

Access to Internet in Rural and Remote Canada

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Abstract. Canada is the second largest landmass country in the world, but has one of the lowest population densities. As of 2011, approximately 19% of the Canadian population lives in rural, or remote communities. The purpose of this study was to examine differences in rural and urban access to the Internet and device use in Canada, and to explore differences in access to broadband between Aboriginal and non-Aboriginal communities in Canada. In general rural-dwellers had lower levels of Internet access and despite efforts to increase access to high speed Internet, Aboriginal communities in some regions have limited access. Future research should explore computer and health literacy in the context of rural and remote communities in Canada.

Keywords. Digital divide, Access to information, Internet

Introduction

Canada is the second largest landmass country in the world, however the population is merely 35 million which renders Canada as having a population density of 4 people per km² [1]. According to the Canadian Household survey of 2011, 18.9% of Canadians live in rural, or remote communities, many of which are Aboriginal Canadian communities. In 2010 Statistics Canada conducted the Canadian's Internet Usage Survey (CIUS) which reported that 80% of individuals in Canada have access to the internet, however detailed analyses of rural versus urban usage were not reported [2].

1. The Digital Divide

The digital divide in the context of healthcare refers to the potential for individuals without access or skills in using technologies to become marginalized as mainstream healthcare provision become increasingly technology based [3]. Individuals in lower income groups often have barriers to access healthcare. The digital divide in healthcare suggests that access to technologies may be a proxy of lack of access to healthcare and lower socioeconomic status. Given that many Canadian live in rural or remote communities, and given that Aboriginal communities have well-documented lower

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levels of income compared to non-Aboriginal Canadians, it is possible that the digital divide may prevent Aboriginal Canadians from accessing healthcare. The impact of 'digital exclusion' has not been fully realized, but the potential to further marginalize already vulnerable population is increased if the only method to access information is via the Internet. Watling and Crawford [4] caution against advancing digital discrimination and liken it to historical events in which certain population sectors were excluded from the dominant method of communication and decision making. They suggest that 'one-size-fits-all' solution to technologies may marginalize and disempower individuals, and they further suggest that point of care workers (in their case social workers) can function to help organize leaders of disadvantaged community members to ensure that technologies can be designed with the disadvantaged communities in mind.

2. National Broadband Initiative

In 2010, the National Broadband initiative was established in Canada. This project seeks to provide all Canadians with low cost access to the Internet. Towards this end, Business Canada conducted a survey between 2009 and 2011 to assess which communities currently have access to high speed Internet including satellite access for communities that are not accessible by traditional wireless services. Data for this survey were collected using 2006 Census block units and Dissemination Block Area (DBAs) from Statistics Canada, which were then mapped into 'grid cell hexagons' which were approximately three kilometres in radius [5].

3. Aboriginal Communities in Canada

There are 686 First Nations, Aboriginal and Inuit communities in Canada. A Canada-wide National Household Survey (NHS) was conducted in 2011. In this survey 1.4 million people reported being Aboriginal, or 4.3% of the total Canadian population. This was an increase from 3.8% in 2006. Recent initiatives towards improving the health of Aboriginal Peoples include the establishment of the First Nations Health Authority (FNHA). In addition to providing healthcare via telehealth/video conferencing at healthcare centres, the FNHA has developed a plan for local community health centres to high speed Internet to improve the work of healthcare providers.[6]

4. Methods

Two data sets were obtained for this analysis; A complete data set from the 2010 Statistics Canada CIUS survey were extracted via the library at the University of British Columbia, and the National Broadband geographic survey area (GSA) 'unserved' mapping from 2011. The CIUS, is a national survey of 30,770 households and 22,623 individuals that was conducted in 2010. Frequencies were performed on categorical data and means and standard deviations were conducted on continuous data. Chi-squared analyses were performed to examine differences between categorical data, t-tests and ANOVAs were performed on continuous data.

5. Results

Results were grouped into CIUS findings and National Broadband survey findings.

5.1 CIUS Findings

Nearly 80% of urban dwellers had ever used the Internet, compared to nearly 70% of rural dwellers and this difference was statistically significant ($\chi^2=272.2$; $p<.001$). When these data were examined based on sex and age, males were more likely than females to have used the Internet ($\chi^2=8.04$; $p=0.02$), and younger people were more likely to have used the Internet than older people ($\chi^2=6361.1$; $p<.001$). When examined by sex, rural/urban and age, rural females were more likely to have used the Internet compared to rural males across all age groups except for males ≥ 60 years.

Table 1. Differences 'Ever Used Internet' by Rural/Urban

Ever Used Internet	Urban n (%)	Rural n (%)
Yes	11,856 (79.3)	5,723 (69.6)
No	3,098 (20.7)	2,501 (30.4)

Table 2. Differences 'Ever Used Internet' by Rural/Urban and by Sex

Age group	Male		Female	
	Urban n (%)	Rural n (%)	Urban n (%)	Rural n (%)
16 to 24	616 (98.9)	295 (96.7)	729 (99.2)	312 (98.1)
25 to 34	980 (97.5)	424 (93.6)	1,221 (98.2)	548 (96.6)
35 to 44	1,094 (94.3)	490 (87.8)	1,266 (95.5)	650 (92.2)
45 to 54	1,196 (84.9)	555 (73.2)	1,351 (88.3)	719 (83.7)
55 to 64	919 (75.3)	487 (61.7)	1,145 (77.5)	630 (67.5)
65 and older	628 (48.8)	266 (33.5)	711 (36.7)	347 (29.3)
Total	5,433 (81.1)	2,527 (68.8)	6,423 (77.8)	3,206 (70.2)

More people in rural Canada accessed the Internet via a desktop computer at home compared to urban-dwelling individuals who had a laptop computer to access the Internet. Only a small proportion of survey respondents reported using a mobile device (smart phone) to access the Internet (see table 3).

Table 4 shows differences in types of device by Rural/Urban and by age and sex. In these data there were small differences between proportions of rural and urban females with rural females more commonly using desktop computers for Internet access, while urban females used laptop computers for Internet access. Urban-dwelling females in age groups 25-34 and 35-44 more commonly used mobile devices to access the internet than their rural-dwelling counterparts. Furthermore, younger females were

more likely to use mobile devices to access the Internet than older females in both rural and urban groups. There were very few differences between urban-dwelling and rural-dwelling males in regards to type of device used to access the internet, however, younger males tended to use mobile devices more commonly than older males in both rural and urban groups.

Table 3. Differences types of devices by Rural/Urban

Type of Device to Access Internet	Urban n (%)	Rural n (%)
Desktop Computer @Home	8,845 (81.6)	4,149 (82.3)
Laptop Computer @Home	5,475 (50.5)	2,260 (44.8)
Mobile device with Internet	2,332 (21.5)	861 (17.1)

Table 4. Differences types of devices to access Internet by Rural/Urban and by Age and Sex

Type of Device	Male		Female	
	Urban n (%)	Rural n (%)	Urban n (%)	Rural n (%)
Desktop				
Age group				
16 to 24	459 (11.1)	199 (10.9)	459 (9.8)	187 (8.1)
25 to 34	687 (16.6)	282 (15.4)	826 (17.6)	369 (15.9)
35 to 44	857 (20.7)	367 (20.0)	993 (21.1)	515 (22.2)
45 to 54	920 (22.2)	410 (22.4)	1040 (22.1)	533 (23)
55 to 64	735 (17.7)	367 (20)	848 (18)	466 (20.1)
65 and older	484 (11.7)	207 (11.3)	537 (11.4)	247 (10.7)
Laptop				
16 to 24	352 (13.7)	149 (14.8)	476 (16.3)	163 (12.9)
25 to 34	550 (21.5)	193 (19.2)	674 (23.1)	243 (19.4)
35 to 44	576 (22.5)	212 (21.1)	630 (21.6)	289 (23)
45 to 54	534 (20.8)	192 (19.1)	581 (20)	262 (20.9)
55 to 64	368 (14.4)	179 (17.8)	398 (13.7)	206 (16.4)
65 and older	183 (7.1)	80 (8)	153 (5.3)	93 (7.4)
Mobile Device				
16 to 24	236 (19.1)	94 (22.4)	224 (20.4)	103 (23.3)
25 to 34	330 (26.7)	104 (24.8)	334 (30.4)	111 (25.1)
35 to 44	296 (24)	104 (24.8)	334 (30.4)	103 (23.3)
45 to 54	206 (16.7)	74 (17.7)	177 (16.1)	70 (15.8)
55 to 64	133 (10.8)	44 (10.5)	88 (8)	38 (8.6)
65 and older	33 (2.7)	15 (3.6)	27 (2.5)	5 (1.1)

5.2 National Broadband Results

A total of 49,999 hexagons were created for the National Broadband survey. This represented 22,905 municipalities and 31.6 million people. Populations of unserved/underserved regions were presented as categorical data in the National Broadband data set. Larger proportions of First Nations communities had higher groups of unserved/underserved people and these differences were statistically significant ($\chi^2=545.9, p<0.001$). (see table 5).

Table 5. Differences in numbers of unserved/underserved individuals between First Nations and non-First Nations communities

Unserved Population	First Nations		Total
	No n population (%)	Yes n population (%)	
None	28,178,528 (78.9)	1,341,133 (73)	29,519,661
1 to 9	71,770 (3.9)	16,038 (1.8)	87,808
10 to 49	323,481 (9.6)	30,910 (6.5)	354,391
50 to 99	248,591 (2.9)	42,073 (4.7)	290,664
100 to 199	374,960 (2.6)	39,975 (5.4)	414,935
200 to 399	339,331 (1.5)	32,964 (3.9)	372,295
400 to 799	316,577 (0.5)	62,074 (3.0)	378,651
800 +	154,768 (0.01)	39,468 (1.1)	194,236
Total	30,008,006	1,604,635	31,612,641

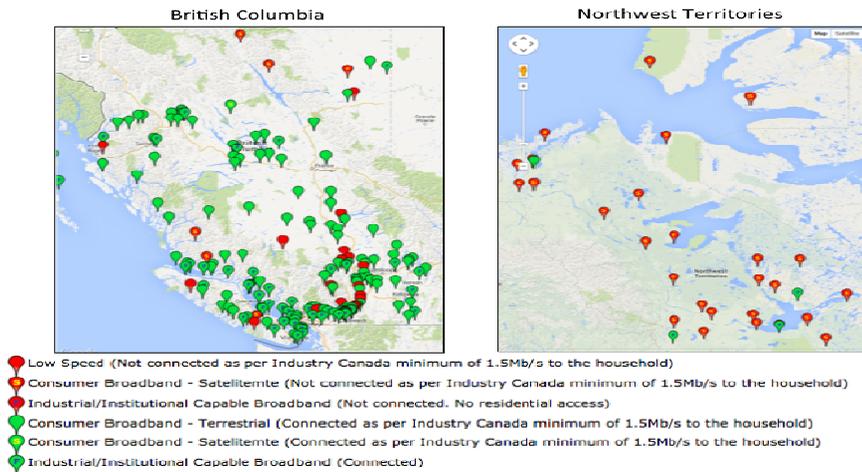


Figure 1 shows a snapshot of access to the Internet from March 2013. These images show that certain regions of Canada continue to be underserved/unserved despite the National Broadband initiative

6. Conclusion

Access to the Internet is a growing expectation for most nations. As access to healthcare and healthcare professionals is increasingly offered via technology, citizens in countries will require access to the Internet. This study sought to explore any differences between rural and urban access to the Internet and differences between First Nations and non-First Nations access to high speed Internet. The CIUS survey was carried out in 2010 and the use of mobile technologies has increased since then, however, the differences between sex, age and types of access were consistent with urban-dwellers having increased access compared to rural-dwellers.

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