Gendering the digital divide: The use of electronic government services and implications for the digital gender gap

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Abstract. Electronic government (e-gov), a means of providing online public services, has the potential to greatly benefit all members of society. However, its advantages are often out of the reach of citizens who are digitally excluded. Drawing on socioeconomic and demographic ICT survey data, researchers have explored the digital divide and have concluded that gender is an important determinant of inequality. If we are to provide e-gov services that are more accessible to women and geared towards their needs, we must consider the digital gender gap. This paper explores gendered differences in e-gov service usage in Brazil. Findings on the disproportionate numbers of women and men seeking and using e-gov services, as well as the reasons for not using them, justify the relevance of gendering the e-gov debate.

Keywords: Gender, electronic government, e-gov, digital divide, sociodemographic variables

Key points for practitioners:

- Gender and other sociodemographic characteristics (such as race, age, level of education and other contextual variables) are essential to a better understanding of the digital divide and its implications on e-gov service use as well as reasons for not using them.
- Collecting data disaggregated by sex and other relevant contextual variables helps provide a more detailed scenario of the digital divide and its implications for electronic government service usage.
- Decision makers should consider the role gender plays at all stages of public policymaking, particularly in relation to e-government.

1. Introduction

This paper draws on data from the ICT Households 2019 survey (Brazilian Network Information Center [NIC.br], 2020) to explore the different ways that male and females use electronic government (e-gov) services in Brazil, looking as well at reasons for not using such services.

Having adopted information and communication technologies (ICT), governments are increasingly providing information to citizens and interacting with them via electronic services – broadly called

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electronic government (Chun et al., 2010; Gerpott & Ahmadi, 2016; United Nations [UN], 2020). However, not all citizens are reaping the benefits of e-gov (UN, 2020; Yera et al., 2020). The digital divide both among countries and individuals remains a barrier to effective e-gov use (Gray et al., 2017). According to the International Telecommunication Union (ITU) (2020), despite a sharp increase in Internet access (from nearly 17% of individuals in 2005 to over 51% in 2019), ICT dissemination continues to be marked by socioeconomic and regional inequalities worldwide. The ITU (2020) also estimated that 49% of males and 40% of females in developing countries were Internet users, suggesting an important gender gap.

While the term *digital divide* has many definitions, it generally involves social and political inequalities related to interactions between individuals, technology, and society (Helbig et al., 2009). Although access to ICT is a requisite for citizens to reach online public services and information, researchers are increasingly considering social and environmental factors when characterizing the multiple dimensions that affect e-gov use (Helbig et al., 2009). Perspectives based solely on access have shifted towards other dimensions, such as digital skills, use patterns and perceived tangible outcomes, that may hinder ICT uptake (Scheerder et al., 2017; van Deursen & Helsper, 2015). Researchers recognize that individuals have different ICT experiences, outcomes and benefits, which in turn may affect the possible improvements to social and economic conditions (Helbig et al., 2009; van Deursen & Helsper, 2015). Not only do digital divides hinder e-gov use, but they also create new divides (Bélanger & Carter, 2009).

It is also important to understand the different ways that the digital divide impacts men versus women. There exists no consensus or advanced theoretical discussion about why men and women use e-gov differently (Gerpott & Ahmadi, 2016). For years, researchers have overlooked gender differences in e-gov use (Sarabdeen & Rodrigues, 2010), and little theoretical consideration has been given to the matter (Helsper, 2010). Some studies have explained this distinction based on the differentiation of preferences (Choi & Park, 2013) without considering the masculinist aspect of e-gov services (Martin & Goggin, 2016). The benefits of e-gov for women, particularly those who experience multiple social disadvantages, exclusion, and marginalization, are still unclear (Martin & Goggin, 2016). Gendering the e-gov debate is therefore fundamental to providing services and information that are more accessible to women and meet their needs. In this regard, a better understanding of the digital gender divide would enable public managers to develop more effective e-gov solutions for overall populations (Helbig et al., 2009), and for women in particular.

This paper examines the gender gap related to e-gov service use. It aims to answer the following research question: What are the gendered differences in the use of e-gov services? This discussion is of particular importance since much of the existing literature offers a supply-side perspective, and greater attention must be given to the demand side if more social groups and individuals are to benefit from such services (Helbig et al., 2009; Choi & Park, 2013).

To examine the gender gap, our analysis draws on secondary quantitative data from the ICT Households survey (NIC.br, 2020) conducted in Brazil by the Regional Center for Studies on the Development of Information Society (Cetic.br|NIC.br).[1] Income inequality in Latin America – where the top 10% hold 37% of wealth, and the poorest 40% hold 13% – remains the highest in the world (United Nations Development Programme [UNDP], 2019). Covering 40% of Latin America, Brazil is the largest country in the region and the most populous, around 32% (United Nations Department of Economic and Social

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[1]Cetic.br|NIC.br is a department of the Brazilian Network Information Center (NIC.br), a non-profit organization that implements the decisions and projects defined by the Brazilian Internet Steering Committee (CGI.br). Cetic.br|NIC.br is a Category 2 Center of UNESCO since 2012. For more information, see https://cetic.br/en/.

Affairs [UN DESA], 2019), with the largest economy, more than 40%. Brazil follows the Latin American trend in terms of inequalities. It is the 9th most unequal country in the world (Brazilian Institute of Geography and Statistics [IBGE], 2020). Although there is no available e-gov data for Latin America as a whole, Brazil has collected robust statistics since 2005. Analyzing Brazil's data can help understand the gender digital divides of a Latin American country where the gender perspective, which governments have overlooked for years, is especially important (United Nations Economic Commission for Latin America and the Caribbean [UN-ECLAC], 2018). We believe that this study can help advance the discussion on e-gov service use in the Global South. Specifically, our analysis of ICT access and use by gender explores sociodemographic variables such as race, education level, age, family income, social class, and economic activity status. Producing data and reflecting on e-gov with a gender perspective is vital to highlighting an issue that must serve in decision-making (Criado-Perez, 2019) as there is no 'universal' profile for e-gov users (Martin & Goggin, 2016).

2. Literature review

Beyond ICT use in the public sector's internal processes, e-gov comprises the use and adoption of ICT as a means of improving public services (Diniz et al., 2009). The migration from hard to soft copies, the diffusion of ICT infrastructure and state reform of the state all resulted from the use of ICT by society, including individuals and organizations. E-gov is anchored in the promotion of efficiency, transparency, and modernization and is intended to improve managerial efficiency and public service quality (Diniz et al., 2009; Moon, 2002). At the outset, the term was mostly related to the provision of electronic services and administrative efficiency. More recently, and even in non-academic publications (UN, 2020), it incorporated social inclusion and citizen engagement. Some authors have looked at conceptual and social aspects of e-government, such as e-democracy and the larger body of technology, politics, and the information society (Helbig et al., 2009).

Even though e-gov policies cover government interactions with citizens, if a population cannot access and use e-gov services, these services will be of little social value (Helbig et al., 2009). In this regard, although much of the literature focuses on the supply-side perspective, more studies on the demand side are needed to address the social issues behind the adoption or non-adoption of e-gov by citizens (Gil-Garcia et al., 2006; Helbig et al., 2009; Choi & Park, 2013; Gerpott & Ahmadi, 2016; UN, 2020).

Despite being theoretically intertwined, e-gov and the digital divide are two complex social phenomena that are rarely studied together (Helbig et al., 2009, Bélanger & Carter, 2009). Helbig et al. (2009) suggest that the digital divide "can be metaphorically seen as a proxy for an E-Government demand-side perspective" (p. 89), a useful approach to analyzing differences in the use of e-gov services.

The digital divide literature can be organized in three different approaches: the technological access approach, the multi-dimensional digital divide approach, and the multi-perspective digital divide approach (Helbig et al., 2009). The first approach, characterized by the dichotomy between those who have access to technology and those who do not, posits that overcoming the access barrier would close the digital gap since individuals would be able to harness ICT's benefits. Researchers who take this approach seek to identify and analyze the socioeconomic characteristics of people who do or do not have access to computers and the Internet (Scheerder et al., 2017). The second approach – to which this paper corroborates – considers multiple digital divides, positing that access is but one among many dimensions. There is no consensus, however, on which dimensions are most important; they may be related to structural or individual characteristics (Helbig et al., 2009). For example, DiMaggio and Hargittai (2001) consider that the digital divide is characterized by five dimensions that go beyond access: equipment, autonomy

of use, skill, social support, and the purposes for which the technology is employed. In countries where Internet access is no longer an issue, studies have shifted to understanding differences related to Internet usage patterns and skills (van Deursen & Helsper, 2015). However, it should be noted that increased access to the Internet at aggregate levels does not necessarily imply that digital divides will be closed across social groups. They may even be reinforced (Büchi et al., 2015). According to these authors (p. 2), "[t]his is relevant because differences may translate into inequalities or disadvantages for certain social groups who make less use of Internet services." Lastly, the multi-perspective digital divide approach considers a more complex scenario, in which even individuals who have equal access "may not have the opportunity to access the Internet or to engage in a wide variety of uses." (Kennedy et al., 2003, p. 73). Researchers propose this approach to address the relation between gender, race, and culture (Helbig et al., 2009), taking a more realistic approach that recognizes the relevance of "access, economic and social inequalities, cultural identity and subjectivity, gender, and class." (Hines et al., 2001, p. 2). This approach looks at the intersection of technology, socioeconomic and individual characteristics (Helbig et al., 2009).

Thus, the digital gap can be characterized as a problem that results from persistent socioeconomic inequalities and goes beyond access to technology (Servon, 2002). An implication of the digital divide is that online content is shaped by people who are connected and therefore able to create content, that is, middle- and upper-income white males (Servon, 2002). When individuals who are digitally excluded manage to connect online, they do not find content that addresses their needs: "The kind of information they seek – information that is directly related to their lives and communities and cultures – does not exist." (Servon, 2002, p. 7). In this context, e-gov services and policies might not be an exception.

Gender has been recognized as an important determinant of a digital divide (Mariscal et al., 2019) that goes beyond access to technology. Kennedy et al. (2003) note that the debate on the digital divide does not adequately consider how women and men use the Internet differently, given that daily activities, influenced by gender roles, may affect how they benefit from online opportunities. Currently, differences related to women's and men's access, use, and ownership of technologies pose challenges for countries around the world (Organisation for Economic Co-operation and Development [OECD], 2018). In this sense, Bimber (2000) argues that the Internet access gap could be better explained by combining gender and socioeconomic differences. Another view offers gender-specific reasons for access and use differences between men and women. Some researchers have focused on the design of technology and on how cultural and contextual characteristics, such as gender stereotypes and attributes given to women, may influence adoption and use of ICT and favor men (Oushoorn et al., 2004; Cooper, 2006; Gray et al., 2017). Other authors consider that gender differences result from different cognitive and communication skills. For example, the e-gov use analysis conducted in South Korea by Choi and Park (2013) used a gender differentiation framework. This perspective evaluates digital gender gaps based on male and female preferences and interests, which implies that the digital divide could be an expression of such differences. Thus, gender differences in Internet usage would be attributable to the fact that men and women have different interests and needs (Choi & Park, 2013). Other authors have based their analysis on gender inequalities and gender theories to explain the gender digital divides (Brännström, 2012; Nesti, 2019). As the World Wide Web Foundation pointed out (2019, p. 7), "the reasons for this digital gender gap are many – from economic and education imbalances between men and women, to cultural expectations and traditional gender roles, to policies that fail to tackle systematic inequalities." According to this perspective, gender digital divides are related to larger structural inequalities that affect not only ICT infrastructure but also the way women use and benefit from digital technologies (World Wide Web Foundation, 2019; Mariscal et al., 2019).

An important aspect of the debate involves a lack of public statistics on the gender digital divide (Brännström, 2012; Mariscal et al., 2019), particularly for exploring e-gov service use (UNDP, 2008; UN,

2020). The United Nations Development Programme (UNDP) (2008) recognized the importance of monitoring e-gov usage by men and women because this type of information can help governments allocate resources based on demand. ITU (2014) proposes core indicators related to the use individuals make of e-gov services to get information from government organizations and interact with such organizations.[2]

Furthermore, there remains a general disregard of gender differences related to e-government use and a lack of theoretical consideration on the topic (Sarabdeen & Rodrigues, 2010; Helsper, 2010). The rare studies on the topic found higher usage by men in Dubai, India, Jordan, Pakistan, South Korea, and Turkey (Al-Rababah & Abu-Shanab, 2010; Sarabdeen & Rodrigues, 2010; Choi & Park, 2013; Venkatesh et al., 2014; Zaidi et al., 2017; Kose, 2019). However, Moreno, Molina, Figueroa, and Moreno (2013) did not find relevant gender differences in e-gov adoption in Spain, and Gerpott and Ahmadi (2016) noted higher e-gov usage among women in Germany.

In this paper, the use of e-gov services by men and women will be analyzed based on the multidimensional perspective of digital divide. This approach recognizes that inequalities in the Internet use can hinder access to online public services and, consequently, their benefits. In this regard, recognizing the parallels between the gender digital divide and e-gov would allow public managers to develop more effective e-gov solutions for the population (Helbig et al., 2009).

3. Methodology

This paper draws on secondary quantitative data from the Survey on the Use of Information and Communication Technologies in Brazilian Households (ICT Households 2019) to examine the digital gender gap in the use of e-gov services. Conducted annually since 2005 by Cetic.br|NIC.br, the survey, which is done via face-to-face interviews, aims to measure ICT use among the residents of Brazilian households (CGI.br, 2020).

Providing data that is representative of the Brazilian population aged 10 and up, the survey can be described as stratified sampling of clusters in multiple stages. The 2019 survey sampled 23,490 households from 350 Brazilian municipalities. In total, 20,536 interviews were conducted, representing some 180 million Brazilians (CGI.br, 2020).

The survey questionnaire consists of different modules.[3] In this paper, we analyze indicators from module G – Electronic government, collected among Internet users aged 16 and up: individuals who used e-gov services; Internet users[4] aged 16 years or older according to the type of public service information sought or used; and Internet users who did not use e-government services by reason for not using them.[5]

To provide an overview of e-gov use in the Brazilian population, we present indicators on Internet users and use of e-government based on the following sociodemographic variables: sex, color/race,[6] age,

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[2]Upon consultation, in August 2020, the ITU, informed that only 7 out of 20 Latin American countries had submitted their data to the ITU related to the use individuals make of e-gov services disaggregated by sex.

[3]The thematic modules in ICT Households 2019 survey are Access to ICT; Computer use; Internet use; Electronic government; Electronic commerce; Computer skills; and Mobile phone use.

[4]"Internet user" refers to the population aged 10 years or more that used the Internet at least once in the three months prior to the interview. This definition is aligned with the methodological framework set forth by the International Telecommunication Union (2014).

[5]It is important to note that the ICT Households survey does not investigate the presence of intermediaries in the use of e-gov services.

[6]According to the Brazilian Institute of Geography and Statistics (IBGE), color/race is a characteristic that is self-declared by the population, based on the following options: white, black, yellow (person who claims to be of Japanese, Chinese, Korean

education level, family income (expressed as minimum wage, MW),[7] social class,[8] and economic activity status.[9]

Additionally, chi-squared test results are presented regarding the independence between the gender variable and the e-government services sought and used by the population in Brazil, with $\alpha = 0.05$. This methodology serves to determine if the use of e-gov services and demand for these services is independent of gender. As the Pearson test statistics used for the chi-squared test for independence considers that data are from a simple random sample, the necessary adjustments were made for complex samples (Rao & Scott, 1981).

Finally, results are presented, crossing gender variables with other sociodemographic variables for the following ICT Households 2019 survey indicators: use of e-gov services and reasons for not using e-gov. This analysis aims to compare use patterns (or reasons for non-use) between men and women in Brazil.

4. Results

4.1. Internet users and e-government users

The ICT Households 2019 survey data show that 74% of the Brazilian population are Internet users and that there is no gender difference in this usage: 73% of women and 74% of men. Although men and women in Brazil access the Internet equally, further analysis shows differences in the online activities they carry out. Whereas 68% of Brazilians use e-gov,[10] there is a significant gender gap: male e-gov usage is almost 10% higher than that of female users.

Table 1 shows the proportions of male and female Internet and e-gov users by selected socioeconomic variables. The main differences in Internet use appear when the indicator is broken down by color/race and in the population without family income. For e-gov use, the main gender differences are linked to age: the older the age group, the greater the difference in the proportions of e-government use among men and women.

4.2. Services sought or used by e-government users

The proportion of male e-gov users is higher for all surveyed services, except those related to Public health, where the proportion of female users is higher, and Public education, where there is gender parity (Table 2). Government taxes and fees services show the largest gender gap: 37% of men used or searched for this type of service versus 19% of women.

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origin etc.), brown (*pardo*) or indigenous. In this paper, considering the survey data error margins, data is presented under the following categories: white, black, brown (*pardo*) and other (yellow and indigenous). For more information about color/race categories adopted by IBGE, in particular brown (*pardo*), see Paixão & Carvano (2008) and Silva (2016).

[7]Considers the sum of the income of all members of the household, including the respondent. The monthly minimum wage is defined by the Brazilian federal government.

[8]Based on the Brazilian Criteria for Economic Classification (CCEB), as defined by the Brazilian Association of Research Companies (Abep), this classification considers the ownership of durable goods for household consumption and level of education of the head of the household. Ownership of durable goods is based on a scoring system that divides households into the following economic classes: A1, A2, B1, B2, C, D, and E. In this paper, we present data for classes A, B, C, and DE.

[9]Corresponds to individuals in the labor force and individuals not in the labor force. The categories are "economically active population (EAP)" and "economically inactive population (EIP)."

[10]The ICT Households survey defines e-gov users as Internet users aged 16 and up who carried out at least one of the e-gov services measured by the survey.

Table 1
Proportion (%) of Internet and e-government users in Brazil by sex in 2019

Variable	Category	Internet users[11]		E-government users[12]	
		Male	Female	Male	Female
Color or race	White	75	75	63	43
	Black	76	65	39	24
	Brown (*pardo*)	76	76	49	44
	Other	60	74	75	70
Age range	10 to 15 years old	85	83	–	–
	16 to 24 years old	93	91	72	75
	25 to 34 years old	90	91	77	74
	35 to 44 years old	82	84	75	66
	45 to 59 years old	69	66	68	56
	60 years old or older	33	34	56	37
Level of education	Illiterate/Pre-school	15	17	74	67
	Elementary	60	60	46	51
	Secondary	90	88	73	69
	Tertiary	97	96	73	66
Family income	Up to 1 MW	60	62	49	52
	More than 1 MW up to 2 MW	71	76	64	61
	More than 2 MW up to 3 MW	76	82	75	71
	More than 3 MW up to 5 MW	88	84	80	78
	More than 5 MW	94	90	89	83
	No income	36	60	63	44
Social class	A	96	92	87	89
	B	94	91	87	82
	C	78	78	72	67
	DE	54	59	47	48
Economic Activity Status	EAP	80	82	75	73
	EIP	61	65	56	54

Source: authors, based on NIC.br (2020).

Table 2
Proportion (%) of Internet users by type of e-government service sought or used over the last 12 months (2019)

Variable	Category	Personal documents	Public health	Public education	Labor rights or social welfare benefits	Government taxes and fees	Police and safety	Public transportation or other urban services
Total		28	23	25	36	28	11	14
Sex	Male	32	21	25	39	37	14	16
	Female	24	26	25	32	19	8	13

Source: authors, based on NIC.br (2020).

We also present the results of independence tests for all surveyed services and the gender variable (Table 3). Results show that in this dataset, e-gov usage is dependent on gender. In fact, only demand for services related to Public education is gender independent. Government taxes and fees service has the greatest gender difference.

The proportions of males and females using services related to Personal documents, Public health, and Labor rights or social welfare benefits are presented in Table 4. Regarding the search for Personal

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[11]Proportion based on the total of the population aged 10 or older.
[12]Proportion based on the total number of Internet users that are 16 or older.

Table 3
Results of independence tests for e-government

	Test statistic	*P-value* of the independence test
E-government use	$F = 14.105$	0.0001846
Public services sought or used through the Internet		
Personal documents	$F = 17.425$	3.296E-05
Public health	$F = 8.535$	0.003576
Public education	$F = 0.0018$	0.9662
Labor rights or social welfare benefits	$F = 11.184$	0.0008611
Government taxes and fees	$F = 84.075$	2.2E-16
Police and safety	$F = 30.368$	4.735E-08
Public transportation or other urban services	$F = 4.4363$	0.03548

Source: authors, based on NIC.br (2020).

Table 4
Proportion (%) of Internet users who sought or used services related to Personal documents, Public health, and Labor rights or social welfare benefits by sex in 2019

Variable	Category	Personal documents		Public health		Labor rights or social welfare benefits	
		Male	Female	Male	Female	Male	Female
Color or race	White	42	13	27	9	15	26
	Black	13	10	11	14	26	9
	Brown (*pardo*)	16	15	15	18	30	20
	Other	31	25	21	30	39	37
Age range	16 to 24 years old	36	34	19	25	29	28
	25 to 34 years old	36	25	22	30	48	42
	35 to 44 years old	27	25	26	26	47	36
	45 to 59 years old	34	16	16	25	39	28
	60 years old or older	18	8	23	18	25	15
Level of education	Illiterate/pre-school	34	25	22	26	41	34
	Elementary	13	12	11	20	20	23
	Secondary	33	23	19	28	42	32
	Tertiary	33	31	23	26	37	33
Family income	Up to 1 MW	20	18	13	21	26	24
	More than 1 MW up to 2 MW	23	21	19	28	33	35
	More than 2 MW up to 3 MW	30	25	22	27	44	39
	More than 3 MW up to 5 MW	40	35	29	29	41	34
	More than 5 MW	48	33	22	28	52	39
	Has no income	18	12	23	15	33	24
Social class	A	46	49	31	35	46	39
	B	45	31	23	28	48	38
	C	30	25	23	28	40	35
	DE	18	14	12	20	24	24
Economic Activity Status	EAP	34	26	23	29	42	38
	EIP	22	20	12	21	24	24

Source: authors, based on NIC.br (2020).

documents, although the proportion of male users is higher for every breakdown, the greatest differences are seen among white respondents and individuals aged 45 to 59. The search for Public health services also differs most between men and women aged 45 to 59, specifically those with secondary education. In almost all sociodemographic breakdowns, the proportion of women seeking or using this service was higher.

There are fewer gender differences linked to Education and Labor rights or social welfare benefits than

Table 5
Proportion (%) of Internet users who did not use e-government services over the last 12 months, by reason for not using them (2019)

Variable	Category	Prefers personal contact	Does not need to look for information or carry out public services	Using the Internet to contact public administration is too complicated	Data security concerns
TOTAL		72	57	55	53
Sex	Male	68	58	52	49
	Female	76	56	58	56

Source: authors, based on NIC.br (2020).

Table 6
Results of independence tests for reasons for not using electronic government services by sex

Reason for not using e-government services	Test statistic	*P-value* of the independence test
Prefers personal contact	$F = 6.8167$	0.00922
Does not need to look for information or carry out public services	$F = 0.22687$	0.0634
Using the Internet to contact public administration is too complicated	$F = 2.7986$	0.0948
Data security concerns	$F = 6.472$	0.01117

Source: authors, based on NIC.br (2020).

other e-gov services. For Public education services, the biggest gender differences are found among men and women in social class B. More men seek services related to Labor rights or social welfare benefits than women – as shown in Table 3 – and the biggest differences are in the group aged 35 and up and among black respondents. The most balanced gender proportions for this service are found among social class DE.

Gender differences were also found among Internet users seeking or using services related to Government taxes and fees, Police and safety, and Public transportation or other urban services. The greatest differences are in the use of Government taxes and fees among the white respondents (39% more men) and among those aged 45–59% (33% more men).

4.3. Internet users who did not use e-government services

According to the ICT Households 2019 survey, in Brazil, 32% of Internet users (35% female, 28% male) had not used e-gov services in the 12 months prior to the survey. "Prefers personal contact" (72%) was the most common reason given (Table 5).[13] It was also the reason with the biggest gender difference among Internet users: 68% of men versus 76% of women.

Testing of the independence of reasons not to use e-government services and gender showed that "Prefers personal contact" and "Data security concerns" are gender dependent (Table 6).

A closer look at the "Prefer to make personal contact" reason (Table 7) indicates that the biggest gender difference is among Internet users aged 45 to 59: 82% of female users against 76% of male users. The proportion of female Internet users who preferred personal contact was higher in all social classes except class A.

"Using the Internet to contact public administration is too complicated" was the reason with the biggest differences between black male and female Internet users as well as between men and women in social

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[13]Other reasons measured by the survey were reported by less than 50% of Internet users who did not use e-gov services ("Services unavailable online," "Services are difficult to find," "Feedback to inquiries is hardly ever provided," and "The services needed are available on the Internet, but completing transactions is not possible").

Table 7
Proportion (%) of Internet users who did not use e-government services over the last 12 months by reason for not using them for each sex (2019)

Variable	Category	Prefers personal contact		Does not need to look for information or carry out public services	
		Male	Female	Male	Female
Color or race	White	47	79	38	34
	Black	58	44	40	68
	Brown (*pardo*)	72	79	58	50
	Other	63	75	57	59
Age range	16 to 24 years old	53	57	61	47
	25 to 34 years old	72	77	61	58
	35 to 44 years old	69	78	51	61
	45 to 59 years old	76	82	59	57
	60 years old or older	73	78	53	55
Level of education	Illiterate/pre-school	69	77	57	58
	Elementary	62	69	59	46
	Secondary	74	81	53	58
	Tertiary	61	79	67	57
Family income	Up to 1 MW	74	80	54	55
	More than 1 MW up to 2 MW	71	72	52	60
	More than 2 MW up to 3 MW	64	76	64	55
	More than 3 MW up to 5 MW	67	80	66	63
	More than 5 MW	73	72	63	69
	Has no income	80	72	36	53
Social class	A	85	70	85	50
	B	67	73	59	65
	C	69	79	57	55
	DE	66	72	57	55
Economic Activity Status	EAP	68	77	60	59
	EIP	66	74	50	53

Source: authors, based on NIC.br (2020).

class A (Table 8). Except for the 45–59 age group, more female Internet users cited "Data security concerns" as a reason for not using e-gov services. The biggest difference was observed in the family income category: while 80% of female Internet users without family income mentioned this reason, only 34% of men did.

5. Discussion

An analysis of the ICT Households 2019 survey data reveals the complexity of Brazil's digital divides, particularly in terms of gender inequality. Although men and women access the Internet in equal proportions (74% and 73%, respectively), the proportion of males using e-gov services is 10% higher than females. This gap reaches 19% among Internet users aged 60 and up, 19% among users with no family income, and 15% among black Internet users. Age, race, and income intersected with gender thus emerge as important variables for understanding e-gov service usage gaps in Brazil. These findings corroborate the multi-dimensional perspective as an important manner of apprehending the digital divide as multiple exclusions that go beyond the dimension of access (Helbig et al., 2009).

Table 8
Proportion (%) of Internet users who did not use e-government services over the last 12 months, by reason for not using them for each sex (2019)

Variable	Category	Using the Internet to contact public administration is too complicated		Data security concerns	
		Male	Female	Male	Female
Color or race	White	37	42	44	61
	Black	57	23	34	47
	Brown (*pardo*)	55	63	52	59
	Other	50	59	47	55
Age range	16 to 24 years old	45	51	41	45
	25 to 34 years old	57	59	52	65
	35 to 44 years old	54	63	42	59
	45 to 59 years old	56	61	58	56
	60 years old or older	50	50	50	54
Level of education	Illiterate/pre-school	52	57	47	69
	Elementary	52	58	55	62
	Secondary	50	54	52	74
	Tertiary	56	59	46	61
Family income	Up to 1 MW	58	70	56	74
	More than 1 MW up to 2 MW	53	56	48	71
	More than 2 MW up to 3 MW	55	60	45	64
	More than 3 MW up to 5 MW	52	50	49	67
	More than 5 MW	48	46	36	73
	Has no income	41	63	34	80
Social class	A	51	24	46	85
	B	53	44	48	67
	C	51	55	48	69
	DE	54	65	50	66
Economic Activity Status	EAP	53	61	48	68
	EIP	50	55	51	66

Source: authors, based on NIC.br (2020).

The independence statistical tests applied to the ICT Households 2019 survey dataset showed that being an e-government user in Brazil is gender dependent. Test results also revealed that, except for those related to Public education, all surveyed e-gov services are gender dependent. Services related to Government taxes and fees, for example, were sought by nearly twice as many male Internet users (37%) as female users (19%), and data also revealed that this gender gap is even larger among white Internet users. It is important to notice that digital gender gap could be associated with larger structural inequalities in the countries (World Wide Web Foundation, 2019). The gender differences in some e-gov service use may be associated with the participation of women in the Brazilian labor market. In 2019, the female participation in the workforce was 53.1% and the male participation was 71.6% (IBGE, 2019). This suggests that men may seek more for services such as Labor rights or social welfare benefits and Government taxes and fees because they are the majority in the Brazilian workforce scenario. On the other hand, more than half of Brazilian females have tertiary graduation (OECD, 2019), which could partially explain the gender-parity in the access of e-gov service in Public Education.

From this perspective, further studies should be conducted to identify reasons for differences in the use of e-gov services, including data on socioeconomic and cultural aspects. Analyzing the digital gender gap with data broken down by several sociodemographic variables is critical to realize that there are multiple profiles of Internet users using e-government services in different manners, although the reasons for this

are still unclear (Martin & Goggin, 2016). Environmental, social, political, and organizational factors play an important role in shaping technology use, although each factor's influence is not fully understood (Helbig et al., 2009). These findings corroborate other studies that underscore the need to look at factors other than access to Internet and devices (van Deursen & Helsper, 2015; Gray et al., 2017; Scheerder et al., 2017; World Wide Web Foundation, 2020; Mariscal et al., 2019) and consider other dimensions to explain digital divides.

We also sought to examine why some Internet users do not use e-gov services. Independence tests of the reasons for not using e-government services with gender determined that "Prefers personal contact" and "Data security concerns" are not independent to gender. Female Internet users cited these two reasons more often than male users did. Interpreting these results merely as gendered preferences would be insufficient to understand their complexities. While further research is needed, it should be noted that studies have indicated that women are more affected than men by online threats such as harassment and hate speech (World Wide Web Foundation, 2020; United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020), which points to the relevance of developing policies aimed at guaranteeing an Internet environment that is safe for women. The lack of digital skills may also be a reason for not using e-gov service. According to European Parliament (2018), there is a persistent gender gap in digital skills among countries in Europe. In Brazil, ICT Households 2019 (NIC.br, 2020) pointed out that more men declared having computer skills than women such as copying and moving files or folders (61% of male computer users against 55% of female users) and using spreadsheets (38% of male computer users against 24% of female users).

To adequately design effective public policies, government organizations must recognize the complexities of the gender digital gap, including the gap in the use of e-gov services. According to Nesti (2019), gender mainstreaming and gender-sensitive policy approaches are important since they aim to integrate a gender perspective in all phases of governmental initiatives, promoting gender equality and fighting against discrimination, including e-government policies (UNDP, 2008).

Latin American countries' ICT plans have generally not addressed the need to gear programs towards women (UN-ECLAC, 2018). For instance, the Brazilian Digital Transformation Strategy's only action involved reinforcing science, technology, engineering, and mathematics (STEM) disciplines for girls and women, encouraging them to seek ICT-related careers. Although one of Brazil's 2020–2022 Digital Government Strategy axes' focuses on a user-centric approach, bridging gender inequalities is not one of its explicit goals. These findings suggest that most states still define e-gov users as gender-neutral (Martin & Goggin, 2016) and do not recognize their masculinist approach. Such gender-neutral or gender-blind perspectives (Brännström, 2012; Nesti, 2019) overlook "how power structures, social, cultural and individual norms, access to resources, impact people of different genders" (OGP, 2019, p. 15).

Results show that governments need to focus their efforts on understanding the reasons for the gendered differences in e-gov service use. Strategies for better policymaking include involving women in the design and implementation of e-gov services and promoting ICT skills for women (UNPD, 2008; World Wide Web Foundation, 2020). Other approaches emphasize the importance of addressing gender social-cultural norms and stereotypes and their impacts on the digital divide (Cooper, 2006; Gray et al., 2017; Mariscal et al., 2019). Structural inequalities based on gender and race, for example, may be considered by decision-makers during all public policy stages, in order to address them and bridge the gaps that hinder the e-gov service use benefits by women.

Finally, this paper reinforces concerns about insufficient public statistics regarding the digital gender divide (Brännström, 2012; Mariscal et al., 2019), particularly on the use of e-gov services (UNDP, 2008; UN, 2020). Data is, of course, critical to informing national policymaking and to setting international

goals. As Hafkin (2003, p. 1) reminds us, "without data, there is no visibility; without visibility, there is no priority." Not only should data be timely, robust, and relevant, it should be produced regularly and disaggregated by sex and other socioeconomic variables in order to elucidate gender inequalities, specifically those regarding the use of e-gov services. It is also important to note that "gender is constructed differently across time and regional location, and because it is impossible to distinguish clearly gender effects from race, class, culture and religion" (Gillwald et al., 2019, p. 222), highlighting the importance of public policies being developed according to the local context.

6. Conclusion

The purpose of this study was to identify gendered differences in Internet users' use of e-gov services. An examination of data from Brazil's ICT Households 2019 survey demonstrated that although men and women access the Internet in equal proportions, there is a gender gap in e-gov service usage. This paper justifies the relevance of adopting gender-specific approaches to understand e-government and the digital divide. Furthermore, it highlights the importance of considering how gendered social-cultural norms impact the digital divide.

The study has both theoretical and practical implications. From the theoretical perspective, portraying the differences, gaps, and particularities in how female and male Internet users use e-gov services, the paper underscores the gender digital divide. The results provide insights for practitioners: governments, national statistics offices or research centers investigating technology use need to collect and make data available by gender. This dimension should be included in the data collection design, availability and analysis practices of all research projects. This paper also draws attention to the need for a gender perspective should be taken into account in all the stages of policymaking.

The results, which characterize phenomena in Brazil, are statistically robust. Based on a descriptive analysis, they provide a foundation for future studies. A future research agenda includes studies exploring how digital divides interfere with the use of e-gov services, as well as deepen the understanding of the relationship between social markers (such as gender and race) and the use of e-gov services. It is essential that further studies consider diverse contexts and especially in the Global South, stimulating the production of data related to digital divide. Researchers are encouraged to explore this topic by carrying out more detailed studies on correlations related to e-gov use and to contribute to a better understanding of the theme, providing explanations for gender differences in using e-gov services – exploring, for instance, if women's 'traditional' care responsibilities (reproductive work) or gender roles are related to the e-gov services that women and men most use. Although located in a region that faces similar challenges, each Latin American country has its own context, each of which must be considered to understand the gender digital divide as it relates to e-gov service use. Likewise, gendering the debate on the digital divide and e-gov services would contribute to a better understanding of a complex phenomenon that has implications in the Global North-South context.

That this study is based on secondary quantitative data poses a limitation. Indeed, there is a lack of data on the role of intermediaries. As e-gov services may be carried out with the assistance of or entirely others (intermediaries), this aspect is relevant for decision makers considering measurement frameworks. Additionally, future studies should explore whether the public services currently offered online consider women's specific needs. Also, it is important to acknowledge that the e-gov services that are measured will impact reported levels of e-gov use, both nationally and internationally. Finally, since gender digital divides are related to larger structural inequalities, it is important to note that public policies intended to reduce them will need to address issues that go beyond technology.

Acknowledgments

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