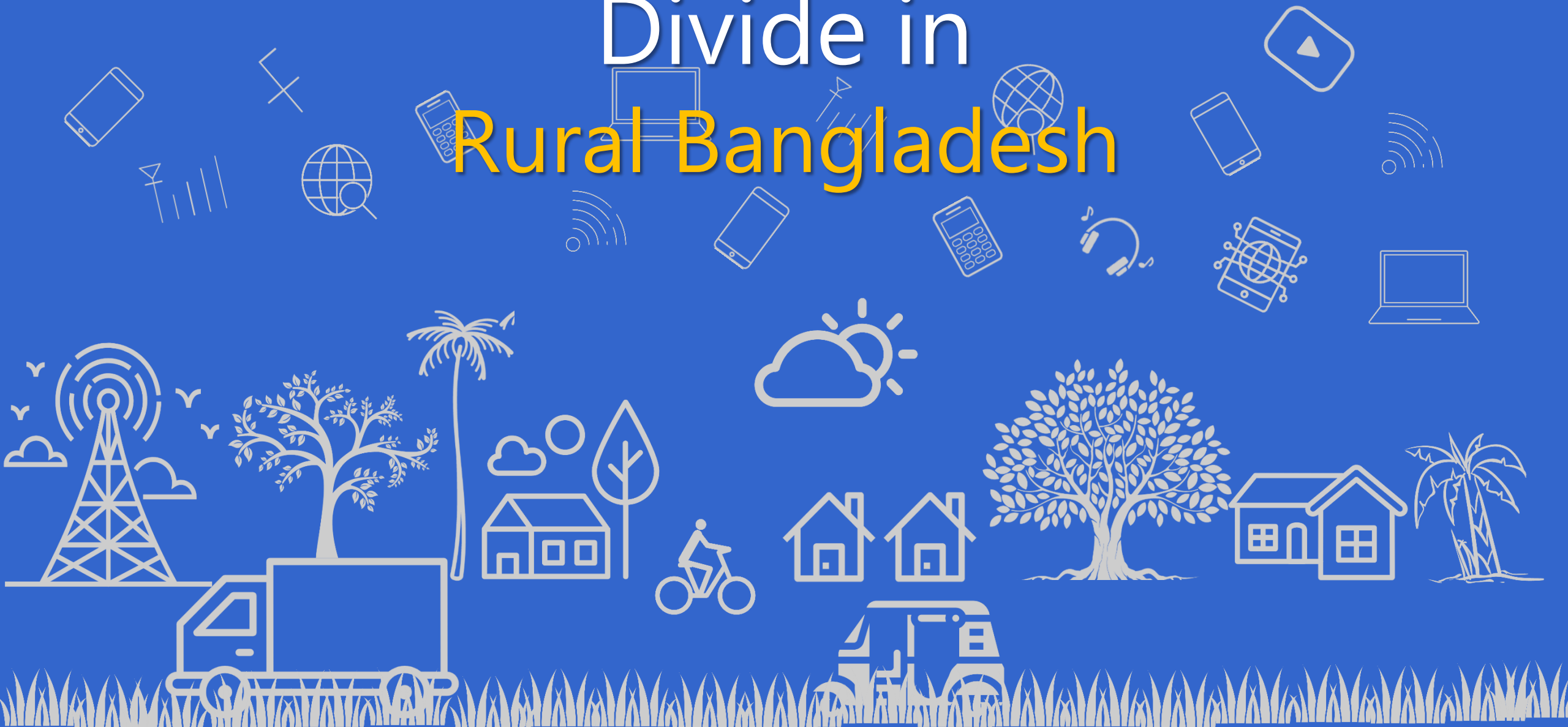
First and Second Level Digital Divide in Rural Bangladesh



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Presentation Outline

- Levels of digital divide
- Background
- Rationale of the Study
- Research Objective
- Digital Divide: A Conceptual Framework
- Data and Methodology
- Mode of Analysis
- Findings
- Conclusion and Policy Recommendations

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Understanding Digital Divide

First-level digital divide	Second-level digital divide
DIFFERENCES IN INDIVIDUALS' ACCESS TO INTERNET INFRASTRUCTURE	DIFFERENCES IN ONLINE SKILLS AND INTERNET USAGE PATTERNS

Source: Newhagen & Bucy, 2005; Dimaggio *et al.*, 2004; Katz & Rice, 2002; Nicole & Eszter, 2009)

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Background: Internet in Bangladesh

- **Only 0.4%** of Bangladesh's population used the internet in 2018
- Reached **3.5%** in 2011
- **103.25 million** internet subscription by 2020
- Mainly fuelled by significant decline in the costs of **internet enabled handsets** and **internet service usage**
- **Broadband internet** limited in big cities and gradually expanding to district and Upazilla levels.

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Background: Internet in Rural Areas

- Since 2011, steady and impressive growth in rural Bangladesh
- Advent of 3G (2013) & 4G (2018)
- **Pro-rural government policies** for benefitting the rural people:
  - Implementation of **5,275 Community Information Centres** (CICs),
  - Digitization of local government institutes (LGIs) and public services
  - Introducing ICTs in education, healthcare services, and NGO initiatives.

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Background: Digital Divide

- **74%** of Bangladesh population aged 15-65 have access to mobile phones, **highest among the Asian countries**
- But the **lowest internet use - only 13%** of the population, but **33% among 15-65 group**.
- Strong gender gap in both the internet and computer usage and mobile access as well
  - Gender gap in internet use **62%**
  - Gender gap in mobile phone ownership **34%**

- *Survey findings by LIRNEasia (After Access survey 2018)*

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Background: Digital Divide

- Despite strong growth in internet access, the rural-urban digital divide remains unambiguous
- Large rural-urban gap in internet use with **rural dwellers lagging behind by 38%** compared to urban counterpart *(LIRNEasia, 2018)*
- The gap is more about skills and usages (second-level) than about access (first-level)
- Rural-urban digital divide causes uneven economic and social development impact (*Brixiova, 2009)*

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Rationale of the Study

- Digital divide can create and intensify social, gender, and regional **inequalities**
- **How to reduce/eliminate the digital disparities** for equitable socio-economic development is a major challenge for policymakers, practitioners, and academicians.
- **Research Gap on first- and second-level digital divides**, especially rural Bangladesh context, particularly how they vary by socioeconomic status, gender and geography, etc.
- This study provide **comprehensive assessment of digital divide in rural Bangladesh** to aid policymakers and practitioners to reducing the gaps in digital divide and ensuring the e-inclusion in rural Bangladesh

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Research Objective

Micro-level internet study, exploring what factors contribute to the first- and second-level digital divide in rural Bangladesh.

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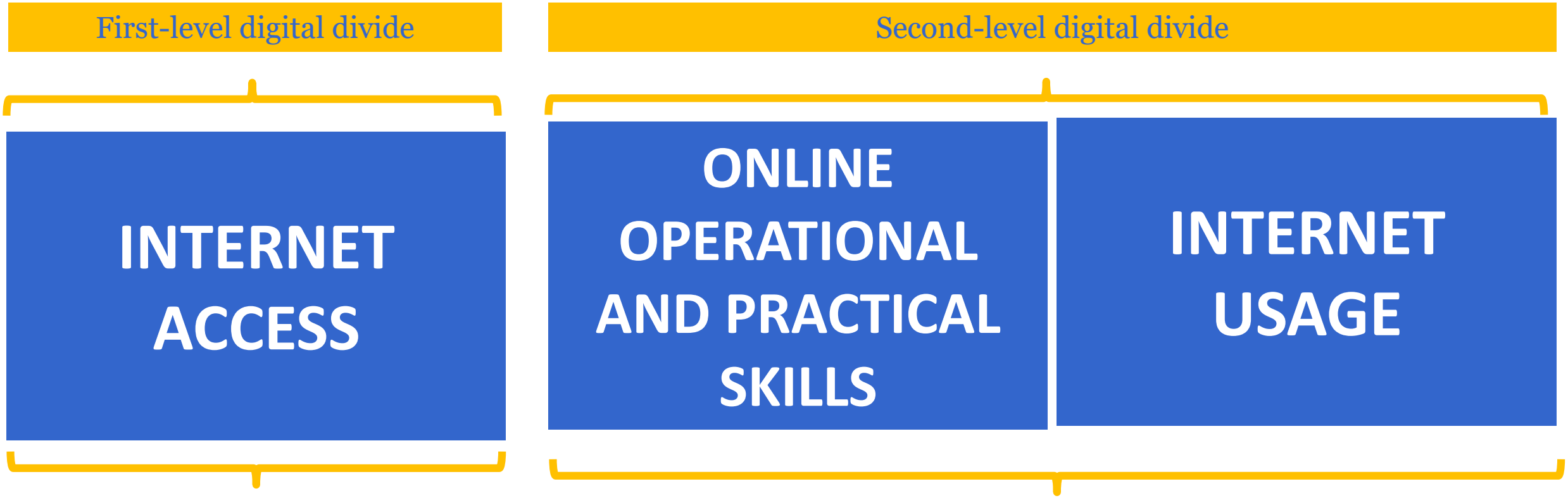
Digital Divide: A Conceptual Framework



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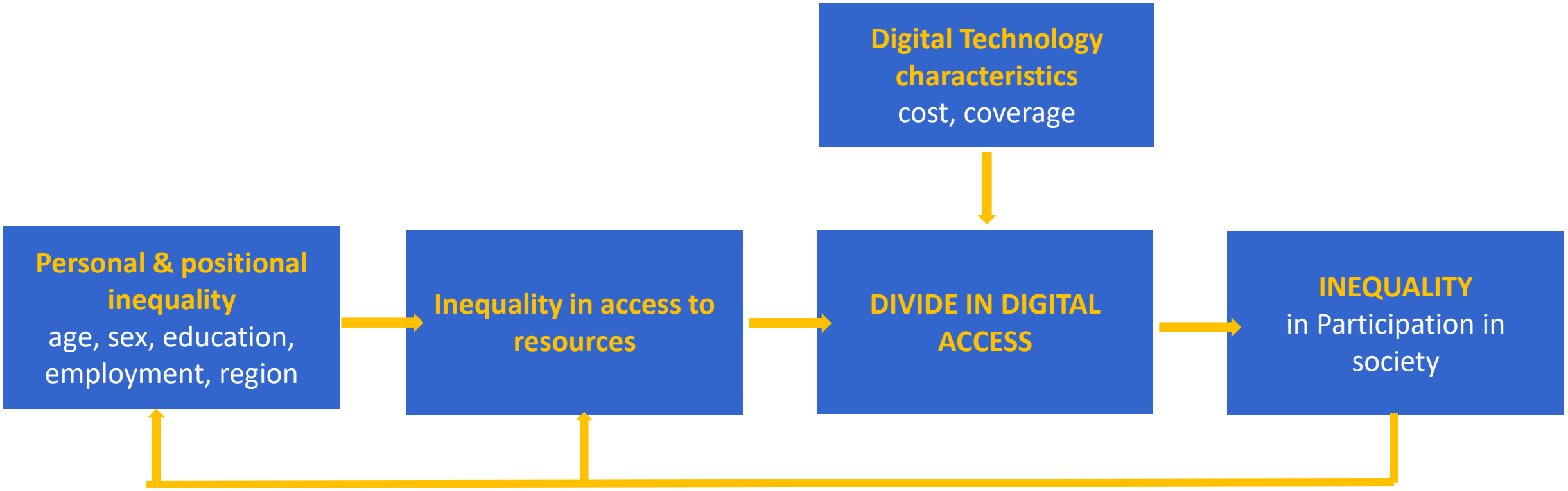
Causal Model to Explain First-Level Digital Divide



Access

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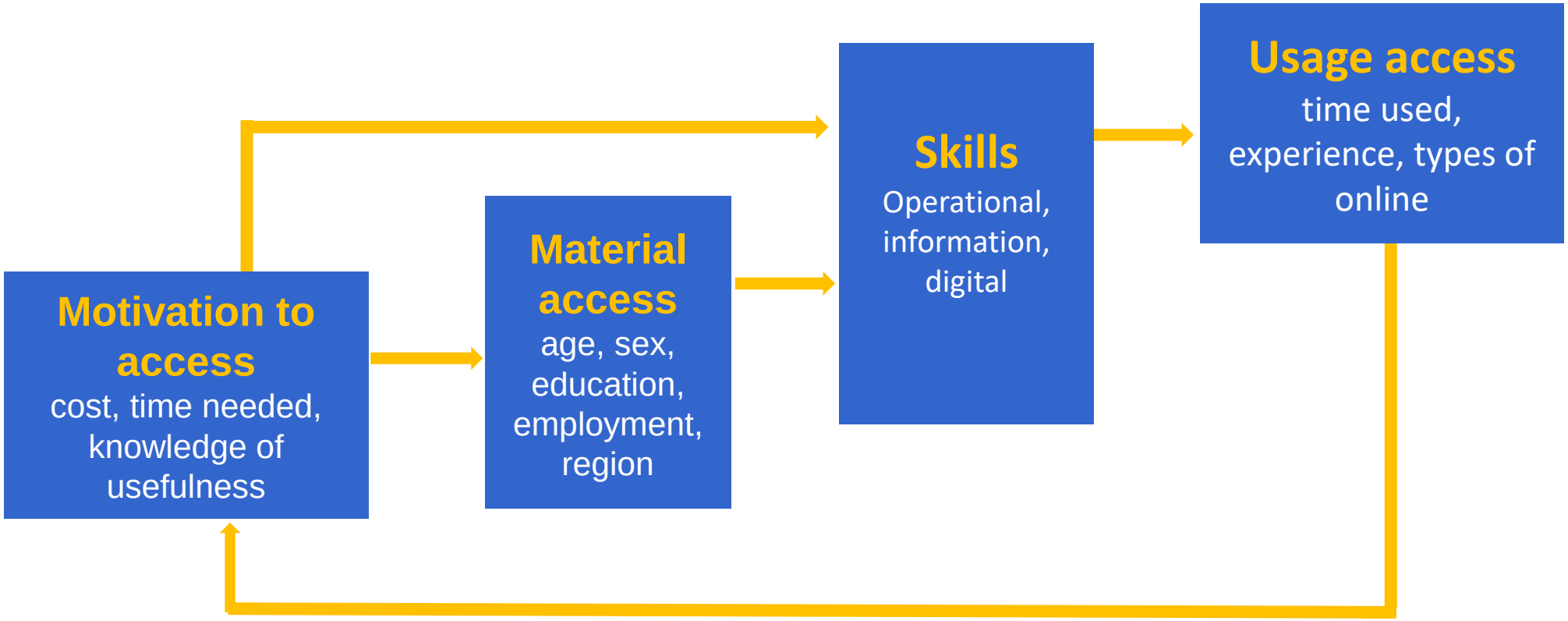
Cumulative and recursive model to explain second-level digital divide (SKILLS AND USAGE)



Skills and Usage

Source: van Dijk (2005, p.22)

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Data and Methodology

- Two-stage cluster sampling technique:
    - Stage 1: **325 PSUs from 60 districts** (4 hill tract districts are excluded)
    - Stage 2: **20 households from each PSU**
- A Cross-sectional Survey data of **6,500 sample** rural households.
- Survey period: **Sept-Nov 2019**
- It is a **nationally representative** sample (**at Division level**)
- We selected the **most digitally literate individual (MDLP)** in a household who answered the digital literacy questions.
- The interview was a mini FGD involving all household members

Explanatory and Outcome Variables

Explanatory

WHAT INDIVIDUAL CHARECTERISTCS EXPLAIN DIGITAL DIVIDE?

Age, household size, education, literacy, household income, occupation, marital status, gender, division.

Dependent

INTERNET ACCESS

At least one of the following: Broadband connection? Mobile internet? In others' phone? In local shop?

ONLINE SKILLS

At least one of the Practical test on finding from official website 1) passport form, 2) passport fee, 3) passport hotline

DIGITAL USAGE

A list of nine activities like reading news, downloading/ listening/ watching content, online training, playing games, paying bills, searching information, and using social media.

First-level digital divide

Second-level digital divide

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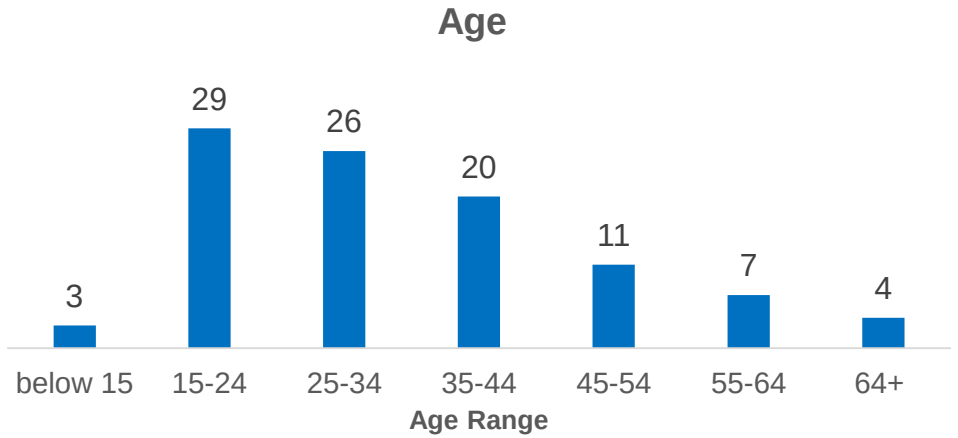
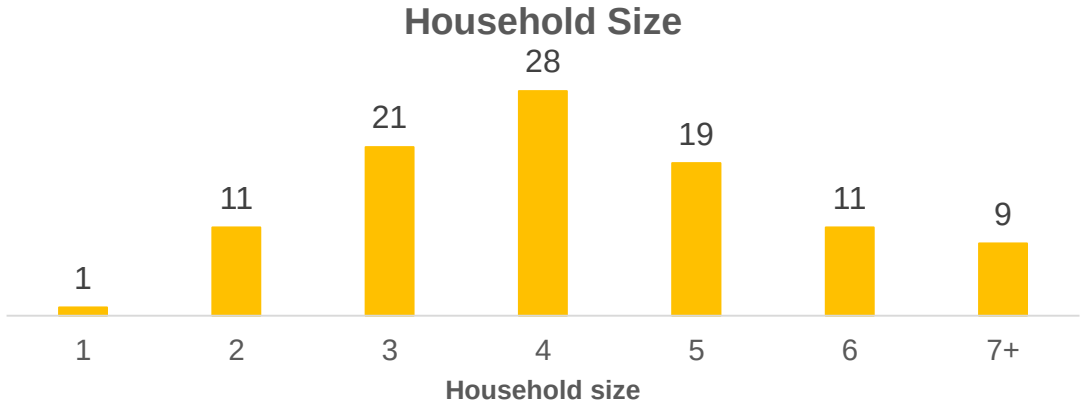
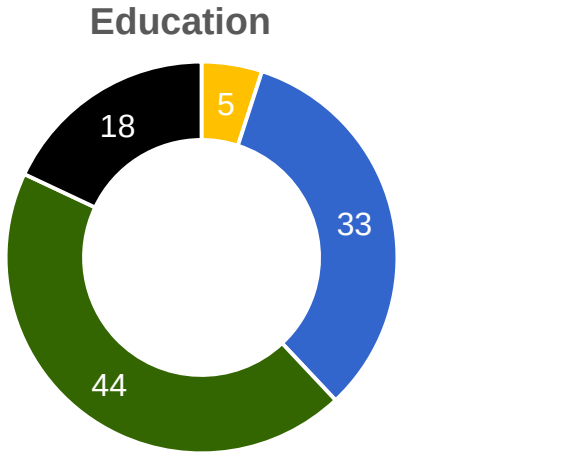
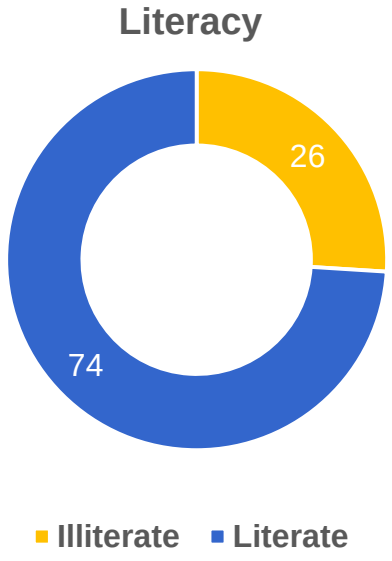
Sampling Distribution by MDLP Characteristics

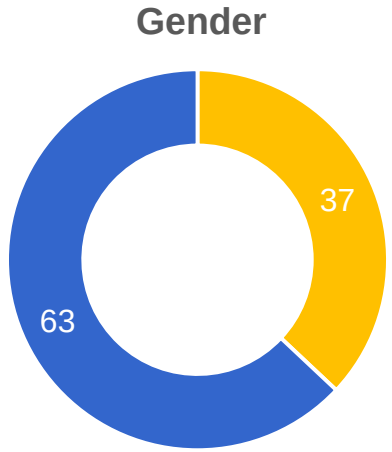
(% of Households)











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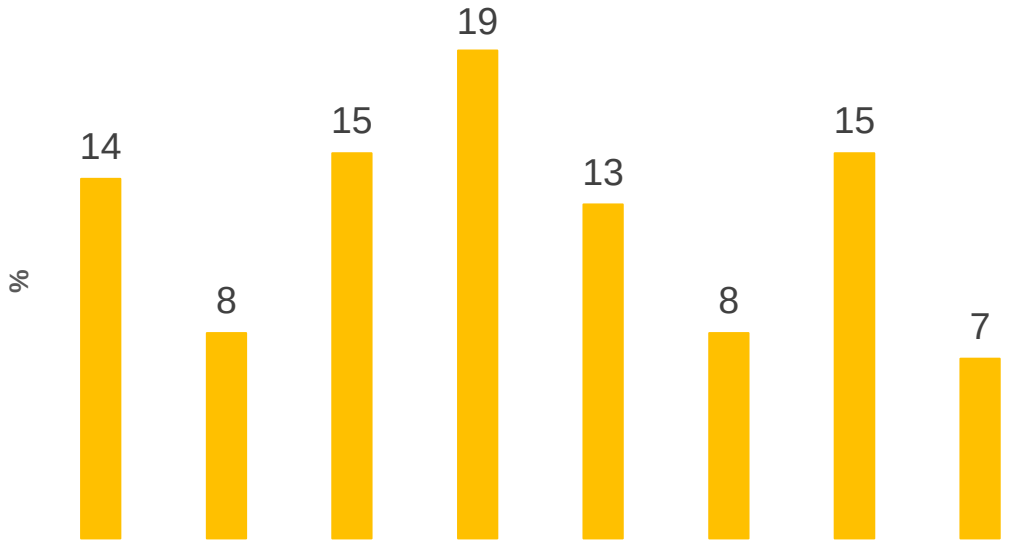
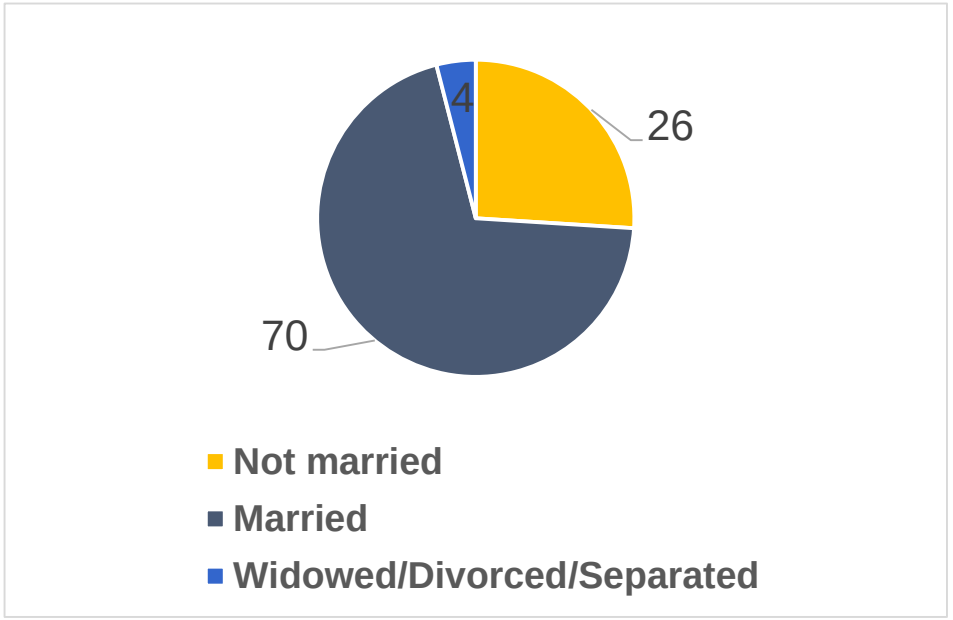
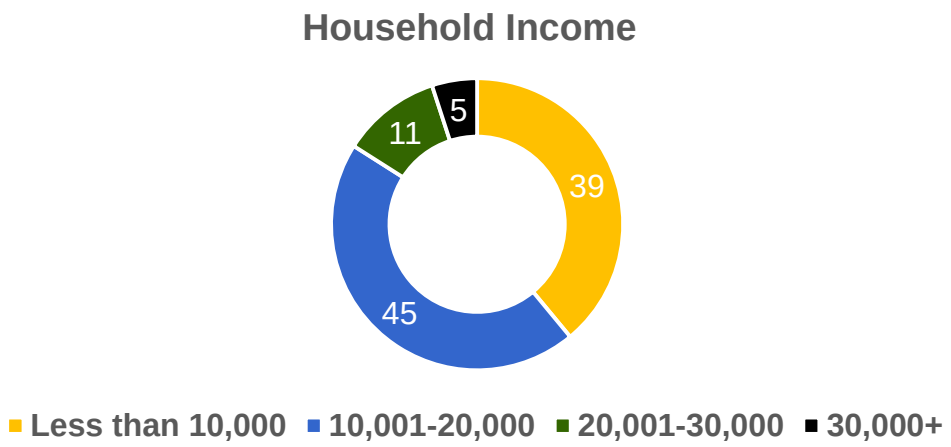
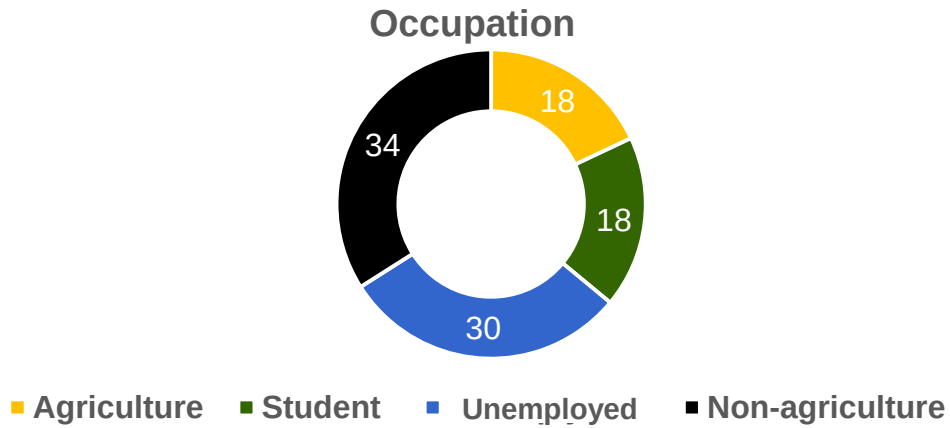
Sampling Distribution by MDLP Characteristics
(% of Households)



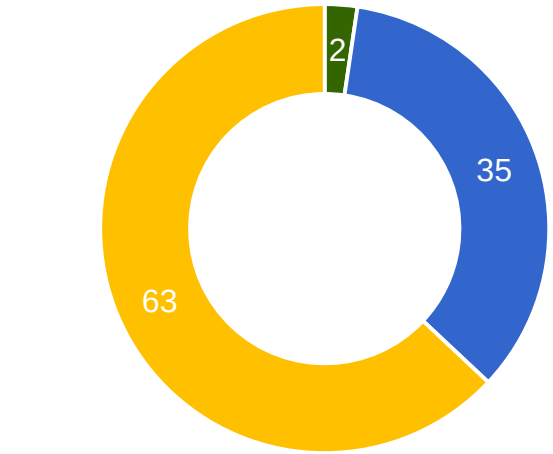




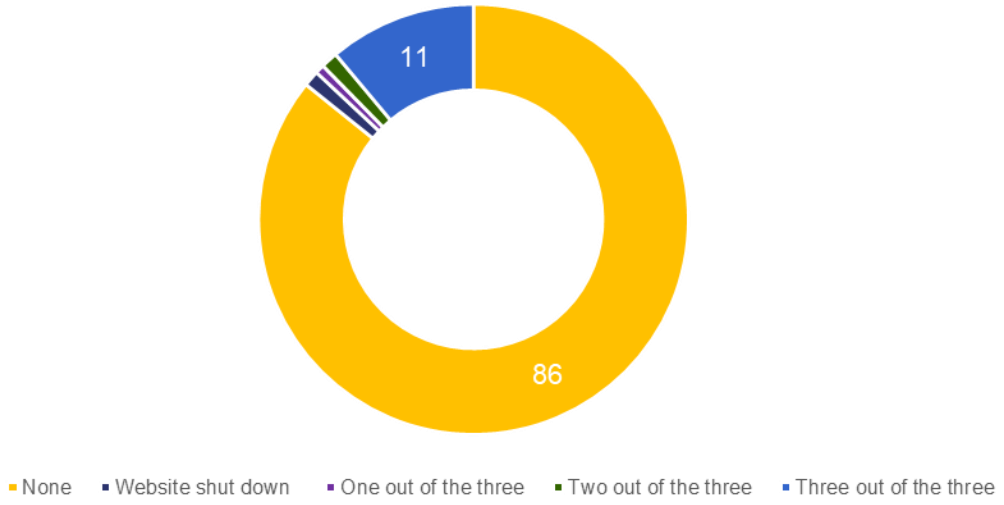


Digital Access, Skills, and Usage
(% of Households)

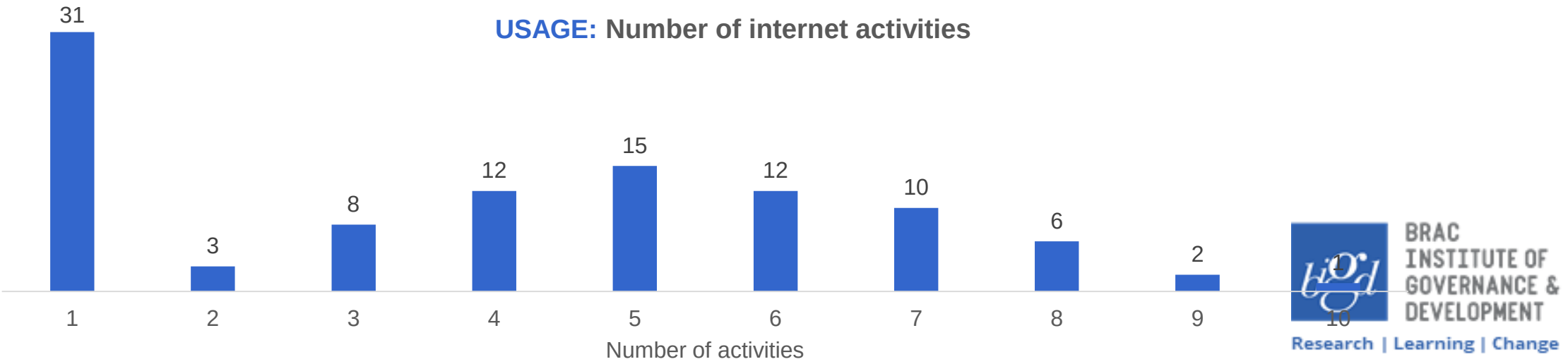
ACCESS: Internet access



SKILLS: Ability to Find information from passport website



USAGE: Number of internet activities



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Digital Divide Using Correlation Matrix

	Internet access	Age	Household size	Education	Literacy	HH income	Gender
Internet access	1						
Age	-0.42***	1					
HH size	0.16***	-0.24***	1				
Education	0.41***	-0.36***	0.12***	1			
Literacy	0.34***	-0.43***	0.12***	0.68***	1		
HH income	0.32***	-0.13***	0.30***	0.26***	0.20***	1	
Gender	0.08***	0.16***	0.08***	-0.03**	-0.09***	0.00	1

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Digital Divide Using Correlation Matrix (2)

	Online skills	Internet usage	Age	HH size	Education	Literacy	HH income	Gender
Online skills	1							
Internet usage	0.39***	1						
Age	-0.12***	-0.21***	1					
HH size	0.00	0.05**	-0.01	1				
Education	0.25***	0.34***	-0.08***	0.02	1			
Literacy	0.14***	0.18***	-0.24***	0.02	0.45***	1		
HH income	0.02	0.11***	0.11***	0.27***	0.12***	0.08***	1	
Gender	0.08***	0.20***	0.02	0.07***	-0.00	-0.01	-0.07***	1

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Digital Divide Using Binary Relationship: Age and Outcomes

Background characteristics	(1) Internet access (Access=1 & No access=0)	(2) Online skills (Skilled=1 & Not skilled=0)	(3) Internet usage (0-9)
Full sample	0.37	0.35	2.99
Age (in years)	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$
Below 15	0.47***	0.39	2.61
15-24	0.65***	0.40***	3.52***
25-34	0.39*	0.34	2.67***
35-44	0.23***	0.25***	2.16***
45-54	0.10***	0.20***	1.44***
55-64	0.06***	0.25	1.75***
>=65	0.03***	0.00*	1.5*

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Digital Divide Using Binary Relationship: HH Size and Outcomes

Background characteristics	(1) Internet access (Access=1 & No access=0)	(2) Online skills (Skilled=1 & Not skilled=0)	(3) Internet usage (0-9)
Household size	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.400$	$Pr(\chi^2) = 0.394$
1	0.09***	0.22	0.89***
2	0.21***	0.29	2.26***
3	0.35**	0.35	2.94
4	0.36	0.37	3.08
5	0.40**	0.38	3.06
6	0.45***	0.35	3.10
>=7	0.52***	0.32	3.04

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Digital Divide Using Binary Relationship: Education and Outcomes

Background characteristics	(1) Internet access (Access=1 & No access=0)	(2) Online skills (Skilled=1 & Not skilled=0)	(3) Internet usage (0-9)
Education	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$
Not passed any class	0.07***	0.13***	1.39***
Below SSC/equivalent	0.29***	0.22***	2.05***
SSC/HSC/equivalent	0.59***	0.42***	3.46***
Graduate/equivalent or more	0.70***	0.56***	4.39***

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Digital Divide Using Binary Relationship: Literacy and Outcomes

Background characteristics	(1) Internet access (Access=1 & No access=0)	(2) Online skills (Skilled=1 & Not skilled=0)	(3) Internet usage (0-9)
Literacy	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$
Illiterate	0.09***	0.11***	1.32***
Literate	0.47***	0.37***	3.11***

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Digital Divide Using Binary Relationship: Income and Outcomes

Background characteristics	(1) Internet access (Access=1 & No access=0)	(2) Online skills (Skilled=1 & Not skilled=0)	(3) Internet usage (0-9)
Monthly household income (in BDT)	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.153$	$Pr(\chi^2) = 0.000$
<=10,000	0.21***	0.34	2.75**
10,001-20,000	0.40***	0.35	2.85**
20,001-30,000	0.63***	0.33	3.22**
>30,000	0.74***	0.41**	3.66***

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Digital Divide Using Binary Relationship: Occupation and Outcomes

Background characteristics	(1) Internet access (Access=1 & No access=0)	(2) Online skills (Skilled=1 & Not skilled=0)	(3) Internet usage (0-9)
Occupation	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$
Agriculture	0.17***	0.26***	2.20***
Student	0.70***	0.46***	3.99***
Unemployed	0.31***	0.28***	2.16***
Non-agriculture	0.35**	0.32**	2.78***

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Digital Divide Using Binary Relationship: Marital Status and Outcomes

Background characteristics	(1) Internet access (Access=1 & No access=0)	(2) Online skills (Skilled=1 & Not skilled=0)	(3) Internet usage (0-9)
Marital status	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$
Not married	0.68***	0.43***	3.74***
Married	0.27***	0.29***	2.30***
Widowed/Divorced/Separated	0.14***	0.26	2.31

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Digital Divide Using Binary Relationship: Gender and Outcomes

Background characteristics	(1) Internet access (Access=1 & No access=0)	(2) Online skills (Skilled=1 & Not skilled=0)	(3) Internet usage (0-9)
Gender	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$
Female	0.32***	0.30***	2.27***
Male	0.40***	0.38***	3.33***

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Digital Divide Using Binary Relationship: Location and Outcomes

Background characteristics	(1) Internet access (Access=1 & No access=0)	(2) Online skills (Skilled=1 & Not skilled=0)	(3) Internet usage (0-9)
Division	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$	$Pr(\chi^2) = 0.000$
Rangpur	0.20***	0.41	3.28*
Barisal	0.31***	0.50***	3.08
Chattagram	0.55***	0.28***	2.94
Dhaka	0.44***	0.38	2.92
Khulna	0.40*	0.39*	3.36***
Mymensingh	0.27***	0.45**	2.55**
Rajshahi	0.37	0.32	3.20*
Sylhet	0.30***	0.14***	1.86***

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Digital Divide using Probit Regression: Age

Access

- Powerful and statistically significant predictor.
- Young adults have more access to ICTs.
- Internet access among individuals aged up to 34 and above 34 years (52% vs. 15%)
- The marginal effect is 18.5 percentage points.

Skills

- Age (=1 if age<=34 and 0, otherwise):
- Positive, significant marginal effect (8 percentage points)

Usage

- Age gap in internet usage significant in rural Bangladesh
- Individuals belonging to lower age group (i.e., <= 34 years) uses more internet

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Digital Divide using Probit Regression: Education

Access

- **Most consistent predictor –** Higher the level of education, more likely of access to internet.
- **Motivation and capability to use internet** depends on education.
- The marginal effects are 13, 30 and 40 percentage points for Class I-VIII,SSC/ HSC/equivalent and above HSC.

Skills

- Reference category (no education)
- No significant differences between no-education and lower than SSC
- Positive and significant relationship with SSC and above.
- Higher education higher likelihood of online skills.
- Marginal Effect 20 and 36 percentage points higher for SSC/HSC/equivalent and above HSC

Usage

- SSC and above plays significant effects on internet usages.

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Digital Divide using Probit Regression: Income

Access

- **Most important determinants** for internet access as per digital literature.
- Using BDT 10,001 as reference category, probability of internet access is positively related with monthly household income.
- The probabilities of access to internet are, on an average, around 9, 21 and 28 percentage points higher for the people in progressively higher income groups

Skills

- No significant association up to BDT 30,000.
- Higher than this is more likely to have online skills & ME shows 7.5 percentage points.

Usage

- Income BDT 20,000 and above plays positive and significant role

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Digital Divide using Probit Regression: Occupation

Access

- Agriculture as reference category, **students, non-agriculture and unemployed categories have significantly better internet access**.
- The probabilities are 15, 17 and 9 percentage points higher for student, unemployed and non-agriculture respectively compared to agriculture.

Skills

- **Only marginal effect of student on online skills**.
- The probability is around 10 percentage points higher for students compared agriculture

Usage

- Significant better usage among Students and unemployed

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Digital Divide using Probit Regression: Gender

Access

- Persistent Gender gap in access
- Marginal effect shows a male individual has 18 percentage points more likely to have access

Skills

- Strong gender difference
- About **38% males have online skills as against of 30% among females**.
- The marginal effect implies a male individual is 9 percentage points more likely.

Usage

- Positive, Significant, Higher magnitude

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Digital Divide using Probit Regression: Divisional

Access

- Rangpur, the most poverty-prone division, as a reference division
- All other divisions have higher level of internet access compared to Rangpur
- Chattagram has the highest IA.
- Probabilities are 27 and 20 percentage points higher for Chattagram and Dhaka respectively.

Skills

- But, insignificant skill difference between Rangpur and Chattagram, Dhaka, Khulna and Rajshahi
- Highest likelihood of online skills is the highest for Barisal (15 PPs), followed by Mymensingh (12 PPs).
- Sylhet division (19 PPs less likely) is lagging behind other divisions.

Usage

- Regional variations significant for Chattagram, Khulna and Sylhet.
- Khulna division performs the best.
- Sylhet performs the worst

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Conclusion and Policy Recommendations

- A clear-cut first-level (access) and second level (skills and usage) digital divide persists.
- Groups with younger ones, the more educated, literate, student, those with more income, male, and those with located in Chattagram and Dhaka have much more internet access.
- **Addressing low-level ICT knowledge, poor infrastructural development, low-income levels, and gender issue can bridge digital divide**

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Conclusion and Policy Recommendations

Skills

- Lower access means lower skills, and lower skills mean lower usage. Finally, lower usage means lower benefits from digitalization.
- But, just access to the internet does NOT ensure skills and internet usage.
- Therefore, Bangladesh government needs to ensure skills-based training programs (maybe with PPP or at subsidized costs), with a special focus to the rural people of Bangladesh along with improving access
- Universal coverage of ICT and hands-on ICT exercises at all educational institutions would help to reduce DD in the longer-term.

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Conclusion and Policy Recommendations

Targeting women and poor

- Poverty hinders access to the internet, acquiring online skills and internet usages. Therefore, **improving economic conditions and subsidizing internet costs for the disadvantaged groups** may reduce digital divide.
- A special focus should be given to **women**. School and college-based massive ICT programs would help to reduce the gender variations in this regard.
- **An international alignment of government aiming to reduce the cost of the internet** for developing countries like Bangladesh will help to provide the internet for all.

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Conclusion and Policy Recommendations

Infrastructure

- Access can be increased by providing the **same internet network signal all around the country**.
- A specific focus by **allocating budget** should be given to meet the SDG deadline for ICT access and empowerment.
- **Scaling up public access points of the internet and scaling up ICT programs** would reduce the digital divide.
- **Regional variation** implies that the digital divide is embedded in the heterogeneity in internet access, online skills, and internet usages. **Internet infrastructure development as per regional disparities** could be implemented through PPP to address regional digital divide

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Thank you

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