Original Article

Encontros Bibli

EVOLUTION OF THE GENDER DIGITAL GAP IN PERU: HAS IT IMPROVED IN THE LAST DECADE?

Evolución de la brecha digital de género en el Perú, ¿ha mejorado en la última década?

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ABSTRACT

Objective: To analyze the evolution of the gender digital gap in Peru from 2012 to 2022, identifying disparities based on area of residence, age, educational attainment, occupational status, and ethnic condition.
Methods: A descriptive, retrospective, and non-experimental study was conducted using secondary data from the National Household Survey (ENAHO) compiled by the Peruvian National Institute of Statistics and Informatics (INEI). Internet usage indicators were disaggregated by gender and analyzed across key sociodemographic variables.
Results: Although Internet usage among women has increased consistently over the decade, notable gender gaps persist in specific segments. The widest disparities were found in rural areas (9.7 percentage points) and among Indigenous populations (12.2 percentage points). In contrast, parity or near-parity was observed among salaried workers and individuals with higher education.
Conclusions: The digital gender divide in Peru is decreasing in general terms but remains deeply stratified along lines of geography, ethnicity, education, and occupational status. Closing these gaps requires targeted public policies that prioritize vulnerable groups, particularly Indigenous women and rural residents, ensuring equitable access to digital resources and opportunities.
KEYWORDS: Gender digital divide. Peru. Internet access. ICT. Rural-urban disparity. Indigenous populations.

RESUMEN
Objetivo: Analizar la evolución de la brecha digital de género en el Perú entre 2012 y 2022, identificando las disparidades según área de residencia, edad, nivel educativo, condición ocupacional y pertenencia étnica.
Métodos: Se realizó un estudio descriptivo, retrospectivo y no experimental, utilizando datos secundarios de la Encuesta Nacional de Hogares (ENAHO) elaborada por el Instituto Nacional de Estadística e Informática (INEI). Se analizaron indicadores de uso de internet desagregados por género y variables sociodemográficas clave.
Resultados: Aunque el uso de internet por parte de las mujeres ha aumentado de manera sostenida en la última década, persisten brechas significativas en ciertos segmentos. Las mayores desigualdades se registran en zonas rurales (9.7 puntos porcentuales) y en poblaciones indígenas (12.2 puntos porcentuales). En contraste, se observa paridad o casi paridad entre trabajadores asalariados y personas con mayor nivel educativo.
Conclusiones: La brecha digital de género en el Perú muestra una tendencia decreciente, pero sigue estratificada por territorio, etnicidad, educación y ocupación. Superar estas desigualdades exige políticas públicas focalizadas en los grupos más vulnerables, especialmente mujeres indígenas y residentes rurales, garantizando un acceso equitativo a los recursos y oportunidades digitales.
PALABRAS CLAVE: Brecha digital de género. Perú. Acceso a internet. TIC. Disparidades urbano-rurales. Poblaciones indígenas.

1 INTRODUCTION

Information and Communication Technologies (ICTs) are fundamental tools for fostering economic, social, and educational development in contemporary societies. Their effective use has the potential to reduce structural inequalities and promote social inclusion. However, uneven adoption of digital technologies has also given rise to new forms of exclusion, commonly referred to as the digital divide (Pappas et al., 2018; Helsper, 2021). This divide is not limited to physical access to the Internet or technological devices but also encompasses the digital skills required for meaningful and effective use (Pick; Sarkar, 2016; Kuhn *et al*., 2023).

Among the most persistent dimensions of this inequality is the gender digital divide. According to the International Telecommunication Union (ITU), 70% of men globally use the Internet compared to only 65% of women, with the gap widening significantly in low-income countries. In these contexts, women face multiple structural barriers, including gender-based inequality, limited economic resources, sociocultural constraints, and restricted access to digital infrastructure (International Telecommunication Union, 2018; Venkatesh; Sykes; Venkatraman, 2014).

In Latin America, and particularly in Peru, these disparities are even more pronounced due to regional, socioeconomic, and gender-based inequalities (Lagunas-Vázques; Beltrán-Morales; Ortega-Rubio, 2016). While Peru has made notable progress in digital connectivity over the past decade, significant gaps remain between urban and rural areas and between men and women in terms of device access, connection quality, and the development of digital skills (Libaque-Saenz, 2023).

The COVID-19 pandemic further deepened these disparities, exposing the limited technological resources available to many Peruvian women, which hindered their ability to continue studying, work remotely, or access essential digital services (García-Martín; García-Sánchez, 2022; Cassaretto; Espinosa; Chau, 2024). Additionally, the unequal burden of unpaid domestic and caregiving work, disproportionately assumed by women, restricted their participation in digital learning and training during the health crisis (Eynon, 2023; Braverman-Bronstein *et al*., 2023).

Despite governmental initiatives, such as the National Financial Inclusion Strategy and rural connectivity programs, the integration of a gender perspective in Peru's digital public policies remains limited (Ticona Machaca *et al*., 2024). Empirical research on the

gender digital divide in Peru is still scarce and fragmented, limiting the design of effective and sustainable interventions (Ancheta-Arrabal; Pulido-Montes; Carvajal-Mardones, 2021).

This study aims to analyze the evolution of the gender digital divide in Peru from 2012 to 2022, using international indicators and national data to identify advances, stagnations, and persistent challenges. By doing so, the study seeks to provide evidence that can inform public policies aimed at promoting digital equity from a gender-sensitive perspective, thereby contributing to the achievement of the Sustainable Development Goals, particularly SDG 5, which focuses on gender equality and women's empowerment.

2 METHOD

This study adopts a quantitative, descriptive, non-experimental, and retrospective design, based on secondary data obtained from official national sources. Its primary objective was to analyze the evolution of the gender digital divide in Peru over the period 2012 to 2022, with a focus on structural disparities that affect digital inclusion. The main data source was the National Household Survey (ENAHO), conducted annually by the National Institute of Statistics and Informatics (INEI) of Peru. ENAHO applies a probabilistic, stratified, and cluster-based sampling design, ensuring representativeness at national, regional, urban, and rural levels. It systematically monitors household-level indicators related to poverty, income, education, employment, and access to public services, providing reliable longitudinal data for policy and academic analysis. In 2021, for instance, 36,856 private households were surveyed nationwide, with 24,064 in urban areas and 12,792 in rural areas.

This study used as its principal reference the official publication Peru: Gender Gaps 2023 (INEI, 2024), which compiles disaggregated data on gender-based disparities derived from ENAHO. The analysis focused specifically on differences in internet use between women and men, considering key dimensions such as area of residence, educational attainment, occupational category, and ethnic background. These dimensions were selected due to their relevance in capturing structural and intersectional inequalities that influence access to and use of digital technologies. All data were retrieved from INEI's official repository and were publicly available, anonymized, and collected through rigorous protocols, which ensured high levels of validity and reliability. Consequently, ethical approval and informed consent were not required, as no identifiable personal data were used in the study.

Descriptive statistical methods were applied to examine trends and patterns over time, allowing for the identification of persistent gaps and contextual variations in digital inclusion by gender. The interpretation of the results was framed within national public policy efforts and the international literature on digital inequality. Although the study did not include inferential or multivariate techniques, it provides a robust empirical foundation for future research that may adopt hypothesis-driven or mixed-method approaches.

One important methodological limitation lies in the absence of qualitative or ethnographic data, particularly from remote Andean and Amazonian regions. These areas often present specific infrastructural and cultural barriers that may not be fully captured by survey instruments, potentially limiting the granularity and contextual depth of the findings. Acknowledging this constraint, the study emphasizes the need for future research to integrate complementary qualitative methodologies that explore the lived experiences of women in these regions and support the development of inclusive and context-sensitive digital policies.

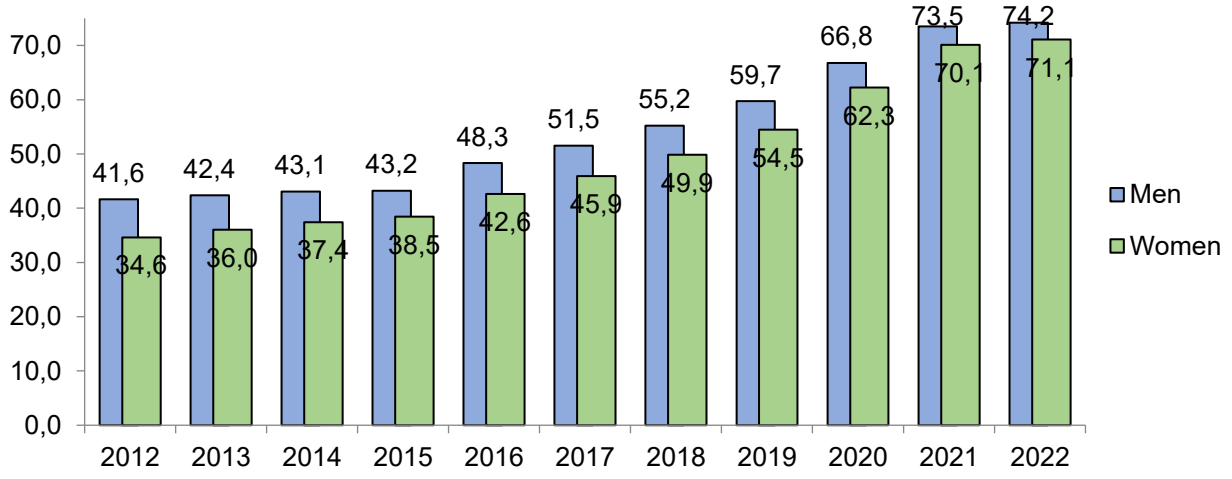
3 RESULTS

3.1 INTERNET USAGE BY WOMEN AND MEN

Technology, particularly Internet access, plays a critical role in promoting social inclusion and equity. It enables access to education, employment, public services, and digital citizenship. However, the extent and conditions under which individuals can benefit from this access vary significantly according to gender and other structural factors. Figure 1 illustrates the evolution of Internet usage in Peru by gender between 2012 and 2022. During this period, both male and female Internet use increased steadily, reflecting broader improvements in national connectivity and ICT infrastructure.

In 2012, only 41.6% of men and 34.6% of women reported using the Internet. This 7-percentage-point difference marked a clear gender gap at the beginning of the observed period. From 2013 to 2016, the increase in connectivity was gradual for both groups, maintaining a relatively stable gap. Between 2017 and 2020, Internet usage expanded at a faster pace, and a notable acceleration occurred between 2020 and 2021, when female usage rose by nearly 8 percentage points in a single year. This sharp rise suggests a period of intensified digital integration for both men and women.

Figure 1 - Internet Use by Women and Men in Peru, 2012 – 2022 (Percentage)



Source: INEI – National Household Survey (2024).

By 2022, 74.2% of men and 71.1% of women reported using the Internet. Although the gap narrowed to 3.1 percentage points, it remained persistent throughout the entire time series. The convergence is evident, but the fact that male usage consistently stayed above female usage each year indicates that improvements in access have not been fully equitable. The difference, while reduced in magnitude, remained steady in direction.

Beyond the percentages, the figure also suggests a few relevant dynamics. First, the gap never reverses, women never surpass men in usage during the entire period, showing a consistent trend. Second, the steeper increases observed from 2019 onward, especially between 2020 and 2021, may indicate the influence of external conditions that pushed digital access to the forefront. Third, the relatively smaller year-over-year changes between 2012 and 2016 suggest that structural barriers may have slowed early adoption for both groups.

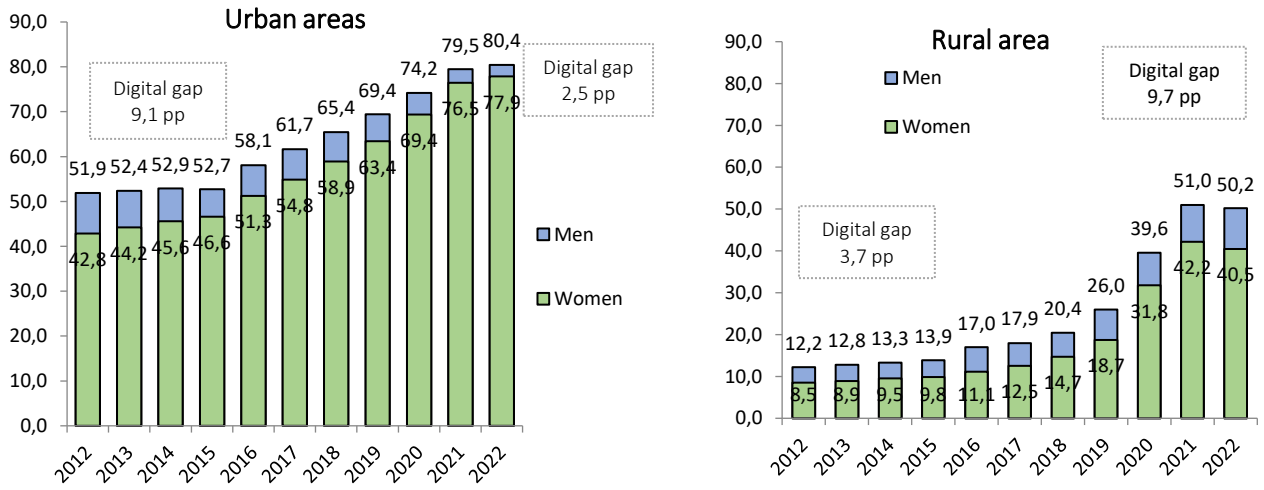
Although the trajectory is positive, the remaining gap reflects that full parity in Internet usage was not achieved by 2022. The consistent lag in female adoption, even when narrowing, implies the existence of differential constraints not visible in the figure but evident in the repeated outcome. In short, while both genders experienced progress, the pace and depth of that progress were not entirely the same.

Despite national improvements in Internet access, the persistence of gender gaps suggests that deeper social norms continue to shape digital behaviors. As noted by Pérez-Escoda, Lena-Acebo and García-Ruiz (2021), in some households, women may have nominal access to connectivity but relinquish device use to male family members, limiting their effective participation in the digital environment.

3.2 INTERNET USE BY WOMEN AND MEN, BY AREA OF RESIDENCE

Access to Internet services in Peru differs significantly depending on the area of residence. Urban populations generally show higher levels of connectivity than rural ones, and gender disparities follow distinct patterns within each context. Figure 2 illustrates the evolution of Internet usage by men and women in urban and rural areas from 2012 to 2022, allowing for a clear comparison of progress and gaps over time.

Figure 2 - Internet Use by Women and Men in Peru, by Area of Residence 2012 – 2022



Source: INEI – National Household Survey (2024).

In urban areas, male Internet usage increased from 51.9% in 2012 to 80.4% in 2022, while female usage rose from 42.8% to 77.9% during the same period. The gender gap, initially 9.1 percentage points in 2012, gradually declined to 2.5 points by 2022. The reduction was steady, especially after 2016, as both groups showed parallel growth. Between 2019 and 2022, adoption surpassed 70% for both sexes, indicating that urban environments have reached high levels of digital access with only a minimal gap remaining.

The rural trend contrasts notably, thus, male Internet usage rose from 12.2% in 2012 to 50.2% in 2022, and female usage from 8.5% to 40.5%. While both groups improved substantially, the gender gap widened over time, from 3.7 percentage points in 2012 to 9.7 in 2022. The most significant increases occurred between 2019 and 2021: rural male usage jumped from 26.0% to 51.0%, while female usage rose from 18.7% to 42.2%. However, by 2022, a slight decline was observed in both groups, and the gap remained practically

unchanged. Unlike the urban setting, rural women's progress did not keep pace with that of men, particularly in the second half of the period.

This comparison highlights two central dynamics. First, the urban gender gap narrowed as overall usage rose, suggesting a more balanced expansion of digital access. Second, the rural gap not only persisted but widened, indicating uneven progress in gender inclusion. While urban women reached 77.9% in 2022, rural women were still at 40.5%, less than half. This divergence underscores the compounded disadvantage faced by rural women in terms of digital access.

These findings are consistent with evidence from other contexts, such as China, where Internet usage disparities by gender are also more pronounced in rural areas, reflecting deeper structural inequalities that limit women's digital integration (Gao; Liu, 2023). This observation also aligns with broader findings from low- and middle-income countries, where rural women face the greatest combination of access, financial, and sociocultural barriers to meaningful digital inclusion (Bünning *et al*., 2023).

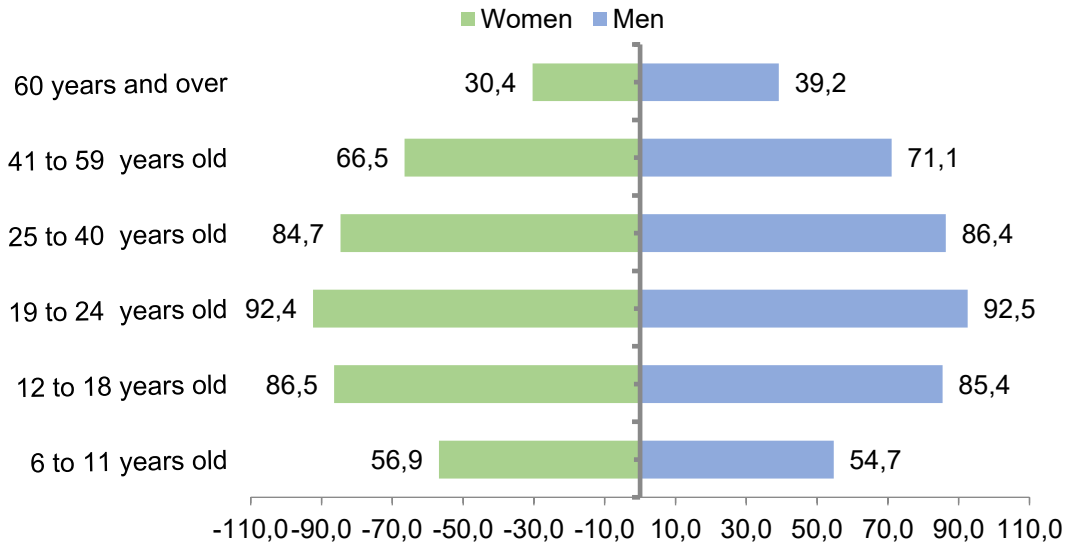
In summary, although connectivity has improved across all groups, women in rural areas remain the furthest behind. The data suggest that area of residence continues to be a strong determinant of digital access, and that gender inequalities are more pronounced in rural environments where structural barriers remain unresolved.

3.3 INTERNET USE BY WOMEN AND MEN, BY AGE GROUPS

Internet usage in Peru during 2022 exhibits significant variation across age groups, with gender gaps fluctuating in both direction and magnitude depending on the stage of life. Figure 3 presents a comparative view of Internet use among men and women by age bracket, revealing a general trend of high connectivity in younger populations and wider gender disparities in older ones.

In the youngest group (6 to 11 years old), usage is relatively balanced: 56.9% of girls and 54.7% of boys reported using the Internet, indicating a slight advantage for girls of 2.2 percentage points. Among adolescents aged 12 to 18, the difference reverses, though marginally: 86.5% of girls and 85.4% of boys use the Internet, resulting in a gap of 1.1 points favoring females. These minimal differences suggest near parity in digital access for school-age children and teenagers, likely influenced by educational integration of technology and household-level support.

Figure 3 - Women and Men Using the Internet by Age Groups in Peru, 2022 (Percentage)



Source: INEI – National Household Survey (2024).

In the 19 to 24 age group, Internet usage peaks, reaching 92.4% for women and 92.5% for men, a virtual tie. The 25 to 40 bracket also shows very high usage: 84.7% among women and 86.4% among men, with a modest gap of 1.7 percentage points favoring men. In both cases, the data reflect widespread digital adoption during working and higher-education ages, with only minor differences between genders.

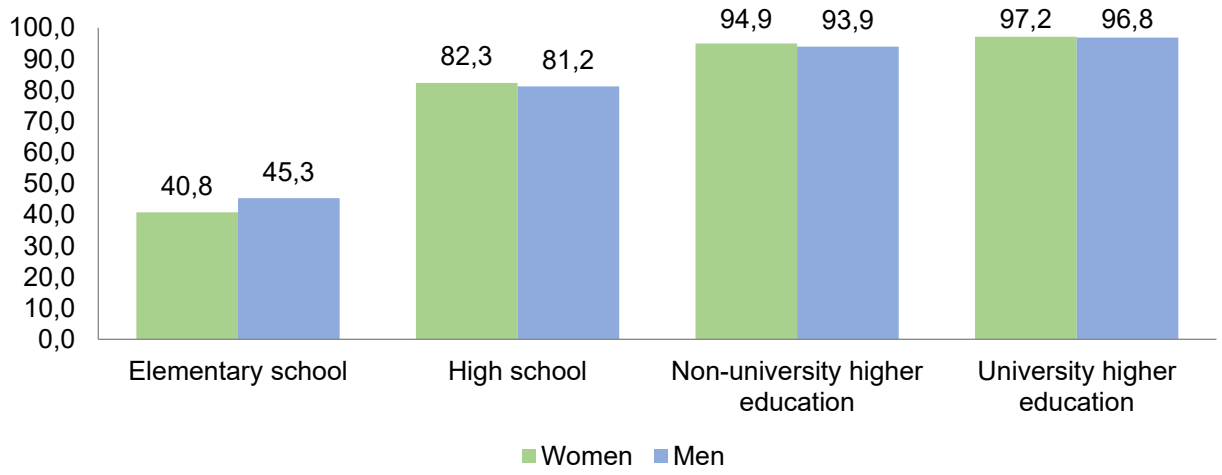
The gap becomes more visible in older groups. Among those aged 41 to 59, 71.1% of men and 66.5% of women report Internet use, a gap of 4.6 percentage points. This disparity increases notably in the 60 and over group, where only 30.4% of women are connected, compared to 39.2% of men. The resulting gap of 8.8 points is the widest among all age segments, indicating that older women remain disproportionately excluded from digital environments. These findings are consistent with qualitative research, by instance, in Chile, where older rural women reported lower digital confidence and often delegated technology-related tasks to younger family members due to limited digital literacy (Artiles-Rodríguez *et al*., 2024).

Overall, the figure reveals three key insights. First, Internet access is nearly universal among young and middle-aged adults, with gender gaps under 2 percentage points up to age 40. Second, gender parity is strongest in adolescence and early adulthood. Third, digital exclusion intensifies among older adults, particularly women over 60, highlighting generational and gendered barriers that persist despite national progress in connectivity.

3.4 INTERNET USE BY WOMEN AND MEN, BY EDUCATIONAL LEVEL

Internet usage in Peru during 2022 increases progressively with higher levels of education for both men and women, with gender gaps that shift in direction and intensity depending on the educational category. Figure 4 presents Internet usage rates by gender across four educational levels, providing a clear view of how access evolves with schooling.

Figure 4 - Internet Use by Women and Men in Peru, by Educational Level, 2022 (Percentage)



Source: INEI – National Household Survey (2024).

The data show that among individuals with only elementary education, Internet use is low for both sexes, particularly for women. Only 40.8% of women in this group report using the Internet, compared to 45.3% of men, resulting in the widest gender gap across all categories: 4.5 percentage points in favor of men. This suggests that limited schooling is associated with reduced access, especially for women, who may face additional structural or cultural barriers. This pattern echoes findings from (Gao; Liu, 2023), who observed that women with lower educational attainment benefit less from digital access, exacerbating inequalities in digital engagement. Bünning *et al*. (2023) emphasize that lower educational levels not only limit access but also digital autonomy, with women often lacking the skills and support needed to benefit fully from available connectivity.

At the high school level, access improves significantly. Internet usage rises to 82.3% for women and 81.2% for men. This small reversal, with a 1.1 point advantage for

women, marks a shift toward greater parity, likely influenced by the increasing integration of digital tools into secondary education and everyday life.

The trend continues in non-university higher education, where usage reaches 94.9% for women and 93.9% for men. The gender gap remains minimal and again favors women by 1 percentage point, indicating a high degree of digital inclusion in this category for both sexes.

At the university level, Internet usage becomes nearly universal, reaching 97.2% among women and 96.8% among men. The difference of 0.4 points is negligible, showing that gender disparities in digital access are virtually eliminated at the highest educational tier.

In summary, the data confirm two patterns: Internet use increases steadily with higher educational attainment, and gender gaps diminish and even reverse as education progresses. While men hold a clear advantage at the lowest level, women equal or surpass them in all subsequent categories. These findings highlight the essential role of education in bridging the digital divide and achieving gender equity in connectivity.

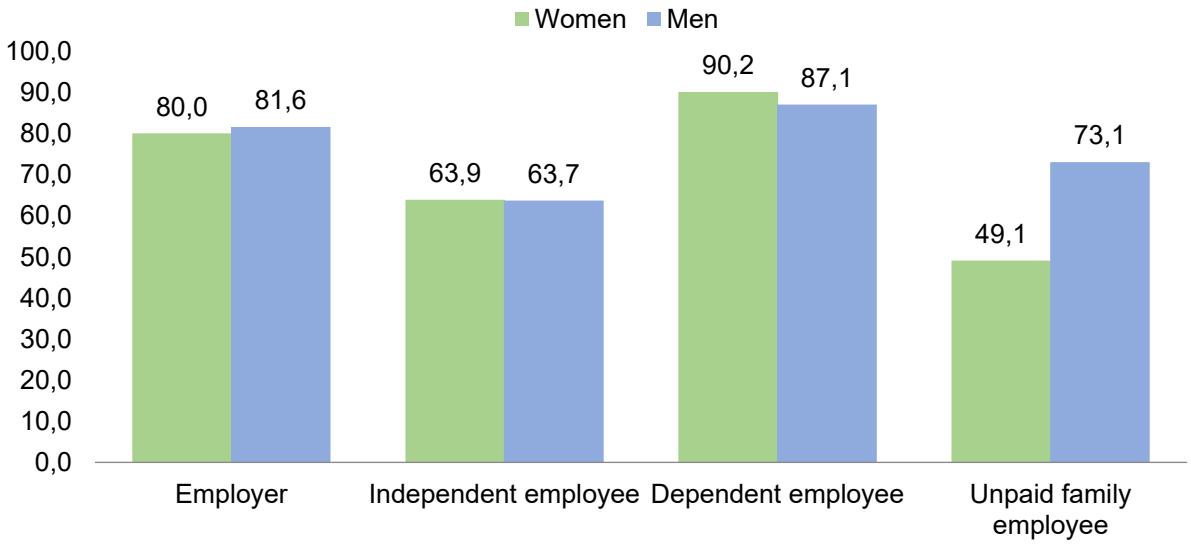
3.5 INTERNET USE BY WOMEN AND MEN, BY OCCUPATION CATEGORY

Occupational category is another important factor that influences Internet usage in Peru. Figure 5 presents digital access levels among women and men across four types of occupational status, allowing for a comparative view of how work roles relate to online connectivity.

The data show marked differences in Internet use depending on occupational status, with the largest gender gap occurring among unpaid family workers. In this group, only 49.1% of women report using the Internet, compared to 73.1% of men, a disparity of 24 percentage points. This notable gap suggests significant barriers to connectivity among women in informal or non-remunerated labor settings.

Among employers, Internet use is high for both genders, though slightly higher for men (81.6%) than for women (80.0%), resulting in a narrow gap of 1.6 percentage points. The small difference in this category may reflect similar digital demands among business owners, regardless of gender.

Figure 5 - Internet Use by Women and Men by Occupation Category in Peru, 2022



Source: INEI – National Household Survey (2024).

In the case of independent workers, usage rates are nearly identical: 63.9% for women and 63.7% for men. This parity suggests that self-employed individuals, despite possible variations in sector and scale, engage with digital tools at comparable levels.

Interestingly, the pattern reverses among dependent (salaried) employees. Here, women report a higher Internet usage rate (90.2%) than men (87.1%), resulting in a gap of 3.1 percentage points in favor of women. This is the only category where women surpass men, indicating that formal employment, often associated with stable access to infrastructure, equipment, and training, may provide more consistent digital opportunities for female workers.

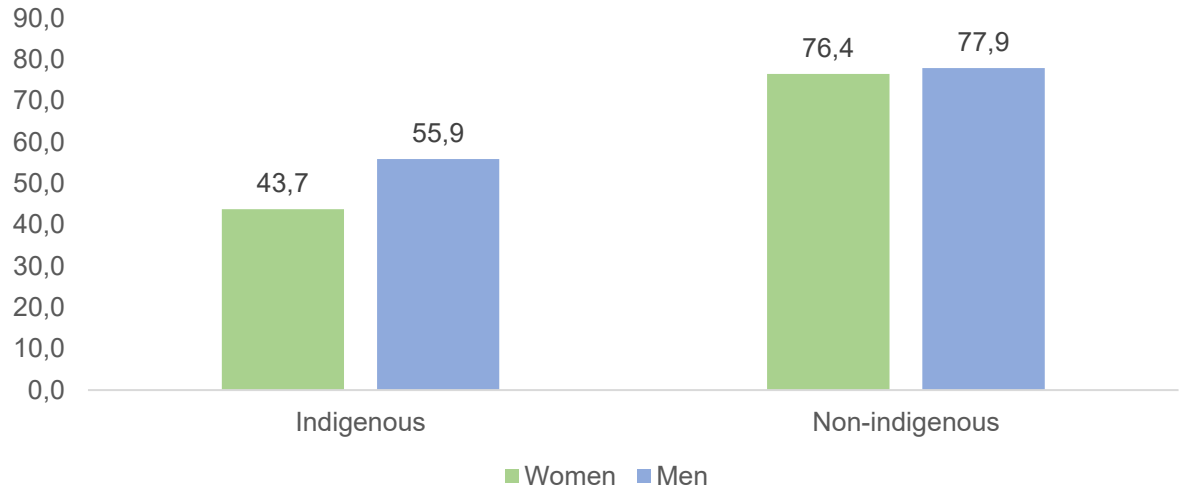
Similarly, Gao and Liu (2023) found that occupational role mediates digital outcomes, with women in informal sectors or unpaid roles experiencing limited benefits from Internet use compared to their male peers.

In summary, Figure 5 illustrates how occupational status is closely linked to Internet usage, and how this relationship interacts with gender. While men generally report higher digital access in unpaid and employer roles, women show equal or greater usage in formal employment contexts, particularly as salaried workers. These patterns underscore the uneven distribution of digital access across labor categories and highlight areas where targeted interventions could help close persistent gender gaps.

3.6 INTERNET ACCESS BY ETHNIC CONDITION

Ethnic background remains a powerful determinant of digital access in Peru. Differences in connectivity between Indigenous and non-Indigenous populations reflect long-standing structural inequalities that intersect with geography, socioeconomic status, and access to education and infrastructure. Figure 6 presents the rates of Internet use among women and men according to ethnic condition, highlighting significant disparities between both groups.

Figure 6 - Internet Use by Women and Men by Ethnic Condition in Peru, 2022 (Percentage)



Source: INEI – National Household Survey (2024).

The data reveal a wide gap in Internet usage between Indigenous and non-Indigenous populations, with Indigenous individuals experiencing much lower levels of connectivity. Among Indigenous men, 55.9% report using the Internet, while only 43.7% of Indigenous women do so. This 12.2-point gender gap is the widest observed in any of the sociodemographic categories analyzed so far, indicating a compounded disadvantage for Indigenous women.

In contrast, Internet usage among non-Indigenous individuals is significantly higher and nearly equal between genders. Non-Indigenous men report a usage rate of 77.9%, while non-Indigenous women reach 76.4%, with a minimal gender gap of just 1.5 percentage points. These figures suggest a much more balanced level of access within this population group.

The contrast between the two groups points to the persistence of a double digital divide for Indigenous women, one based on ethnicity and another on gender. While non-Indigenous women approach parity with their male counterparts, Indigenous women continue to face substantial barriers to digital inclusion. The overall difference between Indigenous women (43.7%) and non-Indigenous men (77.9%) represents a striking 34.2-point gap, illustrating the magnitude of exclusion still present in certain population segments.

Similar dynamics have been observed in other sociocultural contexts, where Indigenous or minority women often experience lower autonomy over digital devices. In rural households, for instance, women frequently report limited control over shared technologies, with usage often prioritized for male family members (Pérez-Escoda; Lena-Acebo; García-Ruiz, 2021).

In sum, Figure 6 underscores that while gender gaps in digital access may be narrowing in some areas, they remain deeply entrenched when intersected with ethnic inequalities. Addressing these disparities requires not only broader connectivity strategies but also targeted support for historically marginalized communities.

4 CONCLUSIONS

This study provides a comprehensive examination of the gender digital divide in Peru over the past decade, revealing important patterns and persistent disparities that transcend national connectivity advances. While the overall gender gap in Internet access has decreased — from 7.0 percentage points in 2012 to 3.1 points in 2022 — the data show that this progress has not been evenly distributed across all population groups.

The most significant inequalities are concentrated in rural and Indigenous populations, where women remain disproportionately excluded from digital environments. In rural areas, the gender gap widened to 9.7 percentage points in 2022, and among Indigenous populations, the difference between women and men reached 12.2 points. These findings highlight the continued intersection of gender, geography, and ethnicity as critical barriers to digital inclusion. They also underscore the urgency of addressing contextual vulnerabilities that limit access, especially in non-urban and marginalized communities.

Educational attainment plays a key role in closing the digital divide. Women with higher levels of education — both university and non-university — exhibit Internet usage

rates equal to or higher than their male counterparts. This suggests that equitable access to education not only enhances digital engagement but also helps reverse traditional patterns of gender exclusion. However, the substantial gap observed among women with only elementary education signals that low educational attainment remains a strong predictor of digital disconnection.

Occupational status further illustrates how structural positioning affects connectivity. Women in salaried employment report higher Internet usage than men in similar roles, reflecting the enabling role of formal work environments. In contrast, unpaid family workers — most of whom are women — show the lowest access levels, reinforcing the digital invisibility of those in informal or non-remunerated labor.

Taken together, these findings emphasize that Peru's progress toward digital equity is real but uneven, shaped by a matrix of intersecting social determinants. Public policy must move beyond aggregate connectivity indicators and prioritize inclusive strategies that address educational, occupational, geographic, and ethnic disparities. This includes expanding rural infrastructure, subsidizing access for vulnerable populations, and delivering culturally and contextually relevant digital literacy programs. Special attention should be placed on Indigenous women, who remain at the intersection of the most acute forms of digital exclusion.

Finally, the study contributes empirical evidence to ongoing debates on gender and technology in the Global South. Its insights serve as a valuable resource for policymakers, educators, and development practitioners seeking to implement targeted and effective interventions. Advancing digital inclusion in Peru requires sustained, multisectoral action informed by evidence and grounded in equity.

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