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Bridging the Digital Divide in Mexico: How Technological Inequality Limits Social Development

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Abstract: ***In the context of Mexico's ongoing digital transformation, this review explores the persistent digital divide that disproportionately affects rural, indigenous, and marginalized populations. Drawing on the 2023 National Survey on the Availability and Use of Information Technologies in Households (ENDUTIH), the article critically examines the socioeconomic, educational, gender, and geographic barriers that hinder equitable access to ICTs. The review argues that while technological infrastructure has improved, deep-rooted structural inequalities continue to impede meaningful digital inclusion. The paper advocates for a multidimensional public policy approach that combines infrastructure expansion, digital literacy, and inclusive governance to close this gap and support social development.***

Keywords: digital inequality, access to ICTs, rural connectivity, digital literacy, technology policy.

1. Introduction

In the current era dominated by digital connectivity, equitable access to information technologies has become an essential driver for countries' educational, economic, and social progress. However, Mexico faces a profound technological disparity, reflected in the limited availability and use of digital tools in rural communities and vulnerable sectors. This digital divide not only exposes structural inequality but also limits the opportunities for comprehensive development for millions of citizens.

This article seeks to analyze the structural and socioeconomic dimensions of the digital divide in Mexico and evaluate national efforts to close it through infrastructure expansion, policy reforms, and educational interventions.

The National Survey on the Availability and Use of Information Technologies in Households (ENDUTIH), conducted annually by the National Institute of Statistics and Geography (INEGI) in collaboration with other institutions, is a fundamental tool for analyzing inequalities. According to data from recent ENDUTIH reports published in 2024, factors such as geographic location, socioeconomic status, age, and gender play a crucial role in shaping the digital divide in Mexico. For example, while internet access exceeds 80% in urban areas, in rural regions the figure barely reaches 50%. [1].

This gap not only reflects differences in technological infrastructure, but also in the affordability of services, users' digital skills, and opportunities for technological appropriation. According to Martínez Domínguez, factors such as service cost, age, educational level, and the digital skills gap are determining factors in the lack of connectivity, severely affecting rural communities [2].

Faced with the challenge of persistent digital inequality, it is imperative to formulate and implement comprehensive public strategies that guarantee technological inclusion as a universal right. These actions must focus not only on eliminating material barriers to access, but also on strengthening the capacities of digital citizens as a whole. Building a truly connected and equitable society requires a sustained commitment that articulates infrastructure, training, and participation in the digital ecosystem.

Understanding and addressing the digital divide is crucial not only for achieving equitable access to ICTs in Mexico, but also for ensuring an equitable distribution of social, economic, and educational opportunities among all demographic groups. This study contributes to the policy debate by identifying the main barriers and proposing comprehensive solutions.

2. Development

This study aims to conduct a comprehensive and critical exploration of digital inequality in Mexico, using current data from the National Institute of Statistics and Census (ENDUTIH) as a reference. The approach adopted allows for an examination of the structural gaps that underpin technological divides, assessing their impact on different social spheres, and proposing mitigation proposals. In an era marked by hyperconnectivity, closing these gaps is not only an ethical imperative but also a strategic requirement for ensuring sustainable development and digital inclusion for Mexican society in the 21st century.

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2.1 Socioeconomic factors and their impact on the digital divide

Digital connectivity in the country has shown significant progress, with 81.2% of the population aged six years and older using the internet in 2023 [3]. However, this national average hides marked differences between urban and rural areas, where access is 85.5% and 66.0%, respectively [31].

The availability of technological devices also reflects an economic disparity. Only 43.8% of households have a computer, a figure that decreases dramatically in lower-income households [3]. Internet access in households in the slightly lower decile reaches 28.9%, while in the upper decile it exceeds 96% [4].

Furthermore, the cost of digital services represents a considerable economic burden for the most vulnerable sectors. Children's households spend up to 5.6% of their quarterly income on information and communications technologies (ICTs), while wealthier households spend only 2.8% [4]. The average monthly expenditure on technology services can reach 3,274 pesos, equivalent to 12.6% of the national average income [5].

The figures show that the digital divide in Mexico is not limited to access, but is deeply linked to socioeconomic factors that perpetuate technological exclusion. Bridging this gap requires comprehensive public policies that consider infrastructure, affordability, and digital training.

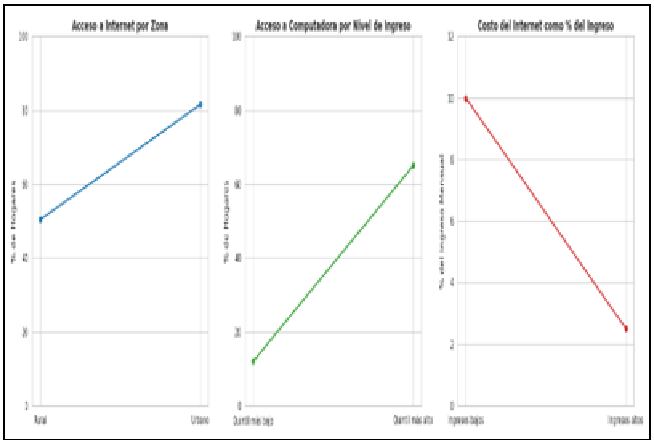

Figure 1: Socioeconomic factors and their impact on the digital divide. Prepared by the authors based on the National Institute of Statistics and Geography (INEGI).

2.2 Education and digital literacy as structural barriers

1) Understanding the digital divide in Mexico requires a deep analysis of the relationship between formal education and digital skills. While internet access has improved in recent years, the meaningful use of information and communications technologies (ICTs) remains unequal. According to ENDUTIH 2023, 30% of internet users in Mexico face difficulties performing basic tasks such as sending email or performing advanced searches [6].
2) These limitations are closely related to educational level. While 85% of people with higher education use the internet regularly, only 40% of those with primary or secondary education do so. This gap is exacerbated in rural areas, where educational coverage is limited and digital literacy programs are scarce [6].
3) Government initiatives, such as the Internet for All program, have successfully expanded coverage in marginalized regions, benefiting more than 17.5 million people in rural areas [7]. However, the impact of these initiatives has been limited due to a lack of digital skills training. In communities where the program has been implemented, only 25% of beneficiaries report effective and consistent use of ICTs, demonstrating that access alone does not guarantee digital inclusion [7].
4) To truly close the digital divide, it is essential to complement technological infrastructure with educational strategies that strengthen digital skills from an early age and at all levels of education.

2.3 Gender and inequality in access to ICTs

Digital inequality in Mexico is not only manifested in economic or geographical terms, but also has a marked gender dimension. While internet access has increased, women generally face specific barriers that limit their full inclusion in the digital environment. According to the ENDUTIH 2023 (National Institute of Statistics and Censuses), for the first time, the percentage of female internet users (81.4%) was slightly higher than that of men (81.0%) [3]. However, this gap is reversed in rural areas, where only 66% of the population has internet access, and women face obstacles to connecting at an older age [3].

Cultural and social factors, such as the allocation of household chores and lack of time for educational activities, contribute to this gap. In rural communities, access to technological devices is also unequal: 77.7% of women do not use a computer, laptop, or tablet sufficiently, compared to 78.1% of men, but a higher proportion of women report not knowing how to use these devices [8].

In the workplace, the gender gap widens even further. According to a study by the Mexican Institute for Competitiveness (IMCO), only 15% of jobs in the Information and Communications Technology (ICT) sector are held by women [3]. This underrepresentation limits not only access to job opportunities but also women's participation in innovation and technological leadership processes.

Closing this gap is not enough to simply expand internet coverage; it is necessary to implement public policies that promote digital literacy with a gender perspective, as well as technical training programs that empower women at all educational and professional levels.

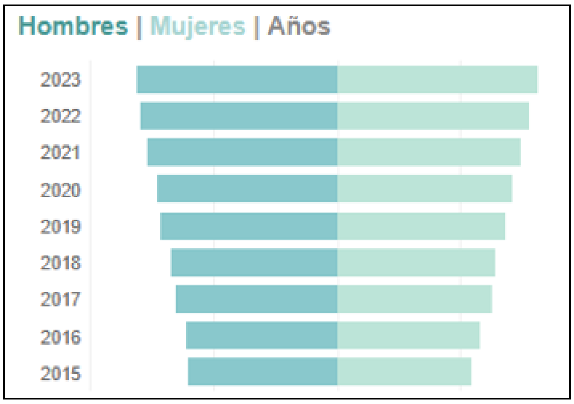

Figure 2: Users of Information and Communication Technologies (Gender) , available at https://www.inegi.org.mx/programas/endutih/2023/

2.4 Technological infrastructure and regional disparities

1) The availability of technological infrastructure in Mexico is an essential component for understanding the persistence of the digital divide. Despite progress in the expansion of telecommunications networks, regional differences remain significant. According to the Federal Telecommunications Institute (IFT), 90% of urban areas have 4G mobile coverage, while in rural areas this figure drops to 60%, reflecting a structural disparity in access to digital services [9].
2) Service quality also varies significantly across states. For example, in Mexico City, the average download speed reaches 50 Mbps, while in states like Oaxaca and Chiapas it barely exceeds 10 Mbps [3]. These differences limit equitable access to educational, employment, and economic development opportunities, perpetuating social inequalities.
3) Another key factor is investment in digital infrastructure, both public and private. States such as Nuevo León and Jalisco have received resources for seniors, which has allowed them to strengthen their technological networks. In contrast, southern regions of the country, such as Chiapas, show significant gaps. In 2023, per capita spending on technological infrastructure was approximately 1,200 pesos in Nuevo León, while in Chiapas it barely reached 300 pesos [10].
4) These disparities demonstrate the need for a national strategy that prioritizes territorial equity in digital development, integrating investment, connectivity, and digital training policies to close existing gaps.

2.5 Impact of the digital divide on social and economic inequality

1) Technological inequality in Mexico cannot be understood solely as an infrastructure problem; it is also a phenomenon that exacerbates social and economic gaps. The lack of internet access and digital skills limits access to virtual education, digital health services, and remote employment, thus restricting social mobility for large segments of the population.
2) During the COVID-19 pandemic, this reality became evident. According to ENDUTIH 2021, more than 55% of students had difficulty continuing their studies due to a lack of connectivity or adequate devices [11]. While indicators have improved slightly in recent years, rural and marginalized communities continue to face significant barriers to accessing digital education [11].
3) In the workplace, internet access has become a determining factor for employability. According to the Inter-American Development Bank (IDB), connected people are up to 30% more likely to find employment than those who are not [**1-2**]. This correlation underscores the importance of connectivity as a tool for economic inclusion.
4) Likewise, inequality in access to digital health services represents another critical point. In rural areas, telemedicine has become a viable solution for serving populations far from medical centers. However, only a fraction of these communities actively use these services due to a lack of technological infrastructure and training [13]. While in urban areas the use of digital medical services exceeds 50%, in rural areas it only reaches 20% [13].
5) These data show that the digital divide not only excludes people technologically, but also limits the exercise of fundamental rights such as education, health, and employment. Bridging it requires comprehensive public policies that combine connectivity, digital training, and territorial equity.

3. Results

1) Bridging the digital divide in Mexico has been addressed through public policies aimed at expanding connectivity in historically marginalized areas. One of the most significant initiatives has been the Internet for All program, coordinated by the Federal Electricity Commission (CFE), which has installed more than 100,000 free internet access points in rural and peri-urban communities [14]. However, significant disparities in coverage persist: while 90% of urban areas have access to 4G mobile internet, only 65% of rural areas have this technology [15].

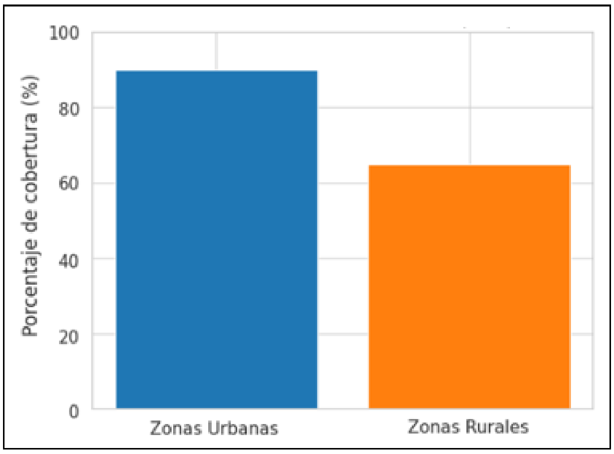

Figure 3: 4G internet coverage in rural and urban areas, prepared by the authors based on: https://www.ift.org.mx/mobile-data-service-coverage-maps

The National Digital Strategy (EDN) has prioritized the deployment of fiber optic networks in states with technological lag such as Oaxaca and Chiapas, where the average connection speed is considerably lower than in urban

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areas [16] While these actions have improved infrastructure, they face challenges related to financial sustainability and technical maintenance in hard-to-reach areas.

The cost of technological devices and internet services represents another structural barrier. According to ENDUTIH 2023, 28% of unconnected households reported that high prices are the main impediment [17]. To counteract this situation, the government has implemented subsidy programs such as MiCompu.MX, which offers laptops to low-income students through affordable payment schemes [18]. Likewise, the Federal Telecommunications Institute (IFT) launched a social tariff scheme in 2024 that allowed more than one million families to access low-cost internet plans [19].

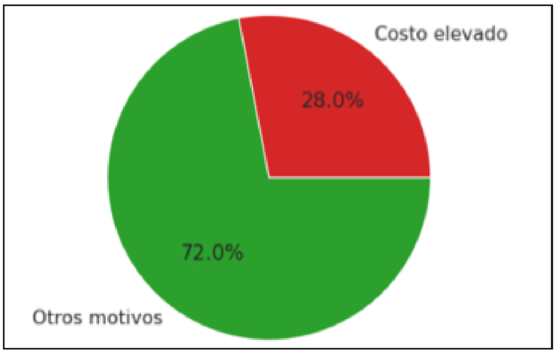

Figure 4: Percentage of households without internet access for economic reasons, prepared by the authors based on: https://www.inegi.org.mx/programas/dutih/2023/

2) Despite these advances, the reach of public policies has been limited due to their limited dissemination and low penetration in Indigenous communities. Furthermore, internet access does not guarantee its effective use. The ENDUTIH 2023 reveals that 35% of users face difficulties performing basic tasks such as sending email or using videoconferencing platforms [17]. In response, technological training programs such as Employment Training, promoted by the Carlos Slim Foundation, have been developed, benefiting more than 22 million people with free online courses focused on digital and job skills [20]. At the institutional level, the Ministry of Public Education has incorporated digital literacy modules into its school curricula, although its implementation has been uneven across states [18].

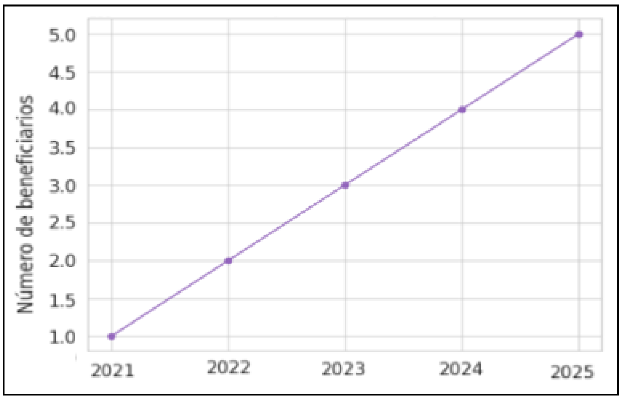

Figure 5: Number of beneficiaries of the "Employment Training" program, prepared by the authors based on: https://capacitateparaelempleo.org

Public-private collaboration has been essential to expanding coverage and promoting digital inclusion. Companies such as Telmex, AT&T, and Huawei have worked with the government to install more than 25,000 free Wi-Fi hotspots in public spaces through the Connecting Mexico Program [21]. Additionally, initiatives such as Google for Education have provided digital tools and training to thousands of Mexican schools since 2022, thus strengthening learning environments [22]. However, a lack of adequate regulation and an over-reliance on private sector spending put the sustainability of these strategies at risk.

Indigenous communities face specific barriers to accessing and using digital technologies, such as a lack of content in native languages and limited infrastructure in their territories. According to ENDUTIH 2023, only 40% of these communities have internet access, compared to the national average of 72.3% [**17**]. To address this inequality, projects such as the Red Compartida (Shared Network) have been developed, which seeks to bring connectivity to the most remote areas of the country. Furthermore, the National Institute of Indigenous Languages (INALI) has launched educational platforms with resources in Nahuatl, Mayan, and Mixtec, benefiting more than 50,000 users in its first year. **[23]**.

4. Conclusions

The analysis reveals that the digital divide in Mexico cannot be addressed solely from the perspective of technological infrastructure. It is a multidimensional problem that reflects and reproduces historical inequalities in access to fundamental rights. Connectivity, while essential, is not sufficient if it is not accompanied by training processes, inclusive policies, and a territorially equitable vision.

Evidence shows that institutional efforts have achieved progress in coverage, but significant barriers to the effective use of technologies persist, especially in rural and indigenous communities and in sectors with lower educational levels. Digital literacy should be conceived as a cross-cutting public policy, capable of empowering citizens to actively participate in the knowledge society.

The gender dimension represents another critical axis. Women, especially in rural contexts, face specific obstacles that limit their access to and participation in the digital environment. Overcoming this gap requires gender-sensitive policies that promote technological inclusion from basic education to the professional sphere.

On the other hand, regional disparities in investment and the quality of digital services reveal a fragmentation of national technological development. Connectivity must be distributed according to criteria of territorial justice, prioritizing those regions historically excluded from digital progress.

In short, closing the digital divide in Mexico requires a coordinated national strategy that integrates infrastructure, training, territorial equity, and a gender perspective. Only through a comprehensive and sustained approach will it be possible to ensure that technology serves as a catalyst for inclusion, development, and social justice.

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