.31	0.42	0.36	0.25	0.36	0.31
Karnataka	0.19	0.17	0.18	0.35	0.39	0.37	0.28	0.31	0.30
Kerala	0.58	0.61	0.60	0.78	0.80	0.79	0.61	0.70	0.66
Tamil Nadu	0.21	0.29	0.25	0.50	0.58	0.54	0.35	0.47	0.41
Telangana	0.29	0.28	0.28	0.36	0.44	0.41	0.32	0.39	0.36
All India	**0.24**	**0.26**	**0.25**	**0.28**	**0.38**	**0.33**	**0.22**	**0.33**	**0.28**

Table A3.2: State of Internet access (access to internet at home, ability to use internet and actual use of internet) in India states by Religion

States	Share in NSS 2017-18								
	Access to Internet at Home			Ability to Use Internet			Actually Used Internet		
	Others	Muslim	Overall	Others	Muslim	Overall	Others	Muslim	Overall
Jammu & Kashmir	0.35	0.47	0.42	0.38	0.39	0.39	0.35	0.36	0.36
Himachal Pradesh	0.61	0.54	0.61	0.60	0.51	0.59	0.56	0.50	0.56
Punjab	0.48	0.53	0.48	0.61	0.70	0.61	0.55	0.67	0.55
Uttarakhand	0.42	0.39	0.42	0.57	0.43	0.55	0.50	0.30	0.48
Haryana	0.47	0.21	0.44	0.51	0.26	0.49	0.46	0.19	0.43
Delhi	0.61	0.45	0.57	0.72	0.63	0.70	0.70	0.61	0.68
Rajasthan	0.30	0.27	0.30	0.30	0.21	0.29	0.26	0.17	0.25
Uttar Pradesh	0.20	0.18	0.20	0.23	0.16	0.22	0.21	0.14	0.19
Bihar	0.20	0.15	0.19	0.24	0.15	0.22	0.19	0.13	0.18
North-East States	0.29	0.14	0.28	0.33	0.19	0.32	0.25	0.15	0.25
Assam	0.20	0.12	0.17	0.34	0.20	0.29	0.28	0.15	0.23
West Bengal	0.21	0.08	0.16	0.32	0.14	0.26	0.26	0.12	0.21
Jharkhand	0.22	0.18	0.21	0.25	0.18	0.24	0.21	0.14	0.20
Odisha	0.11	0.16	0.11	0.19	0.46	0.20	0.16	0.44	0.16
Chhattisgarh	0.17	0.41	0.17	0.21	0.43	0.21	0.18	0.41	0.19
Madhya Pradesh	0.16	0.15	0.16	0.22	0.20	0.22	0.19	0.19	0.19
Gujarat	0.35	0.30	0.35	0.41	0.33	0.40	0.35	0.28	0.34
Maharashtra	0.35	0.36	0.35	0.47	0.38	0.46	0.40	0.34	0.39
Andhra Pradesh	0.20	0.21	0.20	0.37	0.29	0.36	0.31	0.27	0.31
Karnataka	0.18	0.16	0.18	0.38	0.34	0.37	0.30	0.26	0.30
Kerala	0.58	0.63	0.60	0.81	0.75	0.79	0.67	0.63	0.66
Tamil Nadu	0.25	0.28	0.25	0.54	0.60	0.54	0.40	0.53	0.41
Telangana	0.29	0.26	0.28	0.41	0.39	0.41	0.36	0.36	0.36
All India	**0.26**	**0.22**	**0.25**	**0.35**	**0.25**	**0.33**	**0.29**	**0.22**	**0.28**

Table A3.3: State of Internet access (access to internet at home, ability to use internet and actual use of internet) in India states by Caste

States	Share in NSS 2017-18								
	Access to Internet at Home			Ability to Use Internet			Actually Used Internet		
	Gen	Non-Gen	Overall	Gen	Non-Gen	Overall	Gen	Non-Gen	Overall
Jammu & Kashmir	0.49	0.33	0.42	0.45	0.30	0.39	0.42	0.27	0.36
Himachal Pradesh	0.66	0.57	0.61	0.63	0.57	0.59	0.59	0.52	0.56
Punjab	0.60	0.39	0.48	0.73	0.53	0.61	0.65	0.48	0.55
Uttarakhand	0.55	0.31	0.42	0.67	0.46	0.55	0.59	0.38	0.48
Haryana	0.56	0.35	0.44	0.61	0.40	0.49	0.54	0.35	0.43
Delhi	0.72	0.46	0.57	0.82	0.60	0.70	0.81	0.57	0.68
Rajasthan	0.55	0.25	0.30	0.53	0.24	0.29	0.49	0.20	0.25
Uttar Pradesh	0.34	0.17	0.20	0.38	0.18	0.22	0.33	0.16	0.19
Bihar	0.39	0.16	0.19	0.42	0.19	0.22	0.36	0.16	0.18
North-East States	0.20	0.29	0.28	0.28	0.33	0.32	0.23	0.25	0.25
Assam	0.17	0.18	0.17	0.28	0.29	0.29	0.22	0.24	0.23
West Bengal	0.17	0.15	0.16	0.27	0.24	0.26	0.23	0.18	0.21
Jharkhand	0.39	0.19	0.21	0.51	0.22	0.24	0.45	0.18	0.20
Odisha	0.27	0.07	0.11	0.38	0.16	0.20	0.33	0.12	0.16
Chhattisgarh	0.42	0.16	0.17	0.49	0.19	0.21	0.47	0.17	0.19
Madhya Pradesh	0.37	0.13	0.16	0.49	0.18	0.22	0.44	0.15	0.19
Gujarat	0.55	0.26	0.35	0.61	0.31	0.40	0.52	0.27	0.34
Maharashtra	0.47	0.28	0.35	0.57	0.40	0.46	0.50	0.33	0.39
Andhra Pradesh	0.24	0.19	0.20	0.46	0.33	0.36	0.38	0.28	0.31
Karnataka	0.29	0.15	0.18	0.50	0.34	0.37	0.40	0.27	0.30
Kerala	0.64	0.58	0.60	0.83	0.78	0.79	0.70	0.64	0.66
Tamil Nadu	0.43	0.25	0.25	0.58	0.54	0.54	0.53	0.41	0.41
Telangana	0.42	0.25	0.28	0.53	0.38	0.41	0.49	0.33	0.36
All India	**0.38**	**0.21**	**0.25**	**0.47**	**0.29**	**0.33**	**0.41**	**0.24**	**0.28**

Table A3.4: State of Internet access (access to internet at home, ability to use internet and actual use of internet) in India states by Types of Schools/Institutes

States	Share in NSS 2017-18								
	Access to Internet at Home			Ability to Use Internet			Actually Used Internet		
	Govt. Schl	Pvt. Schl	Overall	Govt. Schl	Pvt. Schl	Overall	Govt. Schl	Pvt. Schl	Overall
Jammu & Kashmir	0.40	0.56	0.42	0.39	0.39	0.39	0.35	0.37	0.36
Himachal Pradesh	0.58	0.74	0.61	0.57	0.67	0.59	0.53	0.65	0.56
Punjab	0.43	0.68	0.48	0.58	0.73	0.61	0.52	0.68	0.55
Uttarakhand	0.37	0.69	0.42	0.53	0.68	0.55	0.45	0.64	0.48
Haryana	0.39	0.57	0.44	0.47	0.52	0.49	0.42	0.46	0.43
Delhi	0.54	0.83	0.57	0.68	0.85	0.70	0.66	0.82	0.68
Rajasthan	0.27	0.41	0.30	0.25	0.41	0.29	0.22	0.36	0.25
Uttar Pradesh	0.18	0.27	0.20	0.20	0.28	0.22	0.17	0.25	0.19
Bihar	0.18	0.47	0.19	0.21	0.40	0.22	0.17	0.37	0.18
North-East States	0.25	0.51	0.28	0.32	0.38	0.32	0.24	0.30	0.25
Assam	0.17	0.33	0.17	0.28	0.38	0.29	0.23	0.33	0.23
West Bengal	0.15	0.62	0.16	0.24	0.64	0.26	0.20	0.59	0.21
Jharkhand	0.20	0.36	0.21	0.23	0.37	0.24	0.19	0.30	0.20
Odisha	0.10	0.39	0.11	0.18	0.50	0.20	0.15	0.44	0.16
Chhattisgarh	0.16	0.32	0.17	0.20	0.40	0.21	0.17	0.38	0.19
Madhya Pradesh	0.13	0.36	0.16	0.19	0.46	0.22	0.16	0.42	0.19
Gujarat	0.32	0.70	0.35	0.38	0.67	0.40	0.33	0.53	0.34
Maharashtra	0.32	0.66	0.35	0.44	0.71	0.46	0.37	0.64	0.39
Andhra Pradesh	0.17	0.29	0.20	0.29	0.55	0.36	0.24	0.49	0.31
Karnataka	0.16	0.27	0.18	0.34	0.57	0.37	0.27	0.48	0.30
Kerala	0.57	0.72	0.60	0.78	0.83	0.79	0.64	0.73	0.66
Tamil Nadu	0.21	0.42	0.25	0.51	0.68	0.54	0.37	0.56	0.41
Telangana	0.22	0.39	0.28	0.35	0.51	0.41	0.30	0.45	0.36
All India	**0.22**	**0.41**	**0.25**	**0.31**	**0.48**	**0.33**	**0.26**	**0.42**	**0.28**

Table A3.5: State of Internet access (access to internet at home, ability to use internet and actual use of internet) in India states by Income group

States	Share in NSS 2017-18								
	Access to Internet at Home			Ability to Use Internet			Actually Used Internet		
	High Inc.	Low Inc.	Overall	High Inc.	Low Inc.	Overall	High Inc.	Low Inc.	Overall
Jammu & Kashmir	0.70	0.27	0.42	0.70	0.30	0.44	0.67	0.26	0.41
Himachal Pradesh	0.73	0.44	0.64	0.75	0.39	0.64	0.73	0.30	0.59
Punjab	0.64	0.30	0.61	0.76	0.40	0.73	0.71	0.34	0.68
Uttarakhand	0.81	0.21	0.44	0.93	0.38	0.59	0.89	0.29	0.52
Haryana	0.64	0.27	0.53	0.69	0.28	0.56	0.63	0.22	0.51
Delhi	0.69	0.43	0.68	0.79	0.48	0.77	0.78	0.47	0.76
Rajasthan	0.63	0.14	0.34	0.66	0.13	0.35	0.63	0.12	0.33
Uttar Pradesh	0.71	0.10	0.17	0.70	0.12	0.18	0.67	0.10	0.16
Bihar	0.73	0.12	0.14	0.81	0.17	0.19	0.80	0.14	0.15
North-East States	0.55	0.13	0.31	0.56	0.21	0.36	0.46	0.14	0.28
Assam	0.66	0.11	0.15	0.73	0.22	0.26	0.65	0.18	0.21
West Bengal	0.53	0.06	0.21	0.65	0.15	0.31	0.58	0.11	0.26
Jharkhand	0.71	0.11	0.16	0.70	0.14	0.18	0.66	0.11	0.15
Odisha	0.57	0.06	0.10	0.71	0.12	0.16	0.59	0.09	0.12
Chhattisgarh	0.66	0.13	0.16	0.74	0.15	0.19	0.72	0.13	0.17
Madhya Pradesh	0.51	0.09	0.14	0.71	0.11	0.19	0.64	0.10	0.17
Gujarat	0.54	0.23	0.44	0.61	0.29	0.51	0.55	0.22	0.44
Maharashtra	0.66	0.16	0.41	0.76	0.25	0.50	0.73	0.19	0.45
Andhra Pradesh	0.34	0.13	0.25	0.64	0.21	0.47	0.58	0.18	0.42
Karnataka	0.44	0.08	0.23	0.71	0.23	0.43	0.61	0.19	0.37
Kerala	0.68	0.47	0.65	0.84	0.66	0.81	0.75	0.53	0.71
Tamil Nadu	0.36	0.10	0.29	0.75	0.32	0.63	0.59	0.24	0.50
Telangana	0.54	0.18	0.48	0.67	0.24	0.59	0.62	0.18	0.54
All India	**0.57**	**0.12**	**0.25**	**0.71**	**0.16**	**0.33**	**0.65**	**0.13**	**0.29**