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Digital Inclusion and Gender: A Cross-Country Analysis across Very High Human Development European Countries

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Abstract

Digital inclusion has emerged as a major element of human development in the current digital era, shaping access to information, economic opportunities, and social participation. Despite this, gender-based differences in internet use remain a concern in many parts of the world. Most existing studies focus on developing or low-income countries. Less attention has been given to European countries that already have very high levels of human development. This study aims to fill this research gap by examining the extent to which gender parity in basic internet usage has been achieved across 33 European countries classified as Very High Human Development Index (HDI) countries by the United Nations Development Programme (UNDP). Secondary data used for the analysis were collected from Eurostat, the official statistical office of the European Union. Data for 2023 were used because they were the latest available data. The Shapiro-Wilk test was used to check normality, and the results showed a statistically significant result ($p = 0.001$), indicating that the results showed that the difference in internet usage between men and women was not statistically significant ($Z = -1.689$, $p = 0.091$). Men recorded comparatively higher usage in 21 out of the 33 countries, while women recorded higher internet usage in 12 countries. The average difference was only 0.61 percentage points. The small difference indicates that countries with very high human development are already performing better with regard to internet usage and are more or less attaining gender parity.

Keywords: digital divide; Internet usage; Gender parity; Shapiro-Wilk test; Wilcoxon Signed-Rank test.

Introduction

In the current digital era, digital inclusion has become a crucial element of human development, influencing access to information and services and enabling people to participate in social and economic life. Historically, literacy has been seen as a major driver of development. However, as technology has developed, this idea has expanded to include digital literacy as a necessary skill. Digital literacy plays an important role in inclusive development because it goes beyond technical skills and includes the knowledgeable

and efficient use of online services such as banking, education, employment platforms, e-governance and digital commerce (American Library Association, n.d.).

A major concern is whether men and women have equal opportunities to access and use digital technologies and the internet. These disparities are more evident in lower-income countries, where lower education levels, limited financial resources, and social norms may discourage women from using technology (Singh, 2017).

From the available secondary sources of data, gender differences in internet usage tend to be relatively small in highly developed countries, particularly in many European countries (Broadband Commission for Sustainable Development, n.d.). This is associated with factors such as better education, stronger institutional frameworks, higher per capita income, better standards of living, and well-developed digital infrastructure (International Telecommunication Union, 2024). However, empirical research examining the extent to which countries with very high levels of human development have achieved gender parity in internet usage remains limited. Therefore, this study examines gender differences in internet usage across individual countries within this development context.

Objectives

1. To examine the level of internet usage among men and women in Very High HDI European countries.
2. To assess the normality of gender-based differences in internet usage.
3. To determine whether there is a statistically significant difference in internet usage between men and women in the selected countries.

Literature Review

Digital divide refers to the differences in access to information and communication technology and the use of the internet for a wide variety of activities among individuals, households, businesses and geographic areas at different socio-economic levels (Understanding the Digital Divide, 2001). Over time, researchers acknowledged that mere access to the internet is not enough. Therefore, scholars now mainly discuss three levels of digital inequality. The first level refers to basic access, which means whether a person can connect to the internet. The second level includes the skills people have and the quality of their engagement with the internet. The third level refers to the outcomes people gain from using the internet, such as economic benefits or improved well-being (Ferreira et al., 2021; Kajal Shaw, 2025). The present study focuses only on the first level, that is, basic internet access. However, gender parity at the first level does not necessarily mean that men and women benefit equally from the internet. Differences may still exist at the second and third levels. Warschauer argued that social inclusion is not limited to physical access to technology. It also depends on how people use digital tools in meaningful ways, along with factors such as education, institutional support and the social context. From a development perspective, unequal access to digital technologies can further deepen existing inequalities in income, employment and human capital (Warschauer, 2003).

One of the consistent dimensions of digital inequality is gender. In many developing countries, women mainly face financial, cultural, social, and structural barriers that limit their use of digital technologies. Social norms can outweigh technical barriers, contributing to digital exclusion among women (Antonio & Tuffley, 2014). This claim is supported by the study of Gupta et al. (2023), which examined gender differences in internet usage across Indian states. The study found that 63.06% of men had ever used the internet, compared with 40.65% of women. It also observed that gender disparity was greater in rural areas than in urban areas.

While inequalities in accessing digital technologies are more evident in developing countries, the situation might be different in higher-income and developed countries, where access to digital technology is more widespread. In the European Union context, a study was conducted considering age, education, gender, and income, and found that education was an important factor influencing e-service adoption, while age had a greater influence on social network adoption (Elena-Bucea et al., 2021). Supporting this statement, another study was also conducted concerning the European Union, which identified different groups of internet users based on frequency of access, means of access, and online activities. The findings revealed that digital participation varies across countries and socio-demographic groups. Therefore, although European countries generally have higher levels of digital participation, differences in internet use can still be observed across different European countries (Gomes & Dias, 2025).

There are still limited studies specifically focusing on European countries with a Very High HDI. The present study tries to fill this gap.

Methodology

This study uses a quantitative cross-sectional approach. Secondary data were used for the analysis and were taken from Eurostat, the official statistical office of the European Union.

The UNDP Human Development Report 2025 reports HDI values for 2023, in which 43 European countries fall under the very high HDI category. This study only takes 33 of them because gender-disaggregated internet usage data were not available for all of them. Eurostat data for 2023 were used so that the HDI values and the internet usage figures refer to the same year.

Two main variables used in this study are internet usage by men and women. Both are the percentage of individuals aged 16 to 74 who used the internet in the last 3 months. One limitation is that the data are country-level; they are not broken down by age group, region within the country, or income group.

Descriptive statistics were calculated for both variables. A difference variable was computed by subtracting women's internet usage from men's internet usage. Normality was tested using the Shapiro-Wilk test. Since the normality assumption was violated, the Wilcoxon Signed-Rank Test was used, because it does not require the differences to be normally distributed. The significance level was set at 5% ($p<0.05$). All analyses were

done using IBM SPSS Statistics.

Results and Discussion

Table 1. HDI classification and Internet usage

HDI Rank	Country	HDI Score	Men Internet Usage (%)	Women Internet Usage (%)
2	Norway	0.97	99.7	99.66
2	Switzerland	0.97	99.47	99.04
4	Denmark	0.962	98.86	98.73
5	Germany	0.959	93.47	91.48
5	Sweden	0.959	97.59	97.6
8	Netherlands	0.955	99.18	99.12
10	Belgium	0.951	94.55	94.7
11	Ireland	0.949	97.38	89.36
12	Finland	0.948	97.68	97.71
21	Slovenia	0.931	90.9	89.83
22	Austria	0.930	96.51	94.17
24	Malta	0.924	91.43	94.4
25	Luxembourg	0.922	99.38	99.31
26	France	0.920	92.14	93.48
28	Spain	0.918	95.27	95.62
29	Czechia	0.915	92.35	91.75
29	Italy	0.915	87.9	85.95
32	Cyprus	0.913	90.62	91.78
34	Greece	0.908	85.24	84.79
35	Poland	0.906	86.11	86.7
36	Estonia	0.905	91.93	94.39
39	Lithuania	0.895	86.12	90.69
40	Portugal	0.89	86.63	85.02
41	Croatia	0.889	86.93	79.96
41	Latvia	0.889	92.16	92.48
44	Slovakia	0.88	87.35	87.08
46	Hungary	0.87	91.11	91.77
48	Montenegro	0.862	88.72	87.87
55	Bulgaria	0.845	81.04	79.76
55	Romania	0.845	89.97	88.48
62	Serbia	0.833	86.19	84.56
71	Albania	0.81	84.59	81.72
74	Bosnia & Herzegovina	0.804	83.72	83.01

Source: Secondary data from UNDP HDR report 2025 and Internet usage data from Eurostat (2023)

Table 1 represents the 33 European countries that belong to the Very High HDI category of the UNDP Report 2025. Countries are arranged in descending order according to

their HDI rank, and gender-disaggregated internet usage is greater than 80% in all countries, with Norway and Switzerland having the highest internet usage and Albania and Bosnia & Herzegovina having the lowest usage.

Table 2. Descriptive Statistics

Variable	N	Mean (%)	SD	Min (%)	Max (%)
Internet Usage (Men)	33	91.58	5.30	81.04	99.70
Internet Usage (Women)	33	90.97	5.85	79.76	99.66
Difference (Men's internet usage minus Women's internet usage)	33	0.61	2.33	-4.57	8.02

Source: Authors' calculation based on Eurostat data (2023) using IBM SPSS Statistics

Table 2 shows that internet usage is high for both men and women in all 33 selected European countries. The average internet usage is 91.58 per cent for men and 90.97 per cent for women. The mean difference of 0.61 percentage points shows that men use the internet only slightly more than women across these countries, which is a very small gap. The standard deviation is slightly higher for women (5.85) than for men (5.30), which means there is a bit more variation in female internet usage rates across countries. The negative minimum value of -4.57 indicates that in at least one country, women use the internet more than men.

Table 3. Skewness, Kurtosis, and Shapiro-Wilk Test Results for the Difference Variable

Variable	Skewness	Kurtosis	W	N	p-value
Difference (Men minus Women)	1.188	3.939	0.870	33	0.001

Source: Authors' calculations using IBM SPSS Statistics

In order to check the normality of the difference variable (men's internet usage minus women's internet usage), the Shapiro-Wilk test was used. The null hypothesis states that the difference variable follows a normal distribution, whereas the alternative hypothesis states that it does not follow a normal distribution. The test result shows that the difference variable is not normally distributed because the p-value is 0.001, which is less than 0.05. So, we reject the null hypothesis and accept the alternative hypothesis. Also, the distribution of the differences is positively skewed; skewness is equal to 1.188 and has a positive excess kurtosis value of 3.939, indicating a departure from normality. The differences range from -4.572 to 8.02 percentage points, suggesting variation in the direction and magnitude of the gender gap across countries. Since the normality assumption was violated, the alternative to the parametric paired-sample t-test, the nonparametric Wilcoxon Signed- Rank test was used.

Table 4. Wilcoxon Signed-Rank Test Results

Ranks and Test Statistics	N
Negative Ranks (Women< Men)	21
Positive Ranks (Women>Men)	12
Ties (Women = Men)	0
Total	33
Z	-1.689
p (two–tailed)	0.091

Source: Authors' calculations using IBM SPSS Statistics

Table 4 shows the results of the Wilcoxon Signed-Rank Test. The null and alternative hypotheses were set as follows:

H_0: There is no statistically significant difference in internet usage between men and women.

H_1: There is a statistically significant difference in internet usage between men and women.

In 21 countries, women's internet usage was lower than men's, while in 12 countries, women used the internet more than men. Countries where women exceed men include Belgium, Cyprus, Estonia, Finland, France, Hungary, Latvia, Lithuania, Malta, Poland, Spain, and Sweden. These are mostly Northern and Western European countries known for strong gender equality policies and high levels of education among women.

There was no tie between men and women in internet usage in the European countries. Here, the p-value is 0.091, which is greater than 0.05. So the null hypothesis is not rejected, which means there is no statistically significant difference in internet usage between men and women. Overall, the difference was not statistically significant. Although some differences in internet usage were observed across individual countries, the differences were relatively small.

Conclusion

This study assessed gender differences in basic internet usage across 33 European countries belonging to the Very High HDI category. The results showed that internet usage was above 80% in all the selected countries, and the differences in internet usage across countries were relatively small. The normality assumption was violated, and therefore, a non-parametric test was used for the analysis. The Wilcoxon Signed-Rank Test was used, and the results revealed that there was no statistically significant difference in internet usage between men and women. The findings revealed that Very High HDI European countries have largely achieved gender parity in basic internet access.

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