Who is left behind by digitalisation? Characterising the Digital Divide in Spain

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Abstract

In a digitalised world, people forget that not all of us enjoy the same level of access to ICT, with access to devices and the necessary skills to maximise their use varying. Differences occur for a variety of reasons, with access to and use of ICT being shaped by geography, gender, employment, age etc. Within this in mind, this paper explores the digital divide in Spain and seeks to characterise the digital divide that occurs across the country. Drawing on data collected from a survey undertaken in 2020, when the Covid pandemic was relatively new, a descriptive analysis is undertaken to determine the profiles that characterise the digital divide. Through identifying a series of profiles, it is possible to determine common characteristics of those who suffer a digital divide. Such an approach highlights the need to develop policies to reduce the barriers encountered by women and those who are older when using ICT.

Keywords: digital divide, profiles, logit, Spain

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1. Introduction

The integration of information technologies into all areas of activity, socially and economically, has been welcomed and encouraged around the world (United Nations, 2019). However, not everyone can adapt technological innovations in the same way, with some individuals being very resistant to innovation (Talwar, Talwar, Kaur, & Dhir, 2020). There are also psychological barriers to innovation (Joachim, Spieth & Heidenreich, 2018), as well as resistance to the use of specific technologies such as mobile payments (Kaur, Dhir, Singh, Sahu, & Almotairi, 2020).

But Covid-19 has forced the widespread use of digital technologies (Vargo, Zhu, Benwell, & Yan, 2020; Yan, Gaspar, & Zhu, 2021). Large numbers of individuals have worked from home (ONS, 2020), while students have studied online. While the impact of Covid-19 has been disruptive for many, some of its worst impacts – unemployment, isolation etc - have been mitigated by ICT. Unfortunately, not everyone benefited from ICT to the same extent. Some forms of employment, primarily those with a high labour content (Dingel & Neiman, 2020), could not be moved online, while others lacked a suitable Internet connection or encountered other problems while working from home (Stocker & Whalley, 2021).

Thus, given the key role played by ICT in the pandemic, it is timely and necessary to understand the nature of the digital divides that individuals face. Notwithstanding the initiatives that have been undertaken to narrow the digital divide, which, in practice, means that some are better placed to access the Internet and enjoy the undoubted benefits that this provides, they remain within and between countries. With this in mind, this paper draws on a data from a survey undertaken in Spain during the pandemic to characterise the digital divide of respondents. Through doing so, our analysis focuses on two related issues: what is the profile of those people experiencing the digital divide, and is their lack of Internet use due to fear or a lack of knowledge?

2. Digital divide

Over the years, the digital divide has attracted attention. Research has explored the digital divides that exist, not only between countries but also within them. This research is broad in scope, exploring differences in telecommunications infrastructure (e.g., Garbacz & Thompson, 2007), the availability and uses of online services and the composition, nature and adoption of digital skills (e.g., Anderson, Brynin, Gershung & Raban, 2007). One recurring theme is the socio-economic benefits that emerge from ICT use, with, for example, researchers highlighting how the increased adoption of broadband contributes to economic growth (Briglauer & Gugler, 2019).

The initial focus on connectivity has given way to a broader analysis of the digital divide. Scheerder and van Deursen (2017), for instance, identify three different divides: access, skills and use. All of these have evolved over time. For example, dial-up Internet access has been replaced by fibre-based connections on the one hand and mobile broadband through 4G on the other. Skills have also changed over time, reflecting the aforementioned changes in how the Internet is accessed but also new generations of devices with greater functionality. As a consequence, the skills needed to use older technologies and devices are widely available in society compared to more recent ones (Peng, 2017).

Digital skills vary by gender and education (Hargittai & Dobransky, 2017; Martinez-Cantos, 2017). Correa (2016), for example, found that male and better educated Facebook users in Chile possessed more skills than other users. Martinez-Cantos (2017) explored the gender digital divide within the European Union, noting that it is both significant and persist. Interestingly the divide is the widest with respect to the more complex online tasks – in other words, the gender digital divide varies depending on the task at hand, being narrower for simple tasks than it is for more complicated one.

Those who have grown up with the Internet are sometimes referred to as ‘digital natives’ (Coklar, Yaman & Yurdakul, 2017; Wang, Sigerson & Cheng, 2019). Through being familiar with the Internet, they are familiar with a range of technologies and switch between them (Hargittai, 2010; Wang, Sigerson & Cheng, 2019). But not all ‘digital natives’ are the same. Drawing on data from

Spain, Gomez (2019) identified five different groups of young Internet users – some are digitally excluded while others possess the necessary skills to undertake advanced tasks online. Eynon and Geniets (2016) explore the development of digital skills among the young, concluding that the young cannot be left alone to develop their skills but instead should be supported so that this occurs.

Similarly, older Internet users are diverse. Harigittai and Dobransky (2017) observed that those who were already old when the Internet first appeared had the lowest skills, while working older adults will use the Internet in their employment and thus gain some of the necessary skills. The possession of digital skills by older individuals may help with their employment (Peng, 2017), and generate financial and social benefits as well (Lissita, Chachashvilli-Bolotin & Bokek-Cohen, 2017).

3. Methodology and data

The objective is to analyse whether people use the Internet and, therefore, explore whether they are victims of the digital divide and understand why. The 'whys', which may be varied in nature, are the explanatory variables that define the reasons that increase this digital divide. A logit estimation is used because the research question is about the probability to have or not to have the Internet and if this depends on sociodemographic characteristics. Variables related to the respondent's Autonomous Community (AACC) and municipality residence will be used, as the most uninhabited areas in Spain are likely to suffer more significant connectivity problems. This study reveals the barriers that prevent people from connecting to the Internet, i.e., the factors that contribute to the development of the digital divide.

The logit model it is not a linear model. It is a logistic probabilistic model that gives a result between 0 and 1 that is consistent with a probability result. Equation 1 shows the theoretical logit model.

$$Pr(y_i = 1|x_i;\beta) = \Lambda(x_i'\beta) = \frac{e^{x_i'\beta}}{(1+e^{x_i'\beta})} \quad (1)$$

The logit model is tested with the 'chi-square test' and the existence of each independent variable in the model is tested by 'Wald test' statistics. However, in cases where there is a classification and assignment process, and where normal distribution assumption and continuity assumption are not a prerequisite, data will be analysed with a logit model. Once developed, the impact of the geographical location of residence will be analysed with a post-estimation test to examine whether the place of residence influences or not the estimate.

After the statistical study, the sample will be restricted to individuals without the Internet. This will enable the independent profile of the user to be analysed. This profile will be broken down according to why they do not have the Internet. This will enable a more detailed understanding of the Spanish digital divide to emerge.

The data used to carry out this analysis are obtained from a survey conducted by CIS: 'Trends in the digital society during the Covid-19 pandemic' (CIS, 2021). This survey was conducted in March 2021. The survey consists of 45 questions, with a total of 3,014 people surveyed across Spain. The survey focuses on topics such as the digital divide, satisfaction, and improvement of household ICT equipment during the pandemic, teleworking, and online education.

The survey was conducted by phone (29.50% fixed phone, 70.50% mobile phone) due to Covid-19. The sample is representative by gender (48.34% male and 51.66% female) and age.

[Insert Table 1 about here]

The demographic profile reflects Spanish society in terms of gender, education, income level, employment status and Internet connection. The last variable is particularly important as understanding the digital divide is the aim of this article.

As can be seen, Spanish society is relatively old, with more than 50% of the population over 45 years of age, and more than 50% of the population is middle

class and has a higher education level. Another detail to be noted is the employment situation of Spanish society, where more than 50% are working, 27% are retired, and only 10% are unemployed. Perhaps surprisingly, 8% of the population is neither working nor looking for a job. These may be students or housewives, who, for the purpose of this paper, will be considered as 'inactive'.

Arguably the most important aspect that is highlighted by Table 1 is the 'Internet connection'. According to this survey, 12% of the population does not have an Internet connection. People without any connection to ICT or the Internet suffer from a digital divide, whose study is the objective of this article. Taking this into account, the dependent variable for this study is 'Internet connection', a binary dependent variable. For this, as independent variables are used, the rest of the variables specified in the socio-demographic profile: gender, age, social class, occupation, and education. A correlation matrix of the data is presented in Table 2, which relates the interactions of all the variables.

[Insert Table 2 about here]

Based on Table 2, the variables are adequately related for the study, with no exceptionally high values implying multicollinearity. The first column shows the relationships of the other explanatory variables with having an Internet connection; negative values in the relationship show possible reasons for the digital divide. Age, money, and lack of education may be among them. It is also observed that individuals living in more populated territories are more likely to have the Internet. This will be discussed in more detail in the results section.

4. Results

This section presents the logit model results that estimates the social determinants and barriers that individuals face with respect to Internet availability in the first model. Model 2 presents the possible connectivity problems that users may encounter depending on the size of their municipality and their Autonomous Community.

[Insert Table 3 about here]

Gender is not a significant determinant of having an Internet connection at home. But age, level of education, occupation and social class are significant. This shows that, in the first instance, there is no barrier preventing any individual from consuming the Internet based on their gender. However, this may be questioned later on in the socio-demographic profiles that emerge. In addition, model 1 demonstrates that digital barriers exist in other societal forms. There is a significant age gap, i.e., older people are much more exposed to the digital divide than younger people. This gap is repeated with social profiles with lower purchasing power, i.e., retired and unemployed people, so there is an economic barrier to accessing the Internet. In addition to an economic barrier, people with higher levels of education are more likely to use the Internet. This creates an additional barrier for people who are not Internet natives or online illiterate.

These patterns are repeated in the second model, although this one also adds residence values. Some conclusions can be drawn from the study of the variables related to the size of the municipality. Although all these variables are negative, it seems that residence is a barrier to Internet use. As it is shown, the negative impact decreases as the size of the municipality increases. Therefore, it can be interpreted that living in larger municipalities is synonymous with being able to access the Internet. This is due to the infrastructure and facilities present in large cities. In addition, the Internet is more accessible depending on the size of the population of the area where you live. This is related with the last variable that is population of the Autonomous Community. The AACC population slope is higher the more populated the Autonomous Community in which you live. Being significant and positive shows that living in more populated areas like Madrid, Catalonia, and Valencia facilitates Internet access. At the same time, Internet accessibility is limited in rural communities.

Parameters' testing was carried out to confirm the relevance in the estimation of the different Autonomous Communities of residence. This test shows that living in other areas does generate significant differences if its p-value is significant, table 4.

[Insert Table 4 about here]

As can be seen, the value is significant, and, therefore, there are differences between the Autonomous Regions when it comes to facilitating and standardising Internet access for their inhabitants. It is easier to have Internet in AACC like Madrid or Catalonia than in Galicia or the Basque Country. Rural areas with more dispersed villages make it easier to find citizens suffering from the digital divide.

5. Main findings

Once the socio-demographic profile of the sample is determined, and the impact of personal characteristics on whether users have Internet has been carried out, it is possible to analyse the specific profile of the users who do not have an Internet connection. Reviewing the profile of people who suffer from the digital divide will help us better understand the impact of lack of knowledge and other factors on individuals who suffer from it.

As the results show, there is no significant gender gap in the digital divide. There is, however, an impact by age, income, employment status and education. To explore this, Table 5 contains the socio-demographic profile of individuals who do not have access to the Internet.

[Insert Table 5 about here]

Table 5 represents a higher percentage of older citizens than the percentage of this group in the general (i.e., national) demographic profile. Over 80% of this sample is over 45 years old, while only one individual is under 25 years of age. There are also differences when it comes to employment: more than 60% are retired, only 27% of the population is active, either working or unemployed, and around 10% of the population is inactive, with former homemakers being concentrated in this group.

In terms of the income levels of those affected by the digital divide, there are 20% fewer people who consider themselves middle class and more than twice those who consider themselves lower class than in the whole sample. With these results it can be observed that the digital divide is affecting both workers and retired people. The original demographic profile has more than 50% of workers and only 25% of retired people, and a higher percentage of the middle class than those experiencing the digital divide and less than half lower class, 7%.

Education wise, the population affected by the digital divide has lower rates of tertiary education and a higher percentage of school dropouts after secondary education. These percentages are similar to the representative ones and very high considering the individual's advanced age represented in this profile. Finally, although not significant in the regression, there are large differences in the gender profile described, with a higher percentage of women suffering from a digital divide than men.

After looking at the individual without Internet, it is essential to consider why they do not have Internet. This is reflected in Figure 1 that illustrates those factors that lead individuals not to have the Internet.

[Insert Figure 1 about here]

Among the reasons that lead individuals not to have an Internet connection, the most important are: ‘Not understanding how the Internet works’, not being ‘Previous users’, ‘Economic reasons’ and ‘Connectivity’. These reasons account for more than 70% of the population experiencing the digital divide. In addition, it seems that ‘not knowing how to use the Internet’ or ‘never having used it’ is the most significant barrier, as ‘age’, ‘not being a user’, ‘lack of understanding’, and ‘not seeing the need to pay for it’ also account for more than 70% of this group.

Apart from these reasons for the digital divide, other factors are not related to the lack of knowledge. It is worrying that the 10% of Spanish people who are victims of the digital divide are so because of a manifest inability to connect to the Internet in their residence. Also notable is the role of using other devices in not having the Internet at home. This leaves us with a group of people connected non-

traditionally; with it being reasonable to expect them to be younger rather than older. This will be analysed when looking at each case separately.

In Figure 1 the main reasons for suffering from the digital divide can be seen more clearly. The biggest portion is related to not being a digital native, followed by not being users and economic reasons. This is reflected in the four most common reasons, which occupy much of Figure 1. It can also be seen that a surprisingly high a percentage of people do not have the Internet due to a lack of connection. This is a problem that needs to be urgently corrected as it is not up to the citizens.

In summary: the average individual affected by the digital divide can be defined on the basis of the socio-demographic analysis (Table 2), with a number of reasons explaining why individuals experience a digital divide (Figure 1). These reasons are that the person is older, not highly educated and considered to be outside the middle classes. Furthermore, although not significant in the statistical analysis, the people experiencing the digital divide are mostly women.

Next, the reasons for the digital divide will be categorised. One category relates to educational and cultural barriers, another to economic barriers and the last to other factors. This division is made so that it is possible to identify the main reasons for the digital divide and develop profiles of those most affected to obtain an understanding of who the digital divide affects in Spain.

5.1. Educational and cultural barrier

Table 3 lists factors related to not understanding the Internet, not having used the Internet and the age of users as reasons for the digital divide. These factors are related to education and the cultural barrier of older people when dealing with the Internet.

[Insert Table 6 about here]

The first thing that emerges from Table 6 is a significant gender difference, with more than 60% of those affected being female. This contradicts what was found in Section 4, which denied the relationship between gender and Internet connection. There is also an enormous difference in age, with more than 85% of respondents who fall into this problem being over 65 years old. The age problem is also reflected in employment status. All are retired or inactive, with homemakers being the most frequent group.

In terms of education and social class, individuals are more heterogeneous. Individuals with secondary school, high school and higher education, university or vocational training predominate. There is also a large distribution among individuals who consider themselves middle or lower class. These are fairly educated and affluent people who, despite this, do not have an Internet connection because they do not understand how it works. This is understandable considering their age. Although the Internet has been around for some time, until recently it was not as central socio-economically as it currently is with the consequence that individuals could work, socialise etc without having to know how it works.

From this, it can be concluded that the profile of the individuals who do not use the Internet simply because they do not know how to use it are mostly old, educated, and retired women.

The analysis of the second most repeated reason, ‘not having been a user before’, is shown in the second column. In this case, there is no gender gap, and user profiles are much more homogeneous. The distribution of the responses shows that according to age, most users are over 45 years old, with the most reported age group being over 65 years old. The proportion over 65 years of age accounts for most of these users, with more than 59% of this cohort.

These individuals who are not Internet users because they ‘were not Internet users’ before Covid-19 is mainly made up of people who consider themselves middle class, with higher education and who are retired. All these answers account for more than 50% of the responses. It is also noted that more than 20%

of the respondents are still working, and there are hardly any people unemployed or inactive before retirement in this category.

The last column represents the user that suffers from the digital divide because they consider themselves ‘too old’ to be on the Internet. Unsurprisingly, the individuals who respond that suffer from an age barrier are those who are over 65 and are retired. However, in this case, there is not a gender gap affecting women, but men, with 60% of the cohort being male. Moreover, these are individuals who perceive themselves as middle or working class.

These people that consider themselves too old to be on the Internet are the most heterogeneous group according to their education. The percentages are distributed proportionally between those with no education, those with primary education and those with higher education. Therefore, education is not important when considering being old as a reason for the digital divide. The reason – ‘older people’ - is predominately formed by male, middle class and retired individuals.

This would provide the most intuitive reasons for the digital divide. After examining the reasons related to online illiteracy and age, the following responses are related to interest and need for the Internet. These are shown in Table 7.

[Insert Table 7 about here]

Individuals who do not find the Internet interesting are mostly women (60% of respondents), over 65 years of age (74%), with higher education (60%) and retired (69%). This profile almost perfectly matches that of people who do not need the Internet.

Hence, the digital divide is accompanied by a gender divide, with interest in the Internet being related to men. Interest in the Internet is also associated with young people, as 74% of those who do not have the Internet because they are not interested in it are over 65 years of age. In addition, they have better education and are retired, which is typical given their age.

The subjective social class section is more difficult because it is very evenly distributed. The lack of interest is not linked to any economic level. Next, the last column of Table 7, details those individuals who do not need the Internet. This is closely related to the previous reason.

In this case, some trends from the previous motive are repeated. Women are the most affected by this motive, mostly over 65 years of age and higher education. In this case, the difference is that most respondents are retired or working, with the same percentage, and self-perceive themselves as middle class. In addition, a considerable rate, 18.75%, are between 35 and 44 years old. Moreover, no one under 34 years of age suffers from the digital divide.

5.2. Economical and accessibility barriers

Table 8 shows the digital divide motivated by economic or geographical reasons, which are not related to the consumer but to the price of the Internet (i.e., affordability) or their residence. Place of residence is the fourth most common response. It is one of the main problems with the lack of Internet connection, which the Spanish government understands, as shown in the Digital Plan 2025 (2020). These responses encompass people who do not have Internet with a different profile to the one seen above.

[Insert Table 8 about here]

The economic motives describe a victim of the divide digital, who is primarily female, lower class, retired or unemployed and over 45 years of age. This profile shows a population that suffers multiple discriminations: both employment, namely, the difficulty finding a job at an ‘advanced’ age, and the gender gap, which tends to appear in all ICT-related issues, and poverty. Although the issue of the digital divide on the grounds of inaccessibility is very heterogeneous, it can be deduced that it will be a middle class and educated male. Still, the age and the employment situation are difficult to define.

Focusing on economic reasons, this response also shows a gender gap that disadvantages women, with 60% of those who do not connect to new technologies due to economic problems. It also shows that the 45-65 age group accounts for more than 43% of the population suffering from this type of digital divide, more than the over-65 age group, with around 40%.

The fact that the young population is subject to this digital divide problem is mainly explained by economic and employment reasons. Although 30% of respondents say they consider themselves middle class, most respondents consider themselves lower class. This shows that the economic problem is mainly linked to income, but not completely. There is also a recurring trend that most of those suffering from the digital divide in Spain are highly educated. This may be related to an earlier generational problem. Considering employment status, apart from retired people, who are the majority in this response, there is an unemployed population of over 30%, which is closely related to economic problems.

In the case of inaccessibility, the digital divide is related to men, with 58.5% of cases. But, as in the previous answer, the victims of this digital divide are of various ages, ranging very heterogeneously from 25 to over 65 years old. In other words, these are a lot of relatively young people. Due to the variety of age groups, there are also various employment statuses, including unemployed, working, and retired. However, in line with the trend mentioned above, it is mainly people with higher education and in the middle class.

This may show that, in this case, not so older people are more vulnerable to the digital divide and that the digital divide is more pronounced among the poor. It shows a different profile from the general one and the previous section.

5.4. Others

Table 9 represents users who have access to the Internet but do not have a connection at home. In this case, the following table represents those individuals who use mobile phones to stay connected.

[Insert Table 9 about here]

In this case, the people without an Internet connection at home, but who make do with other devices are primarily women (56%), young people between 25 and 44 years old (60%), middle class (64%), higher education (50%) and working (50%). They are still individuals without an Internet connection at home, but who make do with other options. These individuals may lack electronic devices because they have never needed them. With a larger sample, it would be interesting to see if they have bought new devices or better connections because of Covid-19.

To conclude the analysis of each response, the last table discusses individuals who experience the digital divide for other reasons. The person who responds in this way corresponds to the typical profile of the individual experiencing the digital divide. As shown in Table 9, they are mostly women (62%), over 65 years old (62%), middle class (57%), with higher education (54%), and retired (53%). However, it is also frequently the case that they have never worked or are still working, as both answers account for 56% of the responses.

6. Discussion

In previous sections we have undertaken a statistical analysis that demonstrated that while there is no gender gap there are cultural, educational, employment, economic and age gaps. This was then followed by the identification of the profile of the 'typical' individual who suffers from the digital divide, and the specific causes of it (educational, economic, cultural etc). This is shown in Table 10 (below), which compares the statistical study results with each of the typical individuals found in the population analysis. Comparing these typical individuals will help us understand which barriers affect them and which are the most distinctive in the Spanish population. This, in turn, will enable policies to be developed by the Spanish government to tackle the digital divides that are being experienced across the country.

To this end, in the first column of Table 10, the results obtained from the logit analysis are presented, with the age, educational and economic barriers, adding the employment situations of being unemployed or retired as the most common characteristics of the digital divide. In addition to these, a possible gender gap is added, which, although it did not appear in the econometric analysis, was found in the main findings section. It is determined whether such a situation is located in the socio-demographic study of the different digital divides.

[Insert Table 10 about here]

Table 10 yields several insights. First, is the gender gap. Although no gender gap is found in the logit model, neither is it apparent between those who experience economic and age barriers and those who are not Internet literate. Women are more susceptible to the digital divide than men. Women experiencing the cultural divide are the leading group who say they do not use the Internet because they do not like it or do not need it. Women also experience a digital divide for other reasons. However, as will be seen below, this barrier is closely related to the age of the women who responded that they are victims of the digital divide. Indeed, it is remarkable how the gender gap does not seem to exist among younger women. Young women are more likely than men to resort to alternative methods of connecting to the Internet if they need to.

But the group that is undoubtedly the victim of a significant digital divide are older people, except for those who do not go online for economic reasons. Older people are in the majority in all of the other digital divides identified. Older people suffer from an educational barrier, as they were never taught to use digital technologies, a connectivity barrier, as they are the majority in rural areas, and a cultural barrier, as they say, they are not interested.

The other point that unites more causes of the digital divide is that, in general, the person who suffers from the digital divide is retired. They were the majority in almost all causes, with the exception of the unemployed, in the digital divide for

economic reasons. Arguably this group must have been particularly vulnerable throughout the pandemic since, without the possibility of accessing online work, their digital divide may have widened.

However, it is striking that while it is assumed that people with no education are more likely to suffer from the digital divide, the vast majority of respondents who say they have ‘no Internet’ have a higher education. Having said that, the percentage is lower than that of the general Spanish population. This shows that education in Spain is not linked to the digital divide, as the majority of the population is educated. Even so, and taking into account age, a different question would have been to ask those individuals with training in the use of the Internet and/or e-skills to identify themselves in the survey. This question would probably have yielded very different results, given the ageing of the Spanish population.

To finish exploring the causes, we concentrate on the economic barriers. It is assumed that having low purchasing power is a barrier to using ICT. However, this reason is only represented in the economic barrier; the rest of the reasons: age, culture, education... are not related to being lower class. In general, but to a lesser extent than the Spanish population, most of the people suffering from the digital divide consider themselves to be middle class.

Finally, a gender gap is observed in the comparison of groups, accompanied by an employment and age barrier. It could be considered that, although these individuals tend to have a higher education, this was the case before the emergence of the Internet, so the digital divide is also educational and cultural. What is striking is the relative importance of the economic divide, which limits individuals who suffer from it regardless of their age.

All these groups have been susceptible to the pandemic, though due to their varied characteristics some have fared better than others. These differences, however, necessitate the need to develop policies and initiatives that ensure that the most vulnerable are provided with access to ICT. One aspect of these policies should address the economic barriers to using ICT; the employment of individuals does not provide them with the means to utilise ICT, perpetuating their marginalised status. More broadly, there is a need to ensure those areas without

any or adequate ICT access are targeted with appropriate interventions that address these shortcomings – quite simply, the ICT coverage needs to be expanded so that connections are available wherever individuals live and work. In some cases, these connections will be through fixed technologies, but in others it will be wireless. Adopting a technological neutral approach to improving coverage is important as it enables different access technologies (fibre, Wi-Fi, 5G) to be used where they are most appropriate.

Aside from the need to improve connectivity, our analysis vividly illustrates the need to tackle the obstacles faced by older women. Through the provision of dedicated training or supportive networks, perhaps based around social activities, older women would be shown the benefits of using the Internet. This would, in turn, persuade them to use the Internet. Given the age of the women being supported, this support is time limited – as younger women age, they will bring with them their better ICT skills and positive disposition towards the Internet. However, given the prominent position of women in the digital divides that we have identified, there is also a need to developed gender specific policies that improve female use of the Internet more broadly.

7. Conclusions

This paper has sought to characterise the digital divide in Spain. Drawing on data that was collected in early 2020, when the full impact of the Covid pandemic, was just beginning to be felt, our analysis highlighted the presence of multiple barriers to using the Internet. These barriers are educational, economical and age related, with those who are least educated, poorer and older being more likely to experience a digital divide. Our analysis also demonstrated that accessibility issues remain, with it being more likely that someone will experience a digital divide through the lack of connectivity in the smaller municipalities of Spain. That some still experience an access derived digital divide within Spain suggests one area where further governmental policies are needed, perhaps motivated by the desire to repopulate those areas which are already sparsely populated and maintain those viable population levels that exist. Without access to the Internet, which provides a plethora of opportunities, these areas are likely to experience a continued decline in population levels with all the negative consequences that this entails.

A second area where policy initiatives are required relates to the finding that older people are likely to experience a digital divide. Policies need to be developed to counter this, especially as governmental services go online and families are spread over ever wider geographical areas. Age is, however, compounded by other factors – gender and economic circumstances – which necessitates the development of policies that tackle multiple barriers to using the Internet at the same time. It is a waste of resources to develop initiatives to help older women to develop the relevant skills to use the Internet if they cannot afford a device or monthly subscription or see no reason to use the Internet in the first place.

These policies need to be tailored as the digital divide we uncovered in our analysis is complex. Older women, for example, are more likely to encounter barriers to using the Internet compared to their male counterparts, while the middle aged regardless of gender are likely not to be able to use the Internet due to economic reasons. This suggests a combination of policies, which cover training as well as economic subsidies, are needed, and while some of these may be short term in duration others are likely to be long-lasting. Integral to these

initiatives will be the need to educate those who do not use the Internet of its benefits. While not using the Internet is related to formal education, others – governments, companies, charities, libraries etc – all have a role to play in highlighting the benefits of being online.

Our analysis is not without its limitations. The survey occurred relatively early on during the pandemic. Given how this encouraged online activities, a survey undertaken at a later date may have yielded different results. Having said that, repeating the survey now would enable a comparison that demonstrates the impact of Covid on the digital divide to be investigated. The survey also lacks a question about how familiar respondents are with Internet related issues. Including such a question would enable a comparison between formal and informal education and how this impacts on the digital divide of respondents.

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Table 1. Demographic profile

		Frequency	Percent
GENDER	Male	1,457	48.34
	Female	1,557	51.66
AGE	18-24	191	6.34
	25-34	347	11.51
	35-44	544	18.05
	45-54	623	20.67
	55-64	537	17.82
	65+	772	25.61
SOCIAL CLASS	High	174	6.16
	Medium	1,578	55.88
	Medium-Low	438	15.51
	Working Class	291	10.30
	Low	198	7.01
	Other	145	5.13
LEVEL OF STUDIES	No studies	206	7.42
	Primary	483	17.39
	High School	530	19.08
	Superior Studies	1497	49.65
	Other	62	2.06
OCCUPATION	Working	1,529	50.80
	Retired	824	27.38
	Unemployed	330	10.96
	Inactive	269	8.94
	Other	58	1.93
INTERNET CONNECTION	Yes	2,626	87.16
	No	387	12.84

Table 2. Correlation matrix

	Internet	Male	Age	Social Class	Occupation	Formation	Small Town	Town	City	Big City	AACC's Population
Internet	1.000										
Male	0.052	1.000									
Age	-0.306	-0.023	1.000								
Social Class	-0.256	-0.015	0.156	1.000							
Occupation	-0.109	-0.194	0.046	0.117	1.000						
Formation	0.096	0.085	-0.079	0.047	0.026	1.000					
Small Town	-0.068	0.002	0.050	0.095	0.019	0.019	1.000				
Town	-0.064	0.005	0.000	0.016	-0.002	0.018	-0.097	1.000			
City	0.003	0.002	-0.021	0.018	0.027	0.058	-0.195	-0.309	1.000		
Big City	0.023	-0.003	0.015	-0.036	-0.016	-0.030	-0.166	-0.263	-0.532	1.000	
AACC's Population	0.0574	-0.010	-0.012	-0.006	0.010	-0.031	-0.117	-0.071	0.015	-0.048	1.000

Table 3. Logit model about having Internet Connection at home during 2020.

	Model 1			Model 2		
	Coefficient	**Slope**	**Odds ratio**	**Coefficient**	**Slope**	**Odds ratio**
Male	.127 (.139)	.0108	1.136	.165 (.141)	.013	1.179
Age	-.487*** (.040)	-.041	.613	-.493*** (.040)	-.041	.610
Social Class	-.434*** (.045)	-.037	.647	-.432*** (.046)	-.036	.648
Occupation	-.209*** (.071)	-.017	.810	-.1975*** (.072)	-.016	.820
Formation	.111*** (.031)	.009	1.118	.117*** (.032)	.009	1.124
Small Town				-1.220*** (.384)	-.101	.295
Town				-1.458*** (.343)	-.121	.232
City				-.950*** (.319)	-.079	.386
Big City				-.824** (.326	-.068	.438
AACC's Population				.035** (.015)	.002	1.03
Constant	5.754*** (.331)		315.5	6.137*** (.518)		462.664
n	2,593			2,593		
Pseudo-R^2	0.2014			0.2197		
PCPC	89.05%			89.47%		
ROC	0.809			0.821		

Notes: Standard deviation in parenthesis. * Significant at 10%, ** significant at 5% and *** significant at 1%. PCPC means Percentage of Correctly Predicted Cases.

Table 4. Parameters test on differences between AACC.

X^2	39.30
p-value	0.001

Table 5. Demographic profile for those who have no Internet.

		Frequency	Percent
GENDER	Male	164	42.27
	Female	224	57.73
AGE	18-24	1	0.26
	25-34	18	4.64
	35-44	21	5.41
	45-54	40	10.31
	55-64	53	13.66
	65+	255	65.72
SOCIAL CLASS	High	3	0.93
	Medium	117	36.34
	Medium-Low	54	16.77
	Working Class	38	11.80
	Low	61	18.94
	Other	49	15.22
LEVEL OF STUDIES	No studies	43	11.56
	Primary	46	12.37
	High School	118	31.72
	Superior Studies	159	42.75
	Other	6	1.61
OCCUPATION	Working	66	17.05
	Retired	237	61.24
	Unemployed	41	10.59
	Inactive	35	9.04
	Other	8	2.07

Figure 1. Reasons why people don't have an Internet connection.

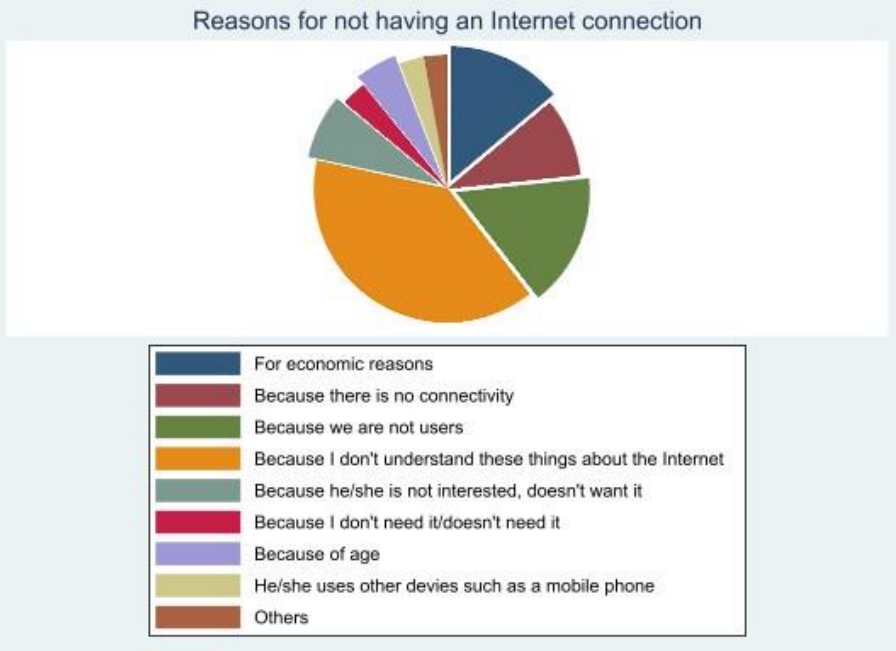

Table 6. Educational and age barrier.

		Not Understand		Not users before		Elder People	
		Freq.	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**
GENDER	Male	57	37.01	34	50.75	15	60.00
	Female	97	62.99	33	49.25	10	40.00
AGE	18-24	0	0.00	0	0.00	0	0.00
	25-34	0	0.00	2	2.99	0	0.00
	35-44	4	2.60	5	7.46	2	8.00
	45-54	8	5.19	10	14.93	0	0.00
	55-64	9	5.84	10	14.93	1	4.00
	65+	133	86.36	40	59.70	22	88.00
SOCIAL CLASS	High	1	0.83	0	0.00	0	0.00
	Medium	42	35.00	26	46.43	7	41.18
	Medium-Low	17	14.17	13	23.21	2	11.76
	Working Class	13	10.83	6	10.71	3	17.65
	Low	29	24.17	7	12.50	2	11.76
	Other	18	15.00	4	7.14	3	17.65
LEVEL OF STUDIES	No studies	27	18.24	2	3.17	4	18.18
	Primary	21	14.19	8	12.70	5	22.73
	High School	59	39.87	19	30.16	6	27.27
	Superior Studies	40	27.03	33	52.38	7	31.82
	Other	1	0.68	1	1.59	0	0.00
OCCUPATION	Working	9	5.84	20	29.85	2	8.00
	Retired	117	75.97	38	56.72	22	88.00
	Unemployed	6	3.90	4	5.97	0	0.00
	Inactive	21	13.64	4	5.97	0	0.00
	Other	1	0.65	1	1.49	1	4.00

Table 7. Cultural barrier.

		Lack of interest		Lack of necessity	
		Frequency	**Percent**	**Frequency**	**Percent**
GENDER	Male	14	40.00	7	43.75
	Female	21	60.00	9	56.25
AGE	18-24	0	0.00	0	0.00
	25-34	0	0.00	0	0.00
	35-44	3	8.57	3	18.75
	45-54	1	2.86	2	12.50
	55-64	5	14.29	2	12.50
	65+	26	74.29	9	56.25
SOCIAL CLASS	High	0	0.00	0	0.00
	Medium	10	34.48	7	50.00
	Medium-Low	5	17.24	3	21.43
	Working Class	5	17.24	2	14.29
	Low	2	6.90	0	0.00
	Other	7	24.14	2	14.29
LEVEL OF STUDIES	No studies	2	6.06	1	7.69
	Primary	3	9.09	2	15.38
	High School	20	60.6	3	23.08
	Superior Studies	6	18.18	7	53.84
	Other	2	6.06	0	0.00
OCCUPATION	Working	6	17.14	7	43.75
	Retired	24	68.57	7	43.75
	Unemployed	2	5.71	1	6.25
	Inactive	1	2.86	1	6.25
	Other	2	5.71	0	0.00

Table 8. Economical and accessibility barriers.

		Economic Reasons		Connectivity problems	
		Frequency	**Percent**	**Frequency**	**Percent**
GENDER	Male	24	41.38	24	58.54
	Female	34	58.62	17	41.46
AGE	18-24	0	0.00	1	2.44
	25-34	5	8.62	6	14.63
	35-44	5	8.62	7	17.07
	45-54	12	20.69	5	12.20
	55-64	13	22.41	10	24.39
	65+	23	39.66	12	29.27
SOCIAL CLASS	High	1	1.92	1	2.63
	Medium	16	30.77	16	42.11
	Medium-Low	9	17.31	9	23.68
	Working Class	3	5.77	4	10.53
	Low	17	32.69	2	5.26
	Other	6	11.54	6	15.79
LEVEL OF STUDIES	No studies	2	3.64	3	8.11
	Primary	4	7.27	1	2.70
	High School	18	32.73	10	27.03
	Superior Studies	25	45.45	21	56.75
	Other	6	10.91	2	5.41
OCCUPATION	Working	10	17.24	16	39.02
	Retired	25	43.10	15	36.59
	Unemployed	19	32.76	7	17.07
	Inactive	3	5.17	2	4.88
	Other	1	1.72	1	2.44

Table 9. Use other devices and others.

		Use other devices		Other	
		Frequency	**Percent**	**Frequency**	**Percent**
GENDER	Male	7	43.75	6	37.50
	Female	9	56.25	10	62.50
AGE	18-24	0	0.00	0	0.00
	25-34	4	25.00	1	6.25
	35-44	6	37.50	2	12.50
	45-54	1	6.25	1	6.25
	55-64	1	6.25	2	12.50
	65+	4	25.00	10	62.50
SOCIAL CLASS	High	0	0.00	0	0.00
	Medium	9	64.29	8	57.14
	Medium-Low	3	21.43	1	7.14
	Working Class	1	7.14	1	7.14
	Low	1	7.14	1	7.14
	Other	0	0.00	3	21.43
LEVEL OF STUDIES	No studies	1	7.14	1	9.09
	Primary	1	7.14	1	9.09
	High School	2	14.29	3	27.27
	Superior Studies	7	50.00	6	54.54
	Other	3	21.43	0	0.00
OCCUPATION	Working	8	50.00	4	26.67
	Retired	5	31.25	8	53.33
	Unemployed	2	12.50	0	0.00
	Inactive	0	0.00	3	20.00
	Other	1	6.25	0	0.00

Table 10. Comparing profiles of Digital Divide.

Logit Model Results	General Digital Divide Profile	Educational and Age Barrier	Cultural Barrier	Economical and access Barrier	Other kind of Barriers
Women	✓	?	✓	?	✓
Older People	✓	✓	✓	✗	✓
Retired	✓	✓	✓	✓	✓
Unemployed	✗	✗	✗	✓	✗
Low income	?	✗	✗	✓	✗
Uneducated	✓	✗	?	✗	✗