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Digital Literacy and Access to Public Services in Rural Households of Bangladesh

Findings from the 2021 Cross-Sectional Household Survey of Rural Bangladesh

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Summary

BRAC Institute of Governance and Development (BIGD) developed a cross-sectional household survey of rural households in Bangladesh titled “Digital Literacy and Access to Public Services”. The survey collected data on digital access, digital skills, and use of digital public services of households in rural Bangladesh. The first round of the survey was conducted in 2019 and the second round was conducted in 2021. In the first round, 6493 households were surveyed across eight divisions. In the second round, 5944 of the same sample were interviewed. This report presents the findings based on the second round of the survey. It also contains highlights of the 2019 survey and some sections that present a comparative discussion based on the findings of the two rounds.

In the 2021 survey, from every household, we interviewed at least one most digitally able person (MDAP1). The MDAP 1 n was nominated by the household members. We collected data on this person’s digital access and digital skills along with information on the household. We also collected household-level data on the use of 31 digital services—majority of which are provided by the government.

We found that a very high share of the households’ MDAP1s had access to a mobile phone; however, access to internet-enabled phones and internet in general is still low. A moderate share of the MDAP1s have lower order digital skills like reading or sending a message, but a small share of them have relatively higher order digital skills needed to use internet-based applications and find specific information from the internet.

From the analysis of the data from two rounds, we see that the MDAPs present in both rounds were more likely to gain more access and skills over time. Among the MDAPs who were present in both rounds of the survey, access to smartphone and internet and the ability to send emails and find information from the internet increased from 2019 to 2021.

If the service requires an intermediary, regardless of the level of digital literacy, MDAP1s or the household members go to formal intermediaries like UDC (Union Digital Centre) or Union Parishad. But if the service offered does not involve an intermediary by design, MDAP1s with higher order digital literacy are likely to use the service by themselves, and those with lower levels of digital literacy are likely to go to informal intermediaries like local computer or mobile shops.

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1 Introduction

The government is responsible for providing important services to people that private sector usually does not. The traditional service delivery would consist of an individuals completing the processes in-person to avail a service. With the advent of digital technology, governments are transitioning to providing many of these services digitally. As states try to modernize their administration and service delivery, the concept of e-governance and digital services are becoming more popular. Digital services are expected to reduce corruption and lead the services directly to their beneficiaries more effectively.

The Government of Bangladesh transitioned 761 services to a digital modality.[1] In this report, we will refer to these government services and selected non-government services that are provided online, fully or partially, as "digital services". Like any other service, the efficacy of digital service delivery depend on both demand and supply sides—on the supply side, the quality of service delivery and on the demand side, whether the potential users subscribe to and use the services digitally.

This study focuses on the demand side of digital services. In 2019, BRAC Institute of Governance and Development (BIGD) conducted a nationwide household-level survey in rural Bangladesh titled "Digital Literacy and Access to Public Services in Bangladesh". In 2021, BIGD conducted another round of the survey with the same sample. Both these surveys aimed to assess how accessible digital devices are, what degree of digital literacy the most digitally able person (MDAP) of the households has, and whether these households are accessing the services digitally. The findings from the 2019 survey were published in the BIGD Working Paper No. 63 in December 2020. This report mainly shares the findings of the survey conducted in 2021.

1.1 Research Objectives

The core objective of this research is to investigate relationship between digital literacy and the use of public services digitally. To study this relation, we address the following research questions:

- How much access do people have to digital devices and internet connectivity?
- What is the level of digital literacy of people who have access to necessary devices and connection?
- How are people accessing the government services? If accessing digitally, are they accessing the services by themselves or with the help of intermediaries?
- Are people with access to digital device and connectivity and digital skills more likely to access the services digitally by themselves?

1.2 Method

[1] The Daily Star. (2022, July 14). Many digital services exist just in name: Finds a govt study. Retrieved from The Daily Star: https://www.thedailystar.net/news/bangladesh/news/many-digital-services-exist-just-name-3069566

Survey Design: "Digital Literacy and Access to Public Services" is a cross-sectional household survey of rural households in Bangladesh. In 2019, the survey was administered in a mini focus group discussion (FGD) in each household to measure the digital literacy and access to public services at the household level. The team conducted mini FGDs instead of collecting responses of one respondent to collect data on different services different household members need. The household members identified the individual who is the most adept at using digital devices. This person was recorded as the most digitally able person (MDAP). Data on the digital literacy of the MDAP of each household was collected since this person possessed the highest level of digital literacy in the household. The household members, along with the MDAP, responded about the services accessed by the household.

In 2021, the same sample was surveyed. Like 2019, responses were collected through mini focus group discussion with the household members. However, there was an attrition - the research team did not find some households, and some households did not consent to take part in the second round of the survey. In the households that participated in the second round, the MDAP identified in the 2019 survey was interviewed. If they were not available, a new MDAP was identified. This MDAP is referred to as MDAP 1 in this report. Additionally, a second MDAP was interviewed who identified themselves with a gender different from that of the 2019 MDAP in the same household. This MDAP is referred to as the MDAP 2 in this report.

Table 1: Two Rounds of Digital Literacy and Access to Public Services

Year	No. of Households	Respondent	Findings
2019	6493	• Most Digitally Able Person (MDAP). • Household members in a mini-FGD setting.	Published in the Working Paper No. 63 in December 2020.
2021	5944 from the 6493 surveyed in 2019	• Most Digitally Able Person (MDAP) from the 2019 survey. If they were unavailable, a new MDAP was identified. • Another MDAP (if available) with a gender identity different from that of the first MDAP.	Findings are shared in this report.

1.3 Sampling

The sampling was done for the survey in 2019. In 2021, the same sample was resurveyed. The sampling technique of the 2019 survey is described below.

Site Selection: The survey sampling was designed to be nationally representative of rural Bangladesh as well as rural areas of each of the eight administrative divisions of the country: Barisal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet. Each division represented one stratum.

Sample Size: In 2019, the sample size for each division or stratum was estimated to be 806.4 households, i.e., 6,451 households across the eight divisions. The research team used the Integrated Multi-Purpose Sample (IMPS) designed by the Bangladesh Bureau of Statistics (BBS) to select the list of Primary Sampling Units (PSUs). Using stratified random sampling, the research team selected 325 PSUs out of the 1077 PSUs in rural areas of Bangladesh, based on population proportional to size using Population and Housing Census 2011. Then they used systematic random sampling to select 20 households within each PSU. Thus the sample size ended up to be 6500 households (325 PSUs x 20 Households).

In 2019, researchers were able to collect data from 6493 households. In 2021, we approached these 6,493 households and found 5,944 households who consented to participate in the survey.

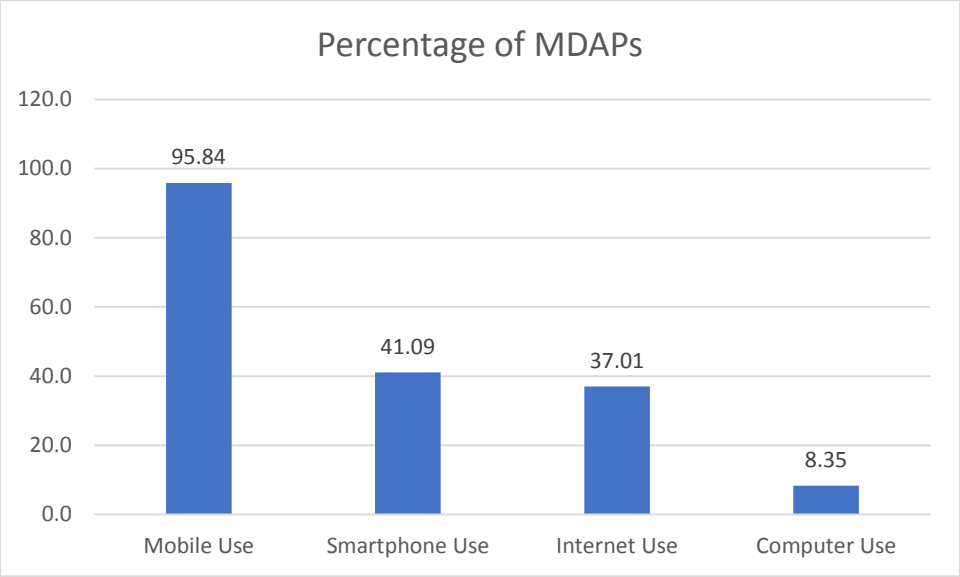
Selection of Services: The e-portal of the Government of Bangladesh (https://services.portal.gov.bd/) lists more than 600 digital services of various government organizations. After a consultation with Access to Information (a2i) in 2019, we decided to exclude services related to information provision and internal administration, which narrowed the list down to 44 digital services. Based on our experience in 2019, we saw that some of these services had little uptake. Hence, for the 2021 round, we curtailed the list further to survey on 31 services related to eight categories: identification, social safety net program, basic utility, education, financial transaction, business, health, and non-essential services.

2 Reviewing Key Findings From the 2019 Survey

Before presenting the findings from the 2021 survey, we highlight some of the key findings from the 2019 survey in this section. We select the findings that are interesting in the context of 2021 survey.

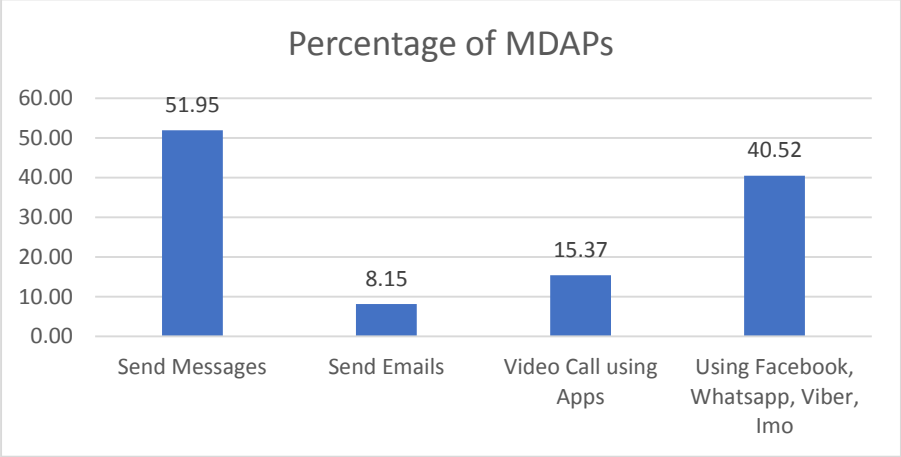
We start with access to digital devices and internet connectivity. In 2019, almost all of the MDAPs (95.84%) had access to mobile phones. However, the use of internet enabled phones (smart/touch phones) and use of internet were low (41.09% and 37.01% respectively). The use of computer among the MDAPs was very low (8.35%).

Figure 1: Percentage of MDAPs With Access to Digital Devices and Internet Connectivity in 2019



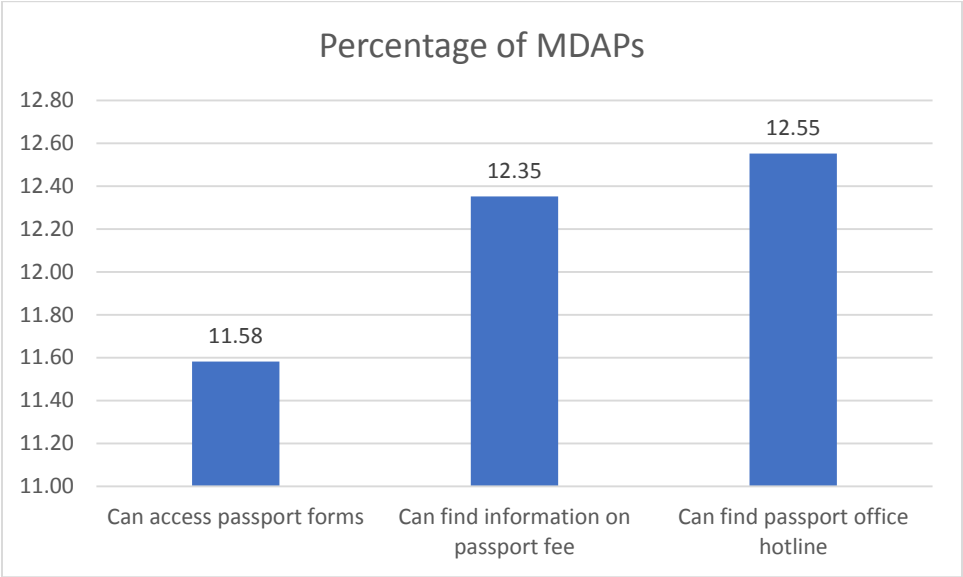
To explore the digital skills of the MDAPs, we focus on two sets of skills. Communication skills denote the ability to communicate using digital means, and information skills refer to the ability to find specific information using digital devices and the internet. In 2019, a little more than half of the MDAPs (51.95%) reported that they could send messages using a mobile phone. Almost 40% reported using media like Facebook, WhatsApp, Viber, or Imo. Low to very low share of MDAPs indicated that they could make video calls using apps or send emails (15.37% and 8.15% respectively).

Figure 2: Communication Skills of MDAPs in 2019



Very low percentage of MDAPs were able to use the internet to find information related to passport forms (11.58%), passport fee (12.35%), and the passport office hotline (12.55%). Those who could do either of the tasks were more likely to be able to do the other two a well.

Figure 3: Information Skills in 2019

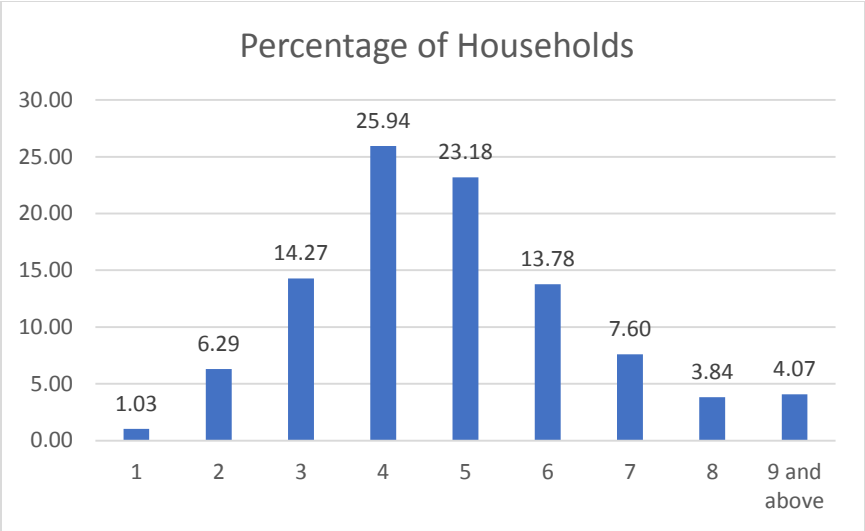


3 Findings From the 2021 Survey

3.1 Insights on Households

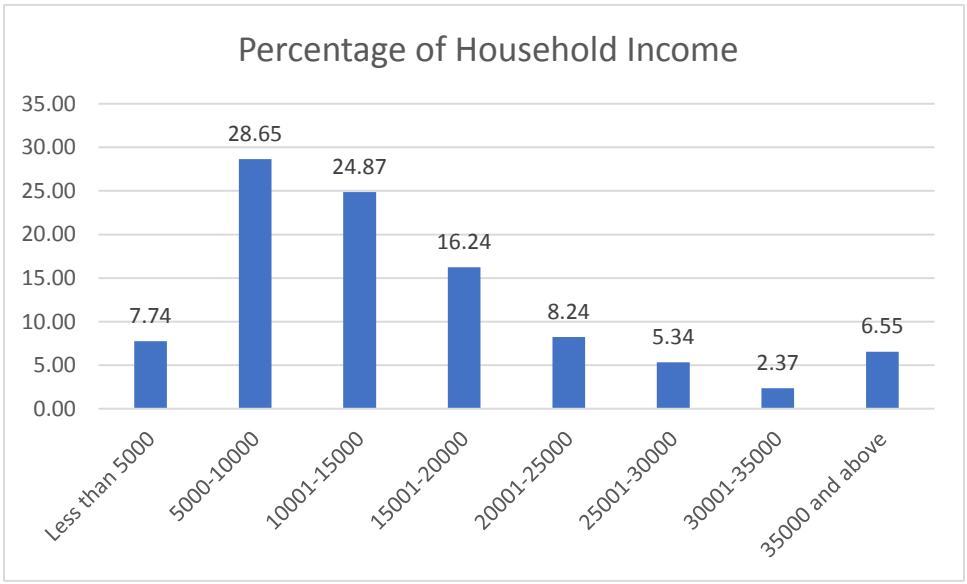
Since the survey is at the household-level, we start with some basic information of the households. In the 2021 survey, the household size ranged from 1 to 17 members.

Figure 4: Distribution of Household Size



The average household size is 4.84. If we arrange the households according to their size, the middle 50% of the households have 4-6 members; this indicates that typically we will see 4-6 members in the households of this survey.

Figure 5: Distribution of Household Income



Looking at the monthly income, we can see that 60.55% of the households, on average, earn 15000 BDT or less per month. According to the Household Income and Expenditure Survey

(HIES) 2016, the average national monthly household income is 15988 BDT. This means that at least 60.55% of the households in the sample earn less than the national average of Bangladeshi household income according to the HIES 2016.[2] The median income fall in the interval of 10001 to 15000. 16.05% earn between 15000 and 20000 BDT and 8.14% earn between 20000 and 25000 BDT.

3.2 Most Digitally Able Person (MDAP): Who are they?

Of the 6493 households, which were interviewed in 2019, 5944 could be traced that also consented to take part in the 2021 survey. In 2019, the household members in the mini-FGD style interview setting identified the most digitally able person (MDAP) of the household. This person was supposed to be the most skilled user of digital devices and services. In 4196 of these 5944 households, the MDAP from the 2019 round was available, and in 1914 households, they were not available. In the households that consented but did not have the 2019 MDAP, a new MDAP was identified. Hence, the overall demographic traits of the MDAPs may vary from those of 2019 MDAPs.

Table 2: Availability of the 2019 MDAP

		2019 MDAP was available
Consented to Participate	**Percentage**	69.77
	Number	4147

3.2.1 Gender

In 2019, 63.09% MDAPs were male and the rest were female. Because almost two-thirds were male, in this round, we asked the households to identify one more MDAP who did not identify with the gender of the first MDAP, if available. If the first MDAP (referred to as MDAP1 hereafter) was male, the second MDAP (referred to as MDAP2 hereafter) was female, and vice-versa . We did it with the hope that it would help us gain more insights into the female MDAPs of the households. Of the 5944 households that we found and consented to participate, 3179 identified a second MDAP. Both MDAP1 and 2 were interviewed on the same modules.

However, since 1797 of the consenting households did not have 2019 MDAP available, we had to identify a new MDAP 1. Of the 1797 new MDAP1s, 33% were male and 67% were female. As a result, in 2021, we have 50.29% male and 49.71% female MDAP1s overall.

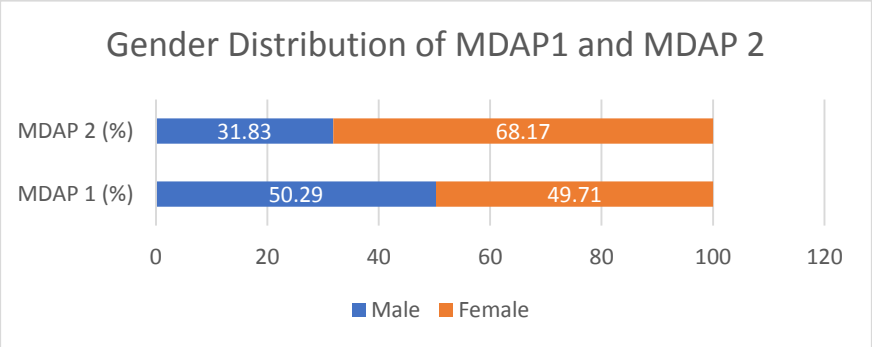
[2] Bangladesh Bureau of Statistics (BBS). (2017). Household Income and Expenditure Survey 2016. Government of the People's Republic of Bangladesh.

Table 3: New MDAP 1s

	Female
Percentage	67.00
Number	1204

Of MDAP 2s, 68.17% were female. This indicates that in the households where MDAP 1 was a male, it was more likely that a female MDAP 2 was identified; however in households where a female MDAP 1 was identified, it was less likely to identify a male MDAP 2.

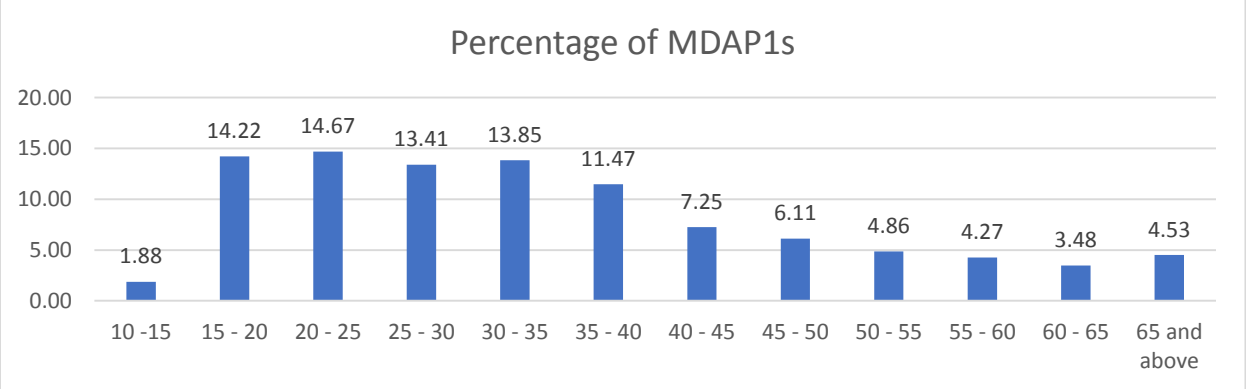
Figure 6: Gender Distribution of MDAP 1s and MDAP 2s



Since the 2021 edition has an almost equal distribution of male and female in the MDAP1s, we focused on using the MDAP1 responses only. Although we collected data from MDAP2s when they were available, we used data from MDAP1s in this report to keep the discussion relatively more simple.

3.2.2 Age

Figure 7: Age Distribution of MDAP1s



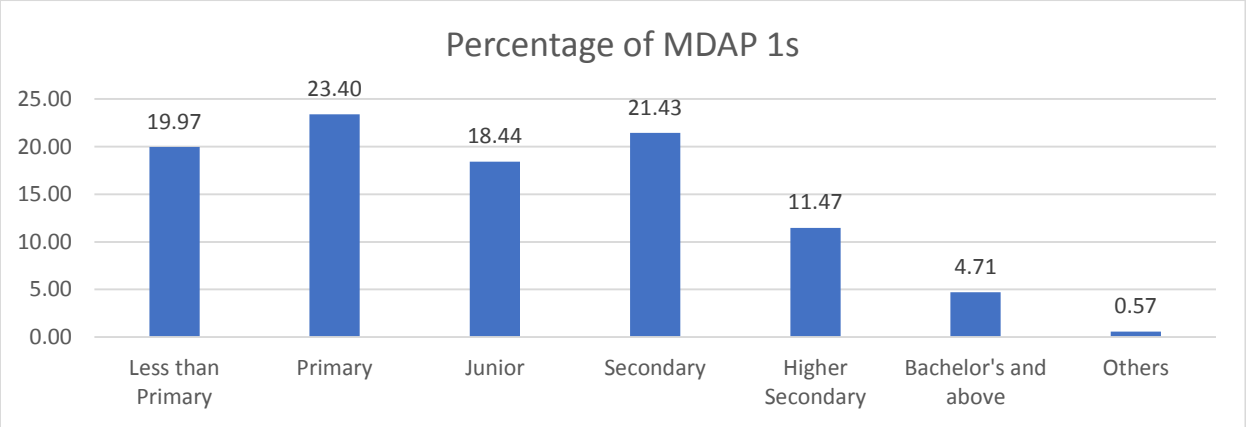
The average age of the MDAP1s is 35.83 years. The age of the MDAP1s range from 12 to 90 years. The interquartile range extends from 24 to 45, which means that the middle 50% of the

MDAP 1s are in this age range. The median age is 33, which indicates that 50% of MDAP 1s are aged 33 years or younger.

3.2.3 Education

One-fifth (19.97%) of the MDAP1s never went to school or did not complete the primary-level education; 23.40% had primary level and 18.44% had junior level of education. Another 21.43% had secondary level of education or passed SSC or equivalent exam, and 11.47% had higher secondary level of education or passed HSC or equivalent exam. Very few MDAP1s (4.71) had undergraduate level education or higher. A very small share (0.57%) received non-formal religious education that is represented by the 'other' category. Median MDAP1 has Junior level (grade 6 to grade 8 equivalent) education. The middle 50% of the MDAP1 ranged from primary to the secondary level.

Figure 8: Education Status of MDAP 1s



3.2.4 Literacy Status

Table 4: Literacy Status of MDAP 1s

Literacy Status	MDAP 1 Percentage
Can read and write	73.70
Neither	20.54
Can read only	0.98
Knows numbers only	4.78

Almost three-quarters (73.70%) of the MDAP1s can read and write, similar to the rate in 2019. This is also very close to the literacy rate (74.66%) found in the "Population and Housing Census 2022".[3]

3.3 Digital Literacy

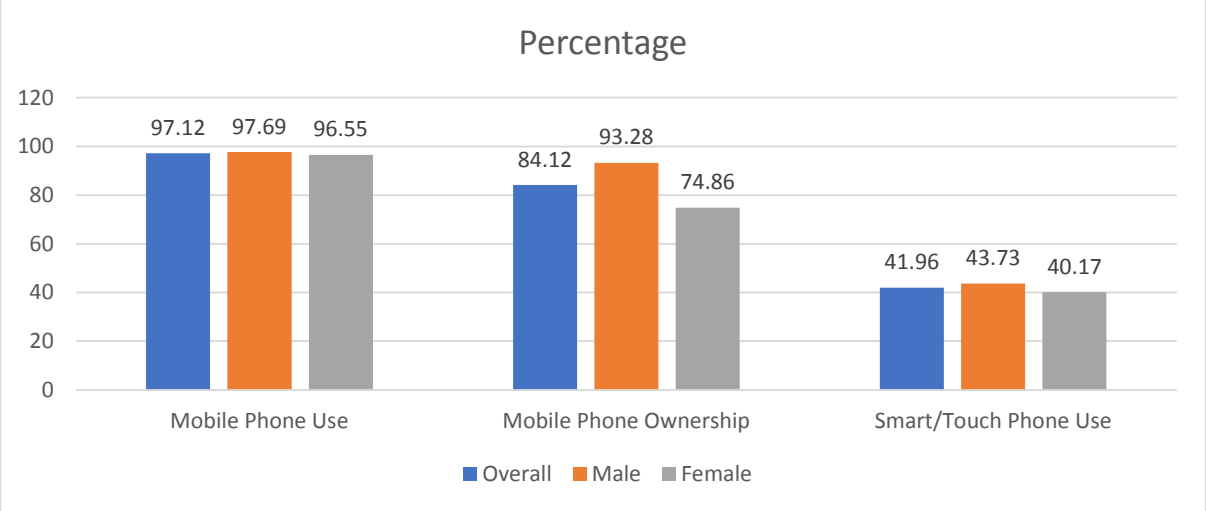
To investigate the nature of digital literacy of the MDAP1s, data were collected on two dimensions: (a) digital access—access to mobile phone, computer, and the internet, and (b) digital skills. For the purpose of this report, we assess two types of digital skills : communications skills and information skills. We present the findings on digital access and digital skills of MDAP1s below:

3.3.1 Digital Access

Overall, mobile phone usage is very high among the MDAP1s. However, women are less likely to own a mobile phone than men. While the mobile phone use is high, the use of internet enabled phones (smartphones or touchphones) and use of internet are low. Use of computers, either at home or somewhere else, is very low.

3.3.1.1 Use of Mobile Phone

Figure 9: Mobile Phone Use and Ownership and Smart/Touchphone Use of MDAP1s



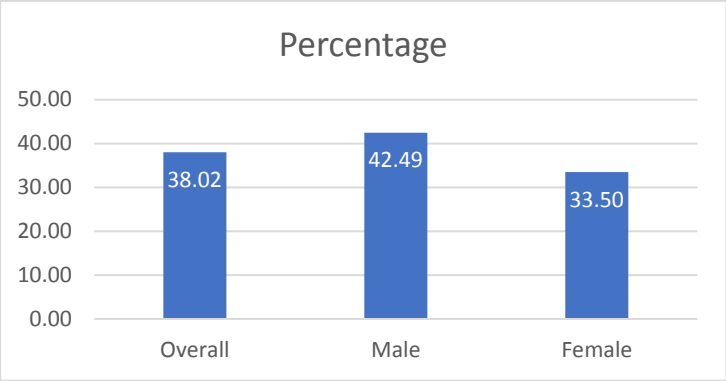
Overall, 97.12% of the MDAP1s are mobile phone users, but 84.12% own a mobile phone. While almost 98% male and 97% female MDAP 1s use mobile phone, when it comes to ownership, male MDAP 1s are more likely (93.28%) to own a mobile phone than the females (74.86%). Overall, the smartphone ownership is low (almost 42%). Male MDAP 1s are more likely (43.73%) to own a smartphone than females (40.17%).

3.3.1.2 Use of Internet

[3] The Daily Star. (2022, July 27). Bangladesh's literacy rate now 74.66%. Retrieved from The Daily Star: https://www.thedailystar.net/youth/education/news/bangladeshs-literacy-rate-now-7466-3080701

Similarly, internet use is also very low (38%) among the MDAP 1s and male MDAP 1s are more likely (42.49%) to use internet than female MDAP 1s (33.50%).

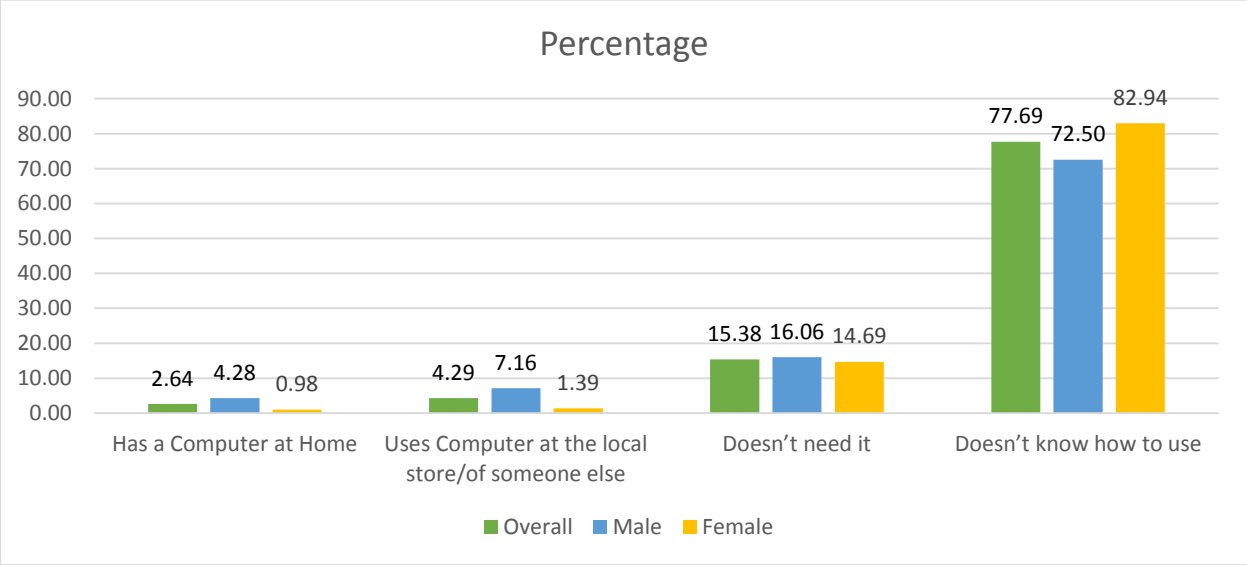
Figure 10: Internet Use of MDAP 1s



3.3.1.3 Use of Computers

Only 2.64% MDAP 1s have a computer at home. 4.29% use computers at the local store or of someone else. In both these cases, male MDAP 1s are more likely to own or use a computer.

Figure 11: Computer Use of MDAP 1s



3.3.2 Digital Skills

We collected data on different aspects of digital skills of MDAP 1s. For the purpose of the report, we categorize the skills into two types. One is communication skills- this denotes the skills required for MDAP 1s to communicate with others using ICT tools; and the other is information skills – it is the set of skills that we use to find specific information using ICT tools. The findings are presented here. Overall, a low to moderate percentage of MDAP 1s have digital skills. They are more likely to be able to communicate than to find specific information using ICT.

3.3.2.1 Communication Skills

The communication skills of MDAP1s extend from moderate to low. MDAP1s are more likely to be able to read messages (67.16%) than to send messages (45.66%) using a mobile phone and are more likely to be able to check emails (17.13%) than send (14.87%). Less than half of the MDAP1s can make a call using internet-based apps (42.26%), and a little over one-fourth are on Facebook (26.41%).

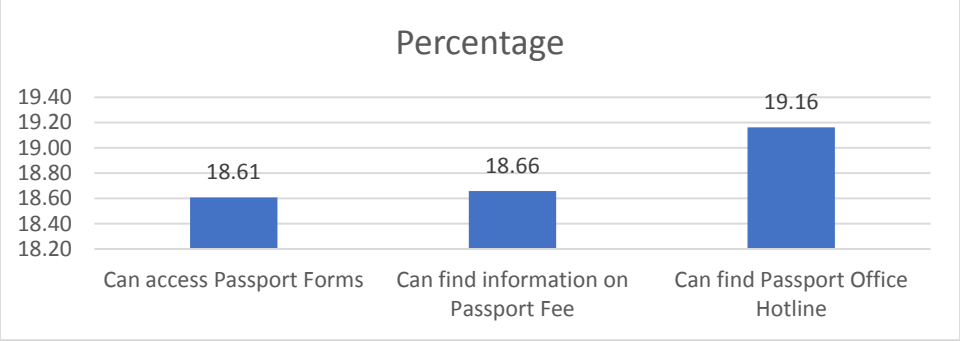
Table 5: Communication Skills of MDAP1s

	Percentage	Frequency
MDAP 1 Can Send Messages	45.66	2714
MDAP 1 Can Read Messages	67.16	3992
MDAP 1 Can Check Emails	17.13	1018
MDAP 1 Can Send Emails	14.87	884
MDAP 1 Can Call Using Apps	42.26	2512
MDAP 1 has Facebook Account	26.41	1570

3.3.2.2 Information Skills

To assess whether the MDAP1s can find specific information using ICT, we asked the MDAP1s to access the passport website of Bangladesh and find some information. Low number of MDAP1s were able to open the passport website and find the information. This indicates that a low percentage of MDAP 1s can use the internet to find information for a specific purpose.

Figure 12: Percentage of MDAP 1s Who Can Find Specific Information Related to Passport From the Internet



Less than one-fifth of the MDAP1s were able to find the passport forms (18.61%), information related to passport fee (18.66%), or the passport office hotline number (19.16%) using the internet.

3.3.3 Examining the Digital Divide

We want to know whether household income has a relation with digital access or digital skills. To examine this, we choose the use of the internet from the components of digital access, the ability to send messages from the communication skills, and a binary variable for information skills. Information skills here have two values: low and high. If MDAP1 could not complete any of the tasks related to finding information about passport or could complete up to two tasks, we categorized that as low level of information skills. If the MDAP1 could complete three tasks, we categorized that as high level of information skills.

Figure 13: Internet Use Across Different Levels of Household Income

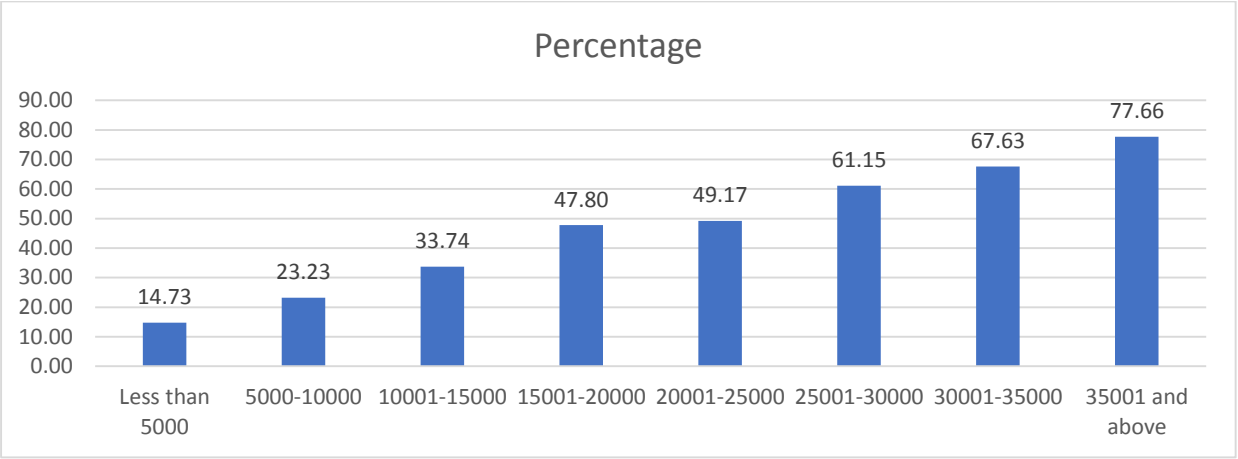
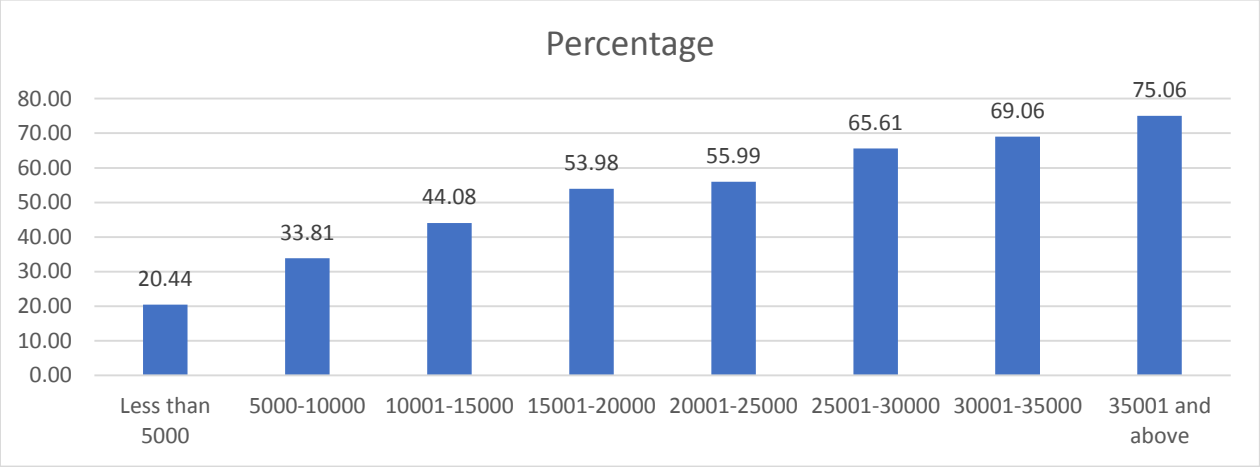
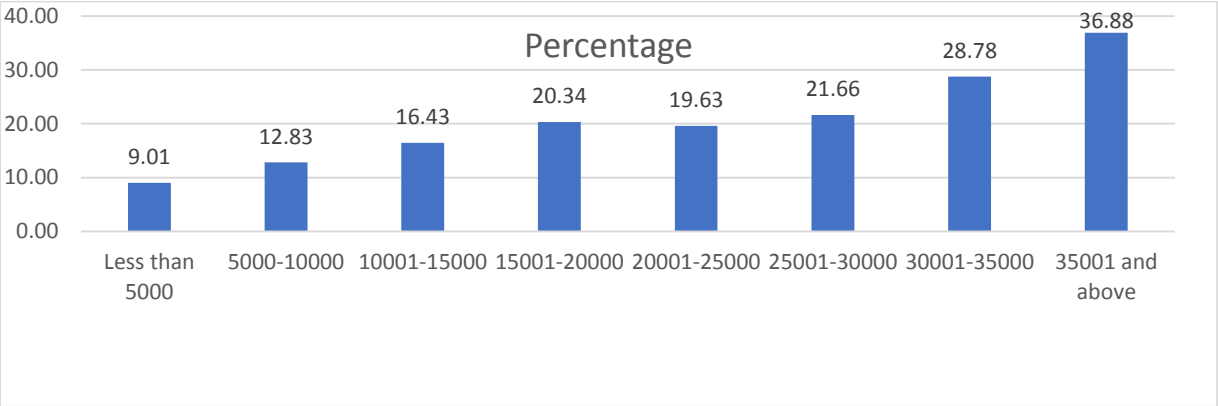


Figure 14: Whether MDAP 1 Can Send Messages Across Different Levels of Household Income



From the data, we find evidence of digital divide across intervals of household income. Richer households are more likely to have access to the internet and have MDAP1s who can send messages.

Figure 15: % of MDAPs with High Information Skills Across Different Levels of Household Income



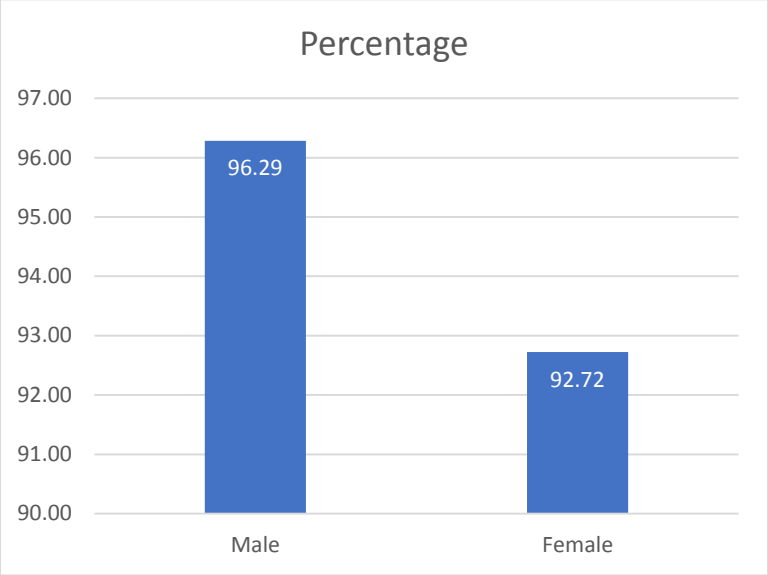
Richer households are also more likely to have an MDAP1 who has high information skills, but overall the share of MDAP1s with high information skills is low in almost all the intervals.

3.4 Digital Services

As mentioned earlier, the success of the government digital services can depend on both—the demand side and the supply side. This survey largely focuses on the demand side—whether the clients have the necessary skills to access the services. The other side is the supply side. It concerns questions including: what is the quality of the services provided and whether the service provider (in this case, it is the government) has done adequate outreach? Assessing the quality of services is beyond the scope of this study but the survey has data on MDAP1s' awareness of government digital services.

Of all the MDAP1s, irrespective of the level of digital literacy, a high percentage are aware of government digital services; males are a little more likely (96.29%) to be aware than females (92.72%). This indicates that the outreach has been effective in creating awareness among the citizens about the government digital services.

Figure 16: Awareness of Government Digital Services



Since we know that a high percentage of the MDAP1s are aware that the government services are provided digitally, we are interested to know what percentage of them are actually using these services digitally when needed? To find the answer we collected data on the services and their use. In the 2019 survey round, we collected data on 44 services. Some of the services did not have significant uptake or were not adequately digitalized. Hence, in 2021, we collected data on 31 services. Because we were collecting data during the COVID-19 pandemic, we included COVID-19 vaccine registration as a service in this survey round. We divided the services related to eight categories: identification, social safety net program, basic utility, education, financial transaction, business, health, and non-essential services.

For the purpose of this report, we have selected the digital services that had an uptake of at least 5% of the sample. The selected services according to their types are:

Table 6: Types of Services that have been selected for this report

Type of the Service	Name of the Service
Identification	Birth Certificate
	Citizenship Certificate
	National ID
Social Safety Net Related	Social Safety Net Allowance
	Old Age Allowance

Basic Utility	Electricity Bill
Education Related	Exam Registration Online
	Checking Results Online
Financial Transaction	Mobile Banking
Health Related	COVID-19 Vaccine Registration
Business Related	N/A
Non-essential	N/A

First, we look at the share of households who use these services irrespective of the mode, digitally or in-person. No business-related or non-essential service had more than 5% uptake. Of the identification services, birth certificate had the highest uptake (24.83%). This is likely because birth registration is essential for many other government services. 18.03% of the households had social safety set allowance recipients and 8.09% of the households had old age allowance recipients. Of all the services, electricity bill payment had the highest uptake (90.39%), followed by COVID-19 vaccine registration (87.30%).

COVID-19 vaccine registration had a higher share of digital users. We included mobile banking as high percentage (73.69%) of the households use this service, although it is not a government service.

The uptake of services, by definition, is determined by the necessity. For example, if a household does not need a passport, they are not going to avail the relevant service. Similarly, if the parents of a child need a birth registration certificate to enroll the child in a school, they are going to apply for it. Hence, we are not interested in what explains the differences in the uptake of services. We are rather interested in how the households availed the services when they needed them.

Of all the services, high shares of those who availed birth certificate registration, national ID registration, checking exam result online, registering for exam online, and COVID-19 vaccine registration services used the digital mode. This indicates that the services have been digitalized completely or significantly to the extent that most of the users are using them digitally. Mobile banking is a completely digital service. For citizenship certificate, social safety net allowance, old age allowance, electricity bill payment - smaller shares of users indicated that they used them digitally. This indicates that either the services have not been adequately digitalized or they offer both digital and manual use of the service.

The services that had an uptake of more than 5% of the respondents are:

Table 7: Data on Selected Services

Name of the Service	Service Users (N)	Service Users as percentage of Sample (%)	Users of Digital Service (N)	Users of Digital Service (%)	Used Digital Service by Themselves (N)	Used Digital Service by Themselves (%)
Birth Certificate	1476	24.83	1434	97.15	8	0.54
Citizenship Certificate	412	6.93	214	51.94	0	0
National ID	628	10.57	561	89.33	8	1.27
Social Safety Net Allowance	1072	18.03	695	64.83	47	4.38
Old Age Allowance	481	8.09	314	65.28	3	0.62
Checking Online Exam Result	790	13.29	785	99.37	520	65.82
Online Exam Registration	341	5.74	329	96.48	106	31.09
Electricity Bill	5373	90.39	2391	44.5	298	5.55
COVID-19 Vaccine Registration	5189	87.30	5126	98.77	506	9.75
Mobile Banking	4380	73.69	N/A	N/A	451	10.3

But what does accessing a service digitally look like? A noteworthy finding is that when we asked the participants how they availed the service, many said that they availed the service digitally but not by themselves. They sought help from an intermediary, for a fee or free. Upon deeper enquiry, we see that even though many use identification or social safety net related services digitally, very few mentioned using it by themselves. For these services, people sought help from intermediaries. In comparison, the other services had higher shares of digital users who used the service by themselves.

For example, 99.51% of the MDAP1s who said that they did the birth registration digitally went to an intermediary. Only 0.49% responded that they did it digitally themselves. This shows that when the respondents say that they availed a service digitally, it does not necessarily imply that

they did it using their own digital literacy or device. In most cases, because they know that the process has been digitalized, they responded that they availed the service digitally.

Table 8: Mode of Accessing Birth Registration

	Intermediary	Respondents Themselves
Manual	97.30	2.70
Digital	99.51	0.49
Don't Know	1.00	0.00

We find it reasonable to assume that it is possible to seek help from an intermediary without any digital literacy as intermediaries generally complete the process from start to the end. Since we are interested in the relationship between digital literacy and access to digital services, we want to see whether having digital literacy results in respondents availing the services digitally by themselves. In order to investigate the relation, we run two sets of regression models. In the first set we include components of digital access as independent variables, and we use the components of digital skills in the second.

We do not run regression for identification and social safety related services since they have very few users who had availed them digitally without an intermediary. Regression models for these services would not give us meaningful results. We run regression for digital services that had at least 5% users who availed them by themselves. By this criteria, the eligible services are: Checking Exam Results Online, Online Exam Registration, Electricity Bill, Covid-19 Vaccine Registration, and Mobile Banking.

3.4.1 Does Digital Access Predict Self-Use of Digital Services?

The dependent variable is binary: the value is 1 if the respondent accessed the service digitally themselves and 0 if they went to an intermediary. Thus we run a linear probability model for each regression. The independent variables are demographic dimensions including age, gender, and education of the MDAP1 and digital access dimensions including digital literacy, ownership of smart phone, access to computer, and the internet. We control for household income.

The equation for the regression is:

$$DigitallyAccessingServicesbyThemselves = \beta_0 + \beta_1 * MDAP1age + \beta_2 * MDAP1gender + \beta_3 * MDAP1education + \beta_4 * SmartPhoneUse + \beta_5 * InternetUse + \beta_6 * ComputerUse + \epsilon$$

The linear probability models are presented in the Annex A 1. We present the models with and without fixed effects next to each other. Originally, when the sampling was done, 20 households were selected from each of the 325 Mauzas. Hence, we cluster the standard error at the Mauza level. We also assume that there might be differences between the districts which might affect the self-use of digital services. In order to account for these differences, we use districts as the fixed effects variable.

In Annex A 1, we can see that using a smartphone was significant at 10% level (without fixed effects) in predicting higher likelihood of digital payment of electricity bill by self and was significant at 5% level (with fixed effects) in predicting higher likelihood for checking exam results online by self, holding other variables constant. For other services, using a smartphone/touchphone does not necessarily indicate that the user is accessing those services digitally by themselves. Internet-use was a better predictor of higher likelihood of self-using exam registration online (significant at 1% level with or without fixed effects), mobile banking (significant at 5% level with fixed effects, at 1% without fixed effects) and COVID-19 vaccine registration (significant at 1% level with or without fixed effects). Computer-use was a good predictor of higher likelihood of digital self-use of electricity bill payment (significant at 1% level with or without fixed effects), mobile banking (significant at 1% level with or without fixed effects), and COVID-19 vaccine registration (significant at 1% level with or without fixed effects). Computer-use was also significant for self-registration of exams online (significant at 10% level with fixed effects, at 5% without fixed effects).

3.4.2 Do Digital Skills Predict Self-use of Digital Services?

For the next set of regression models, we have the same dependent variable—self-use of the government digital service. We run a linear probability model. In this set of regression models, instead of smartphone use, internet use, and computer use, we include sending messages, sending emails, calling using apps, using Facebook as independent variables. All of these are binary variables. We also include a variable named 'Information Skills' – a variable that has discrete values ranging from 0 to 4. We asked the respondents to find the passport website, the form, and passport-related information to assess their information skills. The 'Information Skills' variable in the model takes the number of tasks successfully completed by the respondent. For example, if a respondent successfully completed one task, the value for this variable will be 1, and if they successfully completed 4 tasks, the value for the variable will be 4. We present the results of the regression both with and without the fixed effects. We include district as the fixed effects variable. We also cluster the standard errors at the Mauza level.

The equation for the regression is:

$$DigitallyAccessingServicesbyThemselves = \beta_0 + \beta_1 * MDAP1age + \beta_2 * MDAP1gender + \beta_3 * MDAP1education + \beta_4 * SendingMessages + \beta_5 * SendingEmails + \beta_6 * CallsUsingApps + \beta_7 * FacebookUse + \beta_8 * InformationSkills + \epsilon$$

In Annex A 2, communication skills and information skills could predict the self-use. Keeping everything else constant, MDAP1 who can send email is also more likely to use online services for checking exam results (significant at 5% level in models with or without fixed effects), paying electricity bill, using mobile banking, and registering for COVID-19 vaccine (significant at 1% level in models with or without fixed effects) by themselves. The ability to make calls using apps is positively associated with checking exam results online by themselves (significant at 1% level in both models). Facebook use is associated with higher likelihood of using digital services for checking exam results online, paying electricity bill, and registering for COVID-19 vaccine and using mobile banking by themselves. In case of information skills, MDAP1 who was able to complete more tasks successfully was more likely to use education related services and mobile banking and COVID-19 vaccine registration online by themselves. In case of electricity bill payment, it was associated with a higher likelihood of self-use significantly with the fixed effects but was not significant anymore without the fixed effects.

Only the ability to send messages was negatively associated with the likelihood of checking exam results online and using mobile banking by themselves, holding everything else constant. Hence, we make contingency tables to further investigate. In case of both these services, we see that despite having a negative sign in the regression results, those who can send messages are more likely to check results online by themselves. It is possible that coefficients are picking up negative signs because of bias in the models.

Table 9: Contingency Table of Sending Messages with Checking Result Online and Mobile Banking

Check Result Online			
		Intermediary	**Self-Use**
Send Messages	No	89	92
	Yes	181	428
Mobile Banking			
		Intermediary	**Self-Use**
Send Messages	No	2017	82
	Yes	1912	369

3.4.3 The relation between digital literacy and self-use of selected services

Overall, for the identification and social safety related services, the number of users who availed the services without an intermediary is so small that we could run regression for these

services. It does not matter whether they have digital access and digital skills. Regardless of the MDAP 1's digital access and digital skills, most of the households use an intermediary to avail the services.

Name of the Service	Service Users (N)	Used Digital Service by Themselves (N)	Used Digital Service by Themselves (%)
Birth Certificate	1476	8	0.54
Nationality Certificate	412	0	0
National ID	628	8	1.27
Social Safety Net Allowance	1072	47	4.38
Old Age Allowance	481	3	0.62

Of the services that higher self-users, the education related services had a higher share in comparison to other services. While many respondents took help from the intermediaries for electricity bill payment, mobile banking, and COVID-19 vaccine registration; high number of respondents used the services by themselves as well. Different components of digital access and digital skills had positive correlations with self-use of these services. This shows that some dimensions of digital access and digital skills can predict the self-use of such services.

To further investigate the relation between digital literacy and self-using the digital services, we create some contingency tables (Annex A 3 and Annex A 4). In Annex A 3, we can see that the MDAP1s with digital access and more digital skills are more likely to use the services like checking exam results online or COVID-19 vaccine registration by themselves; but digital access or more digital skills do not make a meaningful difference in the self-use of social safety net registration. In Annex A 4, we can see that those who could register for COVID-19 vaccine digitally were also more likely to be able to self-use education related services, bill pay, and mobile banking. Very low share of people who registered for COVID-19 vaccines by themselves self-used the identification or social safety related services. All these lead us to the question- are there differences in the nature of digital services for identification or social safety net related services and services like checking exam results online or COVID-19 vaccine registration? It is plausible that the latter are more user friendly or easier to administer by self in comparison to the former – which is leading to the citizens leaning towards intermediaries for help.

3.5 Most Used Modes of Accessing the Service

In the following table, we list the modes of accessing the service used by most respondents. We intentionally do not include the modes with low frequencies. We find a clear distinction in the modes between identification and social safety net related services and the rest of the service. For the identification and social safety net related services, most respondents go to the Union Digital Center (UDC) or Union Parishad (UP). For the education related services, high shares of respondents did it by themselves or asked for help from a neighbour or relative; the rest went to the local computer or mobile shop. For paying the electricity bill, most respondents went to the bank, and most of the rest went to a shop in the local marketplace that offers this service. It makes sense since the service is offered both manually and digitally. For mobile banking and COVID-19 vaccine registration, most people went to shops in the market that offered the service including local computer or mobile shops. For both these services, a notable share of the respondents also were also self-user or took help from a neighbour or a relative.

Table 10: Most Popular Modes of Accessing the Services

Name of the Service	Mode of Accessing the Service	Percentage of Respondents
Birth Certificate	Union Digital Center/Computer operator at Chairman's office	59.01
	Union Parishad	34.76
Citizenship Certificate	Union Digital Center/Computer operator at Chairman's office	25.49
	Union Parishad	71.36
National ID	Union Digital Center/Computer operator at Chairman's office	38.06
	Union Parishad	29.62
	Others	14.65
	Individual who provides the service for free	9.87
Social Safety Net Allowance	Union Digital Center/Computer operator at Chairman's office	6.81
	Union Parishad	40.02
	Others	18.38

	Individual who provides the service for free	16.04
Old-Age Allowance	Union Digital Center/Computer operator at Chairman's office	17.67
	Union Parishad	65.07
Checking online exam result	Self-Use of the Service	65.82
	Relative or Neighbour did it digitally	12.28
	Local computer/mobile shop	14.56
Online Exam Registration	Self-Use of the Service	31.09
	Local computer/mobile shop	38.12
	Others	20.23
Electricity Bill	Bank	39.79
	Shop in the local marketplace	26.09
	Others	11.91
Mobile Banking	Shop in the local marketplace	59.91
	Local computer/mobile shop	16.48
	Self-Use of the Service	10.30
COVID-19 Vaccine Registration	Local computer/mobile shop	56.02
	Shop in the local marketplace	9.81
	Self-Use of the Service	9.75
	Relative or Neighbour did it digitally	9.44

4 Comparison between 2019 and 2021

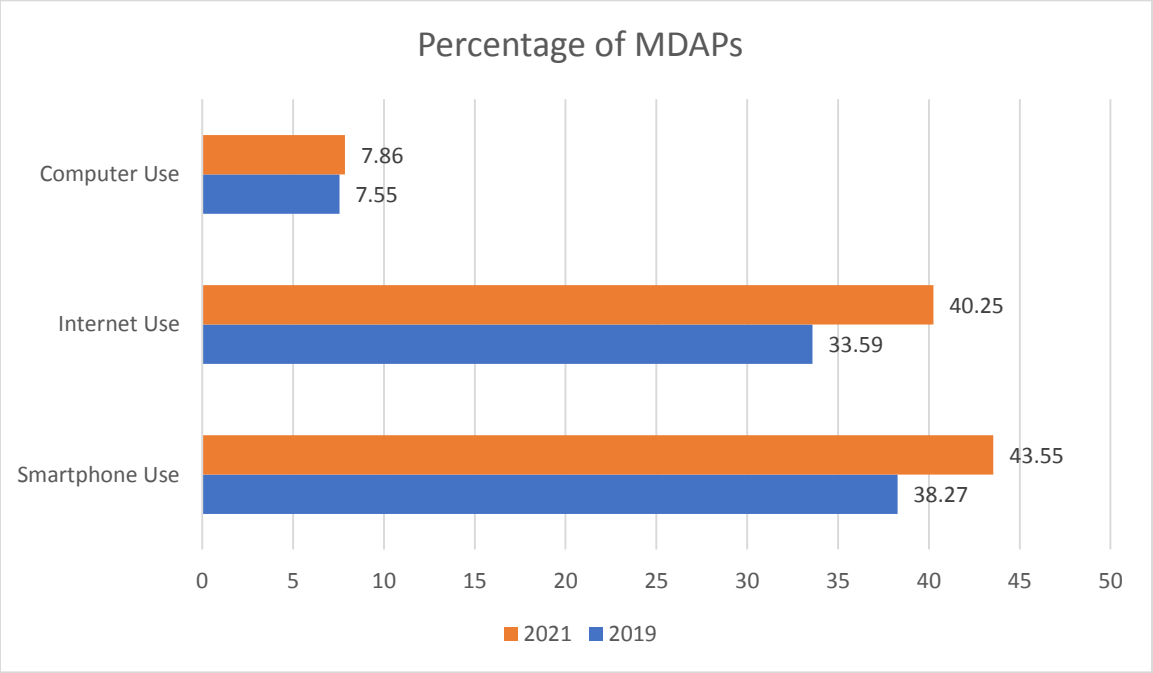
4.1 Digital Literacy Comparison

In this section, we are presenting a comparison of digital access and digital skills of the MDAP1s between 2019 and 2021. Since all MDAPs from 2019 were not available in the 2021 survey, we filtered the 4147 MDAPs who were present in both rounds. We tried to see whether there was any change in their access and skills over time.

We present the comparison for the use of smartphone, internet, and computer to show the changes in access to digital devices and internet connectivity. We also include the ability to send messages and emails to capture the changes in communication skills. We also present the comparison of high information skills (whether the MDAP can perform all three tasks related to finding information about passport).

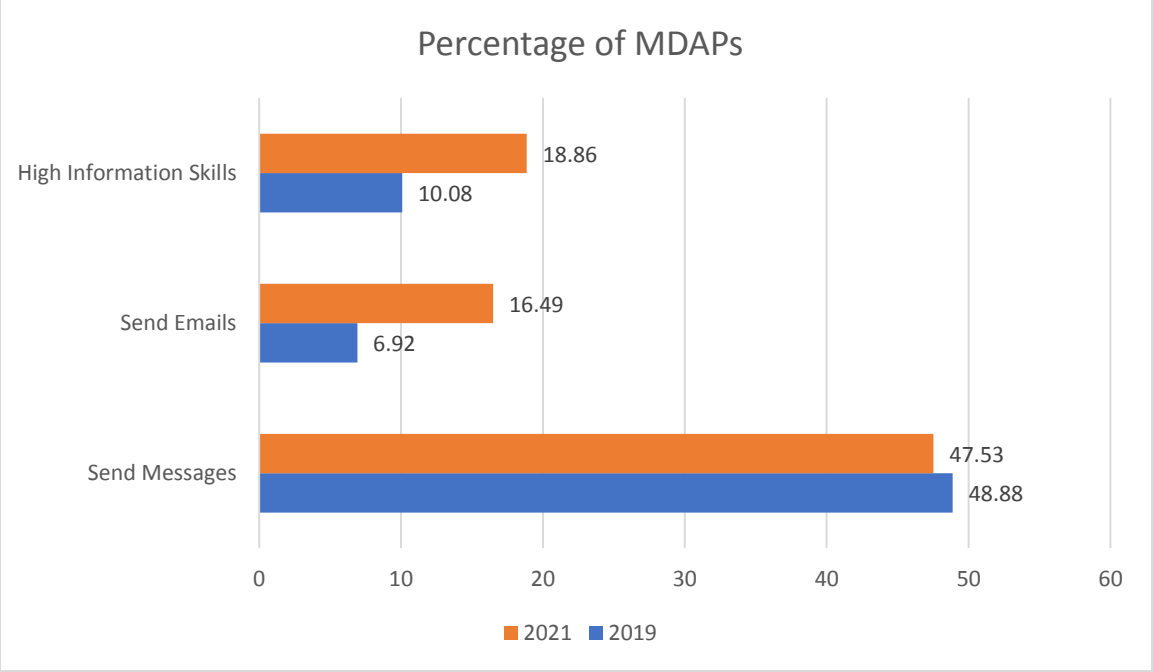
However, we do not include the ability to call using apps and use of Facebook as these variables do not exist in both rounds. In 2019, the MDAPs were asked if they could make video calls using apps like facetime or skype, and in 2021, they were asked if they could make calls using apps like WhatsApp. Similarly, in 2019, the survey asked if the MDAPs use social media like Facebook, WhatsApp, Viber, or Imo; and in 2021, the survey asked if they used Facebook. These variables seem similar but they both do not measure the same thing. Since we do not include these variables.

Figure 17: Comparison of Digital Access in 2019 and 2021



From the comparison, we can see that the use of smartphone and internet increased considerably from 2019 to 2021. The use of computer remained almost the same.

Figure 18: Comparison of Digital Skills in 2019 and 2021



The ability to send emails and find information from the passport website also increased notably. The only decrease was in the ability in sending messages. It is not clear why some MDAPs reported that they could send messages in 2019 but reported that the couldn't in 2021. The question to determine whether the MDAP can send messages was phrased and operationalized differently in 2019 and 2021. That may have contributed to such an outcome.

4.2 Panel Regression of Selected Services: Does Digital Literacy Predict Self-Use of Digital Services Across Two Rounds?

We want to run a panel regression with self-use of digital services as the dependent variable and components of digital access and skills as independent variables. In order to do that we need to find out how many households required a service in both 2019 and 2021. Since we already selected 10 services from the 2021 survey for the linear probability model, we checked how many of the households required those services in 2019 as well. We dropped COVID-19 vaccine registration as this was not relevant in 2019. Of the other 9 services, four had at least 300 users: birth registration, checking exam result online, mobile banking, and electricity bill payment.

Table 11: Households that used the services in both 2019 and 2021

	Required the Service in both 2019 and 2021

Birth Registration	334
National ID	13
Citizenship Certificate	79
Social Safety Net	105
Old Age Allowance	79
Electricity Bill	3993
Exam Result Online	307
Exam Registration Online	44
Mobile Banking	1700

The equation for the regression is:

$$DigitallyAccessingServicesbyThemselves_{it} = \beta_0 + \beta_1 * SmartphoneUse_{it} + \beta_2 * InternetUse_{it} + \beta_3 * ComputerUse_{it} + \beta_4 * SendingMessages_{it} + \beta_5 * SendingEmails_{it} + \beta_6 * InformationSkills_{it} + \epsilon_{it}$$

We form the panel data frame using the 4147 households in which the same MDAP was present in both the 2019 and 2021 rounds of the survey. In the model, $i = 1, 2, 3 \ldots, 4147$ and t refers to the two time periods of 2019 and 2021. We use fixed effects to capture the variance between the households. The regression allows the independent variables to explain the variance within households over time.

Table 12: Panel Regression with Self-Use of Mobile Banking, Electricity Bill Payment, Birth Registration, and Checking Exam Result Online as Dependent Variables

	Mobile Banking	Electricity Bill Payment	Checking Exam Result Online	Birth Registration
Smartphone Use	-0.045	-0.008	0.121	0.003
	0.034	0.014	0.099	0.019
Internet Use	0.032	-0.002	0.395 ***	-0.003
	0.035	0.015	0.113	0.020
Computer Use	-0.057 *	0.064 ***	-0.149 **	0.003
	0.034	0.018	0.062	0.021
Sending Messages	-0.031	-0.006	-0.052	0.031
	0.033	0.013	0.179	0.019
Sending Emails	0.173 ***	0.075 ***	0.156 ***	-0.020
	0.029	0.014	0.058	0.018
Information Skills	0.011	0.009 **	0.020	-0.003
	0.009	0.004	0.021	0.005
Fixed Effects	Household	Household	Household	Household
Number of Observations	4526	6701	1167	1785

Note: *,,*** indicate significance at the 10%, 5%, and 1% level respectively.**

We found using a computer negatively correlated with mobile banking and checking exam results online and positively correlated with electricity bill payment across two rounds. The overall number of computer users is very low in the sample and hence it is difficult to draw serious conclusion from the coefficients.

The variance in mobile banking uses over time is explained by the ability to send emails (significant at 1% level). The variance within electricity bill payment is associated with sending emails (significant at 1% level) and information skills (significant at 5% level). The variance in checking exam result online is positively associated with internet use (significant at 1% level) and sending emails (significant at 1% level).

The variance in availing birth registration is not significantly correlated with any variable.

From the analysis, we can see that sending email consistently predicts more digital self-use of online services over time. This makes sense as we can reasonably assume that sending email requires a higher order skill than that is needed to send messages. What this means is that households in which MDAPs picked up the skill of sending an email were more likely to transition into self-use of the online services.

5 Discussion on the Findings

Based on the findings shared so far, we have few a broad themes:

a) In the 2021 round of the survey, we had almost equal numbers of male and female MDAP1s. The MDAP1s had high access to mobile phones, but moderate to low access to internet-enables phones and internet. Female MDAP1s were less likely own a mobile phone, smartphone, or to have access to internet or computers.
b) Moderate to low shares of MDAP1s had ICT-based communication skills and a low share of MDAP1s had skills needed to find specific information from the internet.
c) The percentage of access to smartphone and internet increased from 2019 to 2021 among the MDAPs who were present in both rounds of the survey. So did their ability to send emails and find information from the internet. This means that the MDAPs present in both rounds were more likely to gain more access and skills over time. The social distancing measures including the lockdowns due to COVID-19 may have contributed to this change.
d) Of the three identification and two social safety net services that had uptake of 5% or more, birth registration and national ID registration seem completely or adequately digital as very high share of respondents reported that they availed the service through digital means. Availing nationality certificate, social safety net allowance, and old age allowance had relatively lower share of respondents who reported that the process was digital.
e) In case of identification and social safety net related services, very low share of respondents reported that they availed the services digitally by themselves. If the services are not adequately digital yet, it is not clear what the participants meant when they reported self-use. Perhaps, they completed the digital processes by themselves that were available to them and completed the rest of it using non-digital means or by going to an intermediary.
f) Having more digital literacy does not mean that a respondent would use the identification and social safety related services by themselves: digital access or digital skills made little to no difference. Even very high share of the respondents who could register for COVID-19 vaccine themselves, went to an intermediary to avail these services. This could mean several things, for example, lack of knowledge about the existence of the services and the inability to use those services because of complex, unintuitive desing of the online services, etc.
g) For identification and social safety net related services, most people went to the Union Digital Centre (UDC) or the Union Parishad (UP), which is a different from the choice of intermediary for the rest of the services. This indicates that these services require some form of non-digital transaction that can be done at the UDC or UP. Hence, people go to these places to avail these services instead of trying on their own.
h) Electricity bill payment is something that most respondents do. Payment of the bill can be done both through bank or by self-use of digital means. Most respondents go to bank

to pay the bills. Some components of digital literacy were significant predictors for paying the bill digitally by the users themselves. From separate models we saw that those who use computers, can send emails, or use Facebook are more likely to pay the bills digitally by themselves. If they are not going to bank or are not doing it by themselves, mostly they go to local shops and pay the bills there – even if they have some degree of digital literacy.

i) Most respondents checked their exam result online by themselves. Using internet, sending emails, making calls using apps, using Facebook, and higher information skills meant that the respondent is more likely to do it by themselves. Others took help of neighbours or relatives or went to a local computer or mobile shop. In comparison, registering for exams online had fewer self-users, although still noteworthy. It may be the case that registering for exam online involves a more sophisticated process than checking exam results online. Using a computer or more information skills were associated with a higher likelihood of registering on their own. Most respondents chose to go to a local computer or mobile shop for this service, even if they had some degree of digital literacy.

j) Mobile banking is a private service that has very high uptake. Most people go to local computer/mobile shops or other shops at the local marketplace that offer the service. It still had a noteworthy share of respondents who availed the service by themselves. Using internet or computer, sending emails, using Facebook, more information skills were associated with a higher likelihood of using the service by themselves.

k) In this round of survey, we included COVID-19 vaccine registration as a service. A very high share of the households registered for the service. Majority of the households registered by going to local shops. But a notable share registered by themselves or took help from a neighbour or relative. If the MDAP1 had access to the internet or computer, or could send emails, use Facebook, had more information skills, that household was more likely to register by themselves.

5.1 What do the findings mean for government digital services in general?

We have developed a framework for identifying the conditions that determine the outcomes in terms of whether and how the MDP1s may use the digital services (Table 21).

Table 13:MDAP 1 Action as a Result of the Requirement of Intermediary and Digital Literacy of MDAP 1

	Digital Literacy of MDAP1	
Requires Intermediary Engagement (Eg. Physical copies of documents, Verification, In-person Delivery, etc.)	**Moderate to High Digital Literacy**	**Low to No Digital Literacy**
Yes	MDAP1 goes to a formal intermediary (Eg. UDC, UP)	MDAP1 is likely to go to a formal intermediary (Eg. UDC, UP)

No	MDAP1 is likely to use the service by themselves	MDAP1 is likely to go to an informal intermediary (Eg. local shops, neighbours, relatives)
No, but the Final Deliverable Needs to be a Physical Copy (Eg. A Printed Document)	MDAP 1 may use it themselves or may go an informal intermediary with printing service	MDAP1 is likely to go to an informal intermediary with printing service

We can consider the identification and social safety net related services that we examined in this report as cases of government services that have not completely or adequately transitioned to digital services i.e, they require some form of intermediary engagement. This can include but not be limited to submission of physical copies of documents, verification of documents through manual means, non-digital transaction of money, non-digital or in-person delivery of the service or the document, etc. Such government services are likely to include local government in the process.

The education related services, electricity bill payment, mobile banking, and COVID-19 vaccine registration can be considered as cases of services that do not require the involvement of an intermediary by design. These services can be availed completely digitally.

In terms of digital literacy, we assume that having a smartphone, or being able to perform basic operations like sending a message or making calls using apps require low levels of digital literacy. We assume having access to internet or computers, being able to use internet based applications like sending emails, using Facebook or finding information related to passport from the internet require moderate to high degree of digital literacy.

Based on this classification, from the table above, we can see that if the services require some form of engagement of a formal intermediary like local government office, people are more likely to go to that formal intermediary instead of trying to complete the digital processes by themselves, regardless of the level of their digital literacy. As we saw from our findings, even if the MDAP 1s had access to internet or computers or were able to use internet based applications, the household members chose to go to the formal intermediary like UDC or UP. If the service does not require an intermediary by design at all, it boils down to the digital literacy of the MDAP 1. If the MDAP 1 has moderate to high digital literacy, they would use the service by themselves. If the MDAP 1 has no to low digital literacy, they are more likely to go to an informal intermediary like local shops or neighbours or relatives. We saw in our findings that smartphone ownership, sending messages, or making calls using apps were not as often associated with higher likelihood of using a service on one's own. Low levels of digital literacy may lead to self-use of some services that are not very sophisticated. But for most services, moderate to high levels of digital literacy are more likely to be associated with self-use. We account for another angle in the table – even if the service does not require any involvement of an intermediary, a print of the final deliverable may be required. In such cases MDAP 1s with low digital literacy will be more likely to go to a formal intermediary with printing service. MDAP 1s with moderate to high levels of digital literacy may complete the process by

themselves and print it later or if they have to go to a printing shop anyway, may choose to get the service from the printing shop they offer it.

6 Conclusion

Given the moderate to low digital access and communication skills and low information skills, the formal and informal intermediaries are playing an instrumental role in connecting the citizens to the government services. However, services that completely transitioned into a digital form and do not require any intermediary saw higher share of its users using them on their own. Because some essential services have not transitioned completely yet, we are not realizing the benefits of the existing levels of digital literacy to the fullest. There is a lot of scope for growth to facilitate access to internet and skills to use internet in the rural Bangladesh. It is also important to note that, there is a lot of room for growth for designing the services in a way that someone with moderate to high level of digital literacy can access those services directly.

References

Bangladesh Bureau of Statistics (BBS). (2017). *Household Income and Expenditure Survey 2016.* Government of the People's Republic of Bangladesh.

The Daily Star. (2022, July 27). *Bangladesh's literacy rate now 74.66%*. Retrieved from The Daily Star: https://www.thedailystar.net/youth/education/news/bangladeshs-literacy-rate-now-7466-3080701

The Daily Star. (2022, July 14). *Many digital services exist just in name: Finds a govt study*. Retrieved from The Daily Star: https://www.thedailystar.net/news/bangladesh/news/many-digital-services-exist-just-name-3069566

Annex A

Annex A 1: Linear Probability Model with Self-Use of Exam Registration Online, Checking Exam Results Online, Electricity Bill, Mobile Banking, and COVID-19 Vaccine Registration as Dependent Variables with Digital Access as Independent Variables

	Exam Registration Online	**Exam Registration Online**	**Checking Exam Results Online**	**Checking Exam Results Online**	**Electricity Bill**	**Electricity Bill**	**Mobile Banking**	**Mobile Banking**	**COVID-19 Vaccine Registration**	**COVID-19 Vaccine Registration**
Control Variables (MDAP 1 Age, Gender, Education, Household Income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Smartphone Use	**0.212 ****	0.082	0.058	0.074	0.021	**0.021 ***	-0.002	0.007	-0.014	-0.0002
	(0.095)	(0.118)	(0.089)	(0.086)	(0.013)	(0.013)	(0.024)	(0.024)	(0.02)	(0.02)
Internet Use	-0.033	0.087	**0.270 *****	**0.288 *****	0.018	0.019	**0.062 ****	**0.075 *****	**0.078 *****	**0.077 *****
	(0.128)	(0.12)	(0.092)	(0.087)	(0.013)	(0.013)	(0.025)	(0.024)	(0.021)	(0.02)
Computer Use	**0.204 ***	**0.189 ****	0.006	-0.009	**0.092 *****	**0.093 *****	**0.105 *****	**0.096 *****	**0.165 *****	**0.167 *****
	(0.122)	(0.09)	(0.051)	(0.05)	(0.028)	(0.028)	(0.035)	(0.036)	(0.032)	(0.032)

Fixed Effects	**District**	**None**	**District**	**None**	**District**	**None**	**District**	**None**	**District**	**None**
Number of Observations	211	211	531	531	4169	4169	3310	3310	3998	3998
In all regressions, Standard Errors were clustered at the Mauza level. Results are presented with and without fixed effects. Coefficients are presented next to the variables. The row below contains the standard errors.										
Note: *,,*** indicate significance at the 10%, 5%, and 1% level respectively.**										

Annex A 2: Linear Probability Model with Self-Use of Exam Registration Online, Checking Exam Results Online, Electricity Bill, Mobile Banking, and COVID-19 Vaccine Registration as Dependent Variables with Digital Skills as Independent Variables

	Exam Registration Online	**Exam Registration Online**	**Checking Exam Result Online**	**Checking Exam Result Online**	**Electricity Bill**	**Electricity Bill**	**Mobile Banking**	**Mobile Banking**	**COVID-19 Vaccine Registration**	**COVID-19 Vaccine Registration**
Control Variables (MDAP 1 Age, Gender, Education, Household Income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sending Messages	-0.015	-0.020	**-0.232 *****	**-0.185 *****	0.0003	0.0005	**-0.021 ***	-0.018	-0.014	-0.010
	(0.135)	(0.118)	(0.067)	(0.065)	(0.008)	(0.008)	(0.011)	(0.011)	(0.009)	(0.009)
Sending Emails	0.029	0.071	**0.111 ****	**0.106 ****	**0.095 *****	**0.100 *****	**0.121 *****	**0.118 *****	**0.148 *****	**0.151 *****
	(0.088)	(0.071)	(0.048)	(0.048)	(0.015)	(0.016)	(0.019)	(0.019)	(0.019)	(0.019)
Calls Using Apps	-0.041	0.003	**0.219 *****	**0.204 *****	0.0009	0.001	0.005	**0.023 ****	-0.0005	0.012
	(0.081)	(0.073)	(0.061)	(0.06)	(0.009)	(0.009)	(0.011)	(0.011)	(0.01)	(0.01)
Facebook Use	0.034	0.050	**0.102 ***	**0.132 ****	**0.025 ****	**0.025 ****	**0.031 ****	**0.027 ***	**0.060 *****	**0.059 *****
	(0.082)	(0.069)	(0.056)	(0.056)	(0.01)	(0.01)	(0.015)	(0.015)	(0.015)	(0.015)

Information Skills	**0.072 *****	**0.050 *****	**0.029 ** **	**0.027 ** **	**0.007 * **	0.006	**0.021 *****	**0.023 *****	**0.021 *****	**0.020 *****
	(0.023)	(0.017)	(0.012)	(0.011)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Fixed Effects	**District**	**None**	**District**	**None**	**District**	**None**	**District**	**None**	**District**	**None**
Number of Observations	341	341	790	790	5373	5373	4380	4380	5189	5189
In all regressions, Standard Errors were clustered at the Mauza level. Results are presented with and without fixed effects. Coefficients are presented next to the variables. The row below contains the standard errors.										
Note: *,,*** indicate significance at the 10%, 5%, and 1% level respectively.**										

Annex A 3: Contingency Table with Checking Exam Result Online, COVID-19 Vaccine Registration, and Social Safety Net Related Services with Digital Literacy Variables

	Checking Exam Result Online		**COVID-19 Vaccine Registration**		**Social Safety Net**	
	Owns a Smartphone?					
	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)
Self-Use	44.29	78.21	4.31	16.5	3.80	4.98
	Uses Internet?					
	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)
Self-Use	41.10	76.35	3.99	18.69	3.54	6.01
	Uses Computer?					
	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)
Self-Use	61.05	80.20	7.12	41.56	4.519	1.852
	Can Send Messages?					
	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)
Self-Use	50.83	70.28	3.85	16.56	3.583	5.459
	Can Send Emails?					
	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)

Self-Use	51.11	81.46	5.33	33.33	4.40	4.24
	Can Make Calls Using Apps?					
	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)
Self-Use	41.09	74.32	3.91	17.42	3.57	5.75
	Can Use Facebook?					
	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)
Self-Use	44.92	78.97	4.41	23.89	4.00	5.65

To further investigate the relation between digital literacy and self-using the digital services, we create contingency tables (**Error! Reference source not found.**) with the variables of digital literacy and three services. We choose checking exam results online and COVID-19 vaccine registration because they had very high share of digital users (99.37% and 98.77% respectively); checking exam results online had the highest share of users who used the service by themselves (65.82%, n=520), and COVID-19 vaccine registration also had a notable share of self-users (9.75%, n=506). From identification and social services, we choose social safety net as it had a higher share of self-users (4.48%, n=47) compared to the other 4 services.

From the table, we can see that, in case of checking exam result online and COVID-19 vaccine registration- respondents who had digital access or communication skills had a higher share of using the services by themselves than those who did not have the access or the skills. The difference is also notable. However, when it comes to social safety net, the respondents with access or skills did not always have higher shares of self-user. In fact, among respondents who can use computers and send emails, a lower share of self-use was observed. For other services, users with access or skills had a higher share of self-users by a very small margin. This means that users with more access or skills are not necessarily using the service more by themselves. This is consistent with the findings from the regression.

Annex A 4: Contingency Table with COVID-19 Vaccine Registration with Other Services

Share of Self-Users of COVID-19 Vaccine Registration in Self-Use of Other Services (Percentage)			
Birth Registration Self-Use	1.79	Online Exam Registration Self-Use	62.14
National ID Self-Use	5.31	Checking Exam Result Online Self-Use	90.31
Social Safety Net Self-Use	3.22	Electricity Bill Self-Use	26.93
Old Age Allowance Self-Use	2.32	Mobile Banking Self-Use	40.09

We choose self-use of COVID-19 vaccine registration as it was accessed digitally by almost everyone, had an overall high uptake, and notable share of self-users and create contingency tables with self-use of other services. This will help us to observe if respondents who are registering for the vaccine by themselves are also accessing other services by themselves.

A high share (90.31%) of self-users of COVID-19 vaccine registration could avail checking exam results online service by themselves as well. Low to moderate share of the vaccine registration self-users paid electricity bill (26.93%), used mobile banking (40.09%), and registered for exam online (62.14%) by themselves. However, we find that a very low share (ranging from 1.79% to 5.31% depending on the service) of respondents who could register for COVID-19 vaccine on their own could avail the identification and social safety net related services by themselves.