CLOSING DIGITAL GENDER GAPS: A SYSTEMS FRAMEWORK FOR CONNECTING WOMEN

Photo Credit : iStock, Victor Karanja

At a glance

- Women in many societies face barriers to access and use of digital technology. Just lowering phone costs is unlikely to close digital gender gaps.
- Understanding these constraints and how they affect household and individual digital access decisions is essential for product design and policy that successfully closes digital gender gaps.
- We offer a holistic gender assessment framework for identifying and addressing barriers and some steps to apply it.

Background

Digital tools are vital for economic and social inclusion, but unequal access and use can worsen inequalities, especially for women in low- and middle-income countries. Closing these gender gaps requires policies and projects designed to account for the challenges and barriers that low-income women face and that go beyond lowering device and data costs. Figure 1 shows the association between smartphone affordability and the internet use gap in 137 countries.[1] While the gender gap is indeed larger in countries where devices are less affordable, countries with low gender inequality have a small gap that is unrelated to affordability.[2] In contrast, the gap is persistently higher across all levels of affordability in gender unequal countries. **Trends predict a 20 percent gender gap in internet use among gender-unequal countries even if affordability reaches United States levels.[3]** While this estimate is correlational, the trend highlights the critical need for gender-sensitive design and policy to give women meaningful digital access.

Our team at Inclusion Economics has developed a framework to explain how interlinked factors influence women's digital technology engagement and uptake. It provides valuable insights for policymakers and practitioners looking to implement projects that enable inclusive digital economies and societies.

[1]We proxy affordability with device cost as a percent of gross national income (GNI) per capita. The internet use gap is the difference between male and female use as a percent of male use. See notes to Figure 1 for detail on data sources.
[2]We use the 2022 UNDP Gender Equality Index as a measure for inequality.
[3]The United States has a -1.5% gender gap, meaning women are slightly more likely to report using the Internet than men, while a smartphone costs 1.4% of gross national income per capital.

Figure 1: Digital Gender Gaps and Per Capital Income

Smartphone Affordability and the Gender Gap in Internet Use Across Countries

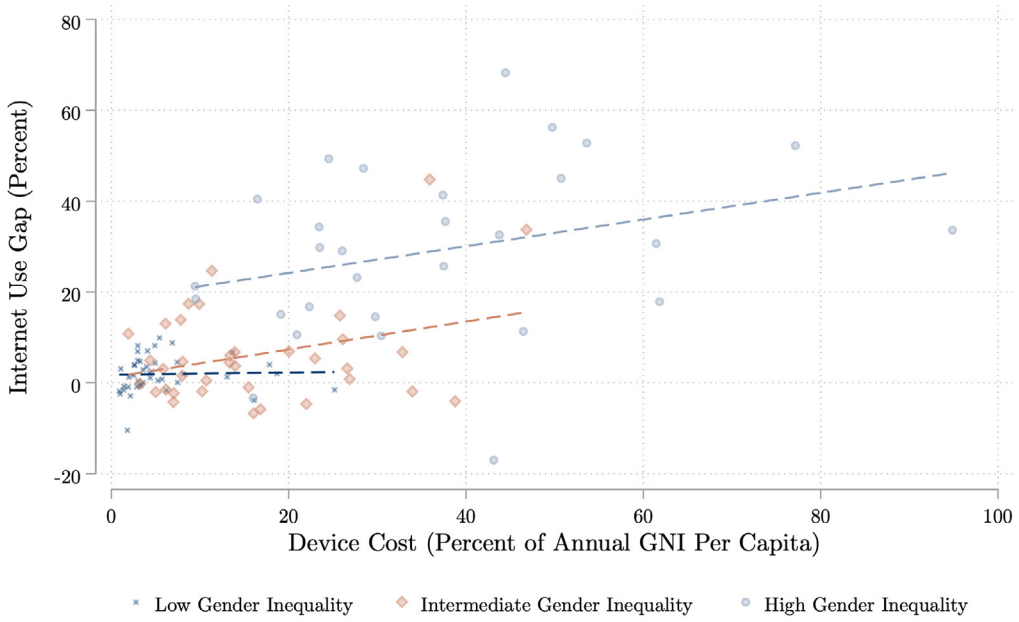


Figure Notes: N=137 countries. The internet use gap is the difference in fraction of men versus women who used the internet in the past week, as a percent of male internet use. Country-level estimates of internet use gap are from the 2022-23 Gallup World Poll. Data on device cost as a percent of annual GNI per capita are for 2022 (from Alliance for Affordable Internet). We classify countries as low (bottom third), intermediate (middle third), and high (upper third) gender inequality using the 2022 UNDP Gender Inequality Index. Dashed lines indicate lines of best fit, estimated by gender inequality classification.

A Framework for Understanding Women's Digital Engagement

Understanding the Enabling Environment

Context matters: a woman's decision to adopt digital tools is shaped by the enabling environment, a phrase for the interlinked individual-, household-, and community- or economy-wide factors that affect decision-making. While details of the enabling environment will vary across settings, we outline core features relevant across a range of contexts. After describing the enabling environment, we walk through the decision-making process itself, represented in Figure 2.

First, **economy- and community-wide factors** that influence men and women's digital opportunities and experiences, in turn, engagement include:

- **The economic environment** encompasses men's and women's (potentially differential) access to jobs, financial services, and other resources that allow them to finance device use and contribute to and benefit from economic growth.
- **The connectivity environment** refers to the infrastructure that enables productive phone use, such as network connectivity, power for device charging, and wireless internet. Access to connectivity may be gendered in settings where men and women are differentially mobile, or spend time in different spaces.
- **Gender norms** refer to gender-specific social expectations for behaviors and roles. Community-wide norms can shape a woman's behavior through social reward and punishment (or expectations of reward/punishment), if for example a behavior triggers stigma or admiration from others. Norms can directly inform the preferences of women and their family members.
- **Safety** encompasses conditions that influence or are perceived to influence a woman's ability to safely engage with digital technology. This includes both safety in the digital world (e.g. risks of online harassment and fraud) and in the physical world (e.g. risk of assault or robbery).

Within communities**, individual- and household-specific factors** also matter for women's choices:

- **Digital skills and human capital** refer to an individual's knowledge, abilities, and competencies to make productive use of digital technologies. Human capital also refers more broadly to an individual's capability to engage in productive work, either at home or in the economy, which is determined by diverse factors including knowledge, skills, and health.

- **Household dynamics** refer to the patterns and processes of decision-making within households. Decision-making dynamics are influenced by norms and expectations regarding household roles, power relations, and the share of economic resources controlled by potential decision makers.

Phone Adoption and Use Choices Occur at the Household-Level: Detailing Household Decision-Making

Women live in households with multiple members who each have different preferences and priorities, and digital devices are both expensive and shareable. Moreover, low-income households typically have limited financial resources. This means a woman's digital technology choice will reflect a compromise between her and other members' wants and needs, accounting for available resources. We describe key elements that determine final choices.

1. Individual returns reflect economic and non-economic costs and benefits.

The costs of acquiring and using a digital device (including data and airtime bills) are ***economic costs***, whereas income changes from device use (e.g. a better job, business growth, and better access to government benefits) are ***economic benefits***. These ***economic benefits*** will depend on individual human capital and digital skills. ***Non-economic benefits*** refer to non-monetary gains like social connectedness, social status, self-esteem, and entertainment. Digital engagement may trigger ***non-economic costs,*** often tied to gender norms – women may be more affected by online harassment or be accused of engaging in "improper" behavior. We define the return as the difference of benefits to costs, when we include both economic and non-economic aspects.

2. The gap between perceived and actual returns may differ, and perception gaps may vary with gender.

Household decisions will be based on perceived returns to smartphone use, which may differ from actual returns. For example, if a woman doesn't grasp WhatsApp's marketing potential, she may think a smartphone won't help her business. Or, her husband may not believe she is capable of using a phone to boost her income. Such perceptions may be amplified when digital use cases are designed for a predominantly male user base. To the extent that (1) perceived returns are lower than actual returns, and (2) the perception gap is larger for women, this will reduce women's adoption of digital tools.

3. How relative returns are perceived within households influences choices.

Given scarce resources, a positive return is not always enough to guarantee use – women's digital engagement may be deprioritized if the relative returns to another household member's engagement are perceived to be higher.

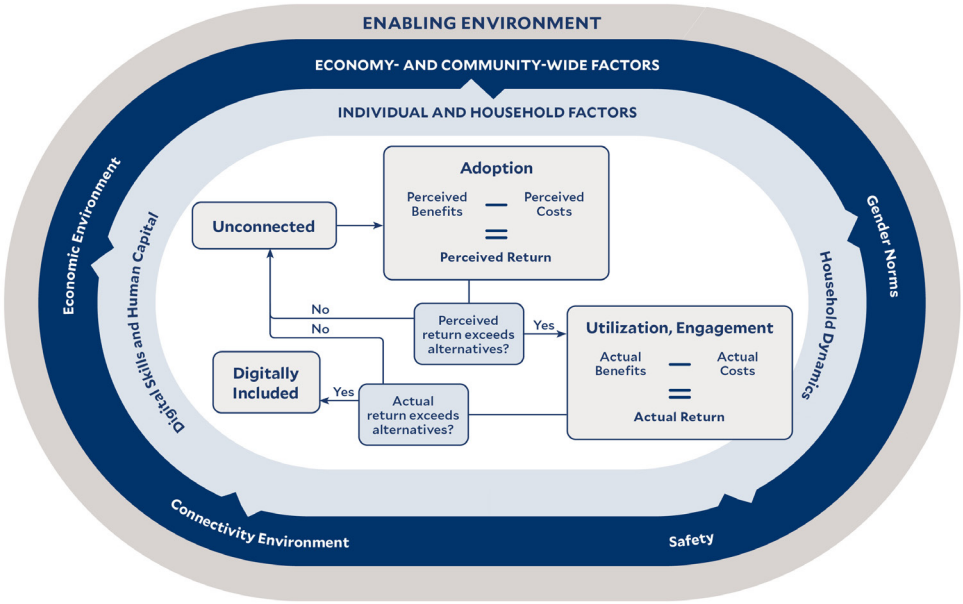
4. Household members' agency matters.

Households balance the wants and needs of their members when making choices about how to invest resources. In many settings, the male head is the primary decision-maker, meaning choices will align most closely with his preferences. A woman's preferences will get more weight when she has more agency. This means that, all else equal, a woman's own desires around her use of digital technology will be better reflected in household choices when her agency and bargaining power are higher.

Figure 2 puts all this together: adoption decisions reflect an assessment of ***perceived relative returns***, shaped by household dynamics and the enabling environment. If a woman adopts, she and her household will learn about ***actual relative returns,*** which could trigger deeper digital engagement and inclusion - especially when returns are high - or could lead to drop out, if returns are unexpectedly low.

[4]Barboni, G., Field, E., Pande, R., Rigol, R., Schaner, S., and C. Troyer Moore (2018). "A Tough Call: Understanding barriers to and impacts of women's mobile phone adoption in india." Available here.

Figure 2: A Conceptual Framework for Women's Adoption and Use of Digital Technologies



Applying the Framework

The framework is useful for assessing new products and policies or diagnosing areas for improvement in existing products and policies. In all cases, the work begins with a **background assessment:**

- **Characterize the enabling environment:** First, examine how the socio-economic context impacts women's and men's returns to phone use. Data, research, and contextual knowledge should be used to answer questions like: "To what extent can men and women participate in labor markets?" "What are the most common income generating opportunities by gender and skill level?" "Can individuals save or borrow to finance digital devices?" "How do social norms govern women's household and economic roles?" "Are digital devices widely available and at what cost?" "What is the state of network speed and coverage?" "How much social and economic agency do women have?"

- **Identify drivers of costs and benefits:** Next, identify the determinants of costs and benefits in your setting. Market research and use case mapping, for example, can help quantify economic costs and economic benefits of owning and maintaining a phone. Qualitative research with your target population can spotlight non-economic costs and benefits, and uncover wedges between actual and perceived returns.

- With contextual knowledge in hand, **follow the framework** to map the decision-making process of your target population. This will help identify key barriers to women's digital engagement. For example: are unconnected women likely to adopt based on your understanding of costs and benefits? If not, is this because actual returns are too low, because of a gap between actual and perceived returns, limits to women's agency, or another factor? How many barriers must be addressed to meaningfully catalyze adoption and use?

This background assessment can inform the design of products and policies. It may be helpful to re-work through the decision-making process as if your product/policy were in place to ensure it stands a good chance of addressing enough barriers to meaningfully affect women's digital engagement. The framework can be used to refine existing products and policies. Process monitoring data and participant feedback can help assess whether your initial assumptions are supported, or whether there are remaining barriers that need to be addressed in order to achieve your goals. By following a process of gender-centered design, learning, and iteration, practitioners stand a better chance of maximizing the impact of their efforts to integrate women into the digital world.

Photo Credit : Ishan Tankha

Authors

Simone Schaner, Associate Professor (Research), University of Southern California | Scientific Director – Gender, Yale Inclusion Economics
Erik Jorgensen, Gender and Digital Lead, Yale Inclusion Economics
Rohini Pande, Henry J. Heinz II Professor of Economics, Yale University | Faculty Director, Yale Inclusion Economics
Emma Riley, Assistant Professor, University of Michigan
Laura Barasa, Senior Lecturer, University of Nairobi
Natalie Theys, Independent Consultant

Date: May 2025

Inclusion Economics' network of researchers ask how policy can promote inclusive and accountable states, markets, and societies; and how citizens — especially the marginalized — can gain influence to make political and economic systems more responsive to their needs. Inclusion Economics at Yale University (YIE) is a collaboration between the Economic Growth Center and the MacMillan Center. The Inclusion Economics network spans YIE, Inclusion Economics India Centre at the Institute for Financial Management and Research (IFMR), Inclusion Economics Nepal at Governance Lab, and several engagements in Sub-Saharan Africa.

Yale Inclusion Economics (YIE) is a collaboration between the Economic Growth Center (EGC) and the Macmillan Center for International and Area Studies.

To learn more about Inclusion Economics' work to advance women's access to digital devices and opportunity, visit https://ie.yale.edu/our-research-areas/digital-inclusion.

This work was made possible with support from the Gates Foundation.