SCHOOL OF ECONOMICS AND MANAGEMENT

Bachelor of Science in Development Studies

Tunisia's Gender Digital Divide

A Case Study of Tunisia's Gender Gap in Internet Usage and the Role of Demographic and Socioeconomic Factors

by

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Today, the digital transformation provides new avenues for women's empowerment. Information and communication technologies (ICTs), including the internet, can contribute to greater gender equality by enabling everyone access to the same online resources and opportunities. Yet, the prevalence of a gender digital divide means that many women, not least in Tunisia and the Middle East and North Africa (MENA) region, still remain on the outside of the digital world. Indeed, despite Tunisia's comparative progress in terms of women's rights, Tunisian women's digital participation still lags behind. This thesis aims to explore gender differences in internet usage in Tunisia and how these are associated with demographic and socioeconomic factors, by mapping out trends following the end of the Arab Spring until the onset of the COVID-19 crisis. The study connects an analysis of descriptive statistics to the academic discussion on the gender digital divide and is guided by a feminist approach and a gender analysis framework. It is found that Tunisia's gender gap in internet usage is the most pronounced among the less educated, the elderly, lower income individuals and people in rural areas. The thesis also finds that access to mobile phones likely impacts individuals' access to the internet. In light of these findings, targeted policy measures aimed at improving internet access among women in these demographic and socioeconomic groups is considered necessary in order to reduce the country's gender digital divide.

Key words: *Gender digital divide, MENA, ICTs, gender equality, digital transformation, internet*

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List of Abbreviations

EIGE	European Institute for Gender Equality
EU	European Union
GU	University of Gothenburg
ICPSR	Inter-university Consortium for Political and Social Research
ICT	Information and Communications Technology
ITU	International Telecommunication Union
Jhpiego	Johns Hopkins Program for International Education in Gynecology and Obstetrics
MENA	Middle East and North Africa
OECD	Organisation for Economic Co-operation and Development
OHCHR	Office of the United Nations High Commissioner for Human Rights
SDG	Sustainable Development Goal
STEM	Science, technology, engineering and mathematics
UI	Utrikespolitiska institutet
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNICEF	United Nations Children's Fund
UN	United Nations

Figures and Tables

1. Introduction

The world is experiencing a profound digital transformation due to technological advancements seen over the past decades, with approximately 63 percent of the global population now online (ITU, 2021a). Information and communication technologies (ICTs) and the internet have become essential for the provision of basic services, education, employment and social interaction. In the context of the COVID-19 crisis, digital platforms and services have significantly helped to mitigate economic, social and health-related costs. Meanwhile, the pandemic has also highlighted, and exacerbated, the costs of digital exclusion (ibid.). The internet has further been celebrated as an engine for equality, given "its potential to expand opportunities across all segments of society, accelerate upward social mobility, and lend voice and platforms to marginalized groups" (Raz, 2020). However, these technologies can also fuel inequality, as some people risk being left behind (UN, n.d.a). This is particularly apparent in the context of gender equality, where a so-called gender digital divide has been observed. In 2020, 62 percent of all men were using the internet, compared to 57 percent of all women globally. In Africa, the Asia-Pacific region and the Arab States, this divide is especially pronounced (ITU, 2021b). The gender digital divide hinders women from integrating into the digital world, leaving them unable to access essential services and information, participate in the digital economy and engage in social networks (UN Women, 2021a). Women in the Middle East and North Africa (MENA) region are especially exposed to these risks, with the region seemingly having the largest gender gap in internet usage globally (Farley & Langendorf, 2021; ITU, 2021b). Despite decades of increasing internet penetration, the proliferation of mobile phones and an expanding internet culture, women in the region are still 12 percent less likely than men to use the internet (Farley & Langendorf, 2021; Raz, 2020). This divide is also present in Tunisia, despite the country being on the forefront in the region in terms of women's rights (Verheijen, 2020). In fact, data from the Arab Barometer, a central resource for quantitative research on the MENA region, suggests that Tunisia experienced the largest gender gap in internet usage across the region in 2018 (Raz, 2020). While a range of factors contribute to the gender digital divide, including barriers to access, education and skills as well as sociocultural biases (OECD, 2018; UNICEF, 2021a; Farley & Langendorf, 2021), disparate rates of internet usage have also been identified along demographic and socioeconomic lines (Raz, 2020; Web Foundation, 2020; ITU 2021a). It is

against this background that this study aims to better understand how demographic and socioeconomic factors are associated with Tunisia's digital gender divide, by mapping out trends from the end of the Arab Spring until the beginning of the COVID-19 crisis. The gender digital divide cannot be closed if its complexities cannot be understood. As emphasised by Doreen Bogdan-Martin, Director of the ITU Telecommunication Development Bureau, "we cannot connect the unconnected if we do not know who they are, where they live, and why they remain offline – nor can we measure the success of our policies to bridge the gap" (ITU, 2021a).

1.1 Aim of the Study

The aim of this study is to explore gender differences in internet usage in Tunisia and how these are associated with demographic and socioeconomic factors. In this manner, the identification of groups who are particularly exposed to the gender digital divide can be achieved. In order to not solely provide a snapshot of the present-day situation, the research incorporates data over the period 2013-2020, following the end of the Arab Spring until the onset of the COVID-19 pandemic. The data consists of quantitative data collected by the Arab Barometer. The research is moreover guided by a feminist approach and the data analysis is conducted within a gender analysis framework. The study connects an analysis of descriptive statistics to the academic discussion on the gender digital divide. In order to fulfil the aim of the study, the following research question is posed:

> *How have gender differences in internet usage in Tunisia been associated with demographic and socioeconomic factors over the period 2013-2020?*

1.2 Relevance

While there is a growing body of research on the gender digital divide across the world (ITU 2021b; OECD, 2018; UNICEF, 2021a; Web Foundation, 2020), the case of Tunisia remains particularly under-researched. Research tends to focus on the MENA region as a whole, which, on the one hand, provides valuable insights into common patterns, but, on the other hand, may lack country-specific information. This becomes especially relevant as Tunisia seemingly experienced the largest gender gap in internet usage across the region in 2018 (Raz, 2020),

despite being on the forefront among MENA countries in terms of gender equality (Verheijen, 2020). In addition, scholars have hitherto paid more attention to linkages between the usage of ICTs and economic benefits in the context of the MENA region and Tunisia (Youssef, 2021; Kouadri & Cherif, 2020; Shehata, 2017) than on linkages between the usage of ICTs and gender equality. Meanwhile, the importance of this relationship continues to grow as the digital transformation continues to accelerate, not least as a result of the COVID-19 crisis. Addressing the gender digital divide is therefore crucial if the benefits of ICTs to gender equality and women's empowerment are to be achieved. This is particularly reflected in Sustainable Development Goal (SDG) 5 on gender equality, which includes a specific target on utilising technology and ICTs to realise the empowerment of women and girls. Not only do ICTs offer vast potential for women in regard to poverty reduction, the creation of decent jobs and the improvement of education and health, but women's digital participation is critical throughout the 2030 Agenda for Sustainable Development (UN Women, 2017). By shedding light on the case of Tunisia and on the role of demographic and socioeconomic factors, the study aims to contribute to the academic discussion on the gender digital divide in the MENA region. Hopefully, this thesis will provide insightful findings in regard to policy implications that can be of interest to a number of stakeholders. With Tunisia recently having become one of the Global Leaders of the Generation Equality Action Coalitions (UN Women, n.d.a), this study becomes of particular importance.

1.3 Scope and Delimitations

The scope of the study is to explore associations between gender differences in internet usage and demographic and socioeconomic factors in Tunisia over the period 2013-2020. The focus on internet usage in particular stems from internet access and usage often being the focal point of the discussion concerning the gender digital divide. The time frame of the analysis is selected since the country entered a new political era with significant social and economic implications during this period, following the Jasmine Revolution and the Arab Spring (Utterwulghe & Khouja, 2021).

1.4 Definitions

This paper includes a set of recurring concepts which are subject to a variety of interpretations. First, the *gender digital divide* broadly refers to the gap between men and women within four categories: access and use of the internet; digital skills and use of digital tools; participation in STEM (science, technology, engineering and mathematics) fields; and technology sector leadership and entrepreneurship (ITU, 2022a). However, this study investigates the gender gap in internet usage particularly. In order to measure this gap, a gender digital divide (GDD) index has been created, which allows for a quantitative and comparable analysis of the gender gap in daily or weekly internet usage by men and women. Second, in this paper, *digital transformation* refers to the impact of technologies on society in a broad sense (European Parliament, 2022). The *digital economy* furthermore incorporates "all economic activities that result from online interactions between people, businesses, organizations, and data. It is an economy based on access and use of the Internet" (Kwan, 2021). Finally, *women's empowerment* is often regarded as an abstract concept. This paper uses the definition by the European Institute for Gender Equality, where women's empowerment is defined as a "process by which women gain power and control over their own lives and acquire the ability to make strategic choices" (EIGE, 2022). In this sense, emphasis is put on women's right to make their own choices; their access to opportunities and resources; their sense of self-worth; their right to control their own lives; and their ability to influence social, economic and political change (EIGE, 2022).

1.5 Outline of the Thesis

The remainder of the thesis is structured as follows. The second section provides a more detailed background of the topic, including an overview of social, economic and political contexts in Tunisia as well as of the digital transformation that has taken place during recent decades. The third section discusses previous literature on the topic, including literature concerning patterns of gender inequality in Tunisia and the MENA region, the debate on ICTs and women's empowerment and research on the gender digital divide. The fourth section introduces the theoretical framework of the study, which combines a feminist approach and a gender analysis framework. The fifth section explains the methodology of the study and presents the data. The sixth section presents and analyses the results of the study and provides a discussion of these

results in relation to the literature. Finally, the seventh section concludes the thesis by discussing policy implications and providing suggestions for future research.

2. Background

2.1 Social, Economic and Political Contexts

Tunisia, officially the Republic of Tunisia, is part of the Maghreb region of North Africa and home to approximately 11,9 million people (Murphy, 2022). The country gained independence from France in 1956 and became the first country in the MENA region to replace its autocratic regime through a widespread popular uprising in 2011 (OHCHR, 2022a; UI, 2022). The Tunisian revolution, or Jasmine Revolution, which protested against corruption, poverty and political repression, then ignited a series of pro-democracy uprisings across the MENA region, known as the Arab Spring (Utterwulghe & Khouja, 2021). Despite these drastic events, Tunisia was considered as the only democracy to have emerged from the Arab Spring (UI, 2022). Since then, significant progress has been made in terms of political rights, governance and human rights. The adoption of a new Constitution in 2014 has been of particular significance, also having established a gender equality legal framework (UN Women, n.d.a). Yet, despite democratic progress, the country struggles with a number of issues. The economic transition has not kept pace and Tunisians are frustrated by the lack of action by the government to address issues such as high levels of unemployment, especially among the youth, and lingering corruption. For instance, youth unemployment has remained around 35 percent following the end of the Arab Spring (World Bank, 2022a). Political instability and financial constraints further hinder the government from addressing challenging but arguably necessary economic and social reforms, leading to even lower levels of public trust and increased social malaise (Yerkes & Mbarek, 2021; Utterwulghe & Khouja, 2021; Reguly, 2021). The average economic growth between 2011 and 2019 was moreover 1,8 percent in comparison to 4,2 percent between 2000 and 2010 (Utterwulghe & Khouja, 2021). As the COVID-19 crisis hit, Tunisia experienced an even sharper decline in economic growth than most neighbouring countries, at -8,8 percent in 2020, having entered the crisis with slow growth and increasing debt levels (World Bank, 2021). Not least has this disproportionately affected women, among other marginalised groups, who already faced

significant challenges in social, economic, political as well as technological domains (UN Women, n.d.a).

2.2. Digital Transformation

Over the past decades, the world has been experiencing a digital transformation that is changing societies and economies at significant speed and scale. Today, digital artefacts and online practices constitute a major part of people's everyday social, organisational and economic activities. Indeed, digital technologies have advanced more rapidly than any other innovation in history (UN, n.d.a; GU, 2020). This transformation is generating an intense debate among policymakers, economists and industry leaders about its societal impact, including concerns over issues such as job losses and security (World Economic Forum, 2022a). Nevertheless, digital advances, including ICTs and the internet, have unlocked major benefits for society and improved people's lives in fundamental ways (UNECE, n.d.). Yet, many people still remain outside of the digital world. In 2021, an estimated 37 percent of the world's population, or 2.9 billion people, had never used the internet. In addition to the gender gap emphasised by this study, ITU data further reveal that people in urban areas are twice as likely to use the internet than those in rural areas. There is also a global generational gap, with 71 percent of young people (15-24 years old) using the internet compared to 57 percent of the rest of the population. Moreover, among those using the internet, infrequent use, the need to rely on shared devices, slow speeds and high connection costs mean many are not able to realise its full potential (ITU (2021a).

Tunisia, along with the MENA region as a whole, has also undergone a digital transformation. The number of internet users has been increasing each year and mobile penetration is high and growing (World Bank, 2022b; ITU, 2022b; OECD, 2017). The COVID-19 crisis has further accelerated this transformation significantly. According to the Wilson Center (2022), internet usage in the region increased by 11 percent during the pandemic. The COVID-19 crisis moreover led to a shift in the nature of work and education within the region, making people more dependent on internet connectivity and forcing regional and local actors to prioritise and invest in the digital economy. Across the region, governments, private telecommunications companies and donors have worked to make internet access more widely available and affordable (ibid.). In Tunisia, this has the potential of leading to increased job and

learning opportunities, especially among the youth and women, and boost more inclusive and sustainable economic growth. However, issues of affordability, lacking digital skills and insufficient infrastructure constitute significant barriers to connectivity across the region (Wilson Center, 2022; Farley & Langendorf, 2021). Hence, the digital transformation has given rise to both opportunities and challenges for countries such as Tunisia, not least in terms of women's empowerment.

3. Literature Review

This section of the paper provides an overview of previous research and academic debates concerning critical aspects of the gender digital divide in Tunisia. First, general patterns of gender inequality in Tunisia and the MENA region will be discussed, given their importance to patterns of inequality in the digital field. Second, the section will discuss the scholarly debate on ICTs and women's empowerment, as this informs the theoretical framework of the study. Finally, contemporary research on the gender digital divide will be presented.

3.1 Gender inequality in Tunisia and the MENA Region

Gender inequality is a multidimensional, global phenomenon influenced by a range of social, political, economic and cultural factors. Despite gender equality being a human right, scholars and researchers continuously demonstrate how women across the world are discriminated against on the basis of their gender, with negative consequences not just for women, but for societies and economies at large (Tisdell, 2019; UN, n.d.b).

In the MENA region, including Tunisia, issues of gender inequality are particularly pervasive. While incremental progress has been documented over the past decade, the pace is slow and does not reflect the commitments made to the Agenda 2030 for Sustainable Development (UNICEF, 2021b). In 2020, the region had the lowest ranking on the Global Gender Gap Index by the World Economic Forum (2022b), with Tunisia ranking 124 out of a total of 153 countries (World Economic Forum, 2020). The female labour force participation rate in the MENA region is moreover the lowest in the world, at approximately 20 percent, with a somewhat higher rate at 25 percent in Tunisia, compared to 50 percent globally. (World Bank,

2022c; OECD, n.d.). This underperformance by the region is often attributed to conservative social norms and legal discrimination, but also to broader challenges, such as a predominance of undemocratic governments, regional conflicts, poor economic growth and mass displacement (Danon & Collins, 2021). Meanwhile, laws, policies and programmes focused on gender equality are growing across the region and women's representation in government and national programming has increased (UNICEF, 2021b). In 2020, Tunisia furthermore became one of the Global Leaders of the Generation Equality Action Coalitions, aimed at accelerating gender equality within a multitude of areas, including technology and innovation (UN Women, n.d.a). However, Tunisia still experiences a range of obstacles to gender equality and women's empowerment. According to UN Women (ibid.), this includes a high rate of unemployment and limited participation in economic life among Tunisian women, persistent sociocultural norms which infringe on women's right to live freely, limited political participation, discriminatory laws and policies as well as limited engagement of men as advocates for gender equality. Thus, despite Tunisia's comparative progress, the country still experiences similar patterns of gender inequality as the rest of the region.

According to the Web Foundation (2020), "digital inequality is both a consequence, and a cause, of broader inequalities". The recognition of these general patterns of gender inequality in Tunisia and the MENA region is hence of particular value when investigating the country's gender digital divide. Research has for instance demonstrated that issues such as discriminatory sociocultural norms and practices have constituted critical impediments to women's access to and usage of ICTs in the MENA region over the past decade. This has particularly been the case in lower socioeconomic environments and rural areas, where ICTs are often accessed outside of the home and where safety concerns and norms regarding socialising may act as barriers to women's digital participation (UNICEF, 2021c; Badran, 2019). By exploring the role of demographic and socioeconomic factors, this study can further help identify gaps and inequalities that impact Tunisian women's opportunities in the digital field.

3.2 ICTs and Women's Empowerment

ICTs, including the internet, have long been recognised as a force for greater equality, removing barriers for those previously held back by their geography, wealth, class, race and, not least, gender. In essence, these technologies are widely considered to have the potential to provide

individuals with access to the same online resources and opportunities (Web Foundation, 2020; ITU, 2022c). However, as demonstrated by the gender digital divide, significant challenges remain.

There is an emerging record of academic literature on ICTs and women's empowerment, with a large number of scholars emphasising the benefits of ICTs to women and the achievement of gender equality. Research has for instance demonstrated the positive impact of these digital technologies on women's enhanced economic activity and entrepreneurship (Nikulin, 2017; OECD, 2022), the empowerment of women in rural areas (Joseph, 2011; Ragetlie et. al., 2022) and in regard to the fight against gender-based violence (Tafnout & Timjerdine, 2009). Meanwhile, certain scholars are more critical, highlighting the risk of these technologies in sustaining and exacerbating systems of inequalities, oppression and discrimination (Kwan, 2021; Ferdous, 2017). Hence, certain tension can be observed between more optimistic and more pessimistic viewpoints on the benefits of ICTs among feminist scholars (Gurung, 2018). Historically, feminist research of technology and ICT began to emerge in the 1990's and was primarily motivated by a desire for political change (Wyatt, 2008). Early feminist responses to the digital transformation were largely optimistic about the potential of ICTs for the empowerment of women and transformation of gender relations. The internet was considered as a gender-neutral space and an emancipatory and democratising platform for people (Grau-Sarabia & Fuster-Morell, 2021). However, feminist research of technology later began to highlight how "gender is embedded in technology itself and the digital revolution is taking place within the same patriarchal institutions, which contain structural gender inequalities" (ibid., p. 5). Current approaches hence underline the mutual shaping of gender and technology and how gender inequalities persist everywhere, including ICTs (ibid.; Wajcman, 2010). In this sense, contemporary feminist research of technology is generally framed within a feminist discourse drawing upon poststructuralist, postmodernist and social constructivism, focusing on the study of forms of gender exclusion of digital technologies (Grau-Sarabia & Fuster-Morell, 2021). Moreover, some feminist scholars express notable criticism of the potential of ICTs for women's empowerment. For instance, Kwan (2021) argues that rather than enhancing a "sharing economy" based on inclusiveness and democratisation, the digital economy constitutes an extension of the neoliberal capitalist system. In this sense, digital developments are considered to have contributed to exacerbating social inequalities, including gender inequality. For example,

she states that while the digital economy is creating flexible jobs for some, other low-wage jobs are automated which in turn disproportionately affects women (ibid.). However, while taking such issues into account, the vast majority of contemporary research demonstrates the emancipatory power of ICTs and highlights that the resistance of such technologies would only further aggravate gender inequalities by widening the gender digital divide (UNICEF, 2021a; OECD, 2018; Plan International, 2022; Web Foundation, 2020). Indeed, scholars like Gurung (2018) emphasise that in today's digital era, the empowerment of women in the technological domain is as critical as the empowerment of women in social, economic and political ones, especially as these fields become increasingly interconnected.

These deliberations provide significant insights for this study, as they underline the importance of ICTs and the internet to the achievement of gender equality and highlight the use of a feminist approach in understanding the complexities of the gender digital divide.

3.3 The Gender Digital Divide

While the gender digital divide is a relatively new concept within the academic literature, researchers and scholars are paying increasing attention to the issue. Indeed, international organisations such as UN Women, the OECD, the World Bank and the EU are placing the gender digital divide higher up on their agenda and considerable efforts are being made around the world to challenge the problem (UN Women, 2021b; OECD, 2018; Klingen et. al., 2021; European Commission, 2018).

Why is the gender digital divide considered that critical then? Research has shown that as the digital transformation of societies and economies expands, economic and social development will increasingly depend on individuals' access and ability to use technology, including ICTs and the internet. For instance, most jobs and daily activities already require basic digital skills, with over 90 percent of jobs worldwide having a digital component (UNICEF, 2021a). Without increased digital adoption and use, women will hence have fewer employment opportunities and face additional barriers to participate in the labour force, an already significant issue in countries such as Tunisia (ibid.; UN Women, n.d.a). Additionally, the internet helps women across the world to pursue education, obtain health and financial services and to access and exchange information. In the MENA region in particular, internet access can also increase participation in public life and raise awareness of women's rights (ITU, 2022a; UNICEF, 2021a). Consequently,

ICTs and digital technologies are seen as an essential pathway to the empowerment of women and girls and critical to the achievement of the SDGs. However, as this study highlights, distinct demographic and socioeconomic gaps exist in regard to internet usage, in addition to that related to gender (ibid., Raz, 2020; ITU 2021a). The identification of these gaps and their association with gender is therefore critical in order to assess which segments of society that are the most vulnerable in the context of the gender digital divide, not least in Tunisia.

Recent research has furthermore suggested that the MENA region's gender gap in internet usage is connected to a so-called "mobile gender gap" (Bhatti, 2020). According to Farley & Langendorf (2021), "around 63 million women in the MENA region are not using mobile Internet, the main gateway to online content among most people". Therefore, researchers and scholars are stressing the need for enhanced accessibility and affordability of such digital technologies, including investments in broadband infrastructure and education and skills, as well as actions to address gender stereotypes and social norms leading to discrimination (Farley & Langendorf, 2021; OECD, 2018; UNICEF, 2021a).

4. Theoretical Framework

The theoretical framework of this thesis stems from the discussion presented in the previous section. Additionally, it is developed in close connection with the methodology of the research. In this manner, the research is placed within a feminist framework emphasising the emancipatory power of technology and ICTs and the analysis of the data and results is conducted within a gender analysis framework. Thereby, the research connects the analysis of descriptive statistics to the academic literature on the gender digital divide.

4.1 Feminist Theory of Technology and ICT

Feminist theory aims to understand the nature of gender inequality and provides a critical perspective on the ways in which social, political and economic practices, norms and structures create injustices experienced by women and individuals who challenge the gender binary and its hierarchies (Ackerly & True, 2020). According to UN Women (2017), the achievement of gender equality and women's empowerment cannot be realised without digital technologies, including ICTs and the internet. In this sense, a feminist theoretical framework of technology and ICT is of

particular value to the study of the gender digital divide, not least in the context of Tunisia. As emphasised by feminist scholars such as Gurung (2018), digital technologies may risk sustaining or even exacerbating systems of inequalities, but resisting them will only aggravate gender inequality and greatly limit women's opportunities in society. Instead, efforts must be made to enhance women's digital participation in order to bridge the gender digital divide. This study is therefore guided by a feminist approach of technology and ICT which is optimistic in nature in regard to the emancipatory potential of ICTs. The framework is moreover of particular use as it highlights how the digital transformation is embedded within systems of structural inequalities and how ICTs can influence gender relations (Grau-Sarabia & Fuster-Morell, 2021; Wajcman, 2010). Consequently, the approach helps us understand how patterns of inequality along demographic and socioeconomic lines also can be identified in connection to the use of ICTs and the internet.

4.2 Gender Analysis Framework

A gender analysis framework provides a structure for organising information regarding gender relations and gender differences (Jhpiego, 2020a). UN Women defines a gender analysis as the following:

> Gender analysis is a critical examination of how differences in gender roles, activities, needs, opportunities and rights/entitlements affect men, women, girls and boys in certain situations or contexts. Gender analysis examines the relationships between females and males and their access to and control of resources and the constraints they face relative to each other (UN Women, n.d.b).

While there is a range of gender analysis frameworks, these are typically applied in more practical, rather than research-oriented, contexts and are consequently of more common use in development practice (Warren, 2007). Therefore, this gender analysis framework draws upon the strengths of various frameworks and is combined with the study's feminist approach. In particular, the data analysis is conducted within this framework, hence facilitating the comparison between men and women in regard to internet usage and the different demographic and socioeconomic factors. This way, the data analysis can reveal where there are gaps and

inequalities that impact women's opportunities concerning access to and usage of the internet (Jhpiego, 2020b). Hence, the recognition of particularly exposed groups can be achieved, giving rise to implications for policy measures.

5. Methodology and Data

This section presents the methodology and data of the thesis. The research design is first explained, followed by an introduction of the data and source material. The process of the data collection and analysis is then presented, after which the limitations to the methodology and data are discussed. Finally, a section in regard to source criticism is provided.

5.1 Research Design

In order to answer the research question and meet the aim of the study, this case study of Tunisia connects an analysis of descriptive statistics to the academic discussion on the gender digital divide. By analysing data from the Arab Barometer over the period 2013-2020, the study explores gender differences in internet usage in Tunisia and their associations with demographic and socioeconomic factors. To allow for a quantitative measure of the gender gap in internet usage, an index of the gender digital divide (GDD) is also introduced. The research is moreover guided by its theoretical framework, based on a feminist approach and gender analysis framework. Therefore, the data analysis pays specific attention to differences between men and women in regard to the different variables and the discussion takes any implications these differences might have into particular account.

The choice of this research design builds on a pragmatic approach and stems from the need to further explore and describe the relationship between internet usage and gender in Tunisia. By using this research strategy, the complexity of the phenomenon can be better understood and addressed.

5.2 Data

5.2.1 The Arab Barometer

This study analyses secondary quantitative data collected by the Arab Barometer. The Arab Barometer is a nonpartisan research network providing insights into social, political and economic attitudes and values among people across the MENA region (Arab Barometer, 2022a). It was initially established as a project in 2005 by the University of Michigan in collaboration with institutions and scholars across the MENA region and developed in consultation with the Global Barometer project, a network composed of regional barometers in Sub-Saharan Africa, Latin America and Asia (University of Michigan, 2020; ICPSR, 2022). The Arab Barometer has conducted public opinion surveys in the region since 2006, including 55 nationally representative surveys over six waves until 2021. Today, the research network has the largest repository of publicly available data on public opinions in the MENA region, including detailed data on internet usage on a country-specific level (Arab Barometer, 2022b). This is why it has been chosen as the primary data source for this study. Table 1 provides an overview of the Arab Barometer data analysed in this study.

Table 1. Overview of the Arab Barometer Waves Analysed in the Study

Arab Barometer Wave	Year	Participants	Women (%)	Interview Method
III	2013	1187	50,3	Face-to-face at home
IV	2016	1185	50	Face-to-face at home
V	2018	2349	49,9	Face-to-face at home
VI	2020	992	51	Mobile phone call

Source: Arab Barometer, III-VI.

5.3 Data Collection and Analysis

In this study, Arab Barometer survey answers based on face-to-face interviews collected 2013, 2016 and 2018 in Tunisia were evaluated to describe and analyse the changes in internet usage and the gender digital divide, described by the gender digital divide (GDD) index, over time. The survey answers collected by mobile phone calls in Tunisia 2020 were analysed separately. These survey answers from 2020 represent a challenge when comparing data from 2013, 2016 and 2018 due to the change of interview method, which will be further addressed in the section on data limitations.

Survey data are available from the Arab Barometer website as CSV files together with the corresponding questionnaires and method summaries as PDF files. The Arab Barometer Wave III, IV, V and VI (part 1) were downloaded and converted to Excel files. For each survey, the questions of relevance were identified and all other data were removed to obtain files of reasonable sizes and complexity. Only data from Tunisia were stored and analysed in this study. A masterfile with all extracted and standardised data from 2013 to 2020 was created and imported to IBM SPSS Statistics in order to assign new categories and groups as described below. Descriptive statistics and the production of visual graphs were then performed using GraphPad Prism 8.0.

5.3.1 Demographic and Socioeconomic Factors

The set of demographic and socioeconomic factors subject to the analysis of the study include gender, age, education level, household income level and home location (categorised into urban or rural). While socioeconomic factors also tend to include occupation or employment, such a variable has not been included in the analysis due to the lack of coherent data offered by the Arab Barometer.

Gender

Gender is defined in all Arab Barometer waves as Male or Female. In this report the terms and index Men = 1 and Women = 2 are used in line with the Arab Barometer indexing for gender.

Age

Age is defined in all Arab Barometer waves by how old participants are in years from 18+. In addition, in this study a new age category was defined using SPSS with two sub-groups named and indexed Younger = 1 and Older = 2. The age interval for Younger ranges from 18-29 years and Older from 65+. This categorisation is in line with that typically employed by the OECD (OECD, 2021).

Education

The Arab Barometer surveys define education at several levels. This study used the same definitions, indexed to level 1-7 from lower to higher education levels. The question asked was: "What is your highest level of education?". The answers were assigned to seven levels from lower to higher education: "No formal education" = 1; "Elementary" = 2; "Preparatory/Basic" = 3; "Secondary" = 4; "Mid-level diploma/professional or technical" = 5; "BA" = 6; and "MA and above" = 7.

In addition, in this study a new education category was defined using SPSS with two sub-groups named and indexed Lower education = 1 and Higher education = 2. The Lower education group combines all participants with a level of education ranging from level 1 to level 3 as defined above. The Higher education group combines all participants with an education level ranging from level 5 to level 7.

Household income

The Arab Barometer surveys define household income at several levels. In this study the same definitions were used and indexed to level 1-4 from lower to higher income levels. The question asked was: "Which of these statements comes closest to describing your net household income?". The answers were assigned to four levels ranging from lower to higher income: "Our net household income does not cover our expenses, we face significant difficulties" = 1; "Our net household income does not cover our expenses, we face some difficulties" = 2; "Our net household income covers our expenses without notable difficulties" = 3; and "Our net household income covers our expenses and we are able to save" = 4.

In addition, in this study a new income category was defined using SPSS with two sub-groups named and indexed Lower income = 1 and Higher income = 2. The Lower income

group combines all participants who face some or significant difficulties covering their expenses (level 1-2 above). The Higher income group combines all participants who face no notable difficulties covering their expenses and those who are able to save money (level 3-4 above).

Home location

The Arab Barometer surveys define home location at two levels over the survey period 2013-2018 but changes classification for wave 6 in 2020. Consequently, this allows for the analysis of the role of urban or rural home location for the study period 2013-2018 but not for 2020. Urban = 1 and Rural = 2.

5.3.2 Internet Usage and the Gender Digital Divide (GDD) Index

Internet usage

The Arab Barometer surveys define internet usage at several levels. In this study the same definitions were used and indexed to level 0-4 ranging from lower to higher frequency of internet usage. The question asked was: "On average, how often do you use the internet?" The answers were assigned to five levels ranging from lower to higher frequency of internet usage: "I do not use the internet" = 0; "A few times a year" = 1; "At least once a month" = 2; "At least once a week" = 3; and "Daily or almost daily" = 4.

In this study, a new internet usage category was defined using SPSS with two sub-groups named and indexed Weekly users = 1 and Less than weekly users = 2. In this study, the Weekly users group combines all participants who use the internet on a weekly or daily basis (level 3-4 above) and the Less than weekly user group combines all participants who use the internet less than weekly or never (level 0-2 above). The rationale for these two groups of internet usage was that weekly or daily usage of the internet is thought to constitute a minimum frequency to fully participate in the digital world, while people who use the internet less than weekly or never are assumed to lack a substantial part of digital participation. Daily or weekly usage of the internet is referred to as "internet usage at least weekly" in the graphs within the results and analysis section.

The gender digital divide (GDD) index

The gender digital divide (GDD) refers to the gender gap in internet usage on a daily or weekly basis, which this study regards as a prerequisite for full digital participation. The GDD index was defined as the relative usage of internet between women and men:

$$GDD\ index\ (\%) = 100 - \frac{\%\ daily\ or\ weekly\ usage\ of\ the\ internet\ by\ woman}{\%\ daily\ or\ weekly\ usage\ of\ the\ internet\ by\ men} * 100$$

The result is a quantitative measure of the gender digital divide where a GDD index of zero is obtained when men and women are equal in terms of daily or weekly internet usage and an index of 100 is obtained when no women at all as compared to men use the internet on a daily or weekly basis. The advantage of the GDD index is that it reveals the relative inequality between men and women. For example, if the proportion of women who use the internet on a daily or weekly basis is 10 percent and the proportion of men is 20 percent, the GDD index would be 50 percent, showing that only 50 percent of women as compared to men use the internet on a daily or weekly basis.

5.4 Limitations

There are certain limitations to the methodology and data of this research. First of all, the findings of the study are limited in terms of external validity, as they are specific to the case of Tunisia. However, Tunisia shares several similarities with other MENA countries in regard to both demographic and socioeconomic dimensions, including patterns of gender inequality (Puri-Mirza, 2022; Raz, 2020; UNICEF, 2021c). Therefore, the findings and policy implications discussed in this paper can still be of interest to stakeholders across a wider set of countries within the Maghreb and MENA region. Furthermore, there is an existent language barrier, as I have primarily relied on source material in English. Because of this, I have not accessed any information in Arabic or French, despite these languages being commonly used among local scholars and government agencies.

Moreover, in comparison to the previous surveys carried out by the Arab Barometer, the interview method of the 2020 survey was changed as a result of the COVID-19 pandemic. Instead of conducting face-to-face interviews, the research team used mobile phone surveys, with samples generated by using random-digit dialling (RDD). This permitted research that was in

compliance with local ordinances and social distancing protocols during the pandemic (Arab Barometer, 2022c). However, this has the potential to impact the results of the data analysis, since access to a mobile phone is associated with access to the internet (Bhatti, 2020; Farley & Langendorf, 2021). Therefore, the 2020 data were analysed separately from the 2013-2018 data. In addition, to address this issue, the observed data from 2020 were compared to predicted data based on a linear extrapolation of data from 2016 and 2018 to predict the results 2020, using data from the face-to-face interviews conducted 2016 and 2018. This is done in order to investigate how access to mobile phones can impact internet usage and the gender digital divide. Table 1 indicates the interview methods used for the surveys between 2013 and 2020.

5.5 Source Criticism

The Arab Barometer is judged as a trustworthy nonpartisan research network and the data is considered to be reliable, representative for the population studied and valid as they contain relevant information for the analysis of this study (ICPSR, 2022; McMaster University, 2022) The data furthermore has an equal proportion of men and women with equal age profiles, as demonstrated in Table 1 and Figure 1. However, the changed interview method in 2020 requires special attention with regard to the analysis of associations between internet usage and demographic and socioeconomic factors, while most other questions in the survey are likely to be less dependent on this change of method.

6. Results and Analysis

This part of the paper is structured into three subsections. The first section illustrates the original Arab Barometer data on demographic and socioeconomic factors across the surveys covering the period 2013-2020. The second and most extensive section explores the gender gap in internet usage and its association with demographic and socioeconomic factors over the period 2013-2018. Finally, the third section analyses the Arab Barometer data from 2020 and compares it with predicated data for 2020, based on face-to-face interviews 2016 and 2018 by applying a predictive linear extrapolation method.

6.1 Arab Barometer Data on Demographic and Socioeconomic Factors

In this section, the demographic and socioeconomic characteristics of survey respondents over the period 2013-2020 are illustrated in Figure 1.

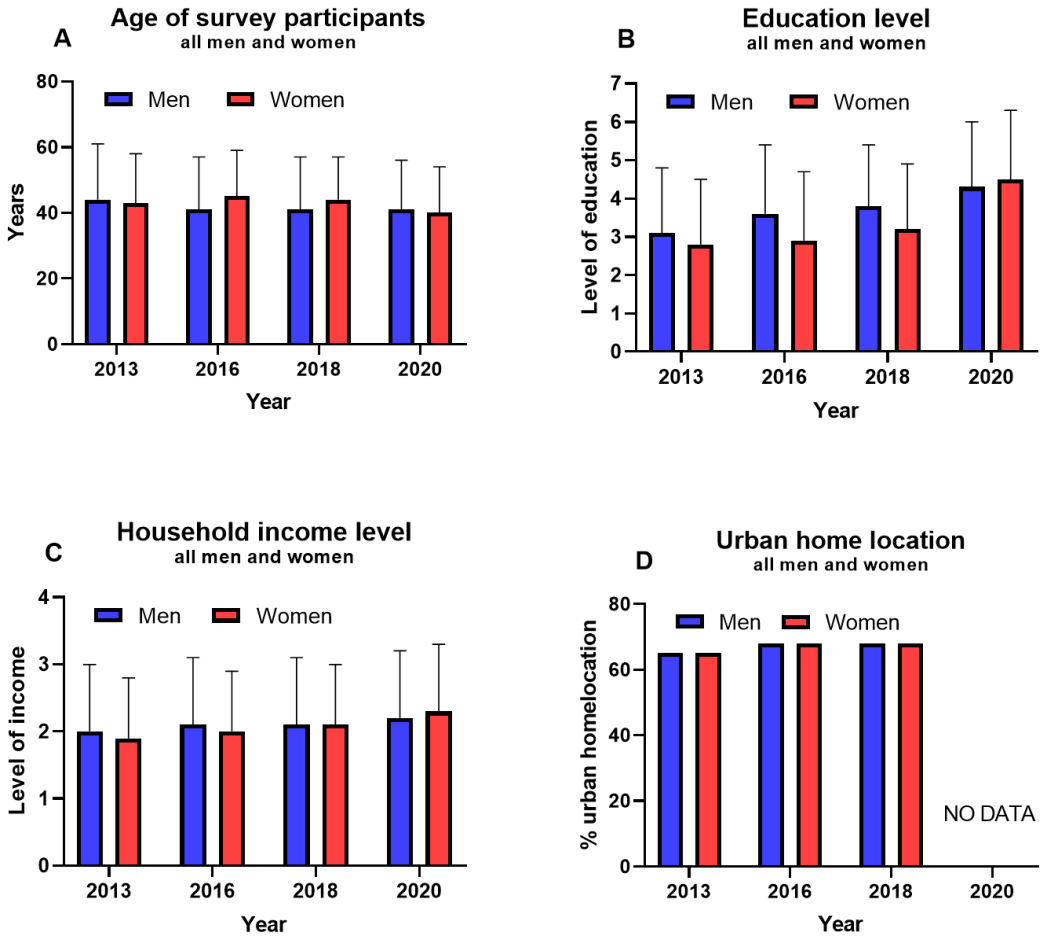


Figure 1: Demographic and Socioeconomic Characteristics of Survey Respondents 2013-2020. *The age of all men and women (A), the level of education of all men and women (B), the level of household income of all men and women (C) and the percentage of men and women in urban homes (D) in the four surveys for 2013-2020. Source: Arab Barometer, III-VI.*

In Figure 1A, the age of participants are comparable between men and women during the studied time period ranging from 40-45 years on average and with a similar age distribution among men and women. In Figure 1B, the level of education indicates a positive development for both men and women over time, with women slightly behind men except for in 2020. The household

incomes shown in Figure 1C were moreover similar for men and women, again with a slightly positive development. Finally, 60-70 percent of both men and women live in urban homes (Fig. 1D) .

To summarise, these data build a good foundation for the analysis of the role of demographic and socioeconomic factors with regard to internet usage and the gender digital divide. The results of the linear regression analysis of the correlations between the demographic and socioeconomic factors and internet usage from 2018 for all men and women in the survey are illustrated in Appendix A and Appendix B.

6.2 The Gender Gap in Internet Usage and the Role of Demographic and Socioeconomic Factors 2013-2018

This section explores the associations between gender differences in internet usage and demographic and socioeconomic factors during 2013-2018.

6.2.1 Internet Usage: All Men and Women

A quantitative measure of internet usage is the proportion (%) of men and women who use the internet at least weekly. From these data a quantitative measure of the gender digital divide, the GDD index, was calculated and compared across demographic and socioeconomic factors. In Figure 2 the proportion of all men and women using the internet at least weekly is illustrated for 2013-2018. In addition, the calculated GDD index is included.

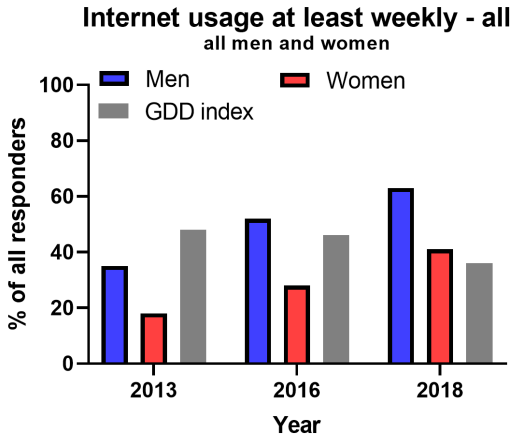


Figure 2: The Proportion (%) of All Men and Women Using the Internet on a Weekly (Including Daily) Basis 2013-2018. *In addition, the calculated gender digital divide (GDD) index is included in the graph. Source: Arab Barometer, III-V. GDD index: author's calculations.*

Figure 2 demonstrates a positive development in terms of increasing internet usage over time for both men and women. However, the data also reveals a significant gender gap in internet usage from 2013-2018. The data further shows that women are behind men by 4-5 years. Hence, unless action is taken to promote women's access to and use of the internet, it may take about 5-10 more years from 2018 to close the gender digital divide, based on the GDD index trend from 2016-2018.

In essence, this graph confirms Tunisia's challenging gender digital divide, as seen in other MENA countries, despite the country's comparative progress in terms of gender equality. Considering Tunisia's role as one of the Global Leaders of the Generation Equality Action Coalitions (UN Women, n.d.a), efforts should be made by the government to address this issue in order to enhance women's empowerment and gender equality in the country. As emphasised by feminist research of technology and ICT, this gender gap in internet usage will increasingly affect women in all aspects of their lives, with implications for women's opportunites, access to resources and power to control their own lives (Gurung, 2018; Grau-Sarabia & Fuster-Morell, 2021; EIGE, 2022).

6.2.2 Internet Usage: Younger and Older Men and Women

In Figure 3, the fraction (%) of all younger (18-29) and older (65+) men and women using the internet at least weekly is illustrated for 2013-2018. The data in Figure 3 show a positive development in terms of increasing internet usage over time for both younger and older men and women.

However, the difference in internet usage between the younger and older populations of both men and women is striking, with the country's elderly being far behind the youth. While internet usage reaches 70 percent for younger women in 2018, it remains at only 12 percent for older women. For older women, the GDD index is moreover at 48 percent in 2018, which is comparatively high. Unless older women's access and use of the internet is promoted it could hence take more than 10 years from 2018 to close the gender digital divide among the elderly, based on the GDD index trend from 2016-2018. Younger women are also still behind younger men by about 5 years in terms of weekly internet usage (2018).

These results demonstrate the generational gap highlighted by the ITU (2021a). They further indicate a situation where both older men and women in Tunisia risk not being able to access basic citizens' services and information thereof, as these become increasingly accessed online (ibid.). The elderly, not least older women, hence constitute a particular group within Tunisian society which must be taken into account when developing new public policies and services which rely on internet access. Among the youth, efforts should moreover be made to decrease the gender gap in internet usage, as this divide impacts both job and education opportunities for women this age (UNICEF, 2021a). From a feminist perspective, these efforts are critical in order to achieve change and enable women to make their own strategic choises (Ackerly & True, 2020; UN Women, 2017).

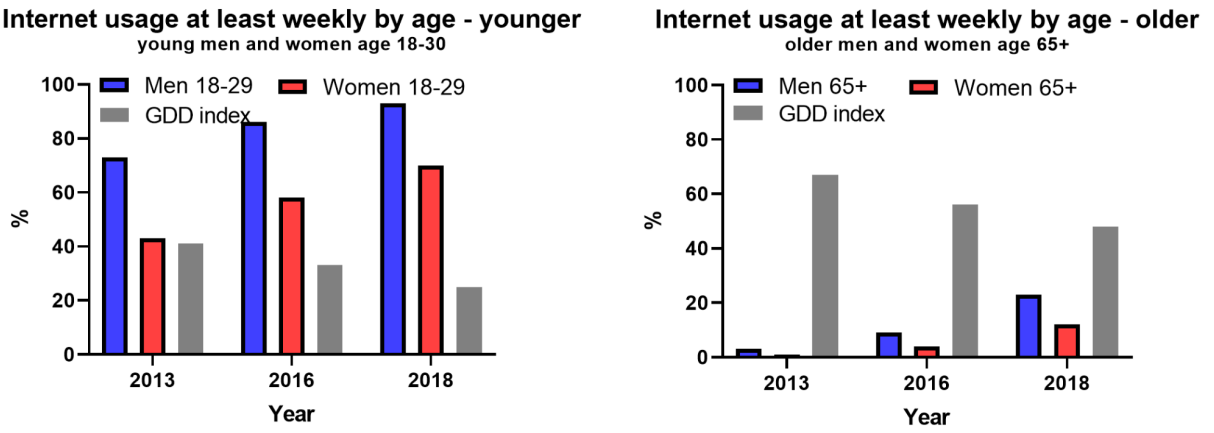


Figure 3: The Fraction (%) of All Younger (18-29) and Older (65+) Men and Women Using the Internet on a Weekly (Including Daily) Basis 2013-2018. *In addition, the calculated gender digital divide (GDD) index is included. Source: Arab Barometer, III-V. GDD index: author's calculations.*

6.2.3 Internet Usage: Lower and Higher Education

In Figure 4, the fraction (%) of men and women with higher and lower education using the internet at least weekly is illustrated for 2013-2018. The data in Figure 4 shows a positive development in terms of increasing internet usage over time for both men and women with higher and lower levels of education.

The difference in internet usage between people with higher and lower education is also significant, with less educated individuals being far behind the higher educated individuals for both men and women. While internet usage reaches 82 percent for higher educated women in 2018, it remains at only 21 percent for lower educated women in 2018. Moreover, the gender digital divide is 50 percent, as indicated by the GDD index, for people with a low level of education, which is the largest observed gender gap in internet usage among all demographic and socioeconomic factors analysed. Indeed, it could take 5-10 years from 2018 to close the gender digital divide among the less educated, based on the GDD index trend from 2016-2018.

The observed increase in internet usage from 2013-2018 (Figure 2) may partly be explained by the observed increase in the level of education 2013-2020 (Figure 1), considering that education is correlated with internet usage as illustrated in Appendix 1.

Based on these results, it can be concluded that education is a powerful way to increase people's internet usage and reduce the gender digital divide, as highlighted by a multitude of organisations (UNICEF, 2021a; OECD, 2018; Web Foundation, 2020). The promotion of accessible education and training opportunities which strengthen digital skills and teach women to navigate the internet efficiently and safely is hence critical in Tunisia in order to bridge the gender digital divide (UN Women, 2021a). This can moreover help combat structural inequalities within ICTs, as women gain practice in using and creating digital content which in turn can shape the way digital technologies develop. Ultimately, this can contribute to challenging gender based hierarchies and injustices, online as well as offline (UNICEF, 2021a; Grau-Sarabia & Fuster-Morell, 2021; Wajcman, 2010).

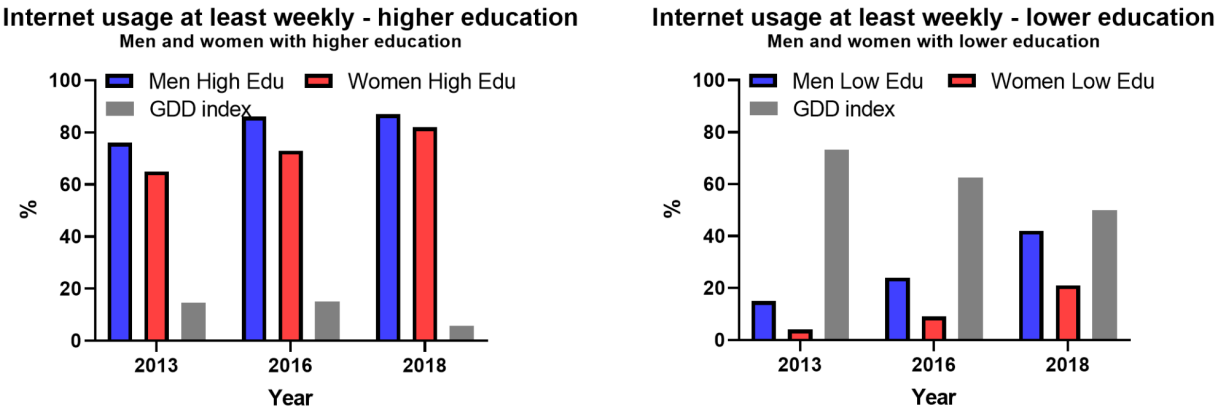


Figure 4: The Fraction (%) of Men and Women with Higher and Lower Education Using the Internet on a Weekly (Including Daily) Basis 2013-2018*. In addition, the calculated gender digital divide (GDD) index is included. Source: Arab Barometer, III-V. GDD index: author's calculations.*

6.2.4 Internet Usage: Lower and Higher Household Income

In Figure 5, the fraction (%) of men and women with higher and lower household income using the internet at least weekly is illustrated for 2013-2018. The data in Figure 5 shows a positive development in terms of increasing internet usage over time for both men and women with higher or lower levels of household income. Women are about 5 years behind men in internet usage. Only 25 percent of women with a lower household income use the internet at least weekly and the gender gap in internet usage is among the largest observed in this study, with a gender

digital divide index of 48 percent. Hence, unless action is taken, it could take more than 10 years to close the gender digital divide among men and women with a lower income, based on the GDD index trend from 2016-2018.

Additionally, it should be noted that these results are based on household income and not individual income. Considering that the female labour force participation rate in Tunisia is merely 25 percent (World Bank, 2022c), it cannot be excluded that even larger differences between men and women with a higher and lower income could be expected. These findings further suggest that affordability plays a significant role for one's access to ICTs and the internet, as emphasised by a range of scholars (Wilson Center, 2022; Farley & Langendorf, 2021). Moreover, along the lines of feminist research of technology and ICT, the results also indicate that the promotion of women's digital participation could enhance women's economic empowerment in Tunisia and generate new work opportunities (Grau-Sarabia & Fuster-Morell, 2021; Gurung, 2018; OECD, 2022).

Consequently, policies aimed at increasing women's digital participation in Tunisia must take low-income women into particular consideration and prioritise the affordability and accessibility of digital means and internet access.

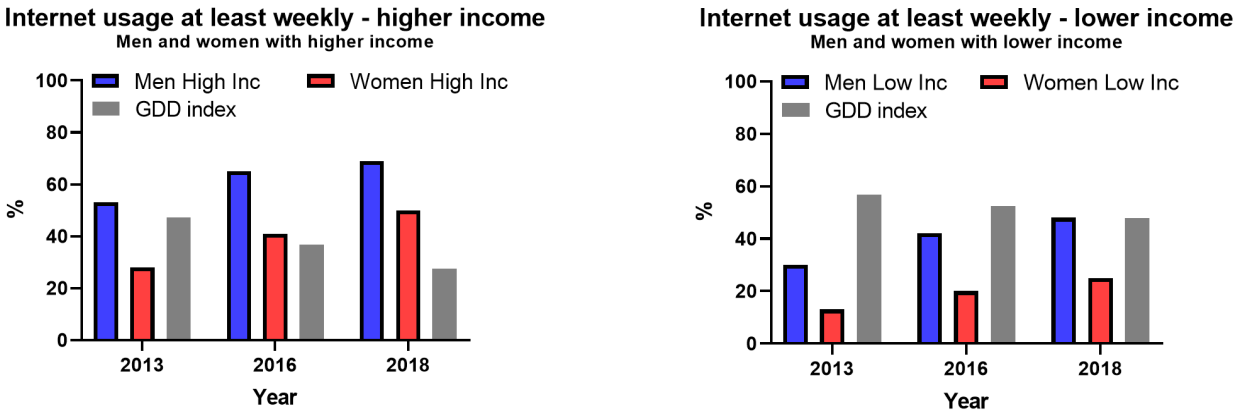


Figure 5: The Fraction (%) of Men and Women with Higher and Lower Household Income Using the Internet on a Weekly (Including Daily) Basis 2013-2018. *In addition, the calculated Gender Digital Divide (GDD) index is included. Source: Arab Barometer, III-V. GDD index: author's calculations.*

6.2.5 Internet Usage: Urban and Rural Homes

In Figure 6, the fraction (%) of men and women in urban and rural home locations using the internet at least weekly is illustrated for 2013-2018. The data in Figure 6 shows a positive development in terms of increasing internet usage over time for both men and women in urban and rural homes. The data in Figure 6 further shows that women in both rural and urban homes are behind men in rural and urban homes respectively by approximately 3-5 years. Consequently, it could take about 3-5 years from 2018 to close the gender digital divide among men and women in rural homes, based on the GDD index trend from 2016-2018.

Hence, the results support the rural-urban gap highlighted by previous research and demonstrate the potential need for investments in broadband infrastructure as well as targeted measures aimed at promoting women's internet access and usage in rural areas specifically (ITU, 2021a; Farley & Langendorf, 2021). ICTs can moreover play a significant role in the empowerment of rural women, not least by connecting women to social networks and by providing them with essential information and services (Ragetlie et. al., 2022; Joseph, 2011). As emphasised by this study's feminist approach, this could in turn positively impact gender power relations in rural households and help women influence social and economic processes (Wajcman, 2010; Grau-Sarabia & Fuster-Morell, 2021; EIGE, 2022).

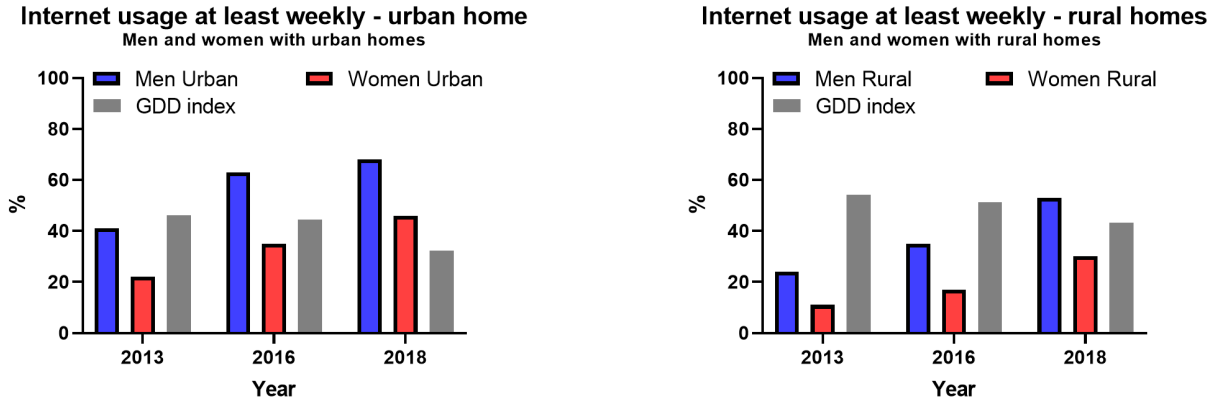


Figure 6: The Fraction (%) of Men and Women in Urban and Rural Homes Using the Internet on a Weekly (Including Daily) Basis 2013-2018. *In addition, the calculated gender digital divide (GDD) index is included. Source: Arab Barometer, III-V. GDD index: author's calculations.*

6.3 Impact of Change of Interview Method from Face-to-Face to Mobile Phone Surveys in Arab Barometer VI

This section investigates how access to mobile phones could have impacted internet usage and the gender digital divide in Tunisia. Arab Barometer data collected by mobile phone interviews in 2020 is therefore compared with predicted data for 2020, which are based on data from previous face-to-face interviews. This is done by applying linear extrapolation to observed data from 2016 and 2018.

In Figure 7, the observed Arab Barometer data from 2020 and predicted data based on 2016 and 2018 are illustrated, showing the age of all men and women (A), the level of education of all men and women (B), the level of household income of all men and women (C) and the percentage of men and women in urban homes (D). The results are similar for men in particular, which supports the method of applying a predictive linear extrapolation for comparison with observed demographic and socioeconomic data. The results suggest as well that access to a mobile phone among men within the study population 2020 is similar to the study population 2016 and 2018.

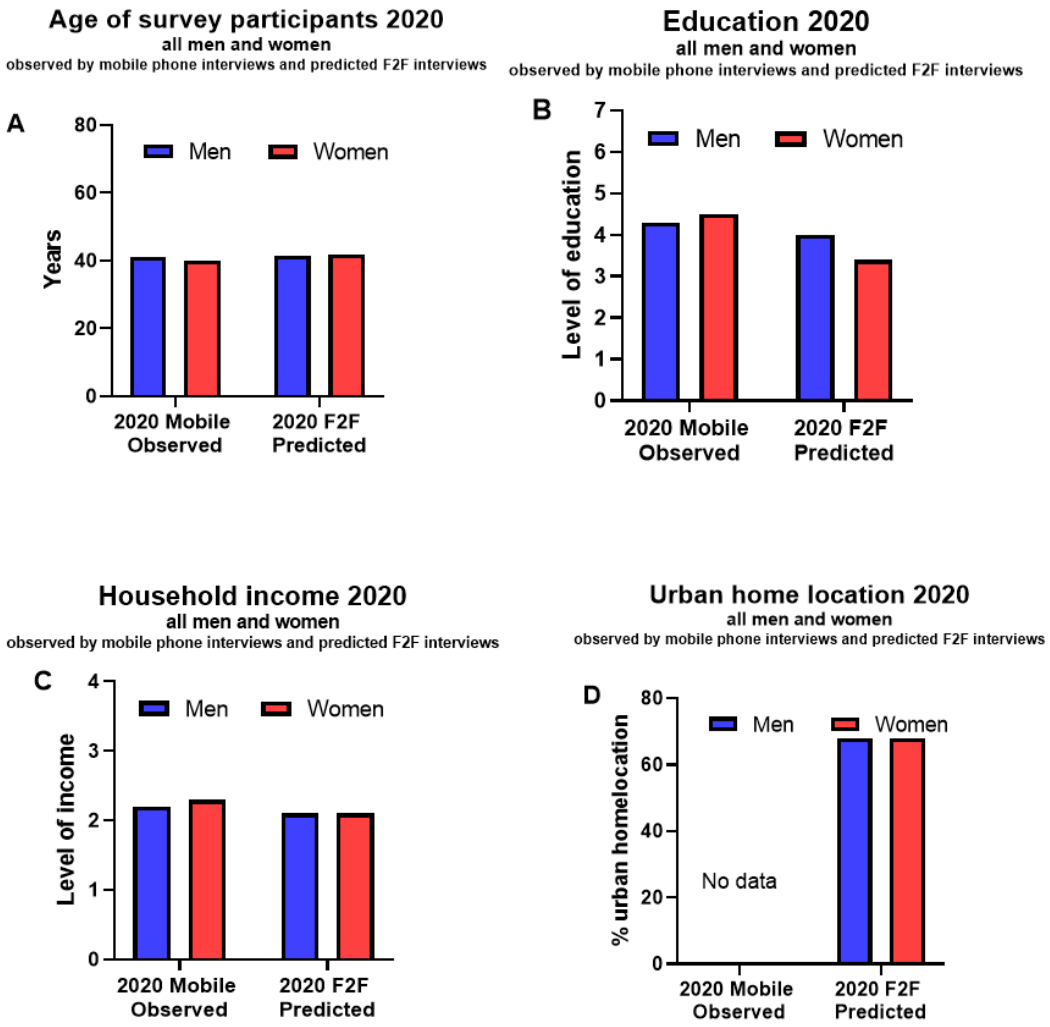


Figure 7: Summary of Arab Barometer Data Observed by Mobile Phone Interviews 2020 and Predicted from Face-to-face Interviews 2016 and 2018. *Observed and predicted age of all men and women (A), the level of education of all men and women (B), the level of household income of all men and women (C) and the percentage of men and women in urban homes (D). Source: Arab Barometer, VI. GDD index and predicted values: author's calculations.*

6.3.1 Internet Usage: All Men and Women 2020

In Figure 8, the fraction (%) of all men and women using the internet at least weekly is illustrated for observed and predicted data for 2020.

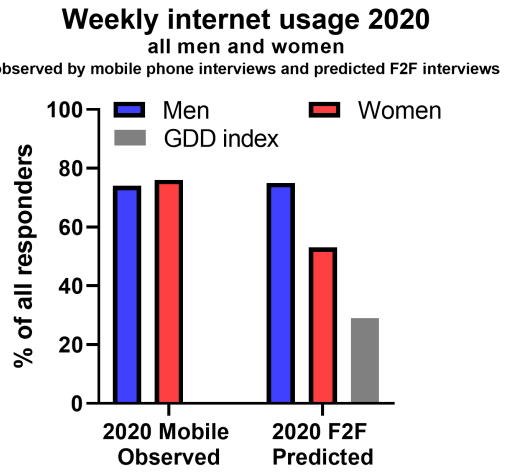


Figure 8: The Proportion (%) of All Men and Women Using the Internet on a Weekly (Including Daily) Basis for Observed and Predicted Data from 2020. *In addition, the calculated gender digital divide (GDD) index is included in the graph. Source: Arab Barometer, VI. GDD index and predicted values: author's calculations.*

The results from observed data 2020 indicate an absence of a gender digital divide and a high level (about 75%) of at least weekly internet usage in the Arab Barometer VI (2020) survey population. In this survey, all men and women presumably had access to a mobile phone. In contrast, the predicted results indicate a pronounced gender gap of almost 30 percent. Additional data on observed and predicted weekly usage of the internet and the gender digital divide index are presented in Appendix 3.

These results indicate that women's access to a mobile phone in Tunisia is overestimated in the Arab barometer survey VI 2020 and does not reflect the general population in Tunisia. This becomes of particular relevance as the issue of a mobile gender gap is found to be connected to the general gender gap in internet usage, as highlighted by scholars such as Farley and Langendorf (2021) and organisations like the ITU (2021c). Hence, this could potentially also be the case in Tunisia.

6.4 Summary of Results

The development over time of weekly or daily internet usage during 2013-2018 among all men and women and within all categories has been positive, with an increase of internet usage by +80 percent for all men and +130 percent for all women. However, the gender digital divide, as indicated by the GDD index, still remains at 36 percent in 2018 for all men and women, revealing a substantial issue of gender inequality. A summary of the results obtained from 2018, the most recent data set where interviews were conducted face-to-face, is presented in Table 2.

Table 2. Summary of the Gender Gap in Internet Usage and the Association to Demographic and Socioeconomic Factors 2018.

Category	GDD index (%)	Internet Usage Men (%)	Internet Usage Women (%)	Ratio Men/Women	% men	% women
Lower education	50	42	21	2,0	20	29
Older (65+)	48	23	12	1,9	5	3
Lower income	48	48	25	1,9	33	34
Rural homes	43	53	30	1,8	16	16
All men and women	**36**	**63**	**41**	**1,5**	**50**	**50**
Urban homes	32	68	46	1,5	34	34
Higher income	28	69	50	1,4	17	16
Younger (18-39)	25	93	70	1,3	13	9
Higher education	6	87	82	1,1	12	9

Source: Arab Barometer, V. Source: Arab Barometer, V. GDD index: author's calculations.

Table 2 demonstrates that there still is a significant gender digital divide, based on the GDD index, among men and women with lower education (50%), older men and women (48%), men and women with lower income (48%) and in rural homes (43%). The weekly or daily internet usage is less than 30 percent for women in these categories and less than 55% for men. The

lowest GDD index is observed for men and women with higher education (6%), younger individuals (25%), men and women with higher income (28%) and in urban homes (32%).

There is furthermore a correlation between weekly or daily internet usage and a reduced gender digital divide, as indicated in Table 2. Hence, the more men and women use the internet on a daily or weekly basis, the smaller the gender digital divide is.

Table 3 illustrates the development of the gender gap in internet usage over time during 2013-2018, as defined by the GDD index. For all men and women, the GDD index was reduced by 12 percentage points from 2013 to 2018, with the largest improvement observed among men and women with lower education (23 percentage points). Yet, these women's internet usage was still only at 21 percent in 2018 (Table 2). The smallest improvement (8 percentage points) was observed for higher educated men and women, which may be explained by already high rates of internet usage.

Table 3. Development Over Time of the Gender Digital Divide Index 2013-2018.

Category	GDD index 2013 (%)	GDD index 2016 (%)	GDD index 2018 (%)	5-year change (percentage points)
Lower education	73	63	50	23
Older (65+)	67	56	48	19
Lower income	57	52	48	9
Rural homes	54	51	43	11
All men and women	**48**	**46**	**36**	**12**
Urban homes	46	44	32	14
Higher income	47	37	28	20
Younger (18-39)	41	33	25	16
Higher education	14	15	6	8

Source: Arab Barometer, V. Source: Arab Barometer, V. GDD index: author's calculations.

Moreover, the estimated time to close the gender digital divide among the different demographic and socioeconomic groups was based on the GDD index trend from 2016 to 2018. This

estimation assumes that no major event would occur that could change the development of internet usage in the near future after 2018. However, in reality this has not been the case. The COVID-19 crisis has significantly accelerated the digital transformation and led to dramatic changes in internet usage, for instance through the increase in remote work and distance-based education. Therefore, it is likely that the gender digital divide can be closed quicker than estimated in this analysis. However, it also becomes more important that it is.

7. Conclusions

The objective of this study was to explore gender differences in internet usage in Tunisia and how these are associated with demographic and socioeconomic factors. In order to fulfil this aim, the following research question was posed:

> *How have gender differences in internet usage in Tunisia been associated with demographic and socioeconomic factors over the period 2013-2020?*

By shedding light on the case of Tunisia and connecting an analysis of descriptive statistics to the literature, the study sought to contribute to the academic discussion on the gender digital divide in the MENA region and provide insightful findings in regard to policy implications. The research was therefore guided by a feminist approach and the analysis was conducted within a gender analysis framework.

The obtained results from this study illustrate significant gender differences in internet usage, defined by the gender digital divide (GDD) index, and their associations with demographic and socioeconomic factors over the period 2013-2020. The gender gap in internet usage was the largest among individuals with lower education, the elderly, individuals with lower income and people in rural home locations. These findings hence confirm the image generally portrayed by previous research, including studies by the Arab Barometer, the Web Foundation and the ITU, while contributing to a better understanding of the specific situation in Tunisia.

Therefore, targeted policy measures aimed at improving internet access and usage in Tunisia are particularly important among women who are less educated, older, poorer and live in rural areas. In this sense, the promotion of education and digital skills among women and girls,

investments in broadband infrastructure and actions to address discriminatory sociocultural norms which hinder women's access to and usage of digital technologies should be prioritised among policymakers. The collection and analysis of gender-disaggregated data is moreover critical in order for gender implications of policies to be identified.

The study's feminist approach and gender analysis framework have further helped analyse and address the gender inequalities and gaps that are seen to impact Tunisian women's empowerment in the digital field. In this manner, the theoretical framework has emphasised the emancipatory power of ICTs and the internet and given rise to important policy implications.

The observed results from the Arab Barometer VI 2020 survey conducted by mobile phone calls further demonstrate the importance of addressing the "mobile gender gap", as it indeed appears as if mobile internet constitutes a critical gateway to the internet. Future research on the gender digital divide should therefore consider differences between men and women in terms of access to a personal mobile phone and address this gap when surveys are conducted. The results from the 2020 survey are nevertheless promising for the future of Tunisia, as affordable access to mobile phones with internet connectivity is constantly growing.

In conclusion, ICTs and the internet have unlocked major benefits for society and improved people's lives in fundamental ways. Through the internet, individuals are able to access and exchange information, gain new work and learning opportunities and access essential services. As women become part of the digital world, they can engage further in public life, participate in social networks and integrate into the digital economy. Yet, as this study has demonstrated, many women, not least in Tunisia and the MENA region, still remain excluded. Understanding the complexities of the gender gap in internet usage is an important step in the process of closing the gender digital divide. This study has contributed to our knowledge of Tunisia's unconnected women, including who they are and where they live. However, further research is needed in order to better understand the causes of why they remain offline, including the role of mobile phones. Looking ahead, increased efforts must hence be made if the benefits of ICTs to gender equality and women's empowerment are to be fully achieved.

References

Ackerly, B. A. and True, J. (2020), "Doing Feminist Research in Political and Social Science", 2nd edn, London: *Bloomsbury Academic*, Available at: https://search-ebscohost-com.ludwig.lub.lu.se/login.aspx?direct=true&AuthType=ip,uid&db=nlebk&AN=3054084&site=eds-live&scope=site [Accessed 16 August 2022]

Arab Barometer. (2022a). *About Arab Barometer,* Available online: https://www.arabbarometer.org/about/ [Accessed 5 August 2022]

Arab Barometer. (2022b). *Arab Barometer Surveys*, Available online: https://www.arabbarometer.org/survey-data/ [Accessed 4 August 2022]

Arab Barometer. (2022c). *Arab Barometer VI*, Available online: https://www.arabbarometer.org/surveys/covid-19-survey/ [Accessed 4 August 2022]

Badran, M. F. (2019). "Bridging the Gender Divide in the Arab Region", *International Development Research Centre*, Available online: https://www.researchgate.net/publication/330041688_Bridging_the_gender_digital_divide_in_the_Arab_Region [Accessed 1 August 2022]

Bhatti, J. (2020). "Arab Girls Often Lack Access to a Key Educational Tool: Mobile Phones", *Al-Fanar Media*, Available online: https://www.al-fanarmedia.org/2020/12/arab-girls-often-lack-access-key-educational-tool-mobile-phones/ [Accessed 5 August 2022]

Danon, Z. and Collins, S. R. (2021). Women in the Middle East and North Africa: Issues for Congress, *Congressional Research Service,* [pdf], Available at: https://sgp.fas.org/crs/mideast/R46423.pdf [Accessed 30 July 2022]

EIGE. (2022). *Empowerment of Women,* Available online: https://eige.europa.eu/thesaurus/terms/1102 [Accessed 29 July 2022]

European Commission. (2018), *Increase in Gender Gap in the Digital Sector - Study on Women in the Digital Age,* Available online: https://digital-strategy.ec.europa.eu/en/library/increase-gender-gap-digital-sector-study-women-digital-age [Accessed 9 August 2022]

European Parliament. (2022). *Digital Transformation: Importance, Benefits and EU policy,* Available online: https://www.europarl.europa.eu/news/en/headlines/society/20210414STO02010/digital-transformation-importance-benefits-and-eu-policy [Accessed 29 July 2022]

Farley, A. and Langendorf, M. (2021). "COVID-19 and Internet Accessibility in the MENA Region", *Wilson Center, Occasional Paper Series,* no. 40, Available online: https://www.wilsoncenter.org/sites/default/files/media/uploads/documents/MEP_211129_OCC%2040%20v4.pdf [Accessed 29 July 2022]

Ferdous, S. E. (2017). "Women Empowerment in ICT: Problems and Prospects", *ASA University Review*, 11(1), pp. 17–29. Available online: https://search-ebscohost-com.ludwig.lub.lu.se/login.aspx?direct=true&AuthType=ip,uid&db=a9h&AN=126542528&site=eds-live&scope=site [Accessed 1 August 2022]

Grau-Sarabia, M. and Fuster-Morell, M. (2021). "Gender Approaches in the Study of the Digital Economy: A Systematic Literature Review", *Humanities and Social Sciences Communications*, 8, Available online: https://doi.org/10.1057/s41599-021-00875-x [Accessed 4 August 2022]

Gurung, L. (2018). "The Digital Divide: An Inquiry from Feminist Perspectives", *Dhaulagiri: Journal of Sociology & Anthropology*, 12, pp. 50–57, Available online: https://eds-p-ebscohost-com.ludwig.lub.lu.se/eds/detail/detail?vid=12&sid=b7292948-5147-4bb

7-8701-394c060c04f2%40redis&bdata=JkF1dGhUeXBlPWlwLHVpZCZzaXRlPWVkcy1saXZlJnNjb3BlPXNpdGU%3d#AN=133965221&db=sih [Accessed 4 August 2022]

ICPSR. (2022), *Arab Barometer Public Opinion Survey Series*, Available online: https://www.icpsr.umich.edu/web/ICPSR/series/508/publications [Accessed 15 August 2022]

ITU. (2021a). *Measuring digital development: Facts and Figures 2021,* Available online: https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx [Accessed 29 July 2022]

ITU. (2021b). *The Gender Digital Divide,* Available online: https://www.itu.int/itu-d/reports/statistics/2021/11/15/the-gender-digital-divide/ [Accessed 29 July 2022]

ITU. (2022a). *Bridging the Gender Divide*, Available online: https://www.itu.int/en/mediacentre/backgrounders/Pages/bridging-the-gender-divide.aspx#:~:text=Broadly%20speaking%2C%20there%20are%20four,tech%20sector%20leadership%20and%20entrepreneurship [Accessed 29 July 2022]

ITU. (2022b). *Mobile Phone Ownership,* Available online: https://www.itu.int/itu-d/reports/statistics/2021/11/15/mobile-phone-ownership/ [Accessed 30 July 2022]

ITU. (2022c). *Goal 5. Gender,* Available online: https://www.itu.int/en/sustainable-world/Pages/goal5.aspx [Accessed 1 August 2022]

Jhpiego. (2020a). *Gender Analysis Framework*, Available online: https://gender.jhpiego.org/analysistoolkit/gender-analysis-framework/ [Accessed 5 August 2022]

Jhpiego. (2020b). *Seven Steps to a Gender Analysis,* Available online: https://gender.jhpiego.org/analysistoolkit/seven-steps-to-a-gender-analysis/ [Accessed 5 August 2022]

Joseph, M. (2011). "The Potential of ICTs to Empower Rural Women", *IST-Africa,* pp. 1–9. Available online: https://search-ebscohost-com.ludwig.lub.lu.se/login.aspx?direct=true&AuthType=ip,uid&db=edseee&AN=edseee.6107338&site=eds-live&scope=site [Accessed 4 August 2022]

Klingen, N., Hammond, A. and Srinivasan, S. (2021), "Putting Women and Girls at the Center of Digital Development", *World Bank Group,* Available online: https://blogs.worldbank.org/digital-development/putting-women-and-girls-center-digital-development [Accessed 9 August 2022]

Kouadri, N. and Cherif, A. (2020). "Impact of the Digital Divide on Economic Growth in MENA Countries, Evidence from Panel ARDL Models 2000-2018", *Review of Economics and Statistics*, Available online: https://www.researchgate.net/publication/351516650_IMPACT_OF_THE_DIGITAL_DIVIDE_ON_ECONOMIC_GROWTH_IN_MENA_COUNTRIES_EVIDENCE_FROM_PANEL_ARDL_MODELS_2000-2018 [Accessed 8 August 2022]

Kwan, C. (2021). "Toward an Inclusive Digital Economy for All: Perspectives from an Intersectional Feminist Social Work Lens", *International Social Work*, Available online: https://journals-sagepub-com.ludwig.lub.lu.se/doi/pdf/10.1177/00208728211009579 [Accessed 4 August 2022]

McMaster University. (2022). *Arab Barometer*, Available online: https://library.mcmaster.ca/data/arab-barometer [Accessed 15 August 2022]

Murphy, E. (2022). "Tunisia", *Britannica*, Available online: https://www.britannica.com/place/Tunisia [Accessed 29 July 2022]

Nikulin, D.(2017). "The Impact of ICTs on Women's Economic Empowerment", in Kaur, H., Lechman, E. and Marszk, A. (eds), *Catalyzing Development through ICT Adoption*, Springer,

pp. 15–24, Available at: https://link.springer.com/chapter/10.1007/978-3-319-56523-1_2#:~:text=Our%20results%20confirm%20that%20the,engagement%20in%20the%20labor%20market. [Accessed 4 August 2022]

OECD. (2017). *Benchmarking Digital Government Strategies in MENA Countries,* [pdf], Available at: https://www.oecd.org/mena/governance/digital-governance-mena.pdf [Accessed 8 August 2022]

OECD. (2018). *Bridging the Digital Gender Divide*, [pdf], Available at: https://www.oecd.org/digital/ieconomy/bridging-the-digital-gender-divide.pdf [Accessed 29 July 2022]

OECD. (2021). *HM1.4 Living Arrangements by Age Groups*, [pdf], Available at: https://www.oecd.org/els/family/HM1-4-Living-arrangements-age-groups.pdf [Accessed 9 August 2022]

OECD. (2022). *The Promises of Digitalisation for Women Entrepreneurs in the MENA Region,* Available online: https://www.oecd.org/gender/data/the-promises-of-digitalisation-for-women-entrepreneurs-in-the-mena-region.htm [Accessed 4 August 2022]

OECD. (n.d.). *The MENA-OECD Competitiveness Programme on Gender,* Available online: https://www.oecd.org/mena/competitiveness/gender-equality-women-economic-empowerment/ [Accessed 30 July 2022]

OHCHR. (2022a). *Tunisia,* Available online: https://www.ohchr.org/en/countries/tunisia [Accessed 29 July 2022]

Plan International. (2022), *Bridging the Digital Divide*, Available online: https://plan-international.org/education/bridging-the-digital-divide/ [Accessed 16 August 2022]

Puri-Mirza, A. (2022), "Demographics in MENA - Statistics and Facts", *Statista,* Available online: https://www.statista.com/topics/5242/demographics-in-mena/#topicHeader__wrapper [Accessed 16 August 2022]

Ragetlie, R., Najjar, D. and Oueslati, D. (2022). ""Dear Brother Farmer": Gender-Responsive Digital Extension in Tunisia During the COVID-19 Pandemic", *Sustainability,* 14(7), Available online: https://www.mdpi.com/2071-1050/14/7/4162/htm [Accessed 4 August 2022]

Raz, D. (2020). "The Arab World's Digital Divide", *Arab Barometer,* Available online: https://www.arabbarometer.org/2020/09/the-mena-digital-divide/ [Accessed 29 July 2022]

Reguly, E. (2021). "Tunisia, 10 Years after the Arab Spring: Democratic Success and an Economic Failure", *The Globe and Mail*, Available online: https://www.proquest.com/docview/2477401432 [Accessed 29 July 2022]

Shehata, A. M. H. (2017). "Role of Information and Communication Technology in Closing Gender Employment Gap in MENA Countries", *The Business and Management Review.* 8(4), Available online: https://cberuk.com/cdn/conference_proceedings/conference_26814.pdf [Accessed 14 July 2022]

Tafnout & Timjerdine. (2009). "Chapter 8: Using ICTs to Act on Hope and Commitment: The Fight Against Gender Violence in Morocco", in Buskens, I. and Webb, A. (eds), *African Women & ICTs*, London: Zed Books, pp. 88–96, Available at: https://search-ebscohost-com.ludwig.lub.lu.se/login.aspx?direct=true&AuthType=ip,uid&db=edo&AN=50299250&site=eds-live&scope=site [Accessed 4 August 2022]

The Web Foundation. (2020). *Women's Rights Online: Closing the Digital Gender Gap for a More Equal World,* [pdf], Available at: http://webfoundation.org/docs/2020/10/Executive-Summary-English.pdf [Accessed 30 July 2022]

The World Bank. (2021). *The World Bank in Tunisia,* Available online: https://www.worldbank.org/en/country/tunisia/overview#1 [Accessed 29 July 2022]

The World Bank. (2022a). *Unemployment, Youth Total (% of Total Labor Force Ages 15-24) (Modeled ILO Estimate) - Tunisia,* Available online: https://data.worldbank.org/indicator/SL.UEM.1524.ZS?locations=TN [Accessed 30 July 2022]

The World Bank. (2022b). *Individuals Using the Internet (% of Population) - Tunisia,* Available online: https://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=TN [Accessed 30 July 2022]

The World Bank. (2022c). *Labor Force Participation Rate, Female (% of Female Population Ages 15+) (Modeled ILO Estimate) - Middle East & North Africa, Tunisia*, Available online: https://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS?locations=ZQ-TN&name_desc=false [Accessed 30 July 2022]

Tisdell, C. A. (2019). "Socioeconomics, Gender Inequality and Female Disadvantage: An Overview", in *Gender Inequality: Socioeconomic Analysis and Developing Country Case Studies*, London: World Scientific, pp. 1–15, Available at: https://www.worldscientific.com/worldscibooks/10.1142/11293#t=toc [Accessed 30 July 2022]

UNECE. (n.d.). *UN Digital Transformation Group for Europe and Central Asia*, Available online: https://unece.org/un-cooperation-unece-region/digital-transformation [Accessed 30 July 2022]

UNICEF. (2021a). *What We Know About the Gender Digital Divide for Girls: A Literature Review*, [pdf], Available at: https://www.unicef.org/eap/media/8311/file/What%20we%20know%20about%20the%20gender%20digital%20divide%20for%20girls:%20A%20literature%20review.pdf [Accessed 29 July 2022]

UNICEF. (2021b). *Situational Analysis of Women and Girls in the Middle East and North Africa,* Available online: https://www.unicef.org/mena/reports/situational-analysis-women-and-girls-middle-east-and-north-africa [Accessed 30 July 2022]

UNICEF. (2021c). *Situational Analysis of Women and Girls in the Middle East and North Africa: A Decade Review 2010 - 2020*, [pdf], Available at: https://www.unicef.org/mena/media/14316/file/54949%20-%20Design%20MENA%20SitAn%20Report%20-%20EXECUTIVE%20SUMMARY.pdf.pdf [Accessed 8 August 2022]

United Nations. (n.d.a). *The Impact of Digital Technologies,* Available online: https://www.un.org/en/un75/impact-digital-technologies#:~:text=Digital%20technologies%20have%20advanced%20more,can%20be%20a%20great%20equaliser [Accessed 29 July 2022]

United Nations. (n.d.b). *Gender Equality*, Available online: https://www.un.org/en/global-issues/gender-equality [Accessed 30 July 2022]

University of Gothenburg. (2020). *Digitalization of Society,* Available online: https://www.gu.se/en/applied-information-technology/digitalization-of-society [Accessed 29 July 2022]

University of Michigan. (2020). *Project: Arab Barometer*, Available online: https://cps.isr.umich.edu/project/arab-barometer/ [Accessed 5 August 2022]

UN Women. (2017). *Reshaping the Future: Women, Girls, ICTs and the SDGs,* Available online: https://www.unwomen.org/en/news/stories/2017/7/reshaping-the-future-icts-and-the-sdgs [Accessed 29 July 2022]

UN Women. (2021a). *Youth Blog: The Gender Digital Divide in the MENA Region: Innovation in Times of Crisis,* Available online:

https://arabstates.unwomen.org/en/news/stories/2021/07/youth-blog-the-gender-digital-divide-in-the-mena-region [Accessed 29 July 2022]

UN Women. (2021b). Addressing the Digital Gender Divide in Africa through the African Girls Can Code Initiative, Available online: https://www.unwomen.org/en/news/stories/2021/10/feature-addressing-the-digital-gender-divide-in-africa [Accessed 9 August 2022]

UN Women. (n.d.a). *Tunisia,* Available online: https://arabstates.unwomen.org/en/countries/tunisia [Accessed 29 July 2022]

UN Women (n.d.b). *UN Women Training Centre ELearning Campus,* Available online: https://trainingcentre.unwomen.org/mod/glossary/view.php?id=36&mode=search&hook=gender+analysis&fullsearch=1 [Accessed 5 August 2022]

Utrikespolitiska institutet. (2022). *Tunisien,* Available online: https://www.ui.se/landguiden/lander-och-omraden/afrika/tunisien/ [Accessed 29 July 2022]

Utterwulghe, S. and Khouja, A. B. (2021). "Ten Years After the Jasmine Revolution, it's Time for the Tunisian Garden to Bloom Again", *UNDP,* Available online: https://www.undp.org/blog/ten-years-after-jasmine-revolution-its-time-tunisian-garden-bloom-again [Accessed 29 July 2022]

Verheijen, A. (2020). "Is the Status of Women in Tunisian Society Endangered?", *The World Bank Group,* Available online: https://blogs.worldbank.org/arabvoices/status-women-tunisian-society-endangered [Accessed 29 July 2022]

Wajcman, J. (2010). "Feminist Theories of Technology", *Cambridge Journal of Economics,* 34(1), pp. 143–152, Available online: http://www.jstor.org/stable/24232027 [Accessed 4 August 2022]

Warren, H. (2007). “Using Gender-analysis Frameworks: Theoretical and Practical Reflections”, *Gender & Development,* 15(2), pp. 187–198, Available online: https://doi.org/10.1080/13552070701391847 [Accessed 5 August 2022]

Wilson Center. (2022). *Digital Transformation in MENA: Harnessing Internet Accessibility for COVID-19 Recovery*, Available online: https://www.wilsoncenter.org/event/digital-transformation-mena-harnessing-internet-accessibility-covid-19-recovery [Accessed 30 July 2022]

World Economic Forum. (2020). *Global Gender Gap Report 2020,* [pdf], Available at: https://www3.weforum.org/docs/WEF_GGGR_2020.pdf [Accessed 30 July 2022]

World Economic Forum. (2022a). *Understanding the Impact of Digitalization on Society,* Available online: https://reports.weforum.org/digital-transformation/understanding-the-impact-of-digitalization-on-society/#:~:text=Digital%20transformation%20is%20generating%20a,health%2C%20resource%20efficiency%20and%20security. [Accessed 30 July 2022]

World Economic Forum. (2022b). *Performance by Region,* Available online: https://reports.weforum.org/global-gender-gap-report-2020/the-global-gender-gap-index-2020/performance-by-region-and-country/ [Accessed 30 July 2022]

Wyatt, S. (2008). “Feminism, Technology and the Information Society. Learning from the Past, Imagining the Future”, *Information, Communication & Society*, 11(1), pp. 111–130, Available online: https://doi.org/10.1080/13691180701859065 [Accessed 4 August 2022]

Yerkes, S. and Mbarek, M. (2021). “After Ten Years of Progress, How Far Has Tunisia Really Come?”, *Carnegie Endowment for International Peace,* Available online: https://carnegieendowment.org/2021/01/14/after-ten-years-of-progress-how-far-has-tunisia-really-come-pub-83609 [Accessed 29 July 2022]

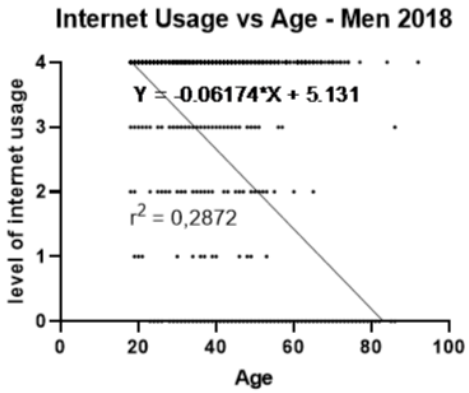
Youssef, A. B. (2021). “Digital Transformation in Tunisia: Under Which Conditions Could the Digital Economy Benefit Everyone?”, *Economic Research Forum*, no. 1512, Available online: https://erf.org.eg/app/uploads/2021/11/1637495187_570_734598_1512.pdf [Accessed 14 July 2022]

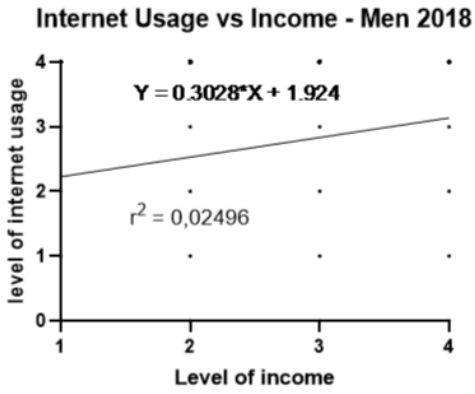
Appendix A

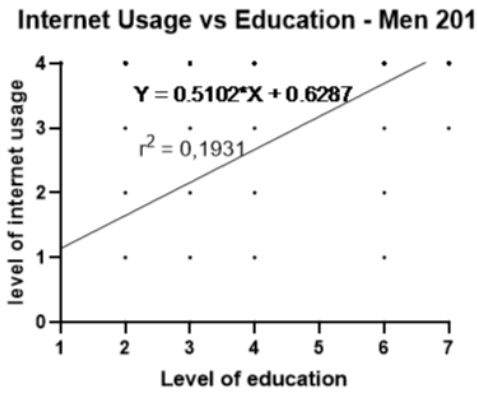
Linear Correlations Between Demographic and Socioeconomic Factors and Internet Usage 2018.

Data extracted from Arab barometer V. Correlation analysis performed by the author.

ALL MEN 2018







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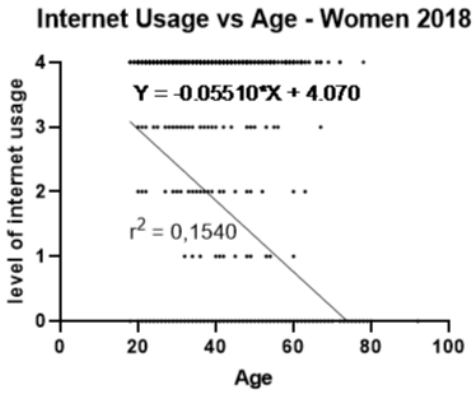

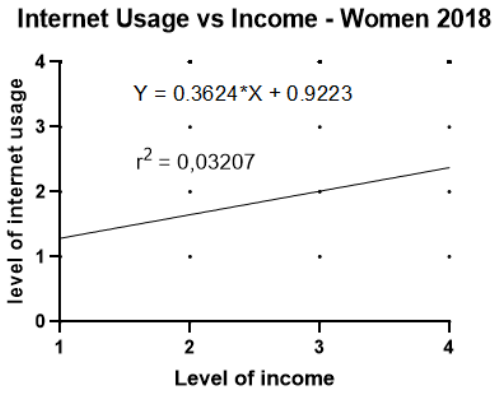

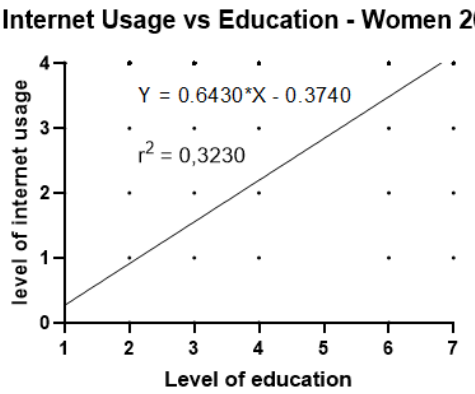

Appendix B

Linear Correlations Between Demographic and Socioeconomic Factors 2018.

Data extracted from Arab barometer V. Correlation analysis performed by the author.

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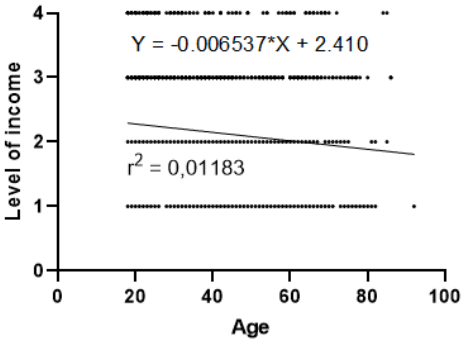

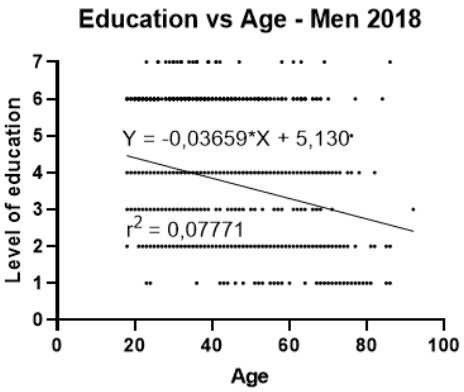

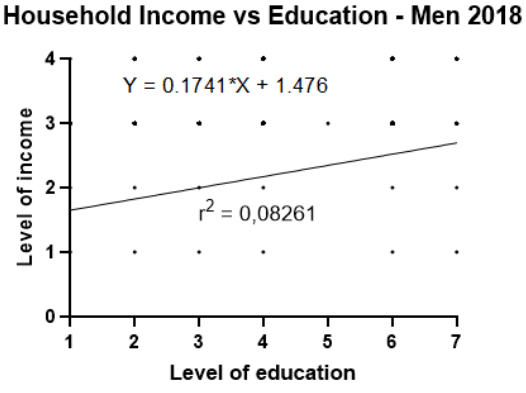

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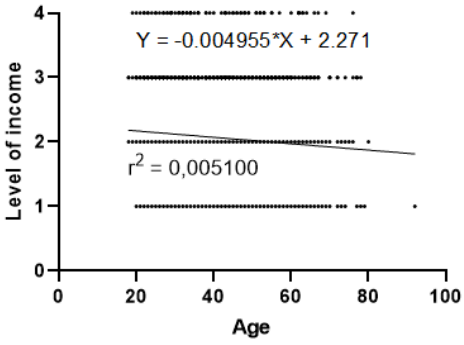

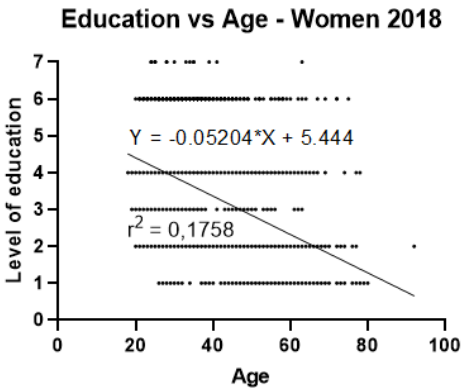

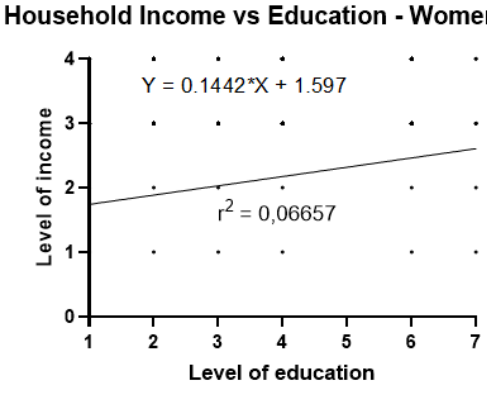

Appendix C

Observed and Predicted Data on Age, Income and Education 2020

Data on observed and predicted weekly internet usage and the gender digital divide illustrate the effects of changing interview methods to mobile phone calls for younger and older men and women, men and women with lower and higher income and lower and higher education.

Source: Arab Barometer, VI. GDD index and predicted values: author's calculations.