Information and Communication Technologies to Support Health and Wellness in Remote and Rural First Nations Communities

LITERATURE REVIEW
Information and Communication Technologies to Support Health and Wellness in Remote and Rural First Nations Communities: Literature Review

May 2010, National Research Council Canada

This comprehensive literature review was conducted by the National Research Council Institute for Information Technology (NRC-IIT) and the Canada Institute for Scientific and Technical Information (NRC-CISTI). Our collaborators were: Health Canada First Nations and Inuit Health Branch (FNIHB e-Health Program) in Ottawa; the Horizon Health Network (River Valley Telehealth) in New Brunswick; Keewaytinook Okimakanak Telemedicine in Ontario; and the VideoCom project, a partnership of NRC-IIT in New Brunswick, Keewaytinook Okimakanak in Ontario, Mik’maw Kina’matneway / Atlantic Canada's First Nation Help Desk in Nova Scotia, the First Nations Education Council in Quebec, and the University of New Brunswick. The views expressed are those of the authors.

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Acknowledgements

The authors of this literature review would like to thank all the authors cited in this report for publishing their work. About 300 publications and presentations are cited and listed in the annotated bibliography, representing the work of more than 400 authors. Many of these authors have acknowledged people who contributed to their publications and research. We cannot list everyone named in the hundreds of publications, so we offer a general thank-you to everyone who contributed to the research discussed in this report.

Many members of First Nations communities – leaders, Elders, youth and other community members – contributed to the community-based research and publications discussed in this report. Gathering the information for these publications represented a significant collective effort by countless First Nations community members. The authors of this literature review acknowledge these efforts and thank the First Nations community members for sharing their experiences, thoughts and wisdom.

Thanks are due to our partners in the VideoCom project - Keewaytinook Okimakanak, Mik'maw Kina'matneway / Atlantic Canada's First Nation Help Desk, and the First Nations Education Council, who have contributed over the years to developing our knowledge about broadband networks and ICT in First Nations. The report authors would also like to acknowledge and thank our report collaborators Keewaytinook Okimakanak Telemedicine and Health Canada First Nations and Inuit Health Branch (e-Health Program) for suggesting documents and overall approaches and reviewing earlier drafts. Our collaborator Horizon Health Network (River Valley Telehealth) in New Brunswick has, in ongoing work with the NRC, helped to develop our knowledge about telehealth services in rural areas. In addition to our collaborators we also would also like to thank John Rowlandson, JRAssociates, who made very helpful suggestions to improve an earlier draft of this report.

Within NRC, special thanks are due to Marilyn Lohnes, client services officer, and Sharon Weaver, both from NRC-CISTI, who contributed bibliographic references and valuable feedback. This literature review was conducted as part of the NRC-IIT Broadband Communication (B-COM) project; final thanks are due to our B-COM project colleagues and NRC-IIT for their support.
Contents

1: Executive Summary ........................................................................................................... 7

2: Introduction ....................................................................................................................... 9

3: ICT, Broadband Networks and Remote and Rural First Nations ..... 11
    3.1 The history of ICT and First Nations communities .................................................. 11
    3.2 Policies and partnerships for broadband services in First Nations communities ...... 12
        3.2.1 First Nations SchoolNet and the RMOs .......................................................... 12
        3.2.2 Other policies and initiatives to increase broadband and ICT use .................. 14
    3.3 Rates of ICT access and use in First Nations communities ..................................... 16
        3.3.1 Broadband connectivity at the community level ............................................. 16
    3.4 Types of ICT used in remote and rural First Nations ............................................. 17
        3.4.1 Internet and web-based (store and forward) technologies .......................... 17
        3.4.2 Videoconferencing ..................................................................................... 18
        3.4.3 Mobile devices and other ICT ..................................................................... 18

4: First Nations and Other Perspectives on Health and Wellness ....... 19
    4.1 Definitions of health and wellness ........................................................................... 19
    4.2 Social determinants of health ................................................................................... 20
        4.2.1 Cultural safety .............................................................................................. 21
    4.3 Community well-being and mental health ................................................................. 21
    4.4 First Nations and other Aboriginal approaches to health, wellness and healing ....... 22
        4.4.1 Being of and with the land .......................................................................... 23
        4.4.2 Language, culture and traditional knowledge .............................................. 24
        4.4.3 Interconnection and interdependency ......................................................... 24
        4.4.4 Holistic healing ............................................................................................ 25
        4.4.5 Mentoring, Elders and role models ................................................................. 26
        4.4.6 Self-reliance, community resilience and self-determination ......................... 27

5: Healthcare and Telehealth Development in First Nations .......... 28
    5.1 History and characteristics of healthcare in First Nations ......................................... 28
    5.2 Delivery of healthcare in remote and rural First Nations ......................................... 29
    5.3 Telehealth networks and partnerships ..................................................................... 31
        5.3.1 Provincial telehealth networks across Canada .............................................. 31
        5.3.2 Telehealth development in remote and rural First Nations ............................ 32
        5.3.3 Integration of provincial and First Nations telehealth .................................. 34
        5.3.4 First Nations SchoolNet RMOs supporting telehealth services ................... 35
    5.4 Overall advantages and opportunities of telehealth in First Nations .................... 35
    5.5 Overall barriers and challenges for telehealth in First Nations .............................. 37
        5.5.1 Telehealth readiness: the need to overcome multiple challenges ............... 38
6. ICT for Health and Wellness in First Nations Communities .......... 39
  6.1 ICT for clinical health services .......................................................... 39
    6.1.1 Clinical consults by videoconference ........................................ 40
    6.1.2 Telemental health ................................................................. 41
    6.1.3 Remote speech pathology and audiology ................................ 43
    6.1.4 Tele-ophthalmology ............................................................... 45
    6.1.5 Tele-homecare ................................................................. 45
    6.1.6 Tele-rehabilitation ................................................................. 45
    6.1.7 Rheumatology services .......................................................... 46
    6.1.8 Digital imaging ................................................................. 46
    6.1.9 Rural and remote memory clinic .......................................... 46
    6.1.10 Electronic Medical Record (EMR) ...................................... 47
  6.2 ICT for health training and education .............................................. 47
    6.2.1 Mini-courses on health by videoconference for multiple First Nations 47
    6.2.2 Health-related education and training via the web ............... 48
    6.2.3 University health education using multiple technologies ....... 48
    6.2.4 Continuing medical education by videoconference ............. 49
  6.3 ICT for sharing health information .................................................. 49
    6.3.1 Websites for exchanging health information and resources .... 49
    6.3.2 Online health discussion forums ......................................... 51
    6.3.3 Health websites combined with multimedia resources .......... 51
    6.3.4 First Nations’ videos on health topics .................................. 51
  6.4 ICT to support being of and with the land .................................... 52
    6.4.1 Three-dimensional and web-based visualizations of landscapes 52
    6.4.2 Electronic resources for co-managing lands and resources .. 53
    6.4.3 Websites and videoconferencing for training and mentoring water operators 53
    6.4.4 Digital tool for assessing archaeological evidence ................ 53
  6.5 ICT to support language, culture and traditional knowledge .......... 54
    6.5.1 ICT to support First Nations languages ................................ 54
    6.5.2 Digital representations of traditional knowledge .................. 55
    6.5.3 ICT to support literacy ...................................................... 56
    6.5.4 ICT to support musical development .................................... 56
    6.5.5 ICT to develop First Nations links to cultural resources in museums 56
  6.6 ICT to support interconnection and interdependency ..................... 57
    6.6.1 Fostering connections through community-based learning ........ 57
    6.6.2 Social networking ............................................................ 58
  6.7 ICT to support holistic healing ....................................................... 59
    6.7.1 Youth video production for holistic health literacy ............... 59
  6.8 ICT to support mentoring, Elders and role models ......................... 59
    6.8.1 Connecting Elders in multiple communities via video .......... 59
  6.9 ICT to support self-reliance, community resilience and self-determination 60
    6.9.1 Community-based networks ............................................. 60
    6.9.2 ICT for self-determination ............................................ 61
    6.9.3 ICT to control First Nations representations and digital spaces 62
7: Experiences from the US, Australia and Other Countries .......... 63

7.1 American experiences ........................................................................ 63
    7.1.1 Telemental health ................................................................. 63
    7.1.2 Diabetes management ............................................................. 66
    7.1.3 Telepharmacies ................................................................. 66
    7.1.4 Teledentistry ................................................................. 67
    7.1.5 Tele-audiology ................................................................. 67
    7.1.6 Electronic Health Records (EHRs) ........................................ 68
    7.1.7 Mobile mammography unit ............................................... 68
    7.1.8 Alzheimer and dementia assessment .................................... 68
    7.1.9 Telephone based smoking Quitline ...................................... 69
    7.1.10 Culturally-appropriate healthy eating and exercise ............. 69
    7.1.11 Education using culturally-appropriate ICT ....................... 69
    7.1.12 Health information online ................................................ 70

7.2 Australian experiences ..................................................................... 70
    7.2.1 General telehealth and telemedicine .................................... 70
    7.2.2 Telegealth in North Queensland ........................................... 71
    7.2.3 Telemental health and mental health literacy ....................... 71
    7.2.4 Forensic telemental health services ..................................... 72
    7.2.5 Tele-palliative care .......................................................... 72
    7.2.6 ICT for diabetic screening .................................................. 72
    7.2.7 ICT for assessments for ear, nose and throat ...................... 73
    7.2.8 Telepharmacies ................................................................. 73
    7.2.9 Health education delivered by multi-site videoconferencing .... 73
    7.2.10 Electronic Health Records (EHRs) ....................................... 74
    7.2.11 Culturally-appropriate information for health literacy via touch-screens .... 74
    7.2.12 Mobile phones for community connection ....................... 75
    7.2.13 Traditional knowledge sharing via a 3D game environment ... 75

7.3 Experiences from other countries ..................................................... 76
    7.3.1 Telemental health in rural Finland and Israel ...................... 76
    7.3.2 Telecare for heart disease in the Pacific Islands .................... 77
    7.3.3 Teledhealth in rural Scotland and Ireland ......................... 77
    7.3.4 Health consultations by mobile phones in India .................... 77

8: Making the Networks and ICT Sustainable in First Nations ........... 78

8.1 Building community control and capacity ................................... 78
8.2 Committing to ongoing funding and partnerships ....................... 79
8.3 Accepting the realities of geography: building broadband infrastructure ........ 80
8.4 Making ICT part of everyday life .............................................. 81
8.5 Developing new knowledge: conducting independent research .......... 81

9: Sample Posters for Community Wellness Activities Using Video .... 83

10: Annotated Bibliography .............................................................. 86
1: Executive Summary

This report is a comprehensive overview of how remote and rural First Nations and their partners and collaborators are using information and communication technologies (ICT) to support health and wellness in their communities. The report authors hope it will be useful for evidence-based program and policy development. It may also spark ideas about how ICT can be improved and new technologies developed to meet community needs.

Over the past two decades, a number of people have been exploring how broadband networks and ICT can deliver health services and support wellness outcomes in remote and rural First Nations communities. They work for a variety of groups and organizations – including First Nations and tribal councils, federal and provincial governments and agencies, regional and local health boards and hospitals, non-government organizations, universities and research institutions and private consulting firms.

This report paints a picture of their activities, as captured in their publications and presentations. The topic is typically framed as “telehealth” that enables delivery of health services over a distance using telecommunication networks. However, First Nations are also using ICT for activities that contribute to improved health and wellness in a larger sense. For this reason, our report uses a “social determinants of health” perspective to build a broader understanding of how ICT can support health and wellness in remote and rural First Nations.

Health Canada has stated that health and well-being are attributed to a wide range of social determinants, and that efforts to address social determinants of health need to be built on partnerships with communities in order to be effective and sustainable. Using this perspective, our report discusses a broad range of literature related to health, wellness and technologies. The search for peer-reviewed publications was performed by NRC-CISTI, Canada’s primary institute for scientific and technical information. In addition, grey literature - documents not produced through commercial publishing - was identified by NRC-CISTI, the researchers, and the report collaborators through works known to them, web searches, and reviews of presentations at relevant conferences.

Without broadband networks, it would not be possible to use the information and communication technologies (ICT) discussed in this report. Technologies for health and wellness exist alongside technologies and broadband networks used for many other purposes. Chapter 3 of the report is an overview of the literature on broadband networks and ICT and First Nations communities: the historical development, policies and partnerships for broadband networks and services, the important role of the First Nations SchoolNet Regional Management Organizations (RMOs), rates of access and use of ICT in First Nations, and finally a brief overview of the types of ICT used.

Technology solutions can be – and often are - designed without an understanding of the human and social problems that the technology is supposed to address. We found in the literature review a wide gap between the research on First Nations’ perspectives on health and wellness and the research on health technologies. In Chapter 4 we review literature on health and wellness from a First Nations perspective, so that our later discussion of technology “solutions” is informed by the views of the intended users.

Chapter 4 begins by discussing internationally-accepted definitions of health and wellness including social determinants of health, a term resonant in recent literature and policy discourse. Literature on the importance of community well-being and mental health is
reviewed, followed by literature on First Nations and other Aboriginal approaches to health, wellness, and healing, including: being of and with the land; language, culture and knowledge; interconnection and interdependency; holistic healing; mentoring, Elders and role models; and self-reliance, community resilience and self-determination.

Anyone new to the topic of healthcare delivery and telehealth services in remote and rural First Nations communities will discover a maze of different jurisdictions – First Nations, tribal council, regional, provincial, and federal – and levels and types of healthcare and healthcare delivery. Chapter 5 provides a high-level overview of this complex situation. It begins with a review of the literature on the history, characteristics and delivery of healthcare in remote and rural First Nations. Next, provincial and First Nations telehealth networks are discussed, the inter-relationships between them, and the role of the First Nations SchoolNet RMOs in supporting the delivery of telehealth services. Finally, the overall advantages, opportunities, challenges and barriers of telehealth for healthcare delivery in remote and rural First Nations are discussed.

Chapter 6 reviews all the literature we could find on how ICT are used to support health and wellness in remote and rural First Nations communities. It begins with the literature on the traditional concept of telehealth – clinical telehealth services. This includes clinical consults by videoconference, telemental health, tele-homecare, tele-rehabilitation and others. Next, the literature on ICT for health training and education as well as sharing health information is reviewed. Finally, the literature related to specific uses of ICT and First Nations concepts of health and well-being is reviewed.

Considering the general lack of research on ICT to support health and wellness in remote and rural First Nations in Canada, it is useful to consider the situation in other countries. Indigenous peoples in the United States, Australia and other countries – especially those in remote and rural areas – face similar challenges of limited access to public services and decreased effectiveness of service delivery compared to the general urban population. Research on initiatives to address these problems place a strong emphasis on not only fore-fronting holistic models of health and wellness but also honouring the specific beliefs and values unique to each community. This culturally-appropriate approach to delivering health services has shown immense success from which Canadian researchers and policy makers can learn and benefit. Chapter 7 reviews articles found in the literature search dealing specifically with ICT in Indigenous communities in the Unites States and Australia.

Broadband networks and ICT need to be sustainable in remote and rural First Nations so that they can be used often and consistently to support health and wellness outcomes. The last chapter of the report offers some directions based on the literature. These are: building community control and capacity, committing to ongoing funding and partnerships, developing broadband infrastructure, making ICT part of everyday life, and conducting independent research on health, wellness and ICT in First Nations.

Following the literature review are several examples of posters for health and wellness events using videoconferencing in remote First Nations. The report concludes with the most comprehensive annotated bibliography yet published on the topic of First Nations health and wellness and information and communication technologies; about 300 items are listed. Report readers are encouraged to follow up on the literature to learn more about specific topics of interest.
2: Introduction

Many of the more than 600 First Nations communities across Canada are located in rural or remote areas. Each has a distinctive culture and history and a diversity of healthcare needs. Most rural and remote First Nations communities have no resident clinicians. A visit by a clinician to a remote community may require a series of expensive flights on a small plane or a 10-hour drive on a temporary winter road. A trip by a rural First Nations resident to the nearest health centre may take two, three, and often four or more hours by vehicle on rough or unpaved roads. It is obvious that health services delivery in remote and rural First Nations will be different than health services delivery in urban locations.

In 2002, the report from the Commission on the Future of Healthcare in Canada (the Romanow report) recommended expanding telehealth to improve healthcare in rural and remote communities. At that time, broadband networks had limited reach. Now, in 2010, broadband networks have expanded considerably. It is opportune to be thinking creatively about how information and communication technologies (ICT) can support health and wellness in rural and remote First Nations communities.

First Nations are one of three distinct groups of Aboriginal peoples in Canada (the other groups are Inuit and Métis). Anyone following the news in Canada will know that Aboriginal people as a whole have a lower health status compared to non-Aboriginal people. Health challenges include higher rates of chronic and communicable diseases, mental health problems, substance abuse, and suicide among Aboriginal people compared to the general population. Across Canada there are many programs and initiatives working to increase health and wellness outcomes in Aboriginal populations; however, many of these programs rely on precarious project funding and are not fully integrated into ongoing healthcare practices.

First Nations, unlike the many multicultural groups that make up Canadian society, have political status at the federal state level. The federal government has a fiduciary responsibility to provide health services in First Nations communities, whereas the provincial and territorial governments are responsible for providing health services for all Canadians. In practice, the federal government, the provinces and territories, First Nations, and other organizations work together on healthcare delivery in remote and rural First Nations communities.

Over the past two decades, people working for a wide range of groups and organizations have been exploring how broadband networks and ICT can be used to deliver health services and support wellness outcomes in remote and rural First Nations communities. This report is an attempt to paint a picture of their activities. We did this by reviewing all the literature we could find on this topic. The topic is typically framed as “telehealth” and other technology processes that enable delivery of mainstream health services. However, First Nations communities are also using ICT for community development activities that can contribute to improved health and wellness in other ways. For this reason, our report uses a “social determinants of health” perspective to shape a broader understanding of how ICT can contribute to community health and wellness in remote and rural First Nations (c.f. Molyneaux & O’Donnell, 2009).

The concept of social determinants of health, defined and discussed in Chapter 4, is rapidly gaining currency in the research and policy arenas. In a recent presentation at the National Aboriginal Health Organization (NAHO) national conference, a senior Health Canada official stated that health and well-being are attributed to a wide range of social determinants,
that these broader social determinants of health need to be addressed, and that efforts need to be built on partnerships with communities and organizations in order to be effective and sustainable (Robinson, 2009).

Using this perspective, our report discusses a wide range of literature, including both peer-reviewed publications and grey literature. The search for peer-reviewed publications was performed by NRC-CISTI, Canada’s primary institute for scientific and technical information. Databases searched include: Sociological Abstracts, ACM, IEEE, Bibliography of Native North Americans, Medline, CINAHL, Google Scholar, Scopus, Web of Science and INSPEC. The databases were searched using a combination of subject terms and keywords, including those related to population (for example, ‘Aboriginal’, ‘First Nations’, ‘Native’, ‘Indigenous’, ‘remote and rural’), computer-based technologies (from ‘cell phones’ to ‘computers’, and from ‘EHR’ to ‘YouTube’), health (including ‘illness’, ‘healing’, and ‘medicine’), and community wellness (including ‘balance’, ‘mind’, ‘body’, and ‘spirit’). The search was not restricted to Canadian sources only. Several interesting studies concerning Indigenous peoples and rural and remote communities from other countries, including the United States and Australia, are also included. A total of 236 unique citations were retrieved and reviewed for their relevance. The full-text of 84 of these articles was then reviewed. Article reference lists were reviewed for additional citations.

A grey literature search was also conducted. Grey literature refers to documents that are not produced through commercial publishing. Grey literature was identified by NRC-CISTI, the researchers, and the collaborators through works known to them and web searches of First Nations organizations, government agencies, and other organizations. We also searched the abstracts from the two major Canadian technology and health conferences in 2008 and 2009 - Canadian Society of Telehealth (CST) and COACH (Canada’s Health Informatics Association), the papers related to technology at the 2009 Aboriginal Policy Research Conference in Ottawa, and the presentations archived over the past three years from the ICT Summit, an annual conference organized by the First Nations Technology Council in Vancouver.

In total, about 300 items are included in the annotated bibliography and discussed in this report. There are, however, gaps where the report authors are aware of activities but where no literature exists. In several cases, for clarification purposes, the report authors communicated with the collaborators and other experts to get the information needed; these clarifications are indicated in the report. The report uses a multi-disciplinary approach, reflecting the diverse range of the report authors’ academic background and disciplines: Anthropology, Clinical Psychology, Communications, Computer Science, English Literature and Cultural Studies, History, Library Science, Nursing, and Sociology.

This report is the most comprehensive overview published to date on the topic of remote and rural First Nations, broadband networks, ICT, and health and wellness. The report authors hope that it will be of use in a wide variety of situations – and more specifically, evidence-based policy, program and research development at community and government levels.

In addition, we hope this literature review will stimulate ideas about how ICT can be improved and new technologies developed to meet community needs. This research area is only in its earliest stages: there is huge scope for future research in partnership with First Nations to develop innovative technologies that support remote and rural First Nations communities in their ongoing efforts to improve their overall health and wellness.
3: ICT, Broadband Networks and Remote and Rural First Nations

Without broadband networks, it would not be possible to use the information and communication technologies (ICT) discussed in this report. Technologies for health and wellness exist alongside technologies and broadband networks used for many other purposes.

This chapter presents an overview of the literature on broadband networks and ICT and First Nations communities: the historical development, policies and partnerships for broadband networks and services, the First Nations SchoolNet Regional Management Organizations (RMOs), rates of access and use of ICT in First Nations communities, and finally a brief overview of the types of ICT used in remote and rural First Nations.

3.1 The history of ICT and First Nations communities

Since at least the early 1970s, First Nations in Canada have been using ICT for a variety of purposes. The ICT most commonly accessed and used in remote and rural First Nations have been telephony, radio and television; these technologies remain widely used today. In 1973, Canada became the first nation to develop a domestic telecommunications system with a satellite in geostationary orbit. Anik A-2 brought network radio, television and improved telephone services to the north (Chouinard, 1983). In 1974, the Wawatay Native Communications Society established the first community radio system in partnership with First Nations in Ontario’s far north (Budka, Bell & Fiser, 2009). By the mid-1980s, remote First Nations communities in Northern Ontario were building local cable plants and receiving public satellite television broadcasts from Wawatay, TVOntario, and the Canadian Broadcasting Corporation; 10 years later, this expanded to commercial satellite television and the multi-channel universe (Fiser, Clement and Walmark, 2005).

By the mid-1990s, there were more than 60 newspapers and almost 50 radio stations run by Aboriginal organizations across Canada. Aboriginal media saw their mission as informing the public about experiences that are consistently manipulated by the mainstream media to discriminate against Aboriginal peoples (O'Donnell & Delgado, 1995). In 1995, this media and communications strategy expanded to the internet, and at that point several First Nations had a presence on the internet. Many were using email to network with each other and with their supporters. To keep the general public informed of their activities, they routinely emailed press releases and bulletins to public internet sites (O'Donnell & Delgado, 1995). In 1999, the Aboriginal Peoples Television Network (APTN) was launched (Baltruschat, 2004; Roth, 2005).

A decade later, the use of ICT by First Nations and their recognition of the importance of this activity had grown considerably. By 2009, the Assembly of First Nations (AFN) – the national political organization representing First Nations across Canada – had passed five resolutions at their annual general assemblies recognizing the need for First Nations communities to have adequate broadband connectivity and access to ICT. At a major Aboriginal research and policy conference in Ottawa that same year, the AFN outlined a strategy for an equipped First Nations broadband network. They saw the network as part of a broader plan for economic, social and cultural change based on knowledge and information. The AFN's “e-Community ICT model” builds upon a common network model employed by Canadian institutions and corporations and has five themes: First Nations capacity development, First Nations connectivity, human resources development, information management, and service delivery and partners (Whiteduck, J., 2010).
3.2 Policies and partnerships for broadband services in First Nations communities

In Canada, there is a universal service requirement for telephone service but not for internet service. Unlike for telephone services, no regulatory mechanism exists to force Internet Service Providers (ISPs) to provide services in any particular area of the country. Canada’s commercial ISPs say they need to have a business case (a proven return on investment) before developing broadband infrastructure and services in rural and remote areas; they have been reluctant or slow or have refused to do so without significant government investment. As a consequence, it can be very challenging to build the partnerships necessary to develop broadband infrastructure and provide internet services in many remote and rural regions of the country.

Given the lack of commercial interest, different levels of government in Canada have become involved as partners and contributors to develop broadband infrastructure in remote and rural areas. However, government policy to support broadband in remote and rural First Nations communities is underdeveloped and uncoordinated among many different departments and program areas. Since 1996, a variety of funding initiatives, strategies, and projects, usually with limited time frames and specific objectives, have been implemented that have supported the development of broadband infrastructure and increased use of ICT in First Nations communities (Perley & O’Donnell, 2006). Some successful initiatives have been underway for many years since then, particularly in the areas of distance education and telehealth.

3.2.1 First Nations SchoolNet and the RMOs

The federal government program most directly responsible for increasing the use of ICT in remote and rural First Nations is First Nations SchoolNet. The program was initiated by Industry Canada in 1996; in late 2006 it was transferred to Indian and Northern Affairs Canada, and the program budgets were reduced in subsequent years. As of May 2010, the future of the program is unclear.

Since 2002, the program has provided funding for six First Nations SchoolNet regional management organizations (RMOs) across Canada. The RMOs work in their particular regions to advance broadband infrastructure and applications in the First Nations schools and communities. The six RMOs are: Mik’maw Kina’matnewey / Atlantic Canada’s First Nation Help Desk (Sydney, Nova Scotia); The First Nations Education Council (CEPN-FNEC, Wendake, Quebec); Keewaytinook Okimakanak (K-Net, Sioux Lookout, Ontario); Keewatin Tribal Council (Thompson, Manitoba); Keewatin Career Development Corporation (KCDC, La Ronge, Saskatchewan); and the First Nations Education Steering Committee (FNESC, Vancouver, British Columbia) (Whiteduck, T., 2010).

The First Nations SchoolNet RMOs have collectively been responsible for much of the broadband infrastructure development and subsequent use of ICT in remote and rural First Nations. First Nations SchoolNet was established to provide internet access, computer equipment and technical support to First Nations schools on reserves across Canada. The program has become the backbone for broadband networks and ICT in many remote and rural First Nations across the country. Although the program focuses on First Nations schools, the infrastructure developed under this program has spread to other applications and uses within communities (Whiteduck, T., 2010).

A recent evaluation of the First Nations SchoolNet program by the funders Indian and Northern Affairs Canada (INAC, 2009) found that the Regional Management Organization
The RMO delivery model is both effective and efficient. RMOs have developed partnerships with both the public and private sector to reduce costs, maximize opportunities and provide economies of scale. This has largely supported the success of the program in positively contributing to educational outcomes, cultural education, cultural and linguistic preservation, mitigating isolation and allowing access to other essential services in the schools and the communities (INAC, 2009).

Five of the six First Nations SchoolNet RMOs are controlled and operated by First Nations organizations. All have developed a network of support for First Nations schools and communities across Canada. The network supports not only educational applications but also telehealth, justice, and economic development applications. The RMO presence extends to: strengthening local community ICT capacity, participation in a national First Nations broadband network, national and regional First Nations videoconferencing, innovative schools projects, collaborative programs with other departments, and economic development (Whiteduck, T., 2010).

The RMO in the most eastern region of Canada is Mik'maw Kina'matneway/ Atlantic Canada’s First Nation Help Desk (http://firstnationhelp.com). The Atlantic Help Desk facilitates the development and use of ICT for education, innovation, and creativity. The organization encourages youth to be producers as well as consumers of information. Initiatives include MMTV News (Mi’kmaq/Maliseet TV) and a web site archiving video clips of elders. Videoconferencing is key to many initiatives including national meetings and sharing student-generated content on legends, social issues, and education. The Help Desk website is an educational resource for First Nations youth and interested mainstream students alike (O’Donnell et al., 2009).

The First Nations Education Council (FNEC) is the SchoolNet RMO in Quebec (in French: Conseil en Education des Premières Nations – CEPN) (www.cepn-fnec.com). FNEC, an association of First Nations and communities, aims to achieve full jurisdiction over education. They will do this while “respecting our unique cultural identities and common beliefs, and promoting our languages, values and traditions” (FNEC, 2009:3). FNEC’s technology department has been very active. FNEC’s videoconference services support training and communication via teleconference in all the First Nations communities of the region. In 2008-2009, videoconference activities rose by 40% and utilization hours increased by 50% compared to the previous year. Requests for videoconference meetings are made by the education and health sectors, INAC, and FNEC employees. At least 58 videoconference systems have been installed in the First Nations schools and health centres of Quebec. Certain Band Councils also use this technology (FNEC, 2009). The videoconference sites are all listed in a directory that can be viewed on the FNEC Website. FNEC is also engaged in: fibre optic development for First Nations in Quebec, software creation services, technology training services (including CISCO-ICT training), a “My School on the Web” project, and support for many other technology-related activities (FNEC, 2009; Whiteduck, T., 2010).

K-Net is the First Nations SchoolNet RMO in Ontario (www.knet.ca). K-Net is the broadband services division of the Keewaytinook Okimakanak (KO) tribal council. In 1996, KO and K-Net became Industry Canada’s First Nations SchoolNet Helpdesk serving Northern Ontario. The same year, CAP sites (Community Access Points), also funded by Industry Canada, were established in 10 of the First Nations in that region. In 2000, Keewaytinook Internet High School was launched, a digital telephone service was implemented in North Spirit Lake and Keewaywin First Nations, and videoconferencing and high speed data connections were established. The following year, K-Net became one of
Industry Canada’s SMART sites and the KOHS-NORTH (Telehealth) Network was launched (TeleCommunications Development Group, 2004). In 2005, K-Net launched the Northern Indigenous Community Satellite Network, working with its partners to provide broadband services to remote communities in Ontario, Manitoba, and Quebec. K-Net remains a leader in broadband communication services for remote and rural First Nations in Canada. From its office in Sioux Lookout, Ontario, K-Net provides web, Internet, satellite and videoconferencing services, and infrastructure to remote communities in northern Ontario. K-Net sees its responsibilities as helping to sustain distinctive and minority cultures, planning and acting on community needs, mobilizing communities, encouraging and supporting individual use of ICT, and providing observations on how to foster and encourage community-based use of ICT for social interaction (Beaton, Fiddler & Rowlandson, 2004; Carpenter, 2010; Fiser & Clement, 2009; Garrick, 2004; KORI, 2005; O’Donnell et. al, 2009).

To give a final example, the First Nations Technology Council (FNCTC) is the First Nations SchoolNet RMO in British Columbia (www.fntc.info). In BC there are 203 First Nations governments, many rural or remote. Most have fewer than 250 people, the majority lack either broadband or community infrastructure, and lack of capacity is a big issue. FNCTC’s vision is for every First Nation in BC to have their information and communication technology needs met while adhering to First Nations’ values and principles. The FNCTC approach is to support the development of FIT communities (Fully Integrated Technologies). FNCTC believes that with connectivity, culture and language can be revitalized, education achievement rates can improve, health services can be improved, Aboriginal business can increase their access to markets, and off-reserve community members can play a more active role in governance (Hanley, 2006 and 2009).

An important point to emphasize is that all the initiatives to increase broadband networks and ICT use in First Nations communities are built on partnerships. The First Nations SchoolNet RMOs work with a range of commercial, non-profit and government partners and collaborators on the local, regional and national levels to build, maintain and develop broadband networks and services and encourage ICT use in the communities. As described by a staff member of the K-Net RMO:

_We work with a pile of organizations ... We have worked with the universities, we’ve worked with corporations, we’ve worked with government, all government levels, municipal, provincial, federal. We’ve worked with Smart Communities all across Canada; we’ve worked with First Nations organizations across Canada; we’ve worked with community groups; we work with individuals, youth; we work with ... anybody who will work with us, I guess, is the best way to describe it._ (As quoted in O’Donnell et al., 2009).

### 3.2.2 Other policies and initiatives to increase broadband and ICT use

Aside from First Nations SchoolNet, a number of other Canadian government programs have supported increased broadband penetration and ICT use in remote and rural First Nations communities. They have not been aimed directly at First Nations but rather at remote and rural communities or marginalized populations.

In 1996, Industry Canada and Human Resources Development Canada established the Community Access Program (CAP) (Howard, Busch and Sheets, 2010). CAP sites are
places where community members can access computers and the internet in supported, culturally-appropriate settings, and many of them were set up in remote and rural First Nations across the country. (As of May 2010, the CAP program funding is precarious, having been cancelled twice in as many years only to continue at the last minute; the future of the program is uncertain at the time of writing.)

In 2000, the K-Net RMO was successful in its application to Industry Canada’s national SMART Communities Initiative; K-Net became the only Aboriginal SMART community demonstration project in Canada. K-Net has also successfully leveraged funding from Industry Canada’s Federal Economic Development Initiative in Northern Ontario (FedNor). Other federal departments that have provided funding to K-Net and other RMOs across Canada include Human Resources and Skills Development Canada (Carpenter, 2010).

In 2001, the National Broadband Task Force was established to propose strategies to increase connectivity for Aboriginal and rural Canadians, and in 2002, the government created the pilot program Broadband for Rural and Northern Development (BRAND) to bring broadband to remote and rural areas (Howard, Busch and Sheets, 2010). In 2009, federal government infrastructure funding was again made available to increase broadband connectivity in remote and rural regions; many of the First Nations SchoolNet RMOs took this opportunity to partner on funding applications to increase broadband bandwidth in remote and rural First Nations communities.

Also at the federal level, the Connecting Aboriginal Canadians policy initiative combined two federal programs – Gathering Strength and Connecting Canadians (CC) – and partnered government and key national Aboriginal organizations to develop the Aboriginal Canada Portal in 2001. It became evident that cultural consideration is as important as improved technological infrastructure, and that governments need to tailor their support for the different approaches taken by Aboriginal people to preserve their diverse cultures and control their image (Alexander, 2001). The federal CC program overemphasized the technological side and undervalued the human side of the public-private partnerships created to build community-based networks. Fiser & Seibel (2009) compared different community-based networks created to address the digital divide in rural, remote, and underserved urban communities, and also compared the investment paradigm of CC programs to those in the US and other OECD (Organisation for Economic Cooperation and Development) countries. Measuring the results of the CC programs is difficult because there is no long-term tracking of the grassroots organizations that received funding. Fiser and Seibel (2009) concluded that funders need a better policy framework to complement project-based funding so they can make more efficient decisions about how to support broadband infrastructure development in First Nations communities.

More recently, federal policy discussions have focused on how broadband networks and technologies can be used to more effectively support the delivery of government services in First Nations, a process often referred to as e-government (which includes services from First Nations governments as well as federal and provincial governments). The ability of e-government to improve service delivery in a citizen-focused way, provide information as a public resource, and engage citizens in governance may be even more important for First Nations peoples than other Canadians, given the often remote locations of First Nations communities and the social, cultural, and economic challenges they face. In the mid-2000s, the Aboriginal Voice project, which brought together national and regional Aboriginal organizations, federal and provincial government officials, and Aboriginal representatives was both a study and a project to develop policy recommendations for future Aboriginal e-government initiatives. The Aboriginal Voice roundtable examined
existing projects and identified challenges of limited infrastructure and ICT capacity. The roundtable found that the success of any initiative is dependent on the close collaboration and equal partnership of all interested parties (Crossing Boundaries, 2004).

More broadly, the Aboriginal Voice Cultural Working project was aimed at finding ways to help Aboriginal communities to overcome isolation and address critical cultural, economic, and social needs through the use of ICT. The project identified a need for dialogue with Aboriginal groups and Canadian society to address issues and problems further exacerbated by technology, such as issues of culture, identity, intellectual property, ownership of knowledge, symbols and other culturally-sensitive information, reliability of information, and ease of access to and navigation through information stores. The conclusion was that no “one-size-fits-all” solution exists, so community-based input and control is needed to set appropriate priorities and apply the technology in a meaningful and useful way (Jock, Simon, Fox, & Nickerson, 2004).

Provincial governments have also made significant investments in broadband infrastructure in remote and rural areas. For example, the Aboriginal Information Communication Technology Forum was a provincial initiative in Alberta. The Forum was an opportunity for Aboriginal government and agencies to discuss how to increase their capacity to deliver programs and services using ICT in order to improve access and encourage a “culture of use” in their communities. Industry was encouraged to build relationships and sponsorships with communities, individuals, and businesses, help with purchasing and maintaining hardware, and provide technical training, cooperative work placements, and mentorship programs (Government of Alberta, 2004). The Treaty 7 First Nations encouraged and promoted the use of ICT for cultural, economic, and social growth and well-being of First Nations people in conjunction with SuperNet, an Alberta government $280 million broadband initiative to connect provincial government institutions such as offices, libraries and health facilities (ICTFN, 2004).

3.3 Rates of ICT access and use in First Nations communities

There are no data available on rates of ICT access and use by residents of remote and rural First Nations communities; this research area is almost non-existent. Statistics Canada does not collect this kind of data in First Nations communities. The data on internet use collected in the early and mid-2000s by Indian and Northern Affairs Canada (INAC), the First Nations Regional Longitudinal Health Survey, and the First Nations Technology Council (2005) in BC are long out of date. (The VideoCom project based at the National Research Council in collaboration with First Nations partners recently collected information on rates of ICT use within several rural and remote First Nations communities and publications are forthcoming.)

3.3.1 Broadband connectivity at the community level

Levels of connectivity to First Nations communities vary considerably across the country and by region. Fiser (2010, forthcoming), in collaboration with the First Nations SchoolNet RMOs, presents the most comprehensive analysis to date of First Nations community connectivity. The analysis mapped Statistics Canada Census Subdivisions (CSDs) with 2009 data from internet service providers. Using this methodology, their research identified that 426 First Nations CSDs (49.2%) have no residential broadband/high speed access greater than or equal to 256Kpbs (kilobits per second); 355 First Nations CSDs (41%) have residential broadband access greater than or equal to 256Kbps but less than 1.544 Mbps (megabits per second); and 85 (9.8%) have residential high speed access
greater than 1.544Mbps. However this data pertain to availability only, and cannot identify how many households in the CSDs actually subscribe to internet services.

There is currently no published research on the specific broadband connectivity needs of remote and rural First Nations communities. In 2001, the report of the National Broadband Task Force (Industry Canada, 2001) stated that a minimum symmetrical speed of 1.5Mbps per second per individual user, capable of supporting 2-way symmetrical data circuits, was required and that applications such as peer-to-peer file interactions and videoconferencing would increase individual user demand for symmetric bandwidth in the 4Mbps-to-6Mbps range.

Industry Canada currently defines broadband as a minimum of 1.5Mbps, or approximately 1.5Mbps to 10 households, and no universal service obligation exists. As Fiser (2010, forthcoming) points out, Canada’s definition is very modest compared to some other western nations. The Australian government’s target is 12Mbps inbound for 98% of its citizens by 2012. Finland has a universal service obligation of 1Mbps inbound; Spain and the UK have pledged to institute similar universal service obligations to a minimum of 1Mbps inbound by 2010 and 2Mbps inbound by 2012, respectively (Fiser, 2010, forthcoming).

Organizations that coordinate and manage the community connectivity for remote and rural First Nations (First Nations SchoolNet RMOs) have documented a need for a minimum 10Mbps connection to the schools in the First Nations. In most cases, a 10Mbps circuit will provide enough bandwidth for shared access to videoconferencing, data transfer, voice services, and basic internet use. As well, these connections are scalable as new applications are introduced. When fibre is installed in a community it is even more cost effective to have a 10Mbps circuit rather than the 1.5Mbps (T1) circuit that First Nations presently are accessing. This level of infrastructure provides the opportunity for the circuits to be scalable, to 100 Mbps, if the design permits and the demand and applications require this bandwidth (Communication with B. Beaton and K. Burton, 2010).

3.4 Types of ICT used in remote and rural First Nations

As stated above, very little literature is available on the use of ICT in First Nations communities. This section will briefly review the types technologies the communities use. Specific uses of these technologies to support health and wellness activities are discussed in Chapter 6 of this report.

3.4.1 Internet and web-based (store and forward) technologies

Internet and web-based technologies include email, websites, social networking sites, online video portals, Skype and others. In the health technology literature, internet and web-based technologies are considered “store and forward technology.” Store and forward refers to communication that is asynchronous rather than delivered in real time like videoconferencing. Store and forward technologies in the health technology literature typically include email, message boards, websites, patient portals (which can also host synchronous technologies), or pre-recorded video.

As mentioned, the most recent research suggests that about half of First Nations communities across Canada do not have access to residential broadband internet, and there are no current data available on the use of email, the internet, or the web within and
by First Nations communities. It is commonly known that First Nations community members use the internet and the web; however only one study has published data about this – the study demonstrated that in remote First Nations in northwestern Ontario, many community members are using the internet (Budka, Bell & Fiser, 2009).

FNTC’s 2005 report on technology use is out of date but it is worth noting that of 143 First Nations communities in British Columbia responding to the survey, 65% said more than half the homes in their community had internet access (although it is not clear how many were remote or rural communities). Almost all the band offices had internet connectivity, although 58 band offices had only dial-up access (First Nations Technology Council, 2005).

There are also publications demonstrating that First Nations community members are using online video, although again no data are available on how widespread the use of online video is in the communities (O’Donnell et al., 2009; Hancock & O’Donnell, 2009; Perley, 2009).

**3.4.2 Videoconferencing**

Videoconferencing refers to live, real-time audio and video exchange between two or more sites separated by distance. Videoconferencing, as described in this report, uses broadband networks and the H.323 Internet Protocol (Molyneaux et al., 2007). Chapter 6 of this report discusses the centrality of videoconferencing to many forms of telehealth.

The First Nations SchoolNet RMOs in most regions of the country have expanded their services to include their own videoconferencing bridging hardware and support. There have been a number of publications on the use of videoconferencing in remote and rural First Nations (Gibson et al., 2009; McKelvey & O’Donnell, 2009; Milliken & O’Donnell, 2009; O’Donnell et al., 2009 and 2010; Perley & O’Donnell, 2006). This same videoconferencing infrastructure is the primary resource available for many telehealth applications in remote and rural First Nations communities; as mentioned in the previous chapter, many of the First Nations SchoolNet RMOs have service agreements with Health Canada to use this infrastructure to support health services in the communities.

A recent study on perceptions of videoconferencing by staff and associates of K-Net and the Atlantic Canada’s First Nation Help Desk found that having visual communication is important when communicating across a distance (O’Donnell, Walmark & Hancock, 2010). Many participants in national multi-site videoconferences in First Nations communities mentioned the visual aspect of videoconferencing. They want to see the other person in a discussion; people take the meetings or gatherings more seriously because others are watching them. The visual communication allows them to build or maintain relationships with people whom they cannot meet in person (O’Donnell, Walmark & Hancock, 2010). Videoconferencing, a highly interactive communication tool, allows people to pick up on verbal and visual (or non-verbal – i.e., body language) cues they would miss in telephone or text-mediated modes of technology (Mitchell, 2007).

**3.4.3 Mobile devices and other ICT**

The report authors are aware that other kinds of ICT are used in some remote and rural First Nations communities – such as cell phones, mobile and wireless devices and others – but as yet there is no published information on this topic. Keewaytinook Mobile is one example of a community-based cell phone network available in remote communities in Northern Ontario; this service is managed by K-Net (www.knet.ca).
4: First Nations and Other Perspectives on Health and Wellness

Technology solutions can be – and often are – designed without an understanding of the human and social problems that the technology is supposed to address. We found in the literature review a major gap between the research on First Nations perspectives on health and wellness and the research on the technology “solutions” designed to improve First Nations’ health. Many articles about telehealth did not use a First Nations health and well-being approach, did not adequately discuss First Nations concepts of wellness, and did not link the technology “solutions” back to First Nations’ concepts and perspectives.

We believe it is important to review the literature on health and wellness from a First Nations perspective, so that our later discussion of technology “solutions” is informed by the views of the intended users of the technologies.

This chapter will begin with internationally-accepted definitions of health and wellness and then introduce the term “social determinants of health,” which is resonant in recent literature and policy discourse. Literature on the importance of community well-being and mental health is reviewed, followed by a wide range of literature on First Nations and other Aboriginal approaches to health, wellness, and healing.

4.1 Definitions of health and wellness

The World Health Organization (WHO) defines health as the “state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity” (Raphael, 2003). According to the United Nations International Covenant on Economic, Social and Cultural Rights (ICESCR), human rights to health include the right to “life, autonomy, information, education, food and nutrition, housing, employment, association, equality, participation, non-discrimination, and many others.” All of these are inseparable from one another and from many other rights, including the right “to the highest attainable standard of physical and mental health” (Tarantola, 2007).

In addition to such individually-focussed definitions of health, community wellness plays a central role in First Nations perspectives of health. In a 1994 workshop hosted by the Department of Health and Social Services for the Northwest Territories, participants defined the characteristics of community wellness as “a strong sense of community, a strong sense of family life, an emphasis on personal dignity, a state of well-being, a strong sense of culture and tradition, zero tolerance to violence of any kind, [and] integrated services” (Gerein, 1998). Other perspectives demonstrated the importance of individual relationships with and within the family and larger community, respect for culture and tradition, respect for humanity’s relationship with the environment, and so on. Focus group sessions involving citizens from the Northwest Territories provided several “visions of what a community should be,” including the following:

*We see a community…where every child grows up knowing how to speak his or her own language. Where everyone has a strong sense of belonging – to the land, to a particular family and community – and is guided by a deep sense of knowing who he or she is. Where everyone’s learning is based on, and flows from, the foundation of culture, heritage and language* (as quoted in Gerein, 1998:1).
In another study, Métis women felt that health was related to physical issues (healthy eating, exercise), while well-being was “holistic and inclusive of the dimensions of spiritual, emotional, physical and mental/intellectual aspects of living” (Bartlett, 2005).

For many Aboriginal people in Canada, staying healthy or well means maintaining a balance between the physical, spiritual, emotional, and mental dimensions of life, including those of the individual and community (Isaac & Marchessault, 2008; Royal Commission on Aboriginal Peoples, 1996; Stewart et al., 2008; Weaver, 2002). In a study with adults and youth from a northern Aboriginal community in Manitoba, one informant explained that health is not limited to the individual:

One group [on its own] is not part of the wellness of the community. All the entities within the community will have to come together under our traditional teachings, community and the individual. You know, we were not like that before Western influence. Everybody was one (as quoted in Isaak & Marchessault, 2008: 117).

4.2 Social determinants of health

The term “social determinants of health” can be understood as “the specific exposures by which members of different socio-economic groups come to experience varying levels of health status” (Raphael, 2003). Health determinants affect both individuals and populations (Mignone, 2003). Some key health factors such as poor housing, clothing, diet, and lack of sanitation have been studied since the mid-1970s, but have received less attention over the years than biomedical and behavioural approaches to health promotion and disease prevention (Raphael, 2003).

In 1974, the Canadian Institutes of Health Information report, A New Perspective on the Health of Canadians (Lalonde, 1974), established a framework for the social determinants of health theory. Key factors listed in the report as determinants of health status include not only health services but also lifestyle, environment, and human biology (Raphael, 2003). There is increasing evidence that medicine, healthcare (Allec, 2005), biomedical interventions and lifestyle choices are relatively limited factors contributing to one’s health (Raphael, 2003). Moreover, several World Health Organization (WHO) reports show that allocation in employment, education, and habitat is more effective in promoting equal access to health status and healthcare than Western health services alone (Jenkins, 1991).

The original framework for the social determinants of health has evolved since its first introduction. Currently, there are various definitions of “social determinants of health“ and numerous directions of study, many of which pay attention to particular individual determinants or the forces at play in their creation (Raphael, 2003). The World Health Organization (WHO) defines the social determinants of health to include economic factors and social support, such as social class, work, unemployment, food and transport, addiction, stress, early life social exclusion, and social support. In the Ottawa Charter for Health Promotion, the prerequisites for health include economic, environmental, and social factors including education, income, shelter, food, a stable ecosystem, sustainable resources, peace, social justice, and equity. Health Canada discusses these issues, along with social status, working conditions, “physical and social environments, biology and genetic endowment, personal health practices and coping skills, healthy child development, health services, and gender” (Raphael, 2003), and (since 2002) culture (Jacklin, 2008; Health Canada, 2009) as determinants of health.
At the 2007 symposium on the Social Determinants of Health, Indigenous representatives from the Americas, Asia, Australia, New Zealand, and the Philippines listed colonization as one of the most fundamental and underlying determinants of health (King et al., 2009). Jacklin (2008) believes that the social determinant of ‘culture’ is misused to describe what should instead be labeled as “colonialism, acculturative stress, assimilation or even racism.” In her studies on health variation among the villages of the Wikwemikong Unceded Indian Reserve in Ontario, Jacklin uses the degree of residential school exposure as one measure of community health. Her results illustrate the importance of identifying culturally and community-specific health determinants by showing a direct relationship between the individual colonial experiences of communities and the variance in their respective health statuses. In a study conducted with 196 different bands in British Columbia, researchers have similarly found that those active in community practices that preserve and develop cultural continuity have lower youth suicide rates (White et al. 2004). Additional health factors were identified at the 2007 symposium, and included “dislocation from traditional lands and lifestyles; policies of cultural or linguistic suppression and forced assimilation; industrial processes’ degradation of traditional lands; and the impacts of interpersonal and institutional racism” (King et al., 2009).

The 1996 Royal Commission on Aboriginal Peoples report states that equity and redistribution are key elements to health and human development, such that “wealthy countries that have a relatively equitable distribution of income (e.g. Japan) enjoy higher health status than countries where wealth is distributed less equitably (e.g. United States)” (Gerein, 1998). Most Aboriginal households in Canada live on significantly lower incomes than those of non-Aboriginal Canadians, with higher numbers of children living in single parent families (Smylie, 2008). At the 2002 Social Determinants of Health Across the Life-Span conference, health researchers and community representatives discussed twelve social determinants deemed specifically relevant and easily understandable to Canadians and policy makers, including: Aboriginal status, early life, education, employment and working conditions, food security, healthcare services, housing, income and its distribution, the social safety net, social exclusion and unemployment, and employment security (Raphael, 2003).

4.2.1 Cultural safety

The concept of cultural safety is currently used in Canada in different contexts, including First Nations communities at risk. Cultural safety is an approach that includes the broader determinants of health within a holistic and community-based context (Brascoupe & Waters, 2009). This concept requires healthcare professionals to competently communicate with a patient by showing respect for and an understanding of the patient’s cultural, political, linguistic, social, economic, and spiritual background, whether the professional be Indigenous or not. The interconnectedness of mental, physical, emotional, and spiritual needs and the connections among individuals, families, and communities need to be recognized by Canadian medical professionals (Van Gaalen, et al., 2009).

4.3 Community well-being and mental health

In addition to the individual and communal socioeconomic health determinants previously listed, Aboriginal health perspectives also incorporate spiritual and emotional aspects, which connect the health of the individual to that of the community as a whole. To date, some tensions stem from the general neglect of mental health in public health systems as well as from the discord between “Western concepts of mental health and the holistic
vision on emotional and social wellbeing projected by Indigenous peoples” (Tarantola, 2007).

In many Indigenous communities, health has great cultural significance and refers specifically to the balance of the mental, physical, spiritual, and emotional aspects of a person’s nature. This balance is traditionally established and maintained through everyday activities like hunting and participating in community gatherings. Illness occurs when one or more of the four elements become(s) unbalanced through disconnection (Stewart et al., 2008). Within this perspective, physical and mental health are not clearly separated (Brasfield, 2009).

Charles Brasfield, a clinical psychologist and psychiatrist specializing in Aboriginal mental health, noticed a pattern in First Nations peoples’ residential school experience. The separation from siblings and denial of native language constituted psychological abuse. Many residential school survivors also reported multiple cases of sexual abuse either by staff or older students and physical abuse under the guise of discipline. The residential schools did not train children in parenting skills but instead contributed to disturbed psychological functioning and future problems with parenting their own children, often leading to the continuation of physical and sexual violence. This intergenerational trauma is only now being realized, and these experiences need to be recognized to aid in the healing process (Assembly of First Nations, 1994; Brasfield, 2001; Brasfield, 2007; Lane et al., 2002; Sochting et al., 2007). An alternative account by Chrisjohn and Young (2006) posits that the standard account of residential schools needs to be challenged, and that the ongoing colonization of Aboriginal peoples is the root of the problem that needs to be addressed before healing can occur.

Similarly, in an examination of levels of suicide, violence, and alcoholism within communities, which was based on data from First Nations and Inuit Regional Health Surveys (1997) and epidemiological studies in Quebec (Cree & Inuit, 1991, 1992), Kirmayer and colleagues (2000), in line with other authors, found the social origins of mental health problems to be a result of the legacy of colonization (c.f. Bombay, Matheson & Anisman, 2009; Hill, 2009; Vickers, 2009).

Looking specifically at issues that have an impact on the health of Aboriginal women, Tait (2008) highlights the effect of deep-rooted practices that oppress Aboriginal women throughout Canada, such as gender subordination combined with economic and cultural marginalization. The idea of being personally responsible for health outcomes adds to this marginalization, as Aboriginal women are viewed as responsible for not only their own health but also the health of their family and community. Tait states the need for a thorough understanding of socio-cultural, historical, and gendered perspectives concerning health (Tait, 2008).

**4.4 First Nations and other Aboriginal approaches to health, wellness and healing**

Cook (2005) found that Aboriginal people obtaining healthcare in Western medical facilities still consider traditional healthcare beliefs and values important. Furthermore, Cook’s study of 100 Mi’kmaq patients at a First Nations community health centre found that 66% reported using traditional Mi’kmaq medicine, although 92.4% of those respondents did not discuss traditional medicine with their physician. Moreover, many of the patients using traditional medicine reported Mi’kmaq medicine as more effective than Western medicine. However, only 50% of those under 20 reported using traditional methods, as compared to 70% of those older than 50 years (Cook, 2005).
4.4.1 Being of and with the land

A common belief among Aboriginal peoples in Canada is that the relationship they have with the land shapes the cultural, spiritual, emotional, physical, and social lives of individuals and communities (Wilson, 2003). In addition, this balance is maintained through living a life of stewardship and harmony with the earth.

Interviews conducted with Odawa and Ojibway descended peoples of various ages who refer to themselves as Anishinabek\(^1\) reveal some of the many layers of meaning and healing that make up their worldviews of living with and being of the land. Many Aboriginal peoples refer to the land as Mother Earth. Turton recounts that in her studies with the Anishinabek (Ojibwa specifically), participants recounted many oral histories that emphasized the need for balance on the earth for the purpose of promoting the health and well-being of “all creation... as well as the health of Mother Earth” (Turton, 1997).

The land is not just the physical or symbolic space in which people carry out their daily activities but points to a way of being. Each and every living creature as well as the actions they perform are a part of Mother Earth. In the geography of health, places are understood to shape identity. Land is not just seen as a factor that shapes or influences identity; rather it is a significant part of identity (Wilson, 2003).

Relationships with the land involve all four aspects of balance. Such interactions of relation with the land, as well as with all of creation, allow for mind stimulation, relaxation, and purification necessary for good health and well-being (Longboat, 2005). In a health study with the Yup’ik of the Alaskan north, topics often focused on the importance of living traditional lifestyles, which involve harvesting food and being in the landscape – practices that participants argued will ensure better nourishment, strong and healthy bodies, social and spiritual fulfillment, and connection through relatedness with others and all of creation (Wolsko et al., 2006). Women from this study group consistently framed their answers in the context of food and medicine harvesting. Both nutritional foods and medicine are necessary for maintaining good health. Research on Inuit consumption of seal, for example, shows that “feeling good” is dependent on eating the animals that are found in nature (Wilson, 2003).

Additionally, Aboriginal peoples often stay connected to the Creator and Mother Earth and thus in a good state of health through the collection and use of medicines, which includes making offerings, smudging, as well as the using traditional medicines made of certain plants, berries, animals and other natural foods. One Anishinabek woman explains some of the added benefits of using traditional medicines:

\[\text{My mom makes a lot of medicines like with golden seal or fungus from trees or tree roots and barks and different things. If I'm sick with an illness I'll just ask her to go and make me some medicine and she goes out and ten minutes later she is back with these things and she is making me something. It is pretty}\]

\(^1\) The Anishinabek Nation refers to a large geographic area in Ontario and includes the north shore of Lake Superior, Lake Nipigon, and Lake Huron as well as Manitoulin Island, and the area south central part to the Chippewas of Sarnia First Nation. First Nation groups in this nation include the Ojibway, Odawa, Delaware, Pottawatomi, Mississauga and Algonquin. http://www.anishinabek.ca/
funny because I always say we don’t have a 24 hour pharmacy...
but I guess in a sense we do (Wilson, 2003:8).

There has been little written on the effects of environmental dispossession – the reduction of access to the resources of traditional lands - on Aboriginal people’s health. However, there have been numerous accounts of the negative effects of pollution and resource extraction and other disruptions to the land and resource base of First Nations communities (c.f. Heinrichs, Hibert and the people of Mishkeegogamang, 2009). Richmond and Ross (2009) interviewed 26 Aboriginal Community Health Representatives (CHR) and found that the CHR described the determinants of health “as balance, life control, education, material resources, social resources and environmental/cultural connections.” The final determinant is not mentioned in Canada’s official social determinants of health list.

4.4.2 Language, culture and traditional knowledge

Traditional knowledge and teaching can create a positive, healthy identity and self-image and help people cope with collective trauma. Language is also closely connected to identity, health, and relations (King, Smith & Gracey, 2009). Language and culture play important roles in Aboriginal communities, but few scholars have examined the links between language, culture, and health. McIvor and colleagues (2009) review foundational literature linking culture and health, the majority of which examines the cultural appropriateness of delivering Western healthcare services. Their review reveals that traditional language does act as a protective factor which cannot be overemphasized.

Hill (2009) reviews the literature on communities in crisis and the role of traditional knowledge, medicine and culture. Protective strategies include the use of traditional knowledge and medicine as tools for empowerment, prevention, and self-determination. Healey and Meadows (2008) found that key determinants of health include culture and traditional knowledge. When the Inuit women spoke about health, they discussed the experience of language loss and its impact on a sense of belonging and collective identity. Dewar (2009), the director of research at the Aboriginal Healing Foundation, has noted that cultural practices have positive impacts that can be measured. Varcoe & Dick (2008) found that powwows and traditional dance play an important role in mental health and cultural and spiritual healing.

4.4.3 Interconnection and interdependency

It is a common belief among many Aboriginal peoples in Canada that everything in nature, including plants, animals, minerals, elements (i.e. water, fire) and so on, is imbued with spirit, so that all of creation is interrelated. This relationship is sometimes explained as analogous to an extension of one’s family (i.e. brothers and sisters), or one’s self (essence of being) (Cianci & Nadon, 1997; Turton, 1997; Wolsko et al., 2006).

Traditionally, Aboriginal children were raised as part of interconnected, familial, tribal, band, and community webs of relation with shared responsibilities. These circles of connection were also combined to create wider social and religious communities. Prior to colonialism, values such as respect for all living things, individual responsibility, self-reliance, and proper conduct were taught in traditional practices and through positive role modeling and learning from oral traditions, stories, and games (Klinck et al., 2005).
Kirmayer and others (2000) write that Aboriginal peoples in Canada might best be described as ‘ecocentric’, rather than ‘sociocentric’, the latter referring to how they have largely been characterized to date. In this way, the self is not simply identified relationally with central importance being placed on the family or community. Rather, the self is understood as being in “transaction... [with] other people, the land, and the animals”, such that “damage to the land, appropriation of land... constitute direct assaults on the person” (Kirmayer et al., 2000).

Generally speaking, Aboriginal value systems in Canada are characterized by the maintenance “of harmony within the community and extended family, sharing, cooperation, non-interference, harmony with nature, a deep respect for elders and a being orientation” (Wolsko et al., 2006), such that individual and community health and wellness is inextricably interlinked (White, 2007).

In Wolsko et al., (2006), the researchers were surprised with the degree to which social and community bonding was raised as a form of healing, along with many other forms of interconnected healing. Informants expressed the desire for community activities that involve all people of all ages. Such an interconnected way of being in Aboriginal communities fosters feelings of interdependency, belonging, and strong cultural identity, and also facilitates the transmission of healthy traditional practices, culture, language, and systems of healing while supporting food security, autonomy, healing, and general well-being.

4.4.4 Holistic healing

Holistic healing may begin for an individual or community at any time of life. It is a process of “following a cultural path, regaining balance (physically, spirituality, emotionally, and mentally), and sharing in the circle of life (respectful interactions with others)” that does not end, but becomes a way of life (Hunter et al., 2006).

Among the Cree and other Aboriginal cultures, it is important to give a gift or offering before taking something or receiving knowledge so as to maintain balance through this show of gratitude (Longboat, 2005; Turton, 1997). In Cree, pastahow refers to the spiritual harm or debt that can “be visited upon the relatives or future generations of the giver or receiver of knowledge if proper payment is not made” (Timmins, 2003). Researcher Deiter explains as taught by women Elders, “What you do, or is done to you, puts in place what will happen in the future; how we treat each other has a fundamental impact on our health” (Timmins, 2003).

Multi-generational grief has been defined as the “losses experienced in a person’s life that are not grieved and healed, and that are transmitted [often unknowingly] to future generations without appropriate healing” (White et al., 2004). This grief can manifest in many ways, including through feelings of loss, shame, fear, loss of identity, and lack of belonging. Healing may occur “through introspective thought, praying, fasting, taking healthy risks, changing unhealthy behaviour, reconnecting to our heritage, and finding our spiritual selves” (White et al., 2004). To deal with hearts “heavy with emotion”, or a difficult situation, Aboriginal people often embrace humour as a way of healing, which provides relief and the ability to “change what was embarrassing, oppressive, sorrowful or painful” (Napoli, 2002).

Many calls have been put forward for the holistic integration of traditional healing in otherwise allopathic settings. The respectful use of concepts and tools is crucial in
promoting health and awareness. Examples include offerings, smudging with sweetgrass and other sacred medicines, sweat and healing lodges, healing circles, sunrise ceremonies, trips to the land, sun dances, fasting, lodge gatherings, drumming, community feasts, real spirit workshops, medicine teachings, school ceremonies, and so on (Dobbelsteyn, 2006; Leenaars, 2000; Napoli, 2002).

One cultural image of balance common to many Aboriginal cultures is the medicine wheel. The wheel is divided into four main quadrants, with each representing one of the four directions and its associated plants, spirits, animals, colors, minerals, and “ages of man” (i.e., childhood, adolescence, young adulthood, elder). Each aspect is balanced by those of the other directions (Turton, 1997). There are various ways in which the wheel and its aspects represent and influence an individual’s health and well-being. The interconnectedness of the aspects of the wheel also represent the relationship of the individual with his or her family, his or her community, and the world (Isaak & Marchessault, 2008), which when in balance and thus good health and healing is expressed through harmonious relations “with others, their community and the spirit worlds” (Wilson 2003). When any one of the aspects is neglected or receives too much attention, health suffers in all four areas (Wilson, 2003). Using items (herbs, animals, rocks, or icons) or calling on the spirits associated with each direction helps to heal, promote, and maintain health (Turton, 1997).

4.4.5 Mentoring, Elders and role models

The presence of healthy role models in a community is extremely important for individual and community health and well-being. This is especially the case when understood in the context of the traditional Aboriginal systems of apprenticeship-based learning, deep and multi-layered forms of interconnection, and ecocentric identity formation. Deschenie (2007) discusses the importance and need for ‘Positive Native Power’ in maintaining community health and wellness, which she explains is created and shared by Aboriginal people who demonstrate mental and physical resilience in contemporary society. Currently, the National Aboriginal Health Organisation (NAHO) helps coordinate a role model program which incorporates and addresses this important need for positive Native power.

Traditionally, children learned cultural norms and rules of behaviour in a holistic way, through watching and listening to their grandparents and other older family members (Heinrichs, Hiebert and the people of Mishkeegogamang; Rogers, 2001). In Aboriginal communities, an Elder is one who has “knowledge of traditional ways and uses this knowledge to teach others” (Wilson, 2003). Elders may also be defined as those who demonstrate leadership and show wisdom in cultural spiritual and historical community matters, but may not necessarily be “old” (King et al., 2009). Elders still hold important status within Aboriginal communities as both teachers and role models. Elders are the keepers of medicinal and other authoritative knowledge in most Aboriginal communities in Canada. A common Anishinabek saying is “Honour the elders, for you honour life and wisdom” (Turton, 1997). With regards to healing, an Elder’s knowledge of herbs and treatments may also include remedies learned through “special apprenticeship (or relationship with the spirits)” (Turton, 1997). Some Elders have expressed that they believe their knowledge and skills are not being used in educational and health systems, causing this Indigenous knowledge to become lost because of the pedagogy of experiential learning and apprenticing with medicine people as helpers (Allec, 2005).

Klinck and others (2005) describe the qualities necessary for proper mentoring programs with Aboriginal youth, as learned through focus groups and interviews with Aboriginal
leaders, family members, and youths of local rural and urban communities in Alberta. Informants emphasized the need for community member collaboration (including youth), inclusion of mentee’s family, inclusion of traditional and local cultural values, and adequate resources for sustainability, including non-monetary support and incentives for volunteers, community ownership, and the embedding of new programs into existing ones.

4.4.6 Self-reliance, community resilience and self-determination

Although many Aboriginal communities practice inextricably interconnected ways of being as previously described, self-reliance is nevertheless a core concept related to the health and well-being of individuals. Coupled with this is the need to feel a sense of belonging, not only through knowing one’s history and feeling connected to one’s cultural identity (Hill, 2006; Lowe, 2002), but also through knowing one’s purpose in life (Turton, 1997). These latter values that help determine self-efficacy (Hunter et al., 2006) – the ability to care for oneself – are particularly important as they reflect the cultural belief that all things have meaning, so that searching out one’s purpose in life, or feeling self-reliant, constitutes healing (Turton, 1997).

An extensive report by the BC Office of the Provincial Health Officer (2007) contains examples of success stories in Aboriginal communities. The researchers conclude that economic self-determination is one of the most critical determinants of health. Similarly, Ladner’s (2009) review of literature on the link between self-determination and well-being concludes that: “there is a definitive correlation between self-determination and community well-being, and that self-determination may be a determining factor in enabling/disabling communities in crisis and in understanding resiliency” (Ladner, 2009: 93).

Community healing and cultural renaissance have grown together through important healing processes involving families, communities, and community systems in a process of planned change and institution-building (McBride, 2003).

Current suicide prevention efforts developing at the grassroots level include various community efforts, the establishment of crisis centres, and the practice of traditional Aboriginal healing (Wadden, 2008). Similar community healing efforts, such as youth suicide prevention among Aboriginal communities, are most successful when “guided by a strong set of values and ideas including youth participation, local ownership, strengths-based and context-sensitive practices, and the recognition that youth well-being and family and community well-being are inextricably linked” (White, 2007). Recent studies also show that suicide rates are lower in Aboriginal communities that possess higher levels of community control or autonomy, such as those studied in British Columbia (Kirmayer et al., 2000; White et al., 2004).
5: Healthcare and Telehealth Development in First Nations

Anyone coming for the first time to the topic of healthcare and telehealth in remote and rural First Nations communities will discover a maze of different jurisdictions – First Nations, tribal council, region, provincial and federal – and levels and types of healthcare and healthcare delivery. This chapter is an attempt to provide a high-level overview of the complex situation.

The chapter starts with a review of the literature on the history, characteristics and delivery of healthcare in remote and rural First Nations. Next, provincial and First Nations telehealth networks are discussed, the relationships between them, and the role of the First Nations SchoolNet RMOs in delivering telehealth services. Finally the overall advantages, opportunities, challenges and barriers of telehealth for healthcare delivery in remote and rural First Nations are reviewed.

5.1 History and characteristics of healthcare in First Nations

As mentioned in the report introduction, the federal government has the primary responsibility for delivering healthcare services in First Nations communities. The healthcare system for on-reserve First Nations peoples was first offered by the federal government in the 1920s. Early efforts consisted of services provided by nurses and translators which were initiated to stop the spread of tuberculosis. Post-1945 responsibility of First Nations health was officially transferred to the federal government though National Health and Welfare (1962), renamed Health Canada’s First Nations and Inuit Health Branch (FNIHB) in 1998 (Mackinnon, 2005). By 1969 services expanded, as some communities were offered limited community-based services (immunization, prenatal and perinatal care) by Community Health Representatives (CHRs) and addictions workers and later, prevention programs (Lavoie & Williams, 2009).

Health Canada’s First Nations and Inuit Health Branch (FNIHB) fulfills its mandate in partnership with the provinces, First Nations, tribal councils and other local and regional organizations. FNIHB’s main service areas are primary care, disease prevention and health promotion (Gideon, et al., 2009). Federal programs retain a strict policy of offering coverage only to First Nations peoples on reserve (Mackinnon, 2005). Registered Indians also receive additional coverage from the federal government for services not covered by the provinces, such as dental, vision care and prescription drug coverage (Assembly of First Nations, 2007).

The direct participation of many provincial governments in healthcare in First Nations is also significant. For example, in Ontario the Aboriginal Healing and Wellness Strategy (AHWS) is a partnership between the Ontario government and 15 Aboriginal organizations, including First Nations political organizations and community representatives (Rowlandson, Williams and Williams, 2008). AHWS has supported more than 250 community-based health and healing programs, including a network of 10 Aboriginal health access centres, six healing lodges, nine women’s shelters and family healing programs, and crisis intervention teams (Rowlandson, Williams and Williams, 2008).

Provincial requirements for the delivery of health services include public administration, comprehensiveness, portability, universality and effectiveness; however, these criteria are unevenly applied in First Nations contexts (Gideon, et al., 2009). The level of services provided in First Nations communities is different than the level provided to other provincial and territorial peoples due to inconsistencies over the interpretation of federal,
provincial, territorial and First Nations jurisdiction. There is uncertainty surrounding the responsibility of First Nations healthcare delivery while at the same time, there is a dire need for community-based care, evidenced by disease complexity, limited access to healthcare providers, higher rates of illness and co-morbidity (Gideon et al., 2009).

There is some debate surrounding different models of care. Some argue that Aboriginal healthcare needs to be community-based and self-governed. Self-governed care can be seen as an opportunity for greater flexibility to adopt healthcare that involves the community and meets local needs. Others see the move to community-based care as part of an ongoing trend for governments to off-load responsibilities to First Nations communities without providing adequate resources to carry out these responsibilities effectively (Gideon, 2006).

5.2 Delivery of healthcare in remote and rural First Nations

Health Canada FNIHB is responsible for providing healthcare services in remote and rural First Nations communities; in practice health services are delivered in partnership with provincial, regional and community-level organizations and service providers. In addition to basic health services, Health Canada FNIHB also funds community-based programs and drug, dental and ancillary health services in some communities and the investment in training First Nations health managers and students in health programs (Robinson, 2009).

As of 2004, FNIHB had 536 healthcare facilities, 252 of which were remote, isolated or semi-isolated, more than 90 km from physician services (Health Canada, 2004). The level of healthcare service in rural and remote First Nations communities is determined by the size and isolation of communities. Most are served by Health Offices, which offer primary care services less than five days a week, without a resident nursing staff. Some communities are served by Health Stations, which offer primary services and screening less than five days a week, without a resident nursing staff. A few communities have Health Centres, which offer emergency, screening and prevention services offered five days a week, with a resident nursing staff. The mandate of Health Centres is primary care, prevention and public health. Less than 11% of First Nations communities are serviced by Nursing Stations, whose resident nursing staff members have an expanded scope of practice allowing for additional prevention interventions and 24/7 service (Lavoie & Williams, 2009).

In rural and remote communities, access to healthcare is limited. According to the First Nations Region Longitudinal Health Survey, almost one in five adult First Nations persons do not have access to a doctor or nurse within their own community (Assembly of First Nations, 2009). Barriers to care have been identified as long waiting lists, the lack of doctors and nurses, and access to and the cost of transportation and childcare (Assembly of First Nations, 2007). Krieg and Martz (2008) found multiple barriers to access of health services including availability (delays, staffing issues), accessibility (problem of transportation), affordability (prescriptions, ambulance, meal delivery, travel costs), acceptability (social isolation/lack of interaction; language barriers) and accommodation (lack of flexibility in office hours/appointment time).

Researchers are currently investigating the link between First Nations health status and access to health and wellness services. Studies indicate that people living in geographically isolated areas have higher hospitalization rates than those in the general population (Gideon et al., 2009). Remote and rural populations in Canada (most notably First Nations and Inuit populations), who must rely heavily on home care programs to meet their health
needs, report poorer overall socioeconomic conditions and reduced quality of public health services (Forbes & Edge, 2009).

Due to lack of public funding, Canadian home care programs have been forced to focus on post-acute clients and thus have little time remaining to devote to persons with chronic conditions who require continuing care. A general lack of intermediary services in remote and rural communities (e.g., Meals on Wheels and caregiver respite programs) often leads to premature admission to acute care, which necessitates the separation of families and increased costs (Forbes & Edge, 2009).

Another factor contributing to the poorer quality of service in remote areas is the shortage of home care providers, a shortage that will continue to increase due to lack of funding and the unattractiveness of the profession to clinicians. Low wages, poor working conditions, and inadequate support, benefits, and compensation is deterring young professionals from entering into home care positions (Forbes & Edge, 2009).

One example of a challenging health service in remote and rural First Nations communities is mental health services. Challenges include, among many others, the difficulty of maintaining anonymity. Privacy remains a major concern and mental illness still has a stigma attached (Kirmayer, Brass & Tait, 2000; Law & Hutton, 2007). It can be difficult for people to get away from their work or other activities to seek treatment, especially if they have to travel. Treatment within the community can also be problematic, as patients may be related to, or know personally, the healthcare professionals they see, which can cause both privacy fears in patients and rapid burnout within the mental health profession. Small and remote communities may also have a difficult time delivering conventional mental healthcare as a result of fewer resources, and a small number of people playing multiple roles (Kirmayer, Brass & Tait, 2000).

Another challenge for health services in remote and rural First Nations is cultural competency. Staff members outside the communities using ICT to work with First Nations communities need to be culturally competent. A culturally competent system is one that acknowledges and incorporates the importance of cultural differences and strives to adapt its services at all levels to address culturally unique needs (Betancourt et al., 2003). Cultural competence involves five major constructs: cultural awareness, cultural knowledge, cultural skill, cultural encounters, and cultural desires. When these five mutually exclusive qualities have been fulfilled by a health care provider, cultural competence can be achieved (Campinha-Bacote, 2002).

Following their 2003 report on cultural competence in health care, researchers Betancourt and colleagues conducted interviews with health care professionals in management, academic, and government positions to shed light on general attitudes toward cultural competency efforts among professionals. The results show unanimous support for the advancement of culturally-competent health care initiatives. Interviewees from all backgrounds acknowledged and supported the potential for cultural competence to alleviate racial and ethnic disparities and thereby improve quality of care for marginalized minority groups, evidencing the promising progression of this research from a marginal to a mainstream issue (Betancourt et al., 2005).
5.3 Telehealth networks and partnerships

5.3.1 Provincial telehealth networks across Canada

“Telehealth” refers to delivering health services over a distance using telecommunication networks. Its practice is growing in Canada as a whole. It has been used in a wide range of health specialties, from addictions and anesthesiology to thoracic surgery and urology (Health Canada, 2002; Health Canada, 2004). Due to the aforementioned challenges of healthcare delivery in First Nations communities, telehealth use has been growing in an attempt to increase access to services.

Before reviewing provincial telehealth initiatives, it is important to underline that since 1994 the federal government has been making significant and increasing financial investments in information technology in the health sector in all the provinces and territories. These investments were recommended by the Canadian Institute for Health Information (CIHI), the Information Highway Advisory Council (IHAC), the Canadian Network for the Advancement of Research, Industry and Education (now CANARIE Inc.), the Office of Health and the Information Highway (OHIH), and the National Forum on Health (Peddle, 2007).

Currently, Canada Health Infoway Incorporated (CHII) is the primary source for funding for telehealth development in Canada. CHII makes project-based funding available to the provinces and territories in telehealth pre-feasibility, pre-implementation, and implementation projects; CHII has invested in telehealth strategic plans, studies of clinical acceptance and adoption, management models, technology standards and system interoperability (Gideon et al., 2009).

As already mentioned, First Nations peoples are entitled – as are all Canadians – to health services provided by the provinces and territories. In Canada, telehealth programs began 30 years ago and are now in place in almost all the provinces and territories. This subsection of the report briefly outlines the various territorial and provincial telehealth networks; note that these networks have developed rapidly in the past few years but that most research on these provincial networks is at least four years old. Although some of this literature is outdated, it does provide useful background information.

As of 2006, the Northwest Territories Western Arctic Telehealth Network (WestNet) offered 20 clinical services over 10 sites (Aboriginal and non-Aboriginal). The network supports continuing medical education, clinical work and administrative meetings and is funded by the territorial government. The Yukon telehealth network is funded by the Department of Health and Social Services of the Government of Yukon as well as by British Columbia and Alberta partners. Videoconferencing is used in 10 Yukon communities for education, administrative meetings and clinical services (Ho & Jarvis, 2006).

In 2006, British Columbia had more than 70 communities (Aboriginal and non-Aboriginal) accessing telehealth in 20 clinical areas. Videoconferencing was being used as well as store and forward methods, portable handheld devices, phone lines and internet access. Again, telehealth was being used for clinical practice, continuing education, medical rounds and administrative meetings.

In 2006, clinical telehealth services were offered to more than 200 Aboriginal and non-Aboriginal sites in Alberta. This telehealth initiative is governed by Alberta Health and Wellness (AHW). Saskatchewan had 26 sites in 2006 which offered telehealth through
videoconference and electronic medical instruments for various clinical uses. In 2006, MB Telehealth in Manitoba coordinated telehealth services for 21 rural and remote (Northern) Aboriginal and non-Aboriginal communities as well as six telehealth sites in Winnipeg. More than 50 clinical specialties are offered through telehealth, and expansion is being made into the most remote First Nations communities (Ho & Jarvis, 2006). In 2007, MB Telehealth had 41 sites which provided communities with access to specialists, education and administrative meetings (Picot and Power, 2007).

In 2006, telehealth in Ontario was organized through a number of networks according to region, including North Network (Northern Ontario Remote Telecommunications Health) CareConnect (Eastern Ontario Telehealth Network) and VideoCare (Southwestern Ontario Telehealth Network) (Ho & Jarvis, 2006). More recently, these networks were merged into the Ontario Telemedicine Network (OTM), which has partnership agreements with the First Nations-managed Keewaytinook Okimakanak Telemedicine.

In Quebec telemedicine dates back to 1990, and by 2007 there were 200 telehealth programs at 116 different Aboriginal and non-Aboriginal sites in Quebec. In Quebec at that time there were nine communities designated as isolated, four as semi-isolated, and 18 as non-isolated (less than 90km from medical services) connected via telehealth programs (Picot and Power, 2007). Although there are many potential uses of telehealth in Quebec, its use in 2007 remained undeveloped.

In Atlantic Canada service delivery models and partnerships also differ according to the province. The latest data, which is outdated, from Newfoundland was that as of 2006 there was no telehealth network, although there were a reported 83 videoconference sites mainly at educational institutions in the province. Prince Edward Island also did not have a province-wide telehealth network in 2006, but received telehealth services from others. The Department of Health and Wellness and the Regional Health Authorities in New Brunswick are responsible for telehealth and as of 2006 there were 63 active telehealth sites. In Nova Scotia telehealth is offered through the Nova Scotia Telehealth Network (NSTHN) which had 10 regional sites in 2006 (Ho & Jarvis, 2006).

5.3.2 Telehealth development in remote and rural First Nations

Gideon et al. (2009) describe how ICT have helped to address the health service access needs of First Nations since the 1930s and the Hudson’s Bay Radio Network. In the 1970s the Department of Communications’ trail or bush radios linked trappers with nursing stations and regional hospitals. Starting in 1975 the introduction of telephony in many remote First Nations communities extended the reliability and capacity of telecommunications.

Telehealth was first introduced in remote and Aboriginal settings because they were seen to be the health service areas where the highest benefit would accrue. Following the launch of the powerful Hermes satellite in 1976, a number of pilot projects began to use the technology, including three telehealth pilots (Chouinard, 1983). Soon after the Hermes launch, the first pilot telehealth project provided an audio link between University Hospital at the University of Western Ontario and a remote nursing station in Kashechewan First Nation and a base hospital in Moose Factory, and both audio and video links between Moose Factory and University Hospital in London. The pilot, which ran for five months, provided radiologic and fluoroscopic examinations interpreted over the link. A second Hermes experiment in 1977 linked the Health Sciences Centre at Memorial University in Newfoundland with four remote hospitals for continuing medical education. The third
Hermes project, Ironstar, concentrated on the production and broadcast of native health information programs. Further telehealth pilot projects were developed in Quebec, Newfoundland and British Columbia (Chouinard, 1983).

In the 1990s, federal investments in telehealth accelerated. Pilot projects included the MERLIN project (MEdiCal Remote Link Indian-health Network) connecting the Sioux Lookout Zone hospital to Health Canada’s Ottawa offices and Nursing Stations in the Kitcenuhmaykoosib Inninuwug and Webequie First Nations (Gideon et al, 2009).

In 1998, Health Canada FNIHB launched a pilot called the National First Nations Telehealth Research Project, involving developing telehealth networks and services in five isolated First Nations communities. The evaluation report (Health Canada, 2001) by an independent evaluation team covered lessons learned and included seven policy recommendations. The three critical elements were found to be human resources, financial resources, and technical resources. The report also stated that a change management strategy is necessary that takes into account the organizational impact of telehealth on existing community healthcare resources. Critical success factors identified in the report could be categorized under community, funding, management, healthcare and educational practice, technology and policy (Health Canada, 2001).

In 2004, Health Canada released a report, the Backgrounder on Telehealth Activities which offered an overview of Canadian telehealth activities in First Nations and Inuit communities as well as an outline of the key drivers and issues with telehealth. The drivers included an ageing population, a shift in healthcare from treatment to prevention, changes in models of care, an expansion in options for diagnosis and treatment, changes in performance and cost of ICT, market forces, the need to reduce healthcare costs, patient demand and urbanization and globalization. Barriers included lack of bandwidth and connectivity, the need for a uniform regulatory system, the impact of ICT in the health field and the need for long term funding and sustainability (Health Canada, 2004).

The report noted the various First Nations telehealth initiatives across Canada in 2004. They included: the Alberta First Nations Telehealth Program (AFNTP); Health Infostructure Support Program (HSP); Keewaytinook Okimakanak/NORTH network Partnership pilot; Minoyawin Distributed Homecare Resources (MDHR) Pilot Project; National Pilot Project for Telemedicine in Nephrology; Screen for Limbs, I-Sight, Cardiovascular and Kidney (SLICK); Telehealth to Improve Renal Care in Central and Northern Alberta; Application en milieu rural de la telemedicine de premiere ligne au Temiscamingue; MB Telehealth Network; the National First Nations Telehealth Research Project; Project Outreach: Telepsychiatry Network; and Telehealth to Improve Child Health in Central and Northern Alberta (Health Canada, 2004). More recently, Sommerfeld et al. (2009) provides overviews and status updates of provincial e-Health and Telehealth projects in BC, including Tripartite Commitment to First Nations e-Health and Telehealth, Tripartite First Nations eHealth and Telehealth project activities in British Columbia.

As mentioned earlier, Canada Health Infoway Incorporated (CHII) is the primary source of funding for telehealth initiatives in Canada. One of CHII’s stated objectives is to directly contribute to increasing and expanding the use of telehealth in Aboriginal communities. As of 2007, CHII had made allocations of $17.5 million to First Nations telehealth to support this commitment (Gideon et al., 2009).

In 2009, a review of the current telehealth models was commissioned and published in a report by the Assembly of First Nations (Gideon et al., 2009). The report outlines several
types of service models employed for First Nations telehealth. The two main models are 1) the health education, training and administrative model and 2) the comprehensive medical service model. The health education, training and administrative model is generally characterized by services requiring less bandwidth and security, fewer complex community capacity requirements and less integration with provincial service providers (services such as web portals and educational videoconferencing). Under this model, clinical service delivery is not emphasized. The second model, comprehensive medical service, allows a hybrid model of development that addresses the community health and wellness needs, integrates with the provincial system and gives local access to telehealth (Gideon, et al., 2009).

Carpenter and Kakepetum-Schultz (2010) outline the importance of incorporating First Nations values and beliefs into a First Nations telehealth system for remote First Nations. The authors highlight the value of respecting and instilling local beliefs and culture to ensure the adoption and acceptance of new health tools and methods. The authors state that the ability of a First Nation to demonstrate ownership and control of the ICT health system improves the service delivery, and that successful health services have respected the local traditions and cultures. The key to this success is building First Nations ownership and control of both the network and service, and addressing cross-cultural barriers to implementing Western-based clinical service into a First Nations community.

Telehealth models that incorporate First Nations values and First Nations organizations as partners in service delivery are clearly the way of the future. Currently in British Columbia, for example, a tripartite system is being worked out. Within this system First Nations leaders from British Colombia are working with representatives from both the federal and provincial governments to plan and execute First Nations health services to meet community needs. Under this system some of the indicators of health are improving, but at the same time more strain is being placed on the healthcare system because more and more First Nations peoples are seeking health services (Adams, 2009). Another partnership initiative is the Alberta First Nations Telehealth Change Management Project that brings together Treaty 6, Treaty 7 and Treaty 8 regions. The project is focusing on implementing change management processes aimed at creating an environment of collaboration, structure, skill-building, increased capacity and readiness with telehealth in First Nations communities (Many Guns and Brown, 2009).

5.3.3 Integration of provincial and First Nations telehealth

It is important to underline that in practice, provincial and First Nations telehealth are joined through partnerships, service agreements and other relationships. There is a necessary relationship between First Nations networks and provincial systems of health information. First Nations telehealth is unworkable without provincial partners: health care practitioners are part of the provincial system, and provincial health systems make significant investments in health care delivery infrastructure - including transportation links, purchasing of bandwidth, management of intersection points between the systems, and setting standards (i.e., for privacy, security, service level management). First Nations health networks and services are partners to these provincial systems and must meet provincial requirements in the most remote and difficult-to-support conditions. Over the last decade, First Nations telehealth initiatives and their provincial partners have become heavily integrated partners – and are essentially leading the charge to break down jurisdictional boundaries (communication with John Rowlandson, 2010).
5.3.4 First Nations SchoolNet RMOs supporting telehealth services

The First Nations SchoolNet Regional Management Organizations (RMOs) were discussed in an earlier chapter of this report. The RMOs in most regions of the country are heavily involved in telehealth service delivery in remote and rural First Nations, usually through contribution agreements with Health Canada.

One leading First Nations telehealth organization is Keewaytinook Okimakanak Telemedicine (KOTM). KOTM works with K-Net – the Ontario RMO - to provide telehealth and telemental health services to First Nations communities in northwestern Ontario. KOTM services include medical consults with specialists, general practitioners and other medical care providers. Educational and training sessions are also offered for nurses, social workers, mental healthcare workers and other community-based healthcare providers. Administrative meetings with band chiefs, elders, councilors and other community members are also enabled through KOTM. Clinical, education, training and administrative meetings are delivered by KOTM through a variety of technologies, including videoconference and telemedicine workstations which have patient cameras as well as otoscopes and stethoscopes. These systems are delivered over the K-Net network. The goal of KOTM is to improve access to services, enhance quality of service and reduce isolation (both social and professional) for community workers and community members. KOTM meets its goals by providing a means to conduct health consultations, administrative meetings and training and educational sessions within First Nations communities (Hogenbirk, 2008; Keewaytinook Okimakanak, 2005, Lavoie & Williams, 2009; Williams, 2009; Williams, 2010).

For another example, the Quebec RMO, First Nations Education Council (FNEC), is the technical lead in deploying videoconference systems across more than 20 health centres in the province. About a third of these health centres share the broadband services provided by the FNEC First Nations SchoolNet program; in these communities the health services would not exist without the broadband services that FNEC provides. FNEC is also supporting the First Nations of Quebec and Labrador Health and Social Services Commission to develop a telehealth strategic plan for the province and a Canada Health Infoway project. The Commission has identified FNEC as the technical lead to provide expertise for videoconferencing, connectivity and technical services (Whiteduck, T., 2010). Without the SchoolNet program, telehealth across Canada for remote and rural First Nations would be disrupted. A Health Canada official stated at an RMO meeting in Halifax in 2005 that: “We don’t have a Plan B if First Nations SchoolNet ceases to be” (quoted in Whiteduck, T.: 116).

As mentioned earlier, at the time of writing this report, the future of the First Nations SchoolNet program is unknown; it is not clear what effect the removal of funding for the First Nations SchoolNet program will have on the delivery of telehealth services in remote and rural First Nations.

5.4 Overall advantages and opportunities of telehealth in First Nations

The AFN First Nations Telehealth Consultation identified three key benefits of telehealth overall: 1) improvement in health services (essential to delivery of health services in remote and isolated communities, improved access and enhanced quality of service); 2) enhanced human resource capacity (professional development for remote staff, reduced feeling of isolation, improvement in recruitment, retention and productivity, increased capacity and employment within community); and 3) patient comfort (reduced travel time
and dislocation, less time away from work and family, visits at a distance, and Elders are better served) (Gideon et al., 2009).

The potential cost savings of using telehealth for remote and rural First Nations are very significant. Rowlandson, Williams and Williams (2008) have pointed out that the medical services model heavily relies on the physical transport of patients and escorts by plane to receive primary and specialized care. The authors calculated that for the Sioux Lookout zone in Ontario in the 2002-2003 fiscal year, Health Canada’s FNIHB’s Non-Insured Health Benefits program for First Nations people documented 19,924 medical transports, accounting for a regional medical travel cost of approximately $15 million. More than 60 percent of all medical transportation was for consultation and counseling services – a category of service that is highly amenable to telehealth delivery. The Assembly of First Nations (AFN) estimates total national medical transportation expenditures at $525,178,793 by 2013-14 (Rowlandson, Williams and Williams, 2008).

The travel saved through flights avoided also has environmental implications. McFatridge and Muller (2009) calculated that in 2008, KO Telemedicine (KOTM) in northern Ontario held 2,574 clinical consults, leading to a CO2 reduction comparable to removing 216 passenger cars from the roads for the same year. Through personal interviews, Elders and leadership voiced the traditional value placed on respecting First Nations land by decreasing the carbon footprint through initiatives such as telehealth.

Most studies on telehealth focus on monetary costs and benefits rather than social benefits, so despite the many telehealth program evaluations available, little research exists on the wider health and wellness impact of telehealth in First Nations communities. In the First Nations context the socio-economic benefits include improved access which may contribute to improved quality of life. However, cost-savings are determined by the distance and number of patients and whether or not the patient’s time and travel is considered, and does not look at social or health benefits (Jennett et al., 2005).

Jennett and colleagues focused their literature review on the socio-economic impact of telehealth on nine areas: geriatrics, pediatrics, home care, mental health, radiology, renal dialysis, rehabilitation, First Nations and rural and remote health services. They note that while cost-effectiveness was mentioned as an outcome, improved health outcomes, enhanced social support, increased access, better educational opportunities, quality of care and life were also cited. The importance of culturally-appropriate delivery of healthcare information was also mentioned as a key issue in the literature (Jennett et al., 2005).

The development of telehealth infrastructure in First Nations communities creates multiple opportunities for community members and healthcare workers alike. Telehealth is seen as a way to overcome geographic barriers to healthcare access found in rural and remote communities (Naditz, 2008). Telehealth can also encourage follow-up that normally would not occur in rural and remote First Nations communities (Gibson, Kakepetum-Schultz, Coulson & O’Donnell, 2009). Important healthcare gaps can also be filled in remote Indigenous communities through various telehealth initiatives (Crawford, 2008). Other benefits of telehealth deployment in rural and remote First Nations communities include better capacity for communication and socio-economic benefits (Ho & Jarvis-Selinger, 2006).

Telehealth in First Nations communities can be a tool to aid in addressing health status inequalities and access resources as well as a means to increase healthcare worker support (through increased recruitment, retention, debriefing, etc.). Assessment and treatment
over telehealth can be more cost-effective, allowing patients and healthcare workers to avoid unnecessary travel. Using telehealth, providers can gain greater access to information which leads to an increase in capacity. Telehealth can also be used to hold the federal government accountable by providing a “new continuum of care and information” even though the healthcare system is fragmented across regions (Gideon, 2006).

However Hogenbirk (2009) found that the net effect of telehealth on healthcare is not well-known. A comparative time series approach was used to examine hospital in-patient, day procedures, emergency department and provincial hospital insurance use by residents of First Nations communities with and without telehealth. Additional research is needed to more fully understand the specific impacts of telehealth provision on healthcare utilization.

5.5 Overall barriers and challenges for telehealth in First Nations

The AFN First Nations Telehealth Consultation identified five critical barriers to telehealth overall: 1) cursory community consultation (insufficient consultation with communities regarding needs, resources, support and engagement; lack of consultation and engagement resources; lack of communication to staff, leadership and elders; wariness of technology; concern for removal of health care choices; inadequate change management processes); 2) lack of connectivity (insufficient access to and quality of broadband services; high costs to implement and sustain; many communities without access; limited or inadequate space, resources to build); 3) sustainability (absence of policy framework and funding mechanism; isolated uncoordinated projects; inadequate financial resources for operations and connectivity; poor or non-existent relationship with provincial or regional service provider; inadequate legislative framework); 4) scarce human resources (capacity of all kinds lacking; need for initial and ongoing training and support for staff; high staff turnover; where no staff is designated to work on telehealth, there is inadequate service and burden on existing staff); and 5) unacknowledged patient concerns (privacy and confidentiality; protection of personal information; limited or inadequate space; inadequate policies and training; wariness of technology; the implication that telehealth may result in reduced in-person service) (Gideon et al., 2009).

Challenges to implementing telehealth are not unique to First Nations communities; however these communities face particular challenges as a result of political, cultural and jurisdictional issues as well as issues concerning “geography, technical infrastructure, human resources, cross-jurisdictional services, and community readiness” (Muttutt et al., 2004). Recruitment and retention are also important in rural and remote First Nation communities. Cross-jurisdiction also needs to be examined; First Nation peoples living on reserves have federal health services while off-reserve services are provincial or territorial. Telehealth may blur jurisdictional lines and hinder telehealth implementation. Readiness is another factor, which requires bandwidth as well as organizational factors. Awareness of telehealth and benefits requires organizational commitment. Champions and multiple advocates are needed at government, community and health care levels. The community also needs to become engaged (Muttutt et al., 2004).

In Heaton’s (2006) review of telehealth in Nunavut, administration procedures in the area are quite new and information systems for the health care system were either not available or were just recently implemented. Heaton also emphasizes the fact that integrating telehealth services into regular health delivery service depends on cooperation among various key players including suppliers of the infrastructure, health centers and staff in the communities, health professionals, educators, and administrators and managers (Heaton, 2006).
The evaluation of telehealth in Nunavut revealed several themes. Heaton notes the introduction of telehealth requires negotiation at both provider and health professional levels. Also there are legal issues in Nunavut such as the issue of crossing jurisdictional lines between the provinces and territories which creates a need for clinical policies and protocols to protect and reassure those practicing and receiving treatment via telehealth. Also the networks need to be well integrated into the current system and not viewed as an “add on.” Sessions should be organized around clinicians’ schedules to make the process of booking and scheduling session more convenient and less of a deterrent (Heaton, 2006).

5.5.1 Telehealth readiness: the need to overcome multiple challenges

In 2003, Health Canada released a report on telehealth that explored telehealth “readiness” – the degree to which people and organizations are prepared to implement telehealth – in rural and remote Canadian communities. The researchers conducted interviews, community awareness sessions and focus groups and determined that there were four types of readiness including: 1) core readiness (dissatisfaction with the status quo), 2) engagement (questioning and assessing risk), 3) structural readiness (building structures and supports) and 4) non-readiness (where need is not recognized). As a result of this study five policy recommendations were made: the need for understanding readiness, conducting a readiness assessment, getting input from stakeholders, adopting culturally sensitive and aware telehealth programs and an increased awareness and understanding of telehealth opportunities (Health Canada, 2003).

In a First Nations context, telehealth readiness really refers to the need for communities to overcome multiple challenges before it can use the technology successfully to improve community health. It refers to much than technological capacity – it needs to take into account geographical, socio-cultural and cost factors, lack of infrastructure, lack of human resources, fear of decreased quality of care, and lack of policy governing telehealth (Ho & Jarvis-Selinger, 2006).

Researchers Ho and Jarvis-Selinger (2006) found that each community required a different telehealth deployment strategy, part of the communities integrated health care program. Overall, the researchers found that health issues are socially-determined and health policy needs to address this issue and that deployment strategies need to take place at the community level. Telehealth needs to be “scalable, sustainable and supported.”
6. ICT for Health and Wellness in First Nations Communities

As defined in the previous chapter, “telehealth” refers to delivering health services over a distance using telecommunication networks. However ICT and broadband networks are used in First Nations communities for a range of other activities that support health and wellness – encompassing education, family and community networks, and reinforcing the vitality and identity of Indigenous languages and knowledge.

This chapter reviews the literature on specific uses of ICT for health and wellness in remote and rural First Nations. It begins with the literature related to the traditional concept of telehealth – ICT for clinical telehealth services. This includes clinical consults by videoconference, telemental health, tele-homecare, tele-rehabilitation, speech pathology, rheumatology, and others. Next the literature on ICT for health training and education, and for sharing health information are reviewed.

Finally, the literature related to specific uses of ICT and Aboriginal concepts of well-being is reviewed. As discussed in an earlier chapter, this includes: being of and with the land; language, culture and knowledge; interconnection and interdependency; holistic healing; mentoring Elders and role models; and self-reliance, community resilience and self-determination.

6.1 ICT for clinical health services

In Canada overall, only a tiny percentage of clinical health visits with patients occur via telehealth; almost all visits with clinicians occur in person. However the number of telehealth visits is growing every year across the country.

Telehealth is used in the following clinical fields in Canada: addictions, allergy and immunology, anesthesiology, cardiology, community medicine, dentistry, dermatology, diabetes services, ear nose & throat, emergency medicine, endocrinology, epidemiology, family medicine, gastroenterology, medical genetics, geriatrics, hematology, internal medicine, medical oncology, mental health services, military medicine, nephrology, neurology, neuroscience, nuclear medicine, nursing, nutrition, obstetrics and gynecology, occupational medicine, occupational therapy, ophthalmology, orthopedics, otolaryngology, pain management, palliative care, pathology, pediatrics, pharmacology, physiotherapy, prosthetics, psychiatry, psychology, public health, radiation oncology, radiology, rehabilitation medicine, respiratory medicine, rheumatology, self care, speech-language pathology, surgery, plastic surgery, thoracic surgery, and urology (Health Canada, 2004).

This represents a very long list of clinical services that are and can be delivered via telehealth; however every health region generally delivers only several of these services on a regular basis. Many telehealth pilots currently exist to expand the service offerings.

Successful clinical telehealth services are integrated into an overall service delivery approach and are not seen as distinct or separate from the in-person clinical service. The clinical health needs of residents of remote and rural First Nations communities are at least as complex, extensive and deserving of comprehensive care as residents of any other community in Canada. The ultimate goal of First Nations clinical telehealth is to enable a comprehensive (as opposed to a one-off) level of clinical health service for their communities (equitable service regardless of geography). Flagship First Nations telehealth networks like Keewaytinook Okimakanak Telemedicine (KOTM) in Ontario are positioned to
deliver all of the “tele” health services – if a clinical health service is in demand and a willing clinician is available, then the KOTM service will make it happen. A mature health service acknowledges that telehealth is part of the standard of care. For example, as part of a model stroke service one would expect tele-stroke to be part of that package (communication with John Rowlandson, 2010).

Many clinical telehealth services are delivered to remote and rural First Nations communities. However our literature review identified only a small number of studies or presentations about clinical telehealth that were specific to First Nations communities.

6.1.1 Clinical consults by videoconference

The most common form of clinical telehealth is consultations by videoconference to connect patients in remote and rural First Nations communities with clinicians in an urban health centre. Some of these consults discussed in this section are for specialized health services; however the literature did not review the specialized service in any detail and so for the purposes of this report these activities are grouped together in this sub-section as clinical consults by videoconference. There are examples from across the country.

The Alberta First Nations Telehealth Change Management Project supports videoconferencing in diabetes care, mental health and discharge. Plans to expand the project into other specialties including oncology, geriatrics and psychiatry are underway. The services enable families to stay together during a health crisis by preventing unnecessary travel. The project also helps bridge the gap between the First Nations community health centres and the hospitals in the cities (Bruner, 2009).

Magiera et al. (2008) presented the results of the clinical telehealth service partnership between Siksika Nation and Calgary Health Region. Successful telepsychiatry consults to Elbow River Healing Lodge in Alberta began in April 2008. The authors believe that telehealth will develop through mutual respect for partnerships.

Sanderson et al. (2009) described the rapid growth of telehealth in First Nations in Manitoba. Fifteen First Nations communities have telehealth capabilities and its use increased by more than 300% from 2008 to 2009. The specialties include oncology, anaesthetics, respirology, psychiatry and dermatology; change in First Nations healthcare delivery in Manitoba is underway.

Carpenter and Rowlandson (2009) described the results of a project to bring telemedicine to some of the most underserved First Nations communities in Ontario: James Bay Coast, Attawapiskat, Fort Albany and Kashechewan. The communities have a high number of referrals. To date the project has had positive results, with engaged leadership and good acceptance and adoption rates. Lessons learned include the need to demonstrate the value of telemedicine to community members and clinicians, to establish long term capacity to implement solutions, and to recognize that First Nations organizations and communities have a unique body of knowledge and relationships to support positive outcomes.

In a later presentation about the same service with the James Bay First Nations in Ontario, Helmer (2010) reported that when telemedicine (videoconferencing) began in 2004, there were 50 referrals; by 2009, there were almost 600 referrals. Videoconferencing is used for clinical, administrative and educational purposes. The advantages to date include cost savings (reduced travel costs), decreased wait times for clinical visits, less time away from
the communities translating into increased quality of life for patients and family members, increased patient satisfaction and increased compliance with appointments.

Ward (2009) reported that in 2008, Keewaytinook Okimakanak Telemedicine (KOTM) conducted more than 2,500 clinical specialist consults through telemedicine, carried out in some of Canada’s most remote First Nations communities in northern Ontario. Protecting the personal health information of patients serviced should be of utmost importance to any telemedicine organization. Furthermore, those dealing with First Nations must also protect the collective privacy rights of the community itself. An earlier evaluation of the KOTM pilot project found that the telehealth service has "virtually" decreased the geographic distances that have, in the past, restricted access to health information and health services (Hogenbirk, Ramirez and Ibanez, 2006).

Currently in Quebec, 28 sites in First Nations have videoconferencing systems installed and have the possibility to participate in training by videoconferencing developed by First Nations organizations or by organizations with the provincial health system. Only two communities have developed or use telehealth to provide clinical services for their community members – one for teleconsultation and the other for follow-up of pregnant women. A tele-ophthalmology program was implemented in 2010 and will be available in future to all First Nations communities in Quebec (communication with C. Power, 2010).

In order to gauge physician needs and interest in telehealth applications, Gagnon et al. (2006; 2007) conducted a survey of physicians from remote and rural areas of Alberta and Eastern Quebec. Participants were provided with a list of telehealth applications and were asked to rate their utility, using a Likert scale (there was also an opportunity for participants to add unlisted applications and rate these as well). Physicians in both Alberta and Quebec considered the following telehealth applications as most useful: access to lab results and prescription information, education and teleradiology. Based on physicians’ ratings, telepsychiatry ranked 11th out of 20 for perceived utility of telehealth applications.

O’Connor et al. (2008) developed, implemented and evaluated a general medicine telehealth clinic for a First Nations community in Alberta. Clinicians (physicians and nurses) and clients were surveyed on their perspectives and satisfaction with the telehealth experience. In addition, clinical evaluations (involving patient outcomes and effectiveness among other things) and chart reviews were also conducted. Their analysis found that patients saved more than 1.54 hours per visit (on average) and repeated telehealth use increased as people accepted the service. A significant level of satisfaction and acceptance was measured by the band members. The authors concluded that improved access to high quality primary health care was an outcome of the project, and consequently the Alberta First Nation community extended the telehealth program for at least another year. Further, all clients but one showed improved health outcomes post-telehealth intervention.

6.1.2 Telemental health

Research on telemental health and teleaddiction was the most common form of telehealth literature related to First Nations. The literature highlighted both the opportunities and challenges of telemental health.

Reid (2008) presented an overview of the successes and challenges of a telemental health project in British Columbia. In March 2007, the telepsychiatry project of Hailika’aas Heiltsuk Health Centre in collaboration with North Shore Anxiety & Stress Clinic and Vancouver Coastal Health Authority was approved by Health Canada FNIHB. The funding has provided
approximately 150 hours of consultation for client care by telehealth in the community. The project goal is to focus on the social needs of the community and to provide healing processes so that the community once again becomes a place where children are safe, families are healthy, and pride in cultural traditions and values can again flourish, and to accomplish this with the assistance of telehealth.

Brasfield and Clement (2007) are the clinicians involved in the Heiltsuk project, and one of the factors contributing to the success of this project is the clinicians’ long-standing relations with the communities. The communities are only accessible by water or air. Offering cognitive behavioural therapy (CBT) over videoconferencing enabled the authors to offer five times the usual treatment time at a much lower cost than in-person treatment. Collectively, 76 hours per month of mental health services were provided to the two remote BC communities, a substantial increase in the amount of care provided compared to when in-person only treatment was used. This form of telehealth allowed the remote First Nations residents to access specialists based in urban centres. Brasfield and Clement found that the multi-disciplinary model of care involving family physicians, psychiatrists, psychologists and nurses collaboratively works best as long as their efforts are funded and monitored. They report that their efforts have been working well in the remote communities of Bella Bella and Bella Coola (Brasfield & Clement, 2007).

In an interview, Brasfield observed that “sharing secrets” or discussing trauma can be easier over videoconferencing because of the distancing effect that the technology can have (Clement, 2007); this phenomenon was also noted by other researchers (Gibson et al., 2009a, 2009b; Shore & Mason, 2004a; Shore et al., 2008b). Brasfield also noted that residents of Bella Bella went two years without psychiatric treatment until the services were offered over videoconference (from 1992-2004 he travelled monthly and then there was a gap between 2004-2006 before telemental health by videoconference began). In November 2006 the service was extended to Bella Coola.

Keewaytinook Okimakanak TeleMental Health in northwestern Ontario has used video conference for telepsychiatry since 2002. Since then, many service providers in the region use video for mental health services including follow-up, reassessments, regular counseling sessions, education for clients, education for professionals, human resources, case management - all related to mental health services. The Keewaytinook Okimakanak (KO) Mental Health Mashkikiwininiwag Mazinaatesijigan Wichiiwewin (MMW) Non-Resident Project provides capacity building and mental health services in six remote First Nations communities in northwestern Ontario. Outcomes from the 2005-2007 evaluations included increased continuity of care, healing, and education through prevention and promotion activities. Activities in the MMW project included training courses offered through videoconferencing, and telecounseling and telepsychiatry. The evaluators of the project recommended further developing support for training (both online and videoconference) as well as additional clinical videoconferencing, and developing a Mental Health Web Portal (Keewaytinook Okimakanak Research Institute, 2008).

Previous to KOTM’s involvement with telemental health activities in 2002, the Keewaytinook Okimakanak tribal council in northwestern Ontario undertook a cutting-edge pilot project that began in April 2000 and ended in March 2001. This project involved providing telepsychiatry services to two of KO’s six communities (KO, 2002). A total of 25 clients met with the psychiatrist, for a combined total of 40 sessions completed over videoconferencing. A substantial evaluation of the project included, among other things, assessing the impact of telehealth on access to services, health outcomes, and user satisfaction. In addition, the costs to the various stakeholders of providing the telehealth
service (estimated to be about $710 per session compared to $2,716 for an in-person session) were evaluated. In the evaluation report, and similar to other findings in the literature, it was concluded that “in contrast to western cultural expectations, the distance created by not being face-to-face with the psychiatrist appears to have helped clients feel comfortable with the psychiatrist.” Finally, this report offers important recommendations to others who may undertake telemental health project (KO, 2002).

The Upper River Valley area of Health Region 3 in New Brunswick (now part of the Horizon Health Network) has limited resources for mental health treatment. The Health Region developed a partnership with Tobique First Nation with the goal of improving access to treatment for First Nations individuals. Their pilot telemental health and teleaddictions partnership project was called Mawi Wolakomiksultine – which means “together, let’s have good healthy minds” in the Maliseet language. An evaluation of the project included data from interviews and focus groups, an administrative and utilization database, evaluation forms, and a review of documents related to the project. Participants reported positive experiences with the treatment they received as part of the project. Specifically 96% were satisfied with their telehealth session and many preferred it to travelling to Fredericton for clinical visits (River Valley Health, 2006). Further, a very useful Aboriginal cultural awareness resource was developed out of this project, available at the following URL: (http://www.rivervalleyhealth.nb.ca/Mawi%20Sections/text/aboriginal_cultural_awareness_project.html).

Telemental health was also assessed in Labrador. By calculating the cost of flying patients from the rural community of Nain to secondary care facilities for assessment and comparing this cost to that of consults by videoconference, Jong demonstrated that the system saved $1,500 per consultation. Additionally, user satisfaction was assessed with positive results (Jong, 2004).

Gibson et al. (2009b) noted that residents of remote, isolated First Nations communities requiring mental health services are usually often faced with two choices: having no service or leaving their community to access services in larger centres. Telemental health delivered via videoconferencing offers certain First Nations communities a third choice. Like all technologies and approaches, telemental health has advantages and disadvantages, for individuals, communities and clinicians. Understanding mental health workers’ experiences and attitudes toward telemental health and its benefits and drawbacks for remote and rural First Nations people was the focus of a study: the first phase explores the attitudes and experiences of mental health workers and the second phase those of remote and rural First Nations community members.

Advantages of telemental health include allowing community members to remain within their community for treatment, connecting First Nations trauma survivors to each other, and distance acting as a facilitator of disclosure. Disadvantages include the challenges of building and maintaining clinical relationships via videoconference and ethical concerns of using the technology. Certain ways forward that seem promising are proposed, including incorporating traditional practices into telemental health initiatives, and creating a national dialogue between First Nations communities and others on telemental health within the communities (Gibson et al., 2009).

6.1.3 Remote speech pathology and audiology

Although service models for remote speech language pathology and audiology pediatric services exist in First Nations and Inuit communities exist in Quebec, Ontario, Manitoba
and the Northwest Territories, publications describing these services were found only for two examples from Ontario.

Polovoy (2008) notes that audiology telepractice is not widespread. In Ontario, all infants in the province receive hearing screening at the time of birth, and those referred for further testing also receive a screening ABR in or near their own communities. But diagnostic audiology brainstem response (ABR) is difficult to provide in remote communities, especially because the health service will transport infants and their families by air for medical care but not for audiology testing. The Thunder Bay District Health Unit began its remote diagnostic ABR service in early 2008. The system requires videoconferencing so the audiologist can see the infant at the remote site and interact with the technician, infant and family; and a secure data stream that allows the audiologist to control the remote ABR equipment. Although there are drawbacks to doing this diagnosis remotely, without this service, infants and their families in remote communities would not have any access to ABR diagnosis, and infants would miss the opportunity for follow-up and further testing (Polovoy, 2008).

Access to speech and language assessments and learning support is a source of potential assistance to many people living in remote and rural First Nations. However, in the traditional Western medical model, this clinical service must be offered in-person. This implies serious constraints to providing the service to remote and rural First Nations, including difficulties recruiting and retaining speech-language professionals and significant costs for travel and time for both professionals and clients. Also the assessment process itself, the procedures and tools, are subject to cultural bias and there is no protocol developed specifically for northern and Aboriginal children referred for potential speech difficulties (Eriks-Brophy et al., 2008).

Cultural differences may make assessments for Aboriginal children different from those in other rural areas. When testing children professionals assume that children will feel comfortable, understand the test task, and try to respond; as well as they can and will attempt to respond even if they don’t understand. These assumptions run counter to cultural values such as avoiding competition, maintaining interactional hierarchies, saving face and individualism vs. group orientation. With Aboriginal children in particular there is a cultural difference in the interpretation of talkativeness – example in articles of non-Inuit teachers who see talkative students as bright, and Inuit teachers who view talkative children as disruptive, unable to control themselves and ill-raised (Inuit children to learn by looking and listening). Eriks-Brophy and colleagues mention other forms of assessment bias, including interviewer bias, bias in materials and procedures (e.g., Items shown to children might features things they have never seen, like a zoo, a policeman directing traffic, a garden hoe), bias in test direction, value bias, and linguistic bias (dialect) (Eriks-Brophy et al., 2008).

Eriks-Brophy and colleagues discuss the pilot project of seven assessments in First Nations communities. Assessments were conducted over videoconference and responses scored by both clinicians: a remote and an on-site speech-language pathologist (SLP). Agreement was very high for language tests and relatively high for articulation measure. The use of a wireless lapel microphone (child) and headset (speech professional) may improve the articulation measure agreement between remote and local sites. Through observations the researchers found a positive response to the videoconferencing system. All children needed an introduction to the equipment and its functioning and younger children were shy at first (although this is similar to onsite assessments). The older children were curious about the system. Videoconference assessment did take more time (more repetition involved) and
may not be the best means of delivering timed tests. Eriks-Brophy and the other authors note the complementary role of technology, and highlight the fact that the technology itself cannot reduce or eliminate assessment bias; however, awareness of sources of potential bias is key (Eriks-Brophy et al., 2008).

6.1.4 Tele-ophthalmology

In 2002, KO Telemedicine partnered with the University of Toronto and NORTH Network on a tele-ophthalmology pilot project (Williams, 2010). The pilot provided retinal screening services in three remote First Nations communities in northwestern Ontario: Sandy Lake, Keewaywin and Fort Severn. During the year-long pilot, 186 persons were screened, and the finding was that 14% of the readings had anomalies that required follow-up. After integrating the lessons learned during the pilot, a revised service model was launched in 2005. Currently the tele-ophthalmology service provides screening, comprehensive diabetic teaching and support to the persons screened, and engages community health workers as part of the screening team.

An evaluation of the current service model found that 78% of the clients were able to avoid a trip out of their communities for retinopathy assessment. In addition, an innovation reduced specialist response time to just 48 hours – using the community network environment to support the digital transfer of ocular imaging data to the ophthalmology web server (Williams, 2010).

6.1.5 Tele-homecare

Vermette (2008) and Coulson and Vermette (2008) describe The KO Telemedicine (KOTM) Home and Community Care Program (Tele-homecare) initiative which provides home-based support services to clients in six remote First Nations communities in northwestern Ontario. The program uses videoconferencing to train, monitor, evaluate and assess home based client care. Equipment includes a camera and monitor placed in the client’s home. The equipment is encrypted, securely locked and connected to the KO Telemedicine network with access to over 400 hospitals and health centres in Ontario. The nurse and other professionals are able to assess the client’s requirements and develop a responsive plan of care that would not be possible without telemedicine. Services brought to the clients in their home are: diabetes education and support, specialists and doctors visits, palliative care, nursing support, case management, mental health visits, and family visitations.

Tele-homecare brings together existing programs and services so clients can access many health services and disciplines within the safe, culturally appropriate environment of their homes. Tele-homecare increases client satisfaction and lessens the burden on the client and family, especially those living in remote fly-in communities. It should also be noted that a potential contributing factor to the success of this program is the role of the community telemedicine coordinators, individuals who are community members and work with KOTM to facilitate telemedicine appointments and events (Vermette, 2008; Coulson and Vermette, 2008).

6.1.6 Tele-rehabilitation

Coulson (2010) describes the Tele-rehab Research Pilot program, launched in April 2009. The pilot is analyzing if remote monitoring can support follow-up rehabilitation visits in remote communities. The project is a partnership with the North Western Ontario Regional
Stroke Network Region rehabilitation and Keewaytinook Okimakanak Telemedicine and Keewaytinook Okimakanak Home and Community Care. It provides consultations to stroke survivors after they have finished their therapy at the hospital. Two visits are scheduled after the client returns to their community, at 6 weeks and 3 months. Clients can choose a portable remote monitoring camera brought into the home, or the video unit at the community nursing station. The consultation will follow-up on problems that may have been identified after the stroke, such as weakness, falls, pain, speech, swallowing, difficulty with dressing or eating and accessing funding for equipment. Clients and their families will receive much needed support that is not otherwise available in their communities.

6.1.7 Rheumatology services

Due to a shortage of rheumatology services in rural and northern communities, researchers Jong and Kraishi conducted a study comparing satisfaction rates of various referral methods. In the study, three rural communities in Newfoundland and Labrador were each assigned one method of outreach rheumatology services: scheduled videoconference consults, email access to the rheumatologist, or a visiting clinic. The control group continued with the traditional method, of eight weekly in-person visiting clinics from an urban based rheumatologist, who was the same clinician answering emails in the second community. In the third community participants were offered video consultation clinics (Jong & Kraishi, 2004).

Although all the physicians responded positively to the methods, the response from the physicians using videoconference was the most positive because of immediate feedback, case-based learning and knowledge transfer. All physicians rated the videoconference accessibility as very satisfactory, while the physicians in the two other groups rated the accessibility of the in-person clinics and email as satisfactory. The videoconference group reported increased levels of understanding. Email was used less by the participants, but it also improved understanding. It was not as popular as videoconference – not immediate response. The in-person clinic control group was happy with the outcomes but did not report any changes in management or increase in knowledge level. The wait list for patients remained long at six months, and there remained a time delay for the written report in the control group. Learning was reported in the highest numbers in the videoconference group - an important finding because as the physicians learn to manage more complex rheumatological conditions they will no longer need to refer patients (Jong & Kraishi, 2004).

6.1.8 Digital imaging

Digital imaging – sending digital images such as radiographic images over broadband networks – is used in many areas of the country but the literature review found only one reference to digital imaging services in remote First Nations. In her presentation of telehealth services in the Mushkegowuk First Nations in Ontario, Helmer (2010) reported that the service uses a picture archive communications (PAC) system, and includes a 4-D ultrasound machine. In 2005, the service instituted the 2nd digital mammography program in Canada, which provides enhanced screening for patients.

6.1.9 Rural and remote memory clinic

Barriers to assessment and healthcare of seniors include their geographic location and cultural context. Access is an issue for those living in rural, remote or Northern regions,
and more research needs to be related to culturally-appropriate health services for Aboriginal seniors with dementia. The authors discuss the interdisciplinary research that takes place at The Rural and Remote Memory Clinic (RRMC) in Saskatchewan. The RRMC was created to provide assessment, diagnosis and management of dementia for the elderly in remote, rural and Indigenous communities, using ICT to improve service delivery (Crossley et al., 2008).

6.1.10 Electronic Medical Record (EMR)

The literature review found only one brief reference to electronic medical records (EMR) specifically for use by remote and rural First Nations. Helmer (2010) reported that the telehealth service for Mushkegowuk First Nations on James Bay in Ontario includes an EMR, established in July 2009. It monitors follow-up and vital signs. The EMR is also a chronic disease management tool and a cancer screening tool. In the future, the service plans to link its EMR to Kingston and Timmins, Ontario.

6.2 ICT for health training and education

ICT such as videoconferencing and websites can be ideal for distance education and training in the health field. The literature search found a number of different initiatives and technologies used across the country.

6.2.1 Mini-courses on health by videoconference for multiple First Nations

Access to training is an issue for all remote and rural First Nations. Several tribal councils and First Nations organizations across Canada are using videoconferencing networks to deliver ongoing educational sessions in First Nations communities. Johnson (2008) describes a project that delivers mini-courses on health and wellness using this technology in British Columbia. Videoconferencing can facilitate training for students who otherwise would have been required to leave their communities for training or not receive it at all, reduce the cost of course delivery, eliminate geographical barriers, and enable a live classroom interaction. In 2007, the Inter-Tribal Health Authority (ITHA) formed partnerships with the University of British Columbia (UBC) Learning Circle and Malaspina University College to bring mini credit courses to First Nations Communities via videoconference. In the Fall of 2007, ITHA began offering mini-courses on health and wellness issues to all 51 First Nations communities with videoconferencing capabilities (Johnson, 2008).

There are many other examples of using videoconferencing for health education and awareness in First Nations. KO Telemedicine (KOTM) has an extensive, ongoing, community education program delivered by multi-site videoconferencing to health workers and community members in remote and rural First Nations in northwestern Ontario [see the posters at the end of this report for some examples from KOTM].

In December 2009, KOTM also used this technology for a national information and training session. KOTM partnered with the VideoCom project at the National Research Council on a national multi-site videoconference event on Telemental Health with First Nations (Gibson et al., 2009).

In rural and remote areas telehealth over videoconference is an important means for healthcare professionals to provide education and information for their clients. Researchers (Saqui et al., 2007) report on the results of a telehealth satisfaction survey completed by
11 participants in remote First Nations in northern Ontario who were part of the Toronto General Hospital’s Home Parenteral Nutrition (HPN) Program. Home parenteral nutrition is nutrition given through a central venous catheter and administered in the patient's home. This patient group is sometimes prone to sepsis – an inflammation and infection – hence the need for monitoring. Participants enjoyed the convenience and quality of care offered through videoconference, and saved on both travel costs and time. Clinically there was no increase in the line sepsis rate. Further, all participants were reportedly generally satisfied with their videoconference experience and were open to using it for new consultations, individual and family education, and follow-up (Saqui et al., 2007).

In a final example, Bahrychuk (2009) describes how the Canadian National Institute for the Blind partnered with MBTelehealth to provide a course supporting adjusting to vision loss. Facilitated discussions with others experiencing similar losses were provided using videoconferencing to isolated communities. This was the first time the CNIB has offered this type of course via videoconferencing.

6.2.2 Health-related professional education and training via the web

Ives and Aitken (2008) discuss the outcomes of delivering social work education at a distance to Community Services staff members in Kahnawake, a First Nation community near Montreal. Two courses were offered through the McGill School of Social Work, ‘Certificate in Aboriginal Social Work Practice’ and ‘Certificate in Northern Social Work Practice.’ The course modules were offered via McGill’s MyCourse website and included readings, audio and video clips, reflection logs, quizzes and downloadable toolkits. Instructional support was available online via email and videoconferencing.

Six Community Service members from Kahnawake participated in the Fall of 2007. Responses were positive. Challenges included computer problems and access issues. The next steps for the McGill School of Social Work will be to blend new technologies with traditional content delivery, perhaps incorporating videoconferencing presentations and onsite follow-up workshops. The authors conclude that communities need to be involved and course material needs to be adapted for Indigenous communities otherwise social work could contribute to continued cultural imperialism and colonization.

Bell, Rossiter and Axtell (2009) presented the Public Health Agency of Canada (PHAC) Skills Online program, a web-based continuing professional development program for public health workers. It offers facilitated modules in both English and French and is offered at no cost to public health professionals since 2002. More than 3,500 individuals have completed one or more modules. PHAC held a recent workshop in Yellowknife to identify the skills development needs of public health professionals in the north. In 2008, PHAC launched a pilot program on health data analysis for public health workers in the north. The pilot evaluation pointed to the need to strengthen online learning materials with more northern and Aboriginal content and facilitators from the north, and to find ways to reduce the geographical isolation experienced by northern public health workers.

6.2.3 University health education using multiple technologies

Although culture influences the acceptance and use of online learning systems, there is a lack of research examining the experiences of learners from different cultural groups. Russell et al. (2005) studied the experiences of Aboriginal nursing students participating in an online nursing university degree program at the University of Manitoba that used
various delivery modalities, including videoconferencing, a web-based conferencing system, and email.

The researchers conducted 22 focus groups with students in the three locations in Manitoba and interviewed four students who had left the program. They found issues affecting students’ learning experiences related to technology, faculty, support staff, students at other distance sites, and the learner’s community. Many issues offered a glimpse into the unique and collective influence of students’ cultural backgrounds, such as rivalries among distant sites related to longstanding issues among First Nations communities, a loss of personal interaction with instructors leading to diminished respect for the instructor with learners perceiving they were not learning but merely being programmed, like “microchips”, faculty lack of familiarity with the unique culture of distant sites leading to faculty’s “stupid comments,” and positive experiences of remaining in their home communities for their educational programs (Russell et al., 2005).

6.2.4 Continuing medical education by videoconference

Heaton (2006) explored the use of videoconferencing for continuing medical education in Nunavut. Challenges raised in the study included scheduling issues over time zones and inflexibility of booking (especially if a session went overtime, and some participants were cut off the scheduled videoconference). The staff demonstrated creativity in overcoming obstacles (faxing slides to sites only able to participate by phone, and so on). In interviews staff stated that these sessions minimized their feelings of personal and professional isolation that they usually face when working in remote communities. This method of continuing medical education was quite popular – in interviews participants stated these sessions often were the only ways to get recent information while others noted that the sessions saved them a lot of time searching on the internet (Heaton, 2006).

6.3 ICT for sharing health information

The research on ICT for sharing health information has focused on pilot projects and small studies of the cultural appropriateness of website information.

6.3.1 Websites for exchanging health information and resources

Websites designed and implemented by First Nations communities and dedicated to health and wellness issues can create virtual communities and greater opportunities for the community through greater access to information and education (Harper, 2007).

Research has highlighted that health information on the web for First Nations needs to be culturally-relevant and culturally-sensitive (Friedman and Hoffman-Goetz, 2007; Hoffman-Goetz and Friedman, 2007). The authors found that culturally-sensitive breast cancer information on the web should incorporate health attitudes and behaviors of Aboriginal women and present plain language information to encourage informed decision-making. Web resources considered credible according to published criteria may not be as relevant for Aboriginal populations. Aboriginal women participating in the study read two articles on webpages about breast cancer, one from a national cancer organization and the second from an Aboriginal health department. The Aboriginal women better understood the Aboriginal website and they preferred to read this culturally-relevant resource. Participants did not regard online cancer information from the medical community to be completely credible. They recommended that cancer resources include contact information for traditional healers in addition to local cancer agencies.
The Honouring Life Network website, launched in April 2008, is a resource to address the crisis number of suicides in First Nations, Inuit and Metis communities (NAHO, 2009). The primary focus is to provide information and create networks to increase resiliency and reduce suicide in communities. The Network is the result of an agreement between the Indian Health Service in the US and Health Canada First Nations and Inuit Health Branch (FNIHB). Information on the website is available in English, French and Inuktitut. The four components are: a referral page for at-risk youth, a youth corner, a resource centre and a youth workers’ forum. The website offers culturally relevant information and resources on suicide prevention to help Aboriginal people deal with a problem that has reached crisis proportions. It offers support for awareness-raising, self-reflection, inspiration and learning (NAHO, 2009).

In a pilot project of a community Learning Centre in Tache, a northern community in the TI’atz’en Nation of British Columbia, researchers and educators focused on training research skills and developing a community-based website (portal). Health priorities included coping with addictions, improving nutrition and diet, preventing and treating disease, utilizing contemporary and traditional information, and creating and accessing information. The program provided opportunities and encouraged youth and Elder interactions by linking contemporary and traditional health information (Jarvis-Selinger et al., 2008).

Atack and Luke (2009) evaluated an online patient-education project (PEPTalk) that began in 2006. Three models of website health information were introduced at the partner websites. PEPTalk houses multimedia health information for patients. Clinicians access the PEPTalk site from a computer in their office, create a patient account, select the appropriate materials and an email message is sent to the patient advising that and education plan is waiting for them at the PEPTalk website. Of the 87 patients who were referred by physicians to PEPTalk, just 29 (33%) logged onto the website. For this project, researchers from Centennial College and George Brown College in Toronto partnered with Keewaytinook Okimakanak Research Institute (KORI) in Thunder Bay, St. Christopher House in Toronto, and a family health team from the Centre for Effective Practice, Toronto.

Pilot studies in Burnt Church and Big Cove First Nations in New Brunswick used an online system called Web-4-All to enable Aboriginal peoples with disabilities to get services and support. The system empowered people and aided in their ability to participate in their communities (Community Action Based Development, 2005).

A national Canadian web-based program for First Nations and Inuit communities, @ YourSide Colleague, enables all-hours access to networks of healthcare experts and peers as well as education tools for palliative, wound and diabetes care. These efforts for a national roll-out are supported by 50 First Nations communities already using the program (Alberta Sweetgrass, 2006).

Harper (2007) outlines a “work in progress” website (portal) project dedicated to health and wellness issues in First Nations communities in British Columbia and the Yukon. This portal is intended to be designed, implemented and kept up by First Nations community members in order to create a virtual community with access to education, information on health and wellness and greater opportunities within the community.

Other groups are considering or have recommended websites or portals on health issues. For example, the Canadian Partnership Against Cancer (2009) at a national forum recommended that a pan-Canadian e-knowledge portal to share culturally relevant cancer
prevention, education and end-of-life tools and programs should have materials specifically for Aboriginal populations.

6.3.2 Online health discussion forums

Online discussion forums can also provide a significant source of social support. Hoffman-Goetz and Donelle explored how participation in online chat forums can provide Aboriginal women with health knowledge support and motivation. They preformed a content analysis on 101 health-related online conversations within a forum for Aboriginal women and found that the postings reflected three levels of social support: emotional, informational and instrumental. This online chat forum acted as a knowledge source for Aboriginal women, a means of social support and motivation to make (and maintain) lifestyle changes.

The chat forum created a virtual community for the women where shared experiences not only offered support but also encouraged self-efficacy, assertiveness and confidence. Aboriginal women also used the chat forum to shared stories about cultural traditions – serving to inform and promote Aboriginal medicine and culture (Donelle & Hoffman-Goetz, 2008; Hoffman-Goetz & Donelle, 2007).

6.3.3 Health websites combined with integrated resources

Type 2 diabetes mellitus is a major cause of morbidity and mortality among First Nations peoples in Canada. Ho et al. (2006) used multiple research methods to inform and develop an integrated multi-institutional diabetes prevention program, based on the successful Sandy Lake Health and Diabetes Project and Apache Healthy Stores programs. In-depth interviews, a structured survey, demonstration and feedback sessions, group activities, and meetings with key stakeholders were used to generate knowledge about the needs and resources for each community. First Nations communities were eager to address the increasing epidemic of diabetes. The strategy developed includes a website for public information with password-protected information. While the reserves shared similar risk factors for diabetes, variations in health beliefs and attitudes and environmental conditions required tailoring of programs to each reserve. In addition, it was necessary to balance community input with proven health promotion strategies. This study demonstrates the importance of formative community research in developing integrated health promotion programs for multiple communities based on previously evaluated studies.

6.3.4 First Nations’ videos on health topics

In 2005, an Atlantic region videoconference connecting First Nations schools was held on the topic of fetal alcohol spectrum disorders (FASD). The event featured Francis Perry, a Mi’kmaw man who has dedicated much of his life explaining the disorder spectrum from the perspective of a survivor and encouraging youth to behave in a manner to reduce the risk for future tragedies. His story inspired the students. A part time teacher wrote a play, “The People Vs. Mary Moses.” Students in Eel Ground School in New Brunswick, working with Learning Through the Arts mentors, added music and lyrics and produced the play. The play won five awards at the New Brunswick drama festival. In 2006 a DVD was produced and a national videoconference was held to share the message across the country. Francis Perry observed the impact of the initiative: “three years ago we couldn’t get five people in a room discussing this issue, but look at it now!” (Whiteduck, T. 2010:212).
6.4 ICT to support being of and with the land

As discussed in Chapter 4 of this report, First Nations concepts of health and wellness go well beyond the traditional medical definitions. One important First Nations concept of wellness is being of and with the land. The literature search found several studies on using ICT to support this activity.

6.4.1 Three-dimensional and web-based visualizations of landscapes

Many people, including members of First Nations communities, may find it difficult to engage with the technical information in typical resource management planning media, such as maps and reports. Lewis and Sheppard (2006) note that a successful technique in public consultations is the use of realistic three-dimensional (3D) visualizations of the future landscape under different scenarios. This technique might provide common ground between different cultural groups in forestry, but has not yet been widely applied with First Nations communities where cultural impacts of proposed management activities need to be discussed. Their study is one of the first to assess the acceptability and effectiveness of photo-realistic landscape visualizations with First Nations and their performance relative to more standard planimetric maps as typically employed by resource managers in their consultations with local communities in British Columbia. This study with the Cheam Band of the Fraser Valley in BC presented a small sample of community members with various landscape management scenarios in the form of simple GIS maps and photo-realistic images.

The newer visualization medium was readily accepted by the community members, despite its novelty. The study found that the simple maps on their own led to less understanding of the proposed management options and some confusion or errors in orientation; the visualizations encouraged more in-depth and lively discussion, and seemed to help participants articulate more clearly their preferences for landscape conditions. Cheam Band members commented on some shortcomings of the maps, but generally found the visualizations to be helpful and more meaningful. However, the authors note that further studies are needed to replicate these exploratory findings with other First Nations communities, to validate the information provided by visualizations, and support more robust guidance for their use in practice (Lewis and Sheppard, 2006).

Kruse et al. (2004) describes a collaboration of 23 researchers and four Arctic communities - Old Crow, Yukon Territory; Aklavik, Northwest Territories; Fort McPherson, Northwest Territories; and Arctic Village, Alaska, USA - in or near the range of the Porcupine Caribou Herd. The collaborators drew on existing research and local knowledge to examine potential effects of climate change, petroleum development, tourism, and government spending cutbacks on the sustainability of four Arctic villages. They used data across eight disciplines to develop an Arctic Community Synthesis Model and a Web-based, interactive Possible Futures Model. Because the Synthesis Model inherits uncertainties associated with each component model, sensitivity analysis is required. The scientists and stakeholders agreed that (1) although simulation models are incomplete abstractions of the real world, they helped bring scientific and community knowledge together, and (2) relationships established across disciplines and between scientists and communities were a valuable outcome of the study (Kruse et al., 2004).
6.4.2 Electronic resources for co-managing lands and resources

The Carrier Sekani Tribal Council in British Columbia is developing the Tsilhqot’in Stewardship Planning Portal, which became operational in 2007. The portal is an interactive, web-based land use information management and planning support system. It includes interactive display of map data. The portal was designed to increase First Nations participation in land and resource management, to ensure compatibility of current land uses with traditional uses and values, and to encourage interest and involvement of First Nations youth by using technology. Some uses of the portal include a more effective way of filing and tracking referrals - such as timber and harvesting proposals, tourism, mining, crown land sales, pesticide spraying, wildlife management and archaeological impact assessments. Traditional Ecological Knowledge (TEK) is increasingly important as a reference for resource extraction; the portal serves as a place for storing TEK and the special ability to assess it when making land use decisions (Lulua and Flannery, 2009).

The Northern Secwepemc First Nations of central British Columbia are facing serious communication challenges in relation to the comanagement of natural resources in their traditional territories. Greskiw and Innes (2008) describe that for First Nations managers, communication by speaking and listening and by sharing stories continues to be important for maintaining traditional ecological knowledge and culture. However management authorities emphasize communications by reading and writing, often in electronic format. This dichotomy is leading to communication crises, with traditional ecological knowledge being required to fit within a rigid technology of literacy; this research points to the need for culturally-sensitive ICT applications for co-managing land and resources.

6.4.3 Websites and videoconferencing for training and mentoring water operators

Access to good quality water is crucial for maintaining First Nations communities and traditional territories. Stewart et al. (2009) describes a web-based resource to support the maintenance of water resources. Water Keepers is a website (www.waterkeeper.org) built by First Nations for First Nations. The site is a resource to train and mentor water operators working in First Nations throughout British Columbia. Through the forum, operators are able to help other operators. The site uses multi-media resources and encourages operators to achieve professional certifications.

Gurstein, Beaton and Sherlock (2009) and Strachan (2010) describe a community-based approach for e-servicing water treatment in First Nations in northern Ontario. Developed by the Keewaytinook Okimakanak (KO) tribal council, this highly innovative approach to the community delivery of water treatment services includes the use of videoconferencing for mentoring, continuing education and support, and remote monitoring and electronic servicing of community water treatment plants. These developments are components of the KO Water and Wastewater Plant Operator Training initiative and the new Safe Water Operations Program with the ongoing operational support from INAC for these innovative and locally managed initiatives. The authors argue that the new opportunities presented by ICT can transform this towards more efficient and effective services in communities and overall towards community empowerment.

6.4.4 Digital tool for assessing archaeological evidence

Jules and Steves (2008) have presented an Archaeological Overview Assessment (AOA) process and model for forest development in the Kamloops, BC timber supply area. The AOA model is a digital tool to assess the risk or potential of finding archaeological...
evidence. The scale of zoning is for forestry. The model suggests areas of high and medium potential – that could require more detailed field assessments and suggests areas of low potential – that could have no further assessment. It can be used as a tool to support expedited processes. The original (2002) model for the AOA was to involve First Nations more directly in the archeological assessment process by developing a business relationship with licensees to conduct the archaeological assessments. The developers also sought greater precision in the model’s ability to predict the occurrence of archaeological evidence by the incorporation of traditional use and cultural information and to increase the operational accuracy of the model to the 1:20,000 scale. The final goal was to make the process more cost effective and efficient for all interested parties.

6.5 ICT to support language, culture and traditional knowledge

There are two conflicting forces associated with ICT and First Nations languages. On the one hand, the global nature of the internet precludes its ability to accommodate different cultural values, such that the target audience becomes the dominant ‘Western’ population (Pannekoek, 2001). Language is a strong indicator of this bias; English is the overwhelmingly prevalent language used on the internet, while many endangered Indigenous languages are virtually non-existent on the internet (Pannekoek, 2001). As a result, the internet and associated technologies may fuel the disappearance of Indigenous languages even as the communities strive to preserve them. Furthermore, much of the existing material representing Indigenous groups on the internet imposes an outsider worldview that misrepresents and objectifies the culture, thereby further contradicting the holistic values that Indigenous cultures uphold (Iseke-Barnes & Danard, 2007; Todd, 1996).

On the other hand, researchers have identified the potential for ICT to promote language preservation as well as cultural growth through digital recording hardware and software and online learning tools (Nickerson & Kaufman, 2005). Providing community members with access to localized online resources catered to community-specific needs will help to ensure the protection that Aboriginal groups require to maintain ownership and control over their knowledge, language, and culture (Nickerson & Kaufman, 2005).

6.5.1 ICT to support First Nations languages

Broadband networks can assist the preservation of culture and language in different ways. An online Oji-Cree dictionary has been developed and is being used in local education and service programs (Beaton, Fiddler, & Rowlandson, 2004). K-Net, the community-based network discussed earlier in this report, has created syllabic computer keyboards with a layout in Oji-Cree and Cree in order to involve elders who do not speak English with computers and ICT applications (Fiser, Clement, & Walmark, 2005). Within New Brunswick, an online Passamaquoddy - Maliseet Dictionary has been developed (see http://www.lib.unb.ca/Texts/Maliseet/dictionary/). Furthermore, the Atlantic Canada First Nations Help Desk provides Mi’kmaw language resources, lessons and an online dictionary as well (see http://www.firstnationhelp.com/ali/dictionary.php).

Phillips (2009) describes a resource for First Nations to develop audio podcasts for the benefits of Aboriginal languages. The author’s podcasting tutorial is a complete step-by-step guide to building a site. Topics include locating and working with the dock, working with the iWeb template, creating a podcast page, adding video content, submitting podcast pages to iTunes, and copyright issues. The resource was developed by the First Voices Language Administrator at the Ktunaxa Nation Council, Cranbrook, BC.
O’Donnell, Beaton and McKelvey (2008) describe how a satellite connection was used by Muskrat Dam First Nation in Ontario to host the Native languages resources videoconference event in January 2008. The event focused on the use and preservation of the Native Oji Cree language and the resources available by the Kwayacyiwin Education Resource Centre in Sioux Lookout. The title of the session was: Anihshininiimowin: Our Language Of The Past, Now And Tomorrow. K-Net provided the videoconference bridge and the staff resources to coordinate the technical aspects of the event. The event used multi-site videoconferencing to bring together approximately 20 participants in Muskrat Dam, including a dozen children, and 15 participants in eight other communities in the region. The main focus of the event was showcasing the Oji-Cree educational resources available through the Kwayaciwin Centre. Speakers from Kwayaciwin used the visual aspects of the videoconference to good potential, demonstrating how different lessons using the materials can be given in classrooms. Afterwards, all the participants in the event had the opportunity to ask questions and discuss issues raised (O’Donnell, Beaton and McKelvey, 2008).

6.5.2 Digital representations of traditional knowledge

Bonny and Berkes (2008) point out that although there are a number of distinct audiences for traditional environmental knowledge (for example students, hunter and trapper organisations, and co-management agencies), little work has been done to analyze how Indigenous knowledge can be best communicated to these different groups. Using examples mainly from northern Canada and Alaska, the authors explore the challenge of collecting and communicating different kinds of traditional environmental knowledge, the media types or communication modes that can be used, and the appropriateness of these kinds of media for communicating with different audiences. A range of communication options are available, including direct interaction with knowledge holders, use of print media, maps, DVD/video, audio, CD ROM, and websites. These options permit a mix-and-match to find the best fit between kinds of knowledge, the intended audience, and the media type used. The authors examine how technology can serve community and other needs. No single option emerges as a clear best choice for communicating Indigenous knowledge. Nevertheless, various media types offer avenues through which northern people can meet their educational, cultural, and political needs, and build cross-cultural understanding.

Thomson (2000) notes that First Nations wish not only to preserve their heritage but also to see that heritage is given its proper place in decisions that affect the land. Each community is unique in the diversity of problems and concerns that it faces. Modern knowledge-based systems permit customized solutions to complex issues, but there is currently no good method of representing traditional knowledge using digital resources and computers in a way that helps the needs of communities to be individually addressed. Most traditional knowledge information is presented in anecdotal form and is therefore difficult to classify and analyze, and some traditional knowledge is not appropriate to be shared. Elicitation, representation and use of knowledge is a major area of research in the field of Artificial Intelligence, leading to development of knowledge bases and expert systems. Thomson’s study describes the elicitation and representation of the traditional knowledge from bands belonging to the Nicola Tribal Association in British Columbia. The study represents the interaction of community and environment in a manner that can be used to show the differences among communities.
6.5.3 ICT to support literacy

Caidi and Walmark (2006) are developing a program to support print-on-demand book services in remote First Nations communities in northwestern Ontario. The need for the service was identified in a 2006 workshop with First Nations participation. Community partners and librarians identified that children in First Nations communities often have limited access to print materials, such as books, and must resort to online resources to retrieve information. There are initiatives by private donors and government to ship books to remote schools, typically for K-12 students. Unfortunately, because of the lack of physical space, the inappropriateness of the texts shipped, or the lack of a proper cataloguing system, many of the books have been under-used. In addition to the lack of books relating to curriculum content and development, participants at the workshop also expressed an interest by community partners to have a repository of culturally-relevant works dealing with knowledge and history of the community, language scripts, and local artifacts. This project is currently underway in partnership with Keewaytinook Okimakanak and First Nations in northwestern Ontario.

6.5.4 ICT to support musical development

Over the last several years, there has been a groundswell of emerging talent among First Nations musicians and artists. However there has been little research on how they are using ICT to develop and produce their work. Warden et al. (2009) have produced a step-by-step guide to delivering a youth music technology workshop for Ktunaxa First Nation. There was a need for an outlet for youth to record and develop their passion for creating music. The Ktunaxa Community Learning Centres (KCLC) project team developed the workshop. More than 20 participants attended the workshop, ranging in age from 15 to 27. During the workshop, participants collaboratively created a song titled “Stomp”, and left the workshop with a thirst for more. This led to the organization of regular Friday evening music recording sessions at the KCLC, and a Facebook group that is receiving increasing community support (Warden et al., 2009).

Masum, Brooks and Spence (2005) describe a study to demonstrate how video-based technologies can promote collaboration and learning. The MusicGrid Project (2002 to 2004) ran more than 100 multi-site videoconferencing education and performance sessions. Although no First Nations communities were involved, two Inuit communities were. The project connected schools in Kangiqsualujjuaq (northern Québec) and Iqaluit (Nunavut). The remote Inuit community of Kangiqsualujjuaq had no music program prior to MusicGrid. MusicGrid provided a group of ten fifth- and sixth-grade students weekly violin lessons for one and a half school years, and another group of eight children with weekly keyboard lessons for one school year. Later, a teacher in Ottawa was found to teach a group of six high school girls traditional throat singing and drum dancing. This knowledge had been lost from the community, but through the project it was being rediscovered from experts elsewhere who have kept alive the ways of traditional music. Girls from the community have performed via broadband video for audiences in North America, Europe, and Hawaii.

6.5.5 ICT to develop First Nations links to cultural resources in museums

Rowley, Sparrow and Schaepe (2009) describe the Reciprocal Research Network that is bringing together information from selected museums around the world to a computer at Musqueam First Nation in BC. The network allows Musqueam to send information back to the museums. Musqueam has three reasons to be involved: to co-develop the network to
gain the most from the development of this new technology; to engage Musqueam community members in learning about their objects, songs, and other material that is housed at museums around the world; and to share information with the museums around the world to ensure a Musqueam voice is being heard.

6.6 ICT to support interconnection and interdependency

6.6.1 Fostering connections through community-based learning

Across Canada, the First Nations SchoolNet (FNS) program is the best example at a national level of using technology to support community-based learning in remote and rural First Nations communities. As discussed in Chapter 3, the program is funded by Indian and Northern Affairs Canada. In their recent evaluation of the program, INAC (2009) found that FNS remains an integral part of First Nations education on-reserve. The program has enhanced the educational experience of First Nations students, provided them with valuable skills and capabilities which have increased their competencies, improved their outlook on learning as well as their confidence in their futures. The program has also provided students with the option of staying in their communities with their families as they complete their education through distance learning which has positively affected retention and graduation rates while providing access to opportunities similar to students from provincial schools (INAC, 2009).

When students and other learners can engage with training and education in their own communities, they remain connected with their social networks. There are many examples of distance education programs in remote and rural First Nations communities but few examples of ongoing programs that use technologies extensively to engage young people in formal education and connecting with young learners in other communities. One notable example of community-based learning on this model is Keewaytinook Internet High School (KiHS), an innovative program servicing schools in remote First Nations communities in northern Ontario. Carpenter (2010) explains that until recently, to continue their education after Grade 8, First Nations children living in remote communities in northern Ontario had to leave their families and communities to attend secondary school hundreds of kilometres away. For many young people, this involved major culture shock and a loss of social support, and often resulted in students quitting school. Now, youth have the choice of staying in their community longer to attend Grades 9 and 10 online using the Keewaytinook Internet High School (KiHS) (Carpenter, 2010).

Potter (2010) and Walmark (2010) outline how KiHS provides a community-based educational option for First Nations high school students through the use of internet technologies. Students who remain in their home communities may access a quality high school program through KiHS while participating in community life. KiHS students earn ministry-inspected credits towards their Ontario Secondary School Diploma at the intermediate and senior levels, and experience life in a high school setting. KiHS gives parents and communities an opportunity to actively participate in the educational experience of their children through local involvement in the program.

K-Net supports KiHS and is a key participant in MoodleFN, a heavily-customized version of Moodle (www.moodle.org), a Learning Management System that allows people to create and manage their own e-learning programs (Walmark, 2010; Whiteduck, T., 2010). The goal of the MoodleFN Project is to promote and support quality e-learning programs in First Nations schools and communities in Canada. It provides teachers and students with a secure, managed online learning environment that can also host special events on a
structured platform. Different online communication tools are available including blogs, wikis, and discussion forums.

The First Nations Education Council (FNEC) in Quebec has developed online educational content and games for children; the material has high cultural value and significance and encourages the students to learn about their culture while they are having fun. The educational materials are available in both official languages on the FNEC website; the games were distributed in DVD format to all First Nations schools in the region and are also available online (Whiteduck, T., 2010).

In another example of community-based learning, Whiteduck, T. (2010) describes how in 2003, the First SchoolNet RMO in northern Saskatchewan, Keewatin Career Development Corporation (KCDC), led the development of a partnership between the RMOs and Cisco for the delivery of Cisco's Networking Academy training programs in First Nations. The program resulted in the development of resource materials tailored for First Nations being delivered through e-learning and videoconferencing by First Nations instructors from several provinces. KCDC also developed and delivered the Breaking Barriers series of interactive videoconference programs that allow students to learn about careers, life stories, and educational programs. The series is available in Saskatchewan and Alberta First Nations schools. According to Whiteduck, T. (2010), the programs not only complement and enhance students' education but also provide them with the opportunity to interact with inspirational individuals from community elders to astronauts.

In partnership with Saint Paul University, the First Nations Education Council in Quebec is using videoconferencing to deliver a First Nations Leadership Certificate program aimed at increasing knowledge about First Nations dynamics and issues. The program has high participation rates from First Nations communities, including the Innu (Whiteduck, T., 2010).

In a final example of ICT for community-based learning, the Atlantic region RMO, Atlantic Canada’s First Nation Helpdesk, supported a project called MMTV (Mi’kmaq/Maliseet TV) News. MMTV was a place for students in First Nations schools in the Atlantic to produce, record, edit and broadcast local, national and international stories. The Helpdesk used multi-site videoconferencing to broadcast the clips to schools in the region and anchor them to a newsdesk, emulating a television news broadcast. Using this technology, students learned about group cooperation, journalism, and current events (Whiteduck, T., 2010).

6.6.2 Social networking

There is only one example in the literature of research on social networking in remote and rural First Nations. Budka, Bell & Fiser (2009) have studied MyKnet.org in northern Ontario. The social networking service is run by K-Net, the broadband services and support organization discussed earlier in this report. MyKnet.org is available to the approximately 45,000 people living in the region. There are 30,000 registered users and 25,000 active sites. More than half the 30,000 users are under age 25, signifying that this is “primarily a youth-driven online social environment.” The network plays an important socio-cultural role by providing a means to build and maintain familial, friendship, and community relationships. The site is also used to organize community relief, for example, disasters like teen suicide have lead to MyKnet.org public information bulletins and memorials. The researchers also noted that MyKnet.org members have been known to monitor their local youth’s homepages for signs of depression, and have staged interventions on a number of
occasions. Similar to community radio, MyKnet.org connects individuals within communities, but it also enables connections across communities. The researchers include stories of parents who use MyKnet.org to locate their children when they travel abroad, or even within the local communities (Budka, Bell & Fiser, 2009).

Leclair and Warren (2007) are Métis scholars and members of the Métis Women’s Circle. In this article they discuss the importance of sharing in Métis culture and the potential benefits of information technology and suggest a social networking function: an important resource for sharing knowledge, creating new opportunities and partnerships and reducing “brain drain” in rural and remote communities. At the same time the use of ICT might breach communal and individual rights when reciprocity, respect and responsibilities are not met.

6.7 ICT to support holistic healing

6.7.1 Youth video production for holistic health literacy

Ricken et al. (2006) and Stewart et al. (2008) describe a participatory research project to promote student use of digital video to explore concepts of health and wellness. Students first chose a health topic of interest to them. The students then planned, researched, and developed a video with their message that they then presented to their community. For the student videomakers, the process provided not only a means of communication and action but also a way for them to acknowledge and promote aspects of Aboriginal culture that have a transformative effect. The project used a model of holistic health literacy. The video technology is culturally appropriate because it relies on an oral tradition. Several themes emerged from the research, including the importance of community (accessing community knowledge, having the support of the community), culture (access to cultural resources, following cultural protocols like circle-sharing time, and so on), confidence (students gain confidence as a result of the project, and they gain skills, and control (control over self, control over the project). In summary, the authors call for a “conception of culturally based health literacy” and the “development of holistic models of health literacy as a positive alternative to the deficit models of health.”

6.8 ICT to support mentoring, Elders and role models

6.8.1 Connecting Elders in multiple communities via video

Elders living in a number of Saskatchewan communities (Whiteduck, T., 2010) and in communities in Ontario and Atlantic provinces (O’Donnell, Walmark and Hancock, 2010) have become involved in video conferencing, and use the medium to meet with each other and discuss issues they identify as important. The Elders regularly speak their Native languages in these sessions. In the Atlantic region, there are several examples where the only contact some Elders have with speaking Mi’kmaq is during these videoconferences, because there are no other Native language speakers in their communities. For them it is not even necessary to make a speaking contribution to these gatherings - hearing the language and seeing the facial expressions and gestures are enough to help them feel connected to their language and culture (O’Donnell, Walmark and Hancock, 2010).

A number of initiatives across Canada are using video to capture the stories and wisdom of First Nations Elders. A good example from the Atlantic region is the Dear Elders videos project available for viewing at the following URL: http://dearelders.ca/
6.9 ICT to support self-reliance, community resilience and self-determination

6.9.1 Community-based networks

The Assembly of First Nations (AFN) is advocating the need for First Nations’ ownership and control of infrastructure, including the ownership of network circuits (Whiteduck, J. 2010). First Nations need control over the flow of information on the networks to determine how the available resources are managed and utilized. Just as hospitals and universities manage their bandwidth, First Nations must be able to determine what applications have priority. For example, an e-health application such as a doctor consult must be able to be supported over the need for the download of a music file. All First Nations require managed broadband circuits that enable the community to administer their own data, applications and services. First Nations must be able to define the costs, needs, standards and priorities for implementing and maintaining their local infrastructure (Whiteduck, J., 2010).

The First Nations SchoolNet Regional Management Organizations (RMOs), discussed in earlier chapters of this report, support First Nations community-based networks that in turn support self-reliance within and among the rural and remote First Nations. The RMOs support the backbone for broadband networks and ICT in many remote and rural First Nations across the country (Whiteduck, T., 2010). Fiser and Clement (2009) studied K-Net, one of the RMOs and found that it has negotiated a compromise between the local autonomy of the community and the socio-economic realities. The RMO structure is an ideal structure to deliver programs in First Nations across Canada where national targets can be established and delivered regionally in a way that both respects diversity and addresses local challenges (Whiteduck, T., 2010).

Community-based networks can limit the effects of the globalizing trend of broadband networks and the internet. There are many examples in the literature that illustrate how community-based networks support ICT use in culturally-appropriate and beneficial ways in First Nations communities. Research on K-net has found that it serves as a facilitator (rather than a vendor) for the community organizations and social groups. In order to address the issue of trust, K-Net personalizes relationships with directors, managers, and program directors, establishing working partnerships and co-operations with local experts and specialists. This careful balance between the needs of communities and public sectors is cited as K-Net’s key to successful sustainability (Fiser & Clement 2009).

In British Colombia, the Namgis First Nation successfully implemented a computing network to facilitate communication between administrators working in different public sectors, leading to increased community resilience and improvements in public services (Gordon, 2006). Based on the success of this program, Gordon provides a guide outlining the factors Aboriginal communities should take into consideration when initiating a community network, as well as step-by-step instructions for implementation. In a later publication, Gordon (2009) has explained that to be relevant to the community, an ICT network must be designed with the needs, objectives, and procedures of its owners (the users) in mind. An ICT network is a provider of an assortment of services. The users are there to provide services to their organizations – in this case the First Nation, Tribal Council or other regional authority. These in turn provide services to the community. Networks need to: grow gracefully, support new technologies when they appear, adapt to changing needs, allow quick, easy diagnosis and repair, allow monitoring of use, and be secure.
Maki (2008) points out that First Nations are taking a stand on building their own connectivity since other providers are not able to come in and find a business model to support it. A First Nation considering building its own network must come up with a vision of what it wants, decide how it will finance the project, review its territory or geographical needs, develop possible partners, have some knowledge of current technology, and make decisions early on if it wants to be just an owner, or an owner operator.

Another type of community network is the RAIN Project: Resource Access and Information Network (Community Learning Project, 2009). The North Coast Region of BC was experiencing significant economic challenges in 2000. The urban centre in the region is Prince Rupert, and the average community size in the surrounding region is 275 people. RAIN is a coalition of 17 North Coast community partners that began in 2002. It is a forum for empowering people through learning, accessing new personal, employment and business information, creating a new way for remote communities to connect to the outside, and fostering a sense of optimism about the future.

Mignone and Henley (2009) argue that that First Nations community networks may establish a synergy of social capital as a pre-requisite for their success, and that the success of these networks have the effect of strengthening the community’s social capital.

6.9.2 ICT for self-determination

The argument that ICT can support self-determination has been made by several authors. Fiddler (2008) outlines how the UN Declaration on the Rights of Indigenous Peoples is a building block and guideline that Indigenous peoples and their states can use to pursue their collective rights and freedoms. Even without Canada’s support of the Declaration, many First Nations across Canada have been actively pursuing these rights. ICT are powerful tools that can be used to realize these rights. With the engagement and commitment of First Nations communities, ICT can be developed and used in new ways that First Nations never thought possible. Fiddler argues that as global leaders, First Nations need to set the stage for the use of ICT in Indigenous communities and nations. Indeed, many First Nations communities are already meeting this challenge.

Breu (2009) investigates the place for e-resources in First Nations communities. She notes that the answer depends upon the individual community; however, when communities define the role of ICT they can use these tools for cultural protection, self-determination and revitalization. As an example, Breu focuses on an assessment of the Centre for Indigenous Environmental Resources (CIER) Virtual Environmental Library.

O’Donnell et al. (2009) describe how two community-based First Nations organizations in Canada – K-Net and Atlantic Canada’s First Nation Help Desk - are using video communications on broadband networks to support economic and social development in remote and rural First Nations. This study situates these two organizations within a broader social movement working toward self-determination for First Nations in Canada, exploring their use of video communications in this context. In an earlier article, O’Donnell and Delgado (1995) discuss how Indigenous peoples and nations are a specific presence on the internet, and how they have made the global computer network a site for information exchange, analysis and action on self-determination.
6.9.3 ICT to control First Nations representations and digital spaces

Harding (2006) investigated historical representations of Aboriginal people in the Canadian news media. A significant finding is the degree to which news discourse about Aboriginal people has remained constant over the last century and a half. In the 1990s, these issues were framed, much as they were in colonial times, in ways that protect dominant interests and signify Aboriginal people as a threat. Making a similar argument for the internet, Iseke-Barnes and Danard (2007) state that Aboriginal people are experiencing a loss of control over how they are represented in the media. The authors argue that cyberspace typically reflects Western thought, which is fragmented and disconnected but at the same time dominant. The internet is impersonal, separating people in power from their subjects, but also encourages power among those who are active participants and can be used as an instrument of globalization, considered an expression of the colonial process. At the same time, Iseke-Barnes and Danard (2007) argue that the internet can be used for anti-colonial education, and in the hands of First Nations peoples can be empowering.

Along these lines, Perley (2009) notes that with the rise in websites for video sharing and the increase in resources to create and upload videos, there is potential for First Nations women to use this technology to represent issues they cannot normally address through mainstream media. Her critical analysis of the representation and participation of First Nations women in online videos provides some insight into how First Nations women are currently using ICT to question and challenge mainstream media assumptions and representations of First Nations women. The study explores the potential of online videos produced by First Nations women to provide an alternate public sphere to represent themselves and their perspectives and promote social change.

Hancock and O’Donnell (2009) explore the potential for new media to provide a means for members of remote and rural First Nations communities to challenge problematic mainstream representations of First Nations identity. Online videos made by First Nations people may provide the means for a social movement that undermines the misrepresentations of First Nations culture and identities in mainstream Canadian media.

McKelvey and O’Donnell (2009) describe a case of community use of multi-site videoconferencing in 2007 that connected a number of First Nations communities across Canada for simultaneous audio-visual exchange. The event created a virtual space controlled by First Nations communities. The authors use the theory of the public sphere to highlight the political effects of multi-site videoconferencing and how the technology used strategically can contribute to the well-being of the communities.
7: Experiences from the US, Australia and Other Countries

Indigenous peoples in the United States, Australia and other countries – especially those in remote and rural areas – face similar challenges of limited access to public services and decreased effectiveness of service delivery compared to the general urban population. Research on initiatives to address these problems place a strong emphasis on not only forefronting holistic models of health and wellness but also honouring the specific beliefs and values unique to each community. This culturally-appropriate approach to delivering health services has shown immense success from which Canadian researchers and policy makers can learn and benefit.

Articles found in the literature search that dealt specifically with the use of ICT in Indigenous communities were mainly from the United States and Australia. As in the Canadian literature, the main focus of most articles on telehealth in American Native rural and remote communities in the US is mental health. Other applications of telehealth in Aboriginal communities in the literature include remote mammography, dietary and lifestyle interventions for improving and preventing diabetes, follow-up for dementia care, teledentistry, telepharmacy, the Electronic Health Record (EHR), telerehabilitation, addictions support and general health education.

7.1 American experiences

The literature reviewed to highlight American experiences included all the research on Native Americans and ICT for health and wellness, plus more general literature on ICT for health in remote and rural communities.

7.1.1 Telemental health

The most prolific author on telemental health and Native American communities is Jay Shore, associate professor at the University of Colorado, School of Public Health Centers for American Indian and Alaska Native Health. Shore, in collaboration with colleagues, has conducted extensive research in particular on the use of videoconferencing for mental health assessment and treatment of American Indian veterans.

In 2008, Shore and colleagues evaluated psychiatric assessments (administration of the structured Clinical Interview for DSM-III-R –SCID with certain modifications for cultural relevance) for 53 male American Indian Vietnam veterans conducted both in-person and by videoconference. All participants were included in both conditions, and both interviews took place within a two-week period by different interviewers who were trained psychiatrists. After the assessments the patients and interviewers responded to questions about the usability of the assessments, their experience with patient/provider interaction, cultural competence, and satisfaction among other things. Overall, participants reacted positively to videoconference (94%) and found the equipment easy to use (96%). Only a small group of individuals reported finding the equipment distracting (15%). Further, 45% of participants indicated a preference for an in-person assessment, while 20% reported that they preferred the video interview, and 34% had no preference. Almost all participants (92%) stated they would use videoconference technology again. One interesting finding from the interviewer data was that the psychiatrists perceived that the participants had more difficulty trusting them over video, when in actuality the trust levels reported by the interviewees did not differ according to interview type. Overall, telepsychiatry was well received (Shore et al., 2008).
When examining the reliability of a Structured Clinical Interview for DSM-III-R (SCID) administered in-person compared to administered by videoconference, Shore and colleagues found no significant differences between the two modalities. This demonstrates the potential diagnostic reliability of videoconference assessment for rural American Indian military veterans (Shore et al., 2007b).

In a 2004 paper Shore and Manson describe a weekly tele-psychiatric clinic treating PTSD in Northern Plains American Indian Veterans. The study results indicated a high degree of patient satisfaction and comfort with the clinic which suggests that multi-site videoconferencing may be a viable means for providing psychiatric care to rural, isolated populations such as American Indians (Shore & Manson, 2004a).

In a 2005 article on developmental models for rural telepsychiatry, Shore and Manson note both benefits and limitations of telepsychiatry for rural and underserved populations. They discuss the American Indian Vietnam Veterans Project which provides mental health services for veterans with post-traumatic stress disorder (PTSD). The five clinics provide medication and case management as well as individual and group psychotherapy via videoconferencing, focusing on education, skills training and supportive therapy (Shore & Manson, 2005).

In a more detailed study, Shore and Manson outline a clinical case study of a 52-year-old American Indian man who has post-traumatic stress disorder (PTSD) and his experience using videoconferencing for assessment and weekly sessions as well as weekly group meetings. The videoconference linked a reservation-based clinic to the Regional Veterans Administration Medical Center (VAMC). The authors note the patient’s difficulty using traditional medicinal and healing traditions; for example, the high heat and humidity of the sweat lodge triggered flashbacks of Vietnam. The patient also had difficulties attending ceremonies because of discomfort with crowded environments. There are also cultural issues related to PTSD. In the patient’s community PTSD is not necessarily recognized as a disease or an illness. At the same time, community members realize that warriors can, as the result of battle, develop spiritual or emotional issues which can be long-term. However, there often are conflicting beliefs; community members may distance themselves from those with PTSD, and PTSD is sometimes seen by community members as part of an addiction (perhaps because alcohol abuse is often co-morbid with PTSD).

The subject in Shore and Manson’s study, referred to as “V,” was reluctant even to seek help for his mental health challenges. He was reluctant to go to the local mental health services because he knew many of the employees there and was concerned about confidentiality. Also “V” was afraid that someone in the community might see him enter the facility. The alternative, seeking care at the local Veterans Affairs (VA) clinic, involved a half-day drive at his own expense, and “V” already distrusted and felt betrayed by the VA system. The solution “V” ended up choosing was attending a telehealth clinic, a part of the tribal veterans program, on the reservation. There he attended a weekly support group, gaining a social support network without fear of stigma by community members. The clinicians “V” dealt with were located hundreds of miles away and he felt more comfortable disclosing information to them because they did not work or live in his community. In fact, after his first telehealth session he reported that he had shared more things during that session than he had ever been able to before. The distance afforded by the videoconference allowed “V” to feel safe and discuss his experiences (Shore & Manson, 2004b). The authors concluded that through the use of videoconferencing, high-quality cross-cultural assessment and care is possible, and that it is an important tool in reaching under-served and isolated communities.
Other research has also highlighted many barriers for American Indians seeking mental health services for PTSD, including (but not limited to) difficulties discussing personal matters, accessibility issues, lack of outreach to communities and cultural issues (Westermeyer, et al., 2002).

Shore believes that videoconferencing for telepsychiatry has real potential for improving mental health treatment in Native American reservations; however, little has been written on the topic. In particular, Shore and his colleagues review the current state of civil commitments – the involuntary commitment of a potentially dangerous mentally ill person – on reservations. Videoconference poses a potential problem depending on if it qualifies as a face-to-face interaction in the area in which the civil commitment takes place, as patients cannot be involuntary committed unless there is a face-to-face interaction. Also there may be jurisdictional issues, as the regulation of civil commitments varies according to the US state.

Adding extra complexity, rules and regulations also differ according to reservation (tribal government). Another issue is the close relationships within rural communities which are important when local providers or law enforcement officials need to become involved – this can create additional tension within the community. Shore and his colleagues note the need to be aware of the different levels of regulation and the need for the establishment of preliminary guidelines and emergency protocols for telepsychiatry. Knowledge of the community’s attitudes and experiences with federal, state and community organizations as well as tribal history and culture are also key to the psychiatrist or mental health professional. Family dynamics also need to be assessed to determine conflict and understand if the involvement of the family would facilitate or hinder the commitment process. Also the physical distance between the patient and provider may aid or hinder the commitment process – greater disclosure can (but not always) take place over videoconference (Shore et al., 2006) but at the same time it can make it more difficult to get an accurate depiction of the community; therefore collaborating with a local provider or facilitator is essential (Shore et al., 2008a).

Shore discusses the key issues relevant for conducting telemental health research with rural, native and veteran or service member populations. He notes that while a Community-Based Participatory Research (CBPR) approach is necessary, it is not always sufficient. Long term relationships need to be developed with the community or population that are mutually beneficial, and the researcher needs to facilitate interactions between the research community and the population. The five key issues for telehealth research include: using the appropriate research methodologies; placing greater emphasis on understanding how models of care can change with eHealth; understanding how access and quality changes with eHealth, fostering a collaborative model; and adapting (or constructing) eHealth programs and models for underserved populations. The current state of telemental health research is focused on videoconferencing. Although the clinical practice of telemental health is outpacing the published research, there is a growing body of outcome data being published. Logistical challenges with rural populations include the infrastructure and distance management, working with multiple collaborators, travel and transportation, motivating participants and creating partnerships with the communities (Shore, 2009).
7.1.2 Diabetes management

Websites are used to provide information and communication to America Native patients with diabetes. The MyCareTeam website is a self-management care system used by Native Hawaiian clients on O’ahu with diabetes. Participants uploaded glucose readings on the site and used the site on a weekly basis to communicate with healthcare providers. This interaction was followed-up monthly via telephone. Recruitment efforts produced 25 participants, 17 whom had limited technology access. Those with computer and internet access reacted positively to gaining instruction and education from the website that was specifically relevant to themselves and their own individual lifestyle and diabetic conditions. The site was also found to be a cost-effective way to monitor clients with chronic conditions, promoting self-management and decreasing medical office visits as well as improving participant retention (Palakiko, 2008).

New diabetes programs using ICT are underway. A newspaper article announced in 2009 that Native American veteran participants in Oklahoma are being sought for the TeleMOVE program. A national Veterans Affairs program for weight loss involving home monitoring, the TeleMOVE program uses a home health monitor, digital scales and a phone line to track daily health and offer positive reinforcement (Native American Times, 2009).

7.1.3 Telepharmacies

Access to pharmacies may be severely restricted in rural and remote communities. For example, in Alaska prior to telepharmacy, there were no full-time pharmacists in rural and remote areas due to staff turnover, lack of housing, and recruitment issues. Starting in 1968, members of some communities were trained in basic medical care to act as health aides who were also responsible for maintaining necessary pharmaceuticals for chronic and acute conditions. This situation created disparities in levels of care between rural and urban communities (Rose, 2007).

Telepharmacy includes the use of automated dispensers. These machines contain standard medications as determined by the network pharmacy and the remote clinical medical director according to the needs of the community. Prescription orders are sent electronically to the central pharmacy, and the pharmacist evaluates the patient’s medication regime and medical history and then consults with the remote provider regarding drug selection, dosing and medication safety (medication interaction, etc.). The medication is then issued to the patient after consultation is provided via videoconference or telephone, and educational materials are printed at the clinic site for the patient. The automated dispenser tracks inventory and expiration dates in real time (Rose, 2007).

Rose’s 2007 article details the pharmacy services to Native and non-Native patients attending the outlying health clinics in the rural Anchorage Service Unit. The Alaska Native Medical Center acts as the central pharmacy that dispenses to those remote pharmacies with the network. In 2003, a six-month comparison of two telepharmacy equipment systems was conducted. Two automated pharmaceutical dispensers with live videoconferencing, Telepharmacy Solutions and PickPoint, were deployed at remote clinic sites. In 2006 22,665 prescriptions were processed, 25% for non-Natives. There were 990 consultations and interventions (due to dose adjustments, interactions, recommendations, etc). The use of telepharmacies enhanced the quality of care in rural and remote locations with healthcare provider shortages. The program demonstrated success in improving services as well as medication. After initial assessments the program was expanded to include eight additional sites. As a result, pharmacy programs were expanded to rural and
remote communities, and more sites are being considered for future service expansion (Rose, 2007).

### 7.1.4 Teledentistry

Dental care is another major health concern in rural and remote communities in the US. Access to dental care is particularly hard for people from low income families and people with disabilities. Further barriers to dental care include geographic remoteness (accessibility dependant on weather and road conditions), lack of public transportation, scarcity of dentists and specialists, and the culturally-specific needs of groups, in particular, American Native people.

Authors Fricton and Chen (2009) discuss various case uses of teledentistry in the United States. Teledentistry uses various ICT including “electronic health records, telecommunications technology, digital imaging, and the internet to provide teleconsultation with specialists, supervision of collaborative hygienists in remote areas, and education” (Friction & Chen, 2009). There are various means in which teleconsultation occurs, including real-time consultation between dentists in rural communities and specialists over videoconference and the “store and forward” method where data (electronic health records, video) are sent to and reviewed by specialists (Fricton & Chen, 2009).

Further examples of teledentistry in the United States include the Total Dental Access program, a US Department of Defense teledentistry program which allows US Armed Forces dentists to consult with specialists. The program focuses on continuing education, dentist-laboratory communications and patient care. Another example is The Children’s Hospital Los Angeles Teledentistry Project which operates in association with the University of Southern California’s Mobile Dental Clinic. This program provides dental care to children in rural and remote areas of California. The Teledentistry network, started in 2004, links University of Minnesota School of Dentistry specialists to rural sites, in particular to help manage orofacial disorders. Researchers found high patient and clinician satisfaction levels. The patients enjoyed the convenience and increased access to care the service provided (Fricton & Chen, 2009).

### 7.1.5 Tele-audiology

Kokesh et al. (2009) describe a project in which an audiologist travelled to remote Alaska to communicate with an otolaryngologist using store-and-forward consultation. Similar to the Canadian north, in Alaska the health system relies on expensive air transport of patients to the nearest hospital. The Alaska Native Medical Centre (ANMC), based in Anchorage, is joined to more than 200 sites for telemedicine purposes. Audiologists based at rural hospitals use store-and-forward technology and broadband networks to transmit clinical data to otolaryngologists for consultation.

In this project, an audiologist received training on specialized software and hardware for remote audiology consultation. In the remote site, the audiologist took video otoscope images and digital camera images as well as patient case histories. The data was then transmitted to the ANMC. The project evaluation was based on 1,458 patient encounters over a 57 month period. The cost of the project was $141,114 and the cost of the air travel alone avoided was $496,420. The services were provided at a significantly lower cost and presented fewer burdens to patients compared with standard referrals. The authors note that this service provided a specialty care that was previously unavailable in the small
villages. In addition to the cost savings from avoided travel, the patients had access to earlier diagnoses which for several patients avoided significant disability (Kokesh et al., 2009).

In another example from Alaska, the Norton Sound Health Corporation (NSHC), a nonprofit tribal health consortium, uses store-and-forward technology and broadband networks to transfer high-definition video images, reducing the wait time by two months for consultations with an otolaryngologist (Polovoy, 2008). HSHC serves approximately 10,000 Native Alaskans in 16 communities in the Bering Strait region. Before starting the teleaudiology service, patients had to fly to Anchorage for a five-minute ear tube check. The program also uses videoconferencing for fitting sessions of new ear molds or hearing aids for patients in remote communities (Polovoy, 2008).

### 7.1.6 Electronic Health Records (EHRs)

There are few studies on the implementation of electronic health records (EHR) in rural and remote Native settings. Sequist and colleagues (2005, 2007) evaluated an EHR implemented in the Indian Health Service (IHS), a federally-funded health system in the United States. They surveyed 223 clinicians at 26 health centers to assess attitudes toward EHR implementation and toward the use of information technology in underserved locations. Features of the EHR included bill capturing, clinical reminders, template-based notes, radiology order entry, immunization documentation, problem list, medication order entry, lab order entry and medication list.

Medical professionals reported high levels of use for medication, lab and radiology order entry. There were low levels of use for electronic clinical reminders and bill capturing. The ability to provide culturally-appropriate education material, information about tribal affiliation and language proficiency were seen as potential uses of the EHR. Technologies considered most useful for the rural and underserved settings included online information sources (98%) telemedicine (81%) consultation over email (80%) and EHR (75%) (Sequist, Ayanian and Cullen, 2005; Sequist et al., 2007).

### 7.1.7 Mobile mammography unit

While breast cancer mortality rates are declining in the overall population, the rates are rising for American Indian women. A mobile mammography unit is used to service rural and remote Native American reserves. In a 2007 article on mammography screening, the process of mobile mammography is described. The images are transmitted by satellite from North Dakota to the University of Michigan Breast Imaging Division in Ann Arbour, a process which takes from 30 minutes to 50 minutes, allowing for follow-up while the unit is still in the community (Oncology News International, 2007).

### 7.1.8 Alzheimer and dementia assessment

Alzheimer and dementia assessment and treatment is currently of great interest to healthcare providers. Satellite videoconferencing has been used for follow-up appointments between the University of Texas Southwestern Medical Center’s Alzheimer’s Disease Center and patients from the Choctaw Nation in the US. To enable the use of videoconferencing for follow-up, the Alzheimer’s Disease Centre has issued guidelines for covering physician’s fee schedules and approved codes for reimbursement (Vikery, 2005).
7.1.9 Telephone-based smoking Quitline

Telehealth interventions can involve low-tech ICT solutions. Telephone interventions have been found to be effective in helping Native American people to quit smoking. A Quitline (QL) is a public telephone service designed to aid and counsel tobacco users in their efforts to overcome their addiction. A 2009 article investigates the effectiveness of QLs among Native American populations. The researchers conclude that while QLs appear to be a generally effective service for Native Americans, several key modifications on the part of the counsellors, such as avoiding direct advice and fast-paced delivery of information, could make the service even more successful (Boles et al., 2009).

7.1.10 Culturally-appropriate healthy eating and exercise

The Rural Hawai‘i Behavioral Health Program (RHBHP) supports culturally-appropriate healthcare by incorporating Native Hawaiian cultural beliefs, values and practices into programs geared towards healthy eating and exercise. Hawaiian beliefs and practices are built into all stages of healthcare and “relevant cultural values, concepts and practices are incorporated to enhance interest, participation, motivation, and effectiveness of interventions.” Oliveira and colleagues (2006) note that traditional beliefs might determine the effectiveness of different types of interventions given to community members. They give two examples of successful programs (diabetes management and an afterschool program) that incorporated traditional events, such as dances with healthy food. The goal of RHBHP is to increase access to quality healthcare that is culturally appropriate to underserved rural areas. Telehealth technology such as videoconferencing is used by the program to reach isolated rural communities; however continued application and evaluation is needed to maximize benefits. More programs are also needed that address counseling needs, pre and post natal care, and health and wellness (Oliveira et al., 2006).

7.1.11 Education using culturally-appropriate ICT

The Four Directions Challenge in Technology Project initiated by the U.S. Department of Education promotes ‘cultural confidence’ among students by following a thematic instruction curriculum model that emphasizes the use of ‘culturally resonant’ topics, strategies, and examples in Aboriginal classrooms (Allen, 1999). Teaching the history, language, and stories important to the community is vital to engaging the students in learning, and, by extension, preserving the local culture and maintaining community wellness. The success of this and other related programs may greatly influence the ways in which new curricula are designed for other Aboriginal communities. In order to facilitate idea sharing and communication among these disparate communities, Miller (1999) provides a listing of websites run by Native American nations in the U.S.

A coalition of academic and tribal participants, Pathways into Health was created in 2004 to reduce the disparities in health, healthcare and healthcare education between the general public and American Indians and Alaska Natives. Pathways into Health develops culturally-reinforcing educational programs that connect professionals through telehealth (Galloway, 2007).
Many Native Americans have major health issues, and researchers suggest that education on accessing health information online could aid in disease prevention and greater awareness about various illnesses. The project “Access to Electronic Health Information for the Public” in North Dakota involved training North Dakota Native Americans how to find reliable information through the library staff, develop a website to promote reliable health resources, provide tribal college universities with a full-text health information database and purchase two dedicated computer workstations for consumer health information in five North Dakota college libraries. The project demonstrated an increase in the awareness of the project products (website, computers) by the follow-up. Researchers also received positive feedback from the librarians and partners in the project who enjoyed having the extra support, felt they leaned from the project and they were better able to teach and help users find health information on the internet (Rieke, 2005).

Carlock (2006) provides a detailed annotated list of websites that offer information on the development and delivery of culturally competent healthcare (i.e. healthcare that acknowledges the importance of balance between body, mind, and spirit) for Native Americans. The author acknowledges that material on traditional healing is most often restricted to personal websites because of its sacred nature in Native American culture, and thus reliability cannot be guaranteed.

The Native Telehealth Outreach and Technical Assistance Program (NTOTAP) has the goal of enabling Native community members to develop projects to disseminate healthcare information within their own community. The project led to the creation of multimedia tools specific to the health needs of the community, including web sites. An interactive CD-ROM and video focused on drug and alcohol use and abuse, preventative information in Hepatitis C, information on birth control method accessible within the community, diabetes information from a Native perspective, information on nutrition and physical activity and more (Dick et al., 2007).

### 7.2 Australian experiences

While the literature on telehealth for rural and remote communities in Canada and the United States dealt primarily with mental health, the literature in the Australia context was quite diverse. Australian researchers have studied a wide variety of telehealth applications, including mental health, palliative care, ophthalmology, assessments of ear, nose and throat conditions, telepharmacy, diabetes and EHR.

#### 7.2.1 General telehealth and telemedicine

In a 2001 study researchers Lessing and Blignault surveyed 25 telemedicine programs in Australia, with 23 organizations responding. Sixteen of the programs handled 526 clients, 75% (397) of whom were located in rural or remote locations and 7% were Aboriginal or Torres Strait Islanders (Indigenous people culturally akin to the coastal peoples of Papua New Guinea). The Australian population averages 2% Aboriginal or Torres Strait Islanders; however, these groups are more likely to live in rural and remote areas. Videoconferencing was used less for clinical activities and more for education (medical education) peer support, administration, professional supervision and connecting families. Seven programs directors (32%) noted they provided Indigenous health services and four employed Indigenous staff to work with Indigenous groups (18%). A further seven stated that none of these steps were taken (32%) and three stated they did not meet the needs of special
groups as part of their delivery service (14%). Additional programs did not collect statistics on Aboriginal populations. Only one program director reported employing workers based on “culturally and linguistically diverse backgrounds” (Lessing & Blignault, 2001).

In a 2004 article from Australia, nurse practitioner Ellis offers a criticism of telehealth. She believes that at best telehealth is a good back-up system for when in-person sessions are not feasible, as is the case in rural and remote areas, or to act as a way to gain access to a second opinion. However, according to Ellis, satisfaction with the patient-physician relationship using telehealth needs to be investigated in-depth. Also, Ellis states that telehealth is usually broken down into sub specialties which can make co-morbidity diagnosis difficult (Ellis, 2004).

7.2.2 Telehealth in North Queensland

In Northern Australia 20% of the Aboriginal people live in very remote areas. Access to these areas for medical or therapeutic purposes is slow and expensive, and migration of patients in these areas results in a lack of continuity of healthcare (Mahmood, 2006). Although rural and remote Aboriginal settlements have, for the most part, poor telecom services (Albolhasan & Wright, 2008), with community involvement and access, telehealth programs in Australia can address some of the barriers to healthcare.

The Networking North Queensland (NNQ) project was implemented in 1999 to improve rural and remote access to health services. NNQ was a two-year project created to ensure reliable basic videoconferencing in 21 North Queensland communities. The project involved many key factors, including user-friendly technology, portability, accessibility, timely support, resources, awareness, collaboration and local champions. Researchers found the highest use of the technology in areas with larger populations and greater medical staffing. Communities that were the furthest away from urban areas also used the videoconferencing systems more often. Important drivers included: low staff turnover, educational programs that ran on a regular basis, local community champion at the facility, and few technical issues. Videoconference was used most often for professional development and community health education (Watson et al., 2001).

Researchers observed innovative use of the videoconference units by community members. The system acts as a link between parents in remote rural communities and their children (or children’s teachers) at boarding schools. Connections were also made within Aboriginal communities, as communities in the Gulf region held meetings to discuss issues of concern with family members great distances away (Watson et al., 2001). Community ownership and responsibility was very important to the project’s success, but the researchers note that this takes time. Training and support needs to be in place at all times because of the high turnover (in particular in rural and remote areas) (Watson et al., 2001).

7.2.3 Telemental health and mental health literacy

In 2001 Lessing and Blignault outlined the results of national health telemedicine program in Australia. Mental health was the most common telehealth application, making up one-third of all telehealth applications. Telemental health is delivered in Australia through videoconference and internet-based programs.

Internet-based mental health information and treatment programs can also be utilized in rural settings. In a 2007 article authors Griffiths and Christensen conducted a systematic
review of evaluations to determine the utility of two popular web-based mental health programs in the Australian context. The two programs were MoodGYM and Bluepages Depression Information. A total of 12 papers were reviewed with sample sizes from 78 to 19,607 people. Although the interventions were not specifically developed or tailored for rural and remote populations, a large portion of users in these studies were from rural or remote areas (20.5%). Griffiths and Christensen identify a few issues with the programs; for example, MoodGYM is not suitable for everyone, as studies show issues for low-literacy users. The programs are also not tailored for rural and remote users, and the authors suggest that future projects should do this and evaluate the programs within remote and rural settings. The authors concluded that the internet-based applications were successful in decreasing depressing symptoms and stigmatizing attitudes about depression, as well as increasing depression literacy. With further investigation, researchers may find these programs particularly useful for rural consumers experiencing mental health issues (Griffiths & Christensen, 2007).

7.2.4 Forensic telemental health services

Videoconferencing is commonly used in Australia for forensic mental health services to link remote courts, prisons and clinics with specialists. Sullivan and colleagues (2008) describe the use of videoconferencing for forensic mental health. They note that Australian Aboriginal people and Torres Strait Islanders are incarcerated at rates 15 times higher than the general population. Videoconferencing can be used for court evaluations, tribunals, and even therapy, and can lower the risk of transferring patients. Although administrative, legal and ethical concerns are discussed, the authors note that to their knowledge there has been no civil litigation in Australia related to the use of videoconference for psychiatry.

7.2.5 Tele-palliative care

McGrath and colleagues (2007) report on a research project on Aboriginal palliative care. Participants included patients, Aboriginal health workers, other healthcare workers, carers and interpreters. A total of 72 interviews were conducted in four rural, remote and sparsely populated areas in northern Australia. The article focuses on the obstacles associated with palliative care in rural and remote locations, including: equipment (lack of equipment, funds, awareness regarding the types of equipment available, delays between ordering and getting equipment); transport (cost); power (no electricity, issues with solar powered sources or generators, cost); telephone access (solar power phones or sometimes no access at all); and distance issues (associated with physical geography and weather) (McGrath, Holewa & McGrath, 2007).

7.2.6 ICT for diabetic screening

Aboriginal people in Australia have a high prevalence of diabetes and diabetic retinopathy, a leading cause of visual impairment. This issue is compounded by limited access to specialists in rural and remote communities. In his dissertation, Ho reports on the pilot study of the Topcon TRC-NW5S non-Mydriatic Digital Fundus camera, a tool for detecting diabetic retinopathy for rural and remote screening. Ho found that the system was an effective means for screening and increased screening rates in remote and rural communities. He also found that the system was a cost-effective screening method, as the rate of return was greater than 60% of the initial investment, with a projected savings of more than $111,000 over seven years (Ho, 2006).
7.2.7 ICT for assessments for ear, nose and throat

In an Australian study the assessment of ear nose and throat issues through pre-recorded medical history and video was compared to in-person assessments. Overall the study indicated that pre-recorded video for early assessment of ear, nose and throat conditions can be useful, especially to detect and monitor Indigenous children at high risk for developing chronic disease and hearing loss (Smith et al., 2006).

Assessment is also carried out through still images which can be sent by email but specialists note that the moving three-dimensional visual video can provide additional benefits such as the visualization of light reflection patterns. However, the video-otoscope used to record was not as accurate as the regular in-person tool used because it was more difficult to determine color and level of transparency. To improve the accuracy of prerecorded assessments, the researchers suggest a more accurate clinical history, detailing other health conditions and previous surgeries, and access to hearing test results. The benefits of using recorded video would be best realized in communities with limited or irregular access to specialists. These video assessments would allow children with suspected conditions quicker access to specialists for assessments, which would allow for more rapid diagnosis and treatment (Smith et al., 2006).

7.2.8 Telepharmacies

Since it has a long history in Australia, telepharmacy is often mentioned in the literature on telehealth. The Royal Flying Doctor Service is a telemedicine consultation service in Australia that has been in operation since 1942. It involves a Medical Chest Program – a chest containing medications and equipment that are prescribed for emergency care and treatment of minor conditions via telehealth consultation (Margolis & Ypinazar, 2008).

While telepharmacy programs in the United States have been successfully evaluated, the results of research on telepharmacy in Australia have been mixed. Researchers Kimber & Peterson reviewed the state of telepharmacies in rural Australia. Overall researchers found positive support for the system, although many participants reacted conservatively, preferring to use existing systems. Their concerns included “the need for regulations and legislation, technology limitations and the cost of implementing and maintaining the system (Kimber & Peterson, 2006).” The researchers conclude that if telepharmacy systems are implemented they need to retain the role of the pharmacist for patient counseling and medication reviews (Kimber & Peterson, 2006).

7.2.9 Health education delivered by multi-site videoconferencing

Hoolahan and colleagues (2007) conducted a study of six interactive mental health information sessions delivered by multi-site videoconferencing. The sessions took place as part of the overall Regional Health Service Program in New South Wales. Participants in the overall program included more than 250 health workers, carers, consumers and community members in 89 rural towns in the region. The six sessions as part of the study were on the following topics: Carer Issues and Mental Health, Mental Health First Aid for Depression, Healthy Ageing, Understanding Mental Illness, Mental Health and Substance Use, and Indigenous Mental Health. The final session was created and presented by Aboriginal mental health workers and cultural specialists in conjunction with a small Aboriginal planning group.
Evaluations of the mental health information sessions were completed by 222 participants. Most participants (87%) found the mental health education topics valuable or very valuable for rural and remote communities. Participants felt that the access to information in general and local information that the videoconference sessions provided was very important (66%). Other benefits identified by the participants included the ability to network with other services and individuals (20%) and eliminating the necessity of travel (14%). The authors of the study stated that well designed, interactive educational sessions are beneficial to rural and remote towns in particular (Hoolahan et al., 2007).

Women’s Health Queensland Wide (WHQW) has been using multipoint videoconferencing to deliver health education. McClelland and colleagues (2003) analyze the education program as well as a follow-up study conducted via telephone interviews. The authors found that the project did improve social capital and that the success of the project had not only on clinical outcomes and cost-effectiveness but also social and community effects. Researchers found evidence of greater interaction and collaboration in communities, with three social capital prerequisites achieved – bonding with people, bridging networks and linking people to institutions and governments. The researchers found that the success of the project was not entirely measurable by usual telehealth standards, but that linking relationships and contributing positively towards social capital “may ultimately contribute to improvements in the quality and range of services delivered to rural and remote communities in Queensland.

7.2.10 Electronic Health Records (EHRs)

Electronic health record systems have been trialed in remote and rural areas of Australia. The Health Connect Northern Territory (HCNT) Shared Electronic Health Record Service (SEHR) trial began as a way to improve care in remote and rural areas of Australia through a secure Health Connect repository. In this system medical and hospital discharge summaries were sent over a secure network to a repository where authorized providers access the documents (with consumer consent). 1,800 consumers and 49 registered providers participated in the trial (Moo & Fletcher, 2007).

The service faced a few challenges. Some providers feared that if they did not forward information to Health Connect or obtain patient consent they would be legally exposed. At the same time some consumers complained that they did not want to be asked for their consent every time a document was sent through the system; they expected after they joined Health Connect that all information would be sent automatically over the system (Moo & Fletcher, 2007).

After the trial the system was implemented territory-wide. The article details the system capability as well as ways in which provider engagement was ensured (through protocols, hotlines to report issues, influencing change management, and so on). According to the researchers, Aboriginal people within the Northern Territory embraced Health Connect at a 90% voluntary participation rate (with 100% provider participation rate achieved). There are clear benefits for the very mobile Aboriginal population in the area for the system, which can improve healthcare coordination across vast distances in remote areas (Moo & Fletcher, 2007).

7.2.11 Culturally-appropriate information for health literacy via touch-screens

Hunter and colleagues (2007) argue that rights and social justice form the first two divides for Aboriginal peoples in Australia, but that health literacy constitutes the triple divide.
Health literacy is not easily addressed – the authors acknowledge that some populations learn not through literacy-dependant media but through watching and listening. Their research focuses on a program in North Queensland that uses touch screens to make available health information that is culturally appropriate. Project team members worked closely with community members, Elders and health workers to develop content, and community members were hired as paid actors, assistants, script writers, and other production staff. The researchers found that Aboriginal participants responded positively to the narrative multimedia sessions as well as the content that was activity-orientated or geared towards problem solving. Also, high levels of community involvement lead to greater interest in the subject matter.

Other research by this team (Doessel et al., 2007) found that touch-screen kiosks can be a solution to one aspect of the digital divide – limited access to relevant hardware and software – and to provide education materials on maternal and child health, cancer and Alzheimer’s disease. The project incorporates games and quizzes in order to present interactive information on diabetes, musculoskeletal conditions, and alcohol use.

### 7.2.12 Mobile phones for community connection

Through an ethnographic study of mobile phone use in Cape York, Australia, a remote and rural Aboriginal community, Dyson and Brady found a higher rate of adoption than any other ICT. While the community has computer facilities at the library, a community office and a touch screen kiosk in the clinic waiting room, the community only has one public telephone which is generally out of order. The use of home phones and home computers with internet access is also very low because of the costs associated with the infrastructure. However, many community members owned mobile phones (58% of those interviewed). Mobile phones were used for communication, listening to music and playing games. There were a few innovated uses of the mobile phones that participants mentioned, including using the video function for capturing traditional Aboriginal cultural practices. While community members made use of mobile technology and applications, the service organizations in the community did not (Dyson & Brady, 2009).

In order to meet the needs of the community, Dyson and Brady concluded that mobile coverage needs to be extended to reach remote areas with limited service and cheaper mobile phones need to be sold, with prepaid cards in lower denominations. Also ICT training needs to be expanded beyond desktop computers and the internet to mobile phones, especially for older Aboriginal people. Finally applications and content needs to be developed for work programs, health, cultural revitalization, education, and so on. Content could be developed by providers or by the community – however, this content would have to be provided for free of charge for maximum effectiveness (Dyson & Brady, 2009).

### 7.2.13 Traditional knowledge sharing via a 3D game environment

The Australian CRC for Interactive Design (ACID) funded a project investigating the use of 3D game engine as a place of narrative construction for traditional knowledge practice and dissemination for Australian Aboriginal peoples. Researchers (Pumpa & Wyeld, 2006; Pumpa, Wyeld & Adkins, 2006; Wyeld, 2007; Wyeld & Pumpa, 2007) found that the game system offers a means to empower Aboriginal socio-cultural practice by enabling a means of experiencing notions of Aboriginality. The researchers worked with local Aboriginal activists, artists and Traditional Owners in rural areas of Australia to develop the 3D game engine as a ‘landscape metaphor’ that allows for preformative special narratives. The
system is a capturing and archiving tool as well as a culturally-appropriate environment that acts as a way to collaborate, share and develop community content.

Acknowledging that ways of representing cultural knowledge differ according to cultural group and region, the researchers identified that Aboriginal people capture traditional knowledge through song, dance and sand paintings. At the same time, these three-dimensional representational forms have become two dimensional, photographed, for example, to be sold to collectors, depicted on the internet, and so on. The authors call for the use of a 3D game engine as a way for Aboriginal people to preserve and share cultural knowledge within the medium of storytelling in a virtual environment that represents sacred and spiritual lands.

7.3 Experiences from other countries

Our literature review uncovered a few articles on the uses of ICT for healthcare in rural and remote areas of the UK, Finland, the Pacific Islands, India and the Middle East. Telehealth applications mentioned in the literature include mental healthcare, rheumatic heart disease referrals, treatment for eating disorders, assessment and treatment in general using videoconferencing, the use of videoconferencing for consultations between patients with epilepsy and specialists and cell phone technology for general telehealth assessments and referrals.

7.3.1 Telemental health in rural Finland and Israel

As identified in the literature on telehealth in Canada, the United States and Australia, assessing and treating mental health is currently one of the biggest challenges for healthcare in rural and remote communities. Ohinmaa and colleagues discuss the use of telemental health services in Finland. They note that rural health sites use telemental health more than 20% of the time, and that utilization rates are even higher in Canada, where in 2003 there were 14.7 videoconferencing consultations per 100,000 compared to 4 per 100,000 in Finland in 2005. In the province of Alberta rates are 10 times higher than Finland, and twice as high as the Canadian average in 2003 (Ohinmaa et al., 2008).

Modal and colleagues investigate the use of videoconference for mental healthcare compared to in person treatment in Or Akiva and Hadera, Israel. Thirty-nine patients completed the study, and there were 42 in the comparison group (who received treatment in person). Over the year both patients and physicians meeting over videoconference were satisfied with the method; however the researchers found that the videoconferencing method was more expensive that the in-person treatment, with a trend towards increased hospitalization, because the distance between the rural communities and the main clinic was between 15 and 20 km. Adherence ratios were twice as high in the videoconference group than the comparison group, which may be the case because those who wanted to participate via videoconference were more likely to comply than those who continued with in-person treatment. “Presence” was experienced by both patients and therapists over the videoconferencing system. Overall two main behaviours were reported with videoconference treatment: patients paid more careful attention to the way they looked and patients and physicians did not interrupt each other. As a result, videoconferencing sessions were more organized (Modal et al., 2006).
7.3.2 Telecare for heart disease in the Pacific Islands

In developing countries rates of rheumatic heart disease (RHD) are very high. Poverty, access to care, isolation and lack of resources are contributing factors to RHD in the Pacific Basin. As a result programs have been developed to provide medical services to the Indigenous peoples of the pacific Islands: the Pacific Island Healthcare Project (PIHCP) at Tripler Army Medical Center) is one such program. In 1998 they developed a store-and-forward telemedicine network that is web-based and secure. Prior to the telemedicine platform, patients arrived seriously ill or died on the way to hospital. Frequently patients had additional medical conditions and their medical histories were not available. Referrals by long distance phone calls were difficult to understand. In the remote communities only basic healthcare services were available, patients had to be flown out for extensive treatment, and the annual cost of care for 400 Pacific Islanders in the 1990s was $8-10 million per year. The telemedicine platform allows for easier consultations and referrals, and allows for the attachment of images (chest x-rays, ECGs) and echocardiographic video clips. The system also allows for easier care at home and careful screening before referrals (Abbas & Person, 2009).

7.3.3 Telehealth in rural Scotland and Ireland

Simpson and colleagues (2006) discuss the assessment and treatment of Bulimia Nervosa through the delivery of Cognitive Behavior Therapy (CBT) via videoconferencing. Treatment was given to clients living in remote and rural areas via weekly videoconferencing between rural hospitals in north-east Scotland and the Aberdeen Eating Disorders Service. Both initial assessments and treatments were conducted over videoconference. While it was not feasible to conduct a comparative in-person control group in this study, Simpson and colleagues’ findings suggest that videoconferencing may be beneficial to rural and remote bulimic clients (Simpson et al., 2006).

In Northern Ireland and Scotland epilepsy patients can attend specialist consultations via videoconference. This service is of particular importance to many epilepsy patients because they may not be able to drive. Such consultations have been going in Northern Ireland and Scotland since 2001, and patient satisfaction rose from 90% to 100% by 2003. The system is also used for teaching family physicians and nurses in rural areas about epilepsy. In the future the service will be extended to other areas in Northern Ireland and Scotland (Laird, 2009).

7.3.4 Health consultations by mobile phones in India

Health consultations can be made using more readily-available ICT such as cell phones. Researchers Bali and Singh describe a 2006 study of mobile phone health consultations in a rural area of northern India. The majority of calls were made by men, mostly for the following issues: skin and hair problems, respiratory problems, and mental health issues. Callers were either advised to manage the issue at home, or referred to specialists, their regular physicians or the emergency room depending on the severity of the health issue. The researchers found that using mobile phones for consultations was of benefit to the community, improving timely access to medical care while allowing for the treatment of minor issues before they become major problems (Bali & Singh, 2007).
8: Making the Networks and ICT Sustainable in First Nations

Previous chapters of this report have reviewed how remote and rural First Nations and their partners and collaborators are using broadband networks and ICT to support health and wellness in their communities. More generally, using broadband networks and ICT can lead to positive economic, social, institutional and community impacts for First Nations communities (Marlin & Bruce, 2005; Smith, 2008). For lasting impacts, it is imperative to consider the sustainability of the technology; as Gordon (2006) notes, simply providing the hardware and facilities for use by community members will do little to aid communication and technological competency without ensuring that other supports are in place.

Broadband networks and ICT need to be sustainable in remote and rural First Nations so that they can be used often and consistently to support health and wellness outcomes. This final chapter of the report offers some guidance from the literature about how to make this happen.

The key issues identified in this chapter are: building community control and capacity, committing to ongoing funding and partnerships, building digital networks, making ICT part of everyday life, and developing new knowledge by conducting research.

8.1 Building community control and capacity

The need for First Nations ICT systems and processes to be rooted in communities was identified by many of the independent research studies discussed in earlier chapters.

Several key consultations on telehealth and ICT in First Nations have come to similar conclusions about what is needed to make ICT-enabled processes sustainable. The AFN First Nations Telehealth Consultations identified “community control” as the first success factor (Gideon et al., 2009). Telehealth systems must be driven by First Nations and rooted in a community need for services before they are developed. First Nations community members need to identify priority health care needs, through community needs assessments, prior to implementing new telehealth processes (Gideon et al., 2009).

Similarly, the final report of the Aboriginal Canada Portal Working Group (2004), with participants from government, national Aboriginal organizations and the World Summit on the Information Society (WSIS), identified and reported on the main challenges for ICT use in Aboriginal communities. The key findings of the group were that community involvement, champions and input are necessary at every stage of ICT development and implementation, and that while the government may be the enabler, the model for sustainability has to come from communities.

An important series of forums dedicated to the Aboriginal digital divide stressed the need for significant community engagement and leadership in efforts to build, operate and maintain a national broadband network (Aboriginal Connectivity Portal, 2006). Along the same lines, the Aboriginal Voice project consultations also identified the need for community input and control to set appropriate priorities and apply the technology in a meaningful and useful way in communities (Jock et al., 2004).

More recently, the Assembly of First Nations (Whiteduck, J., 2010) outlined the requirements for “the e-Community ICT model.” The model is similar to the network development and IT maintenance model employed by institutions and corporations across Canada. Every First Nation community requires a broadband (fibre) connection and a local
technical team to provide ongoing support for the telecommunications infrastructure. In this model, the community broadband fibre connection will support a wide range of community applications, including: online meetings, videoconferencing, high-speed internet, voice-over internet (VOIP), e-justice, mobile services, e-learning, e-administration, webcasting, telehealth, telemedicine, and e-commerce.

The e-Community ICT model also includes building community capacity to use ICT as an integral part of the model (Whiteduck, J., 2010). Similarly, the AFN First Nations Telehealth Consultations identified the need for capacity building and dedicated human resources within communities to make telehealth work for First Nations communities (Gideon et al., 2009).

Research has consistently shown that broadband and ICT projects face similar challenges that impede uptake and limit use at the community level. Many programs underemphasize the importance of access, and do not provide adequate resources for training, skills development and capacity-building within communities. Many of the studies discussed in earlier chapters of this report that have identified the need for community capacity-building in ICT include: Gibson et al., 2009; O'Donnell et al., 2009; Peddle, 2007; Simms et al., 2008; Smith, 2008. For example, in his report on broadband in First Nations in BC, Smith (2008) points out that in urban centres, broadband systems are largely handled by the marketplace and maintained by skilled technicians. These factors are not present in most rural and remote First Nations communities and user fees are rarely adequate to cover system maintenance, support and upgrades. Policy initiatives relating to technical training (both for equipment and software) and funding for operational improvements will need to be ongoing and may need to grow over time.

Related specifically to telehealth, Rowlandson, Williams and Williams (2008) have pointed to the limited pool of available and qualified individuals for local telehealth site coordination, which speaks to a need for developing specialized curricula and dedicated common services for the site coordinator position. Training needs to address the specific challenges of retaining dedicated training resources on staff, establishing and embedding performance standards as part of the job and working directly with community health staff to understand the changing job function requirements (Rowlandson, Williams and Williams, 2008).

8.2 Committing to ongoing funding and partnerships

The need for ongoing and sustainable partnerships between governments, First Nations and health service providers was also identified by many of the independent research studies discussed in earlier chapters.

In a 2004 report on telehealth activities in First Nations and Inuit Communities, Health Canada (2004a) identified the need for long term funding and sustainability to make telehealth work in First Nations communities. The Aboriginal Canada Portal Working Group (2004) also identified the need for horizontal partnerships for sustainability and “a close and equal partnership between funders and the communities.” Similarly, the successful Keewaytinook Okimakanak Telemedicine has stated that in order to successfully deliver telehealth and telemedicine all levels of government need to be involved as well as the First Nations communities (KOTM, 2008).

The AFN First Nations Telehealth Consultations identified critical success factors as ongoing partnerships, including partnerships with provincial service providers and stakeholders, and
ongoing funding for networks, staffing, training and technical support (Gideon et al., 2009).

The key word is “ongoing,” funding. In contrast, project-based funding formulas favour short term benefit over long-term sustainability, and the resulting instability creates significant complications for the organizations receiving the funding and their staff (Gibson, O’Donnell & Rideout, 2007).

8.3 Accepting the realities of geography: developing broadband infrastructure

As discussed in Chapter 3 of this report, across Canada, telecommunications firms are slow, and in many cases unwilling, to extend broadband networks to remote and rural communities without significant government investment. This situation reflects the geography of the country and will not change in the future. Extending broadband services is cheaper in urban communities and more expensive in rural and remote communities because the costs include the lower volume of services and the high cost of construction and maintenance in rural and remote areas.

Also as discussed in Chapter 3, the most recent research on First Nations community connectivity suggests that significant new investments will be needed to increase broadband capacity in remote and rural First Nations. The data suggest that currently, about half of First Nations communities have no residential broadband or high speed access, about 40% of First Nations have residential broadband access, and about 10% have residential high speed access (Fiser, 2010, forthcoming). Communities need equitable access to broadband technology and more precisely, a comprehensive solution that is cost-effective, sustainable and viable to meet future and evolving technologies (FNEC, 2009).

Videoconferencing was identified in many of the studies as the core telehealth technology, and First Nations are also using videoconferencing to support many other wellness activities. Ensuring secure and reliable videoconferencing requires significant bandwidth (Molyneaux et al., 2007). As discussed in Chapter 3, organizations that coordinate and manage the community connectivity for remote and rural First Nations have documented a need for a 10Mbps fibre connection to the communities. In most cases, this will provide enough bandwidth for shared access to videoconferencing, data transfer, and basic internet use.

To be sustainable, building, upgrading and maintaining broadband infrastructure in remote and rural areas will need significant ongoing investment by governments. SuperNet in Alberta for example was subsidized by the provincial government so it could cover 95% of communities across Alberta for a fixed rate irrespective of location in order to further develop the province socially, culturally and economically (Mitchell, 2007).

The geography of remote Canadian communities implies transportation access problems, long cable builds, and harsh climate. Building sustainable broadband infrastructure capable of telehealth delivery in remote and rural First Nations is and will continue to be costly. Travel and shipping telehealth equipment to some rural and remote areas can account for up to 40% of the project budget (Muttitt, Vigneault & Loewen, 2004). Rolling it out could also generate new and interesting possibilities for innovation and technical development. New engineering and technical solutions are needed to reduce these and related infrastructure costs.
8.4 Making ICT part of everyday life

The history of the diffusion and acceptance of information and communication technologies clearly shows that ICT become sustainable when they become part of everyday life. The challenge is that some of the ICT used for health and wellness in remote and rural First Nations – in particular the core technology, videoconferencing - are not part of everyday life. Videoconferencing is not used every day by most people in First Nations communities or by the many people working in organizations and institutions at the federal, provincial and regional level who communicate with remote and rural First Nations on a daily basis.

Researchers have argued that if the everyday barriers to using videoconferencing and other ICT can be overcome and ICT become a part of daily life, then the technologies will be used not only for everyday community reasons but more often and more widely for institutional applications. Therefore, increasing everyday use of ICT in remote and rural First Nations will have a positive impact on the take-up of telehealth as more people become comfortable with this alternative option to expensive and time-consuming travel (O’Donnell, Walmark and Hancock, 2010).

The double challenge is: how can videoconferencing and other ICT used for health and wellness become more a part of everyday life in remote and rural First Nations communities across Canada, as well as for the people living in urban centres who work with them? Making this happen will require changes and developments on many levels.

Governments and organizations in urban locations that work with remote and rural First Nations have a major part to play in making ICT more consistently used in these communities. O’Donnell, Walmark and Hancock (2010) have argued that all government departments and agencies working with remote and rural First Nations need to review their own departmental videoconferencing capacity. The goal should be that all public servants who communicate now by telephone, or travel to, remote and rural First Nations should in future be able to communicate by using videoconferencing. The only way to become comfortable with videoconferencing is to use it often, so as people begin to use videoconferencing and other ICT for communicating with remote and rural First Nations, the use of the technologies will increase for health and wellness purposes.

8.5 Developing new knowledge: conducting independent research

This literature review has highlighted many things we do not know about ICT, health and wellness and First Nations. The only way we will develop new knowledge and understanding is by conducting independent research on a broad diversity of topics related to health and wellness in remote and rural First Nations.

There are numerous topics on which research is either very limited or non-existent. In particular, there is no current research available on how First Nations community members are using broadband networks and ICT for a range of purposes – including health and wellness activities and many other activities – and what their views are on using ICT for health and wellness activities. Creating this knowledge would greatly improve the evidence needed to develop policy and programs for ICT, health and wellness that meet community needs.

Related specifically to telehealth research, Maar et al., (2009) developed an Aboriginal e-health research agenda to address the substantial knowledge gaps impeding e-health deployment and adoption particularly in rural and remote Aboriginal communities in
Canada. The analysis resulted in six research priority areas: ethical principles for Aboriginal e-health research, internet-based national information for Aboriginal e-health initiatives, e-health education and professional development, sustainability, best practices, and broader applications and impact of e-health on Aboriginal culture and communities (Maar et al., 2009).

Researchers working with First Nations should be aware of at least two key documents that discuss the ethics of doing research with Aboriginal communities. The first is the Canadian government’s Tri-Council Guidelines on Ethical Conduct for Research Involving Humans. These ethical guidelines are mandatory for all researchers affiliated with universities in Canada, the National Research Council, and several other institutions. Other researchers not affiliated with these institutions should consider these guidelines as best practice. The Tri-Council Guidelines protect the rights of participants and attempt to minimize risks to their well-being. The new chapter on research with Aboriginal people in Canada will be included in the revised guidelines released in 2010 (Tri-Council, 2009).

Secondly, researchers need to be aware of the National Aboriginal Health Organization (NAHO) approach to Ownership, Control, Access, and Possession (OCAP), which constitute the four major principles that enable self-determination when conducting research with First Nations (Schnarch, 2004). The OCAP principles ensure that First Nations involved in research have control over the ways in which research is conducted, have access to and possession of the data, own the resulting information, and have the right to distribute results.

Researchers working in the field of ICT have developed further guidelines for IT-specific research with First Nations. In 2005, a group of Canadian researchers founded a network committed to Research on ICT with Aboriginal Communities (RICTA), which focuses on providing community members with information and opportunities to contribute their perspectives on the use of ICT for public services (Kenny, Walmark & O’Donnell, 2005; Walmark, 2009; Walmark, O’Donnell & Beaton, 2005). Researchers in this field are also exploring alternate methods of research that are more participatory and support diverse and collaborative ways of collecting and interpreting data (Gratton and O’Donnell, 2010, forthcoming; Tomkinson, 2009).

In addition, evaluators of ICT projects in remote and rural First Nations communities may want to consider alternative evaluation approaches (Ramirez, 2001, 2007, 2010; Ramirez and Richardson, 2005). In conventional project evaluation, the instrumental side of technology is emphasized and evaluators seek to demonstrate a direct link between investments and results. Ramirez (2007) argues that the contribution of ICT to rural economic, social and cultural wellbeing is increasingly difficult to demonstrate beyond short-term measurable indicators. His alternative approach uses socio-technical systems, stakeholder engagement, an acknowledgement of the multiple dimensions at play, and the growing evidence of unpredictability of ICT. In a later contribution, Ramirez (2010) argues that effective evaluations for community-based technology projects can focus on “moments of truth” as a dimension of program effectiveness. The settings for his study include remote First Nations communities in northwestern Ontario. As an example, the Community Technology Coordinators (CTCs) are centrally important to health service delivery in remote communities; understanding the moments of truths experienced by the CTCs is crucial because they represent the human face of technology-mediated health services in remote communities - they are the ones that encourage users to try the new systems and they understand community needs (Ramirez, 2010).
9: Sample Posters for Community Wellness Activities Using Video

9.1 Keewaytinook Okimakanak: Elders Visitation by Videoconference

![Image of a poster for an event on Health, Culture & Language Series]
9: Sample Posters for Community Wellness Activities using Video

9.2 Keewaytinook Okimakanak: Youth Music Festival by Videoconference

In the Spotlight...

YOUTH MUSIC FESTIVAL

ALL ROCK BANDS & YOUNG MUSICIANS OF ALL STYLES ARE INVITED TO SHOWCASE THEIR TALENTS THROUGH KOTM VIDEOCONFERENCING WEDNESDAY, JUNE 2/10 1-4pm (CST)

If you are interested in performing contact Kevin Mason at kevinrmason@knet.ca or Vivian Spinelli at vivianspinelli@knet.ca

To register your school or site, contact your local Community Telemedicine Coordinator or Wesley at (807) 735-1381 Ext. 1263 or wesleymckay@knet.ca
9: Sample Posters for Community Wellness Activities using Video

9.3 Keewaytinook Okimakanak: Alzheimer Society Info Session by Videoconference
10: Annotated Bibliography

Abbas, M. I., & Person, D. A. (2008) The Pacific Island Healthcare Project (PIHCP): experience with rheumatic heart disease (RHD) from 1998 to 2006. *Hawaii Medical Journal, 67* (12), 326-329. In developing countries, rates of rheumatic heart disease (RHD) are very high. Poverty, access to care, isolation and lack of resources are contributing factors to RHD in the Pacific Basin. As a result there are programs to provide medical services to Indigenous peoples in the pacific Islands: the Pacific Island Healthcare Project (PIHCP) at Tripler Army Medical Center) is one such program. In 1998 they developed a store-and-forward telemedicine network that is web-based and secure. This paper evaluated RDH cases from 1998-2006.

Aboriginal Canada Portal Working Group (2004) Final Report: Third Annual National Connecting Indigenous Peoples in Canada Forum. Ottawa, March 24-26. This final report was generated by a working group of various government departments, national Aboriginal organizations and the World Summit on the Information Society (WSIS) to identify and report on the main challenges and obstacles of the digital divide for Aboriginal communities. The goal was to produce a blueprint that would coordinate and guide the efforts and programs of governments, the private sector, national and regional Indigenous groups as well as community planners. The working group identified the key challenges in four areas: community awareness and ICT planning capacity, telecom infrastructure and public access, network sustainability, and finally ICT skills and e-skills development. The key findings of the group were that community involvement, champions and input are necessary at every stage of ICT development, implementation and sustainability; there is a need for better coordination across governments and horizontal partnerships for infrastructure, sustainability; and while the government may be the enabler, the model for sustainability has to come from communities.

Aboriginal Connectivity Portal (2006) Sustainable “Draft” Overview of National Aboriginal Connectivity and E-Services Partnership Framework Forum Discussion Paper. Presented at the National Aboriginal Connectivity and E-Services Forum. Four forums were held over a span of five years to understand the digital divide challenges for connecting Aboriginal communities. This report investigates the impediments to connectivity, as well as social, economic and program and community development issues discussed in the forums. The report recommends that a group effort be engaged to build, operate, maintain national broadband network because the effort needs significant community engagement and leadership; and that videoconferencing, video over IP, single window service delivery and online training are critical for community social and economic development.

Adams, E (2009) Improving Aboriginal Peoples’ Health in British Columbia. Keynote Mo Watanabe Lecture at the Canadian Society for Telehealth, Vancouver, October 4-6. Adams outlines the social determinants of Aboriginal health and discusses the tripartite First Nation health plan in British Columbia. Presenting some findings from the report Pathways to Health and Healing, Adams notes that while some indicators of health are improving others are worsening under the tripartite system because more and more people are seeking health services. Finally Adams outlines what needs to be done to see even greater improvement in health in First Nations communities.

Alberta Sweetgrass (2006) Online Health Tool for Aboriginal Peoples Expanded. *Alberta Sweetgrass*, 13(2): 9. This newspaper articles announces the plan of Saint Elizabeth Healthcare, a not-for-profit Canadian organization, to support a national web-based program for First Nations and Inuit communities. The program @ YourSide Colleague enables all-hours access to networks of healthcare experts and peers as well as education tools for palliative, wound and diabetes care. These efforts for a national roll-out are supported by 50 First Nations communities already using the program.

for First Nations communities. The Connecting Aboriginal Canadians policy initiative to support development objectives with ICT started with the 2001 Aboriginal Canada Portal, with key national Aboriginal organizations. The government combined the Gathering Strength and the Connecting Canadians programs to that end. There was hope that by including First Nations in the knowledge-based economy and society, long-standing and entrenched issues that have disadvantaged First Nations people could be overcome. The article outlines the potential benefits of e-Government and ICT, including horizontal collaboration within and between governments and First Nations stakeholders and supporting efforts of Aboriginal people to self-present and preserve diverse cultures.

Allec, R. (2005) First Nations Health and Wellness in Manitoba: Overview of Gaps in Service and Issues Associated with Jurisdictions: Inter-Governmental Committee on First Nations Health. This large report is the result of a literature review as well as interviews with federal, provincial and First Nations officials to identify gaps and disparities as well as new trends in First Nations health and wellness. A contextual overview is presented of Manitoba’s First Nations peoples, containing health concerns as well as non-medical determinants of health like demographic information on education, income, as well as information on housing conditions, mould, water quality, etc.

Allen, N. (1999) Native American Schools move into the new millennium. Educational Leadership, 56 (7): 71-74. Allen describes the Four Directions Challenge in Technology Project, an initiative of the US Dept of Education to support projects using technological tools in education, and to learn from those projects how technology fits into educational reform for “culturally resonant” curriculum. This collaborative initiative between schools, universities, and public and private organizations was administered by the Laguna Department of Education in New Mexico. The program used thematic instruction as the curriculum model because it works well for non-mainstream culture and fits well with the traditional holistic learning model of Native Americans. There were three levels of concern in the curriculum design: to avoid content and strategies that conflict with community values; to use strategies, examples and analogies that are culturally resonant; and to teach history, language, stories and values of the culture to shore up student’s cultural confidence. Students and staff use QuickTime software to make virtual reality movies of objects and events; digitize records; and use video in oral history projects, language instruction and preservation.

Assembly of First Nations (2009) RHS: The Next Generation of Community-Based Research. First Nations Information Governance Committee. March. The Regional Health Survey (RHS), which began in 1995, is a First Nations’ survey of the health of First Nations communities. This purpose of this report is to describe the RHS as a new generation of community-based research that begins and continues with relevance to communities. The report contains the RHS cultural framework, with the center being action, vision, relationships and reason. The RHS data collection, interpretation and dissemination are described, along with other key aspects of the RHS.

Assembly of First Nations (2007) Our Voice, Our Survey, Our Reality: Selected Results From RHS Phase 1 (2002/03). January. This report provides a snapshot of the health and living conditions in First Nations communities for a range of topics including marital status and family structure, language and tradition, housing, chronic disease, sexual health, gender differences, and many others. The data were obtained from surveys conducted in 2002-03 (Phase 1). Phase 2 is currently in progress, and the field collection will occur every four years. The RHS is the first national survey to comply with the principals of OCAP (Ownership, Control, Access and Possession) or self-determination applied to research.

Assembly of First Nations (1994) Breaking the Silence: An Interpretive Study of Residential School Impact and Healing as Illustrated by the Stories of First Nations Individuals. Ottawa: AFN. This report examines the impact of the residential schools and explores various paths towards healing. In the study the lived history of 13 First Nation individuals who attended residential schools is explored as well as the stories of others, as told in more informal conversation. Previously published literature is also cited to contextualize these personal histories.
This report is an evaluation of the online patient-education project (PEPTalk) that began in 2006. Three models of website health information were introduced at the partner websites. PEPTalk houses multimedia health information for patients and has the potential to re-define the health education process. Clinicians access the PEPTalk site from a computer in their office, create a patient account, select the appropriate materials and an email message is sent to the patient advising that and education plan is waiting for them at the PEPTalk website. Of the 87 patients who were referred by physicians to PEPTalk, just 29 (33%) logged onto the website. Researchers from Centennial College and George Brown College in Toronto partnered with Keewaytinook Okimakanak Research Institute (KORI) in Thunder Bay, St. Christopher House in Toronto, and a family health team from the Centre for Effective Practice, Toronto.

Bahrychuk, J. (2009) Transitions: Building Support for Isolated Aboriginals with Vision Loss Through the Use of Technology. Canadian Society of Telehealth, Vancouver, October 3-6. Canadian National Institute for the Blind partnered with MBTelehealth to provide a course supporting adjusting to vision loss. Facilitated discussions with others experiencing similar losses were provided using videoconferencing to isolated communities. This was the first time the CNIB had offered this type of course via videoconferencing.

Bali, S., & Singh, A. J. (2007) Mobile phone consultation for community healthcare in rural north India. Journal of Telemedicine and Telecare, 13(8): 421-424. Researchers describe a study of mobile phone health consultations in a rural area of northern India. The majority of calls were made by men, mostly for skin and hair problems, respiratory problems and mental health issues. Callers were either advised to manage the issue at home, or referred to specialists, their regular physicians or the emergency room depending on the severity of the health issue. The researchers found that using mobile phones for consultations was of benefit to the community, improving timely access to medical care while allowing for the treatment of minor issues before they become major problems.

Baltruschat, D. (2004) Television and Canada’s Aboriginal Communities: Seeking Opportunities Through Traditional Storytelling and Digital Technologies. Canadian Journal of Communication, 29 (1). This paper traces the origins of the Aboriginal Peoples Television Network (APTN) and highlights current trends in Indigenous film and television production. Indigenous film and television narratives are rooted in storytelling traditions and oral culture. They describe histories and communities, and highlight critical issues from land claims to language preservation. In spite of their local focus, film and television programs are also closely linked to global production modes through co-productions and international distribution. This results in a dichotomous dynamic: While First Nation producers are dedicated to preserving Aboriginal cultures, they also partake in the development of global cultural production.

Bartlett, J. G. (2005) Health and well-being for Métis women in Manitoba. Canadian Journal of Public Health, 96, S22-27. Data were collected using a “talking circle” methodology for this study. Métis women were asked about their own conceptions of well-being and health. They felt health was related to physical issues (health eating, exercise), while well-being referred to a broader number of issues, was “holistic and inclusive of the dimensions of spiritual, emotional, physical and mental/intellectual aspects of living.”

Bell, M., Rossiter, J., Axtell, T. (2009) Skills Online: Public Health Professional Development for the North. Public Health Agency of Canada (PHAC). Presentation at the National Aboriginal Health Organization (NAHO) National Conference, Ottawa, November. This presentation starts by identifying the need to strengthen the public health workforce. PHAC has flagship education programs including core competencies for public health in Canada and Skills Online. Skills Online is an internet-based continuing professional development program for public health workers. It offers facilitated modules in both English and French and is offered at no cost to public health professionals since 2002. More than 3,500 individuals have completed one or more modules. PHAC held a recent workshop in Yellowknife to identify the skills development needs of public health professionals in the north. In 2008, PHAC launched a pilot program on health data analysis for public health workers in the north. The pilot evaluation pointed to the need to strengthen online learning materials with more northern and Aboriginal content and facilitators from the north, and to find ways to reduce the geographical isolation experienced by northern public health workers.

Betancourt, J.R., Green, A.R., Carrillo, J.E., & Park, E.R. (2005) Cultural Competence and Healthcare Disparities: Key Perspectives and Trends. Health Affairs, 24 (2): 499-505. Following their 2003 report on cultural competence in healthcare, the authors conducted interviews with healthcare professionals in management, academic, and government positions to shed light on general attitudes toward cultural competency efforts among professionals. The results show unanimous support for the advancement of culturally competent healthcare initiatives. Interviewees from all backgrounds acknowledged and supported the potential for cultural competence to alleviate racial and ethnic disparities and thereby improve quality of care for marginalized minority groups, evidencing the promising progression of this research from a marginal to a mainstream issue.

Betancourt, J.R., Green, A.R., Carrillo, J.E., & Ananeh-Firempong, O. (2003) Defining Cultural Competence: A Practical Framework for Addressing Racial/Ethnic Disparities in Health and Healthcare. Public Health Reports, 118: 293-302. Studies have shown that social determinants for racial or ethnic minorities in America lead to poorer overall health, signalling the necessity for changes to healthcare policies and practices that will recognize and meet the unique needs of culturally diverse patients. This seminal article provides a comprehensive overview of cultural competence in healthcare, defining a culturally competent healthcare system as one that acknowledges and incorporates the importance of cultural differences and strives to adapt its services at all levels to address culturally unique needs. The authors identify sociocultural barriers to healthcare at three levels: organizational (leadership and workforce), structural (processes of care), and clinical (provider-patient encounters), and make practical and detailed suggestions for surmounting these barriers.

Boles, M., Rohde, K., He, H., Maher, J. E., Stark, M. J., Fenaughty, A., et al. (2009) Effectiveness of a tobacco quitline in an Indigenous population: a comparison between Alaska Native people and other first-time quitline callers who set a quit date. International Journal of Circumpolar Health, 68 (2): 170-181. Tobacco use is more prevalent among Native American and Canadian Aboriginal people than among non-Native people. A Quitline (QL) is a public telephone service designed to aid and counsel tobacco users in their efforts to overcome their addiction. This article investigates the effectiveness of QLs among Indigenous American populations. The researchers conclude that while QLs appear to be a generally effective service for Indigenous people, several key modifications on the part of the counsellors, such as avoiding direct advice and fast-paced delivery of information, could make the service even more successful.

Bombay, A., Matheson, K., Anisman, H. (2009) Intergenerational Trauma: Convergence of Multiple Processes Among First Nations Peoples in Canada. Journal of Aboriginal Health 5 (3): 6-47. Bombay and colleagues describe intergenerational trauma and collective trauma that occurs in First Nation families and communities. First Nations people suffer from high rates of depression, substance abuse, posttraumatic stress disorder and illness comorbidity as a result of stress factors, lack of coping strategies, and lack of social support. Bombay and colleagues discuss both historical and contemporary trauma and stressors, intergenerational transmission of trauma, parental mental health and childhood experiences. Despite increasing awareness and study of intergenerational trauma, there is still a lack of documented statistics related to trauma disorders in First Nations
communities. More research needs to be done examining collective trauma and how that differs from interpersonal trauma, and trauma screening needs to be implemented to identify individuals and communities at risk and to develop strategies to address intergenerational trauma. This research is needed to guide future clinical work – on both intervention and therapeutic levels.

Bonny, E., Berkes, F. (2008) Communicating traditional environmental knowledge: addressing the diversity of knowledge, audiences and media types. *Polar Record, 44* (230): 243-253. Although there are a number of distinct audiences (for example students, hunter and trapper organisations, and co-management agencies) for traditional environmental knowledge, little work has been done in analysing how Indigenous knowledge can be best communicated to these different groups. Using examples mainly from northern Canada and Alaska, the authors explore the challenge of collecting and communicating different kinds of traditional environmental knowledge; the media types or communication modes that can be used; and the appropriateness of these kinds of media for communicating with different audiences. A range of communication options is available, including direct interaction with knowledge holders, use of print media, maps, DVD/video, audio, CD ROM, and websites. These options permit a mix-and-match to find the best fit between kinds of knowledge, the intended audience, and the media type used. The authors examine how technology can serve community and other needs. No single option emerges as a clear best choice for communicating Indigenous knowledge. Nevertheless, various media types offer avenues through which northern people can meet their educational, cultural, and political needs, and build cross-cultural understanding.

Brascoupe, S., Waters, C. (2009) Cultural Safety: Exploring the Applicability of the Concept of Cultural Safety to Aboriginal Health and Community Wellness. *Journal of Aboriginal Health* 5(2): 6-41. In order to understand First Nations communities at risk, this paper examines the literature on cultural safety, including broader determinants of health within a holistic and community-based context. Cultural safety expresses an approach recognizing that contemporary conditions result from the historical roots of colonization and cultural and social assimilation, and can be applied to all areas of social policy, not just in the health field.

Brasfield, C. (2009) Polar Bears and Firewood. In Canadian Institute for Health Information, ed. *Mentally Healthy Communities: Aboriginal Perspectives*. Ottawa: CIHI: 21-24. In writing about mentally healthy communities, Brasfield, a psychiatrist and psychologist, focuses on key positive concepts including communication, a culturally shared language, ties to the land and mentally healthy government. Brasfield notes that physical and mental health are not completely separate ideas in many First Nations communities. Poor mental health is seen as a state similar to the physical body influenced by poor diet, injury or disease.

Brasfield, C. (2007) Indian Residential Schools: The Aftermath. *Visions Journal* 3(3): 9-10. Brasfield, a medical doctor interested in Aboriginal mental health, noticed a pattern in the residential school experience. The separation from siblings and denial of native language constituted psychological abuse. Many residential school survivors also reported multiple cases of sexual abuse either by staff or older students and physical abuse under the guise of discipline, which lead to significant scarring and damage to the eyes and teeth. The residential schools did not train children in employable or parenting skills but instead contributed to disturbed psychological functioning and problems with parenting their own children, often leading to the continuation of physical and sexual violence. This intergenerational trauma is only now being realized, and these experiences need to be recognized to aid in the healing process.

Brasfield, C., Clement, C. (2007) Beyond the Pilot Studies: Cognitive Behavioral Therapy in a Remote Aboriginal Community. Canadian Society of Telehealth. St. John’s NL, November 4-6. Brasfield and Clement outline the provision of outreach psychiatry over telehealth in the Heiltsuk community of Bella Bella in this conference paper. The authors note that rural and remote reserve communities are different than Canadian cities, as the death rate, suicide rate and morbidity rates are much higher. According to the authors 90% of women and 40% of men in these remote and rural reserve communities have experienced sexual abuse or assault. Major diagnosis are PTSD, depression and anxiety disorder, which all carry the concern of suicide and require psychotherapy,
particularly cognitive behavioral therapy (CBT). Offering CBT over videoconferencing enabled the authors to offer 5 times the usual treatment time at a much lower cost than in-person treatment – allowing residents in remote and rural communities access to specialists who do not reside in their own communities. Brasfield and Clement report that their efforts have been working well in the remote and rural communities of Bella Bella and Bella Coola.


Brasfield’s suggested diagnosis term for residential school survivors, “residential school syndrome” (RSS) is described in this article. Diagnostic symptoms are similar to posttraumatic stress disorder and include flashbacks, nightmares, intrusive memories and avoidance, but has specific cultural impact. RSS also includes detachment form others as well as from Aboriginal cultural activities. Parenting skills can be deficient and RSS can also include alcohol and/or drug abuse. RSS can be treated through healing centres as well as outpatient follow-up, via local therapists or travelling therapists. This treatment can be difficult because of cost and demand. Also there could be issues of confidentiality; local therapists who are community members may also be relatives.


In this article Breu investigates the place for e-resources in First Nations communities. She notes that the answer depends upon the individual community; however, when communities define the role of ICT they can use these tools for cultural protection, self-determination and revitalization. As an example, Breu focuses on an assessment of the Centre for Indigenous Environmental Resources (CIER) Virtual Environmental Library.


This short newsletter article discusses the Alberta First Nations Telehealth Change Management Project, which allows for videoconferencing access for consultations between professionals and specialists in diabetes care, mental health and discharge. Plans to expand the project into other specialties including oncology, geriatrics and psychiatry are underway. The services enable families to stay together during a health crisis by preventing unnecessary travel. The project also bridges the gap between the First Nation community health centres and the hospitals in the cities.


Budka and colleagues discuss the history of MyKnet.org, a collection of personal homepages for First Nation users in remote and rural areas in Northern Ontario. They examine the site as an extension of Indigenous media production, such as news and radio, and other ICT like telephones, while detailing user experiences with MyKnet.org. After interviewing and surveying MyKnet.org users, the researchers found that the homepages were used to connect individuals within communities and enable cross community connection. Individuals used the sites to post updates, and to advertise and promote community events.


Burke and colleagues outline the results of a needs assessment and pilot project of a school-based telehealth clinic in a rural area in the Arkansas Delta. With support from the American Academy of Pediatrics CATCH program (Community Access to Child Health) and the University of Arkansas for Medical Sciences Center for Distant Health consultations took place between clinical subspecialists and 2 local school nurse stations in order to enhance pediatric care. In this article they provide seven keys steps that act as guidelines for planning and implementing a rural school-based telehealth clinic. These steps include the need to conduct local and regional needs assessments, gather community support and set goals, identify resources, figure out all the logistics of the project, train staff, inform parents and open the clinic.
Caidi, N. & Walmark, B. (2006). Developing an On-Demand Book Service for First Nations Communities in Northern Ontario. Background Paper prepared for the CRACIN Workshop, 2006. Faculty of Information Studies, University of Toronto. At a workshop with First Nations participation, the library and information needs of remote First Nations were discussed. Community partners and librarians identified that children in First Nations communities often have limited access to print materials, such as books, and must resort to online resources to retrieve information. Shipping books to these remote areas was also discussed, particularly the initiatives by private donors and government representatives to ship books (typically for K-12 students) to some remote schools. Unfortunately, because of the lack of physical space, the inappropriateness of the texts shipped, or the lack of a proper cataloguing system, many of the books have been under-utilized. In addition to the lack of books relating to curriculum content and development, there was also an interest expressed by community partners to have a repository of culturally-relevant works dealing with knowledge and history of the community, language scripts, and local artifacts.

Campinha-Bacote, J. (2002) The Process of Cultural Competence in the Delivery of Healthcare Services: A Model of Care. Journal of Transcultural Nursing, 13 (3): 181-184. Blending theories from the fields of transcultural nursing, medical anthropology, and multicultural counselling, this article presents a Venn-diagram model illustrating the process of cultural competence, which the author divides into five major constructs: cultural awareness, cultural knowledge, cultural skill, cultural encounters, and cultural desires. When these five mutually exclusive qualities have been fulfilled by a healthcare provider, cultural competence can be achieved.

Canadian Partnership Against Cancer (2009) Report on National Forum on First Nations, Inuit and Metis Cancer Control. June 30. This report is a summary of key discussions and outcomes of the national forum. ICT featured in the theme: primary prevention and screening. The recommendation was that facilities should be created to share materials, including a pan-Canada e-knowledge portal to share culturally relevant cancer prevention, education and end-of-life tools and programs.

Carlock, D. (2006) Native American health: traditional healing and culturally competent healthcare Internet resources. Medical Reference Services Quarterly, 25(3): 67-76. This article provides a detailed annotated list of websites that offer information on the development and delivery of culturally competent healthcare (i.e. healthcare that acknowledges the importance of balance between body, mind, and spirit) for Native Americans. The author acknowledges that material on traditional healing is most often restricted to personal websites because of its sacred nature in Native American culture, and thus reliability cannot be guaranteed.

Carpenter, P., Kakepetum-Schultz, T. (2010) Above and Beyond: Embedding Community Values and Beliefs into an Evolving First Nations IT Health System. E-Health COACH Conference, Vancouver, May 29-31. This presentation outlines the importance of incorporating First Nations values and beliefs into a First Nation IT health system for remote First Nations. It highlights the value of respecting and instilling local beliefs and culture to ensure the adoption and acceptance of new health tools and methods. The ability of a First Nation to demonstrate ownership and control of the ICT health system improves the service delivery. Successful health services have respected the local traditions and cultures. First Nations in Northern Ontario manage their own broadband managed network and telemedicine program. The key to this success is building First Nations ownership and control of both the network and service, and addressing cross-cultural barriers to implementing Western-based clinical service into a First Nation community.

Carpenter, P. and Rowlandson, J. (2009) Accelerating Access to an Integrated and Scalable Health Infostructure for remote Ontario First Nations: Optimizing Community, Provincial & Federal Resources in Ontario’s James Bay Coast. COACH e-Health Conference, Quebec City, June 3. Carpenter and Rowlandson describe the results of a project to bring telemedicine to some of the most underserved First Nation communities in Ontario: James Bay Coast (pop. 11,500), Attawapiskat (pop. 1,300), Fort Albany (pop. 1,000) and Kashechewan (pop. 1,200). The communities have a high number of referrals. To date the project has had positive results, with engaged leadership and good acceptance and adoption rates. Lessons learned include the need to demonstrate the value of telemedicine to clinicians and their patients, to establish long term capacity to implement solutions, and to recognize that First Nations organizations and communities have a unique body of knowledge and relationships to support positive outcomes.

Chouinard, J. (1983) Satellite contributions to telemedicine: Canadian CME experiences. Can Med Assoc J, Vol 128 April. In 1972, Canada became the first nation to develop a domestic telecommunications system with a satellite in geostationary orbit. Anik A-2, launched in 1973, brought network radio, television and improved telephone services to the north. Following the launch of the powerful Hermes satellite in 1976, a number of pilot projects were launched, including three telehealth pilots. The first, in 1976, provided an audio link between University Hospital at the University of Western Ontario and a remote nursing station in Kashechewan Ontario and a base hospital in Moose Factory, Ontario; and both audio and video links between Moose Factory and University Hospital in London. The pilot, which ran for five months, provided radiologic and fluoroscopic examinations interpreted over the link. A second Hermes experiment was launched in 1977 and linked the Health Sciences Centre at Memorial University in Newfoundland with four remote hospitals for continuing medical education. The third Hermes project, Ironstar, concentrated on the production and broadcast of native health information programs. The article describes further telehealth pilot projects in Quebec, Newfoundland and British Columbia.

Chrisjohn, R., Young, S., with Maraun, M. (2006) The Circle Game: Shadows and Substance in the Indian Residential School Experience in Canada. Penticton: Theytus Books. The central essay in this book was prepared for the Royal Commission on Aboriginal Peoples with supporting documents as appendices. The nine recommendations include a special inquiry to investigated all aspects of Indian Residential Schooling; comprehensive apologies and recognition of wrongs offered by all the civil and ecclesiastical organizations that participated in the process; establishing a resource archive on Indian Residential Schooling; the fair, just and immediate settlement of land and resource claims and Residential School abuse claims; a fund to be used by Aboriginal Nations to undertake works to reconstitute their societies; the dismantling of that part of the Therapeutic State that impacts upon Aboriginal Peoples and replacement by institutions reflecting Aboriginal philosophies and under Aboriginal controls; those suffering the effects of Residential Schools be given unrestrained access to the treatment of their choice; and, if these recommendations are not brought about, an open and honest declaration that the destruction of Aboriginal Peoples is official government policy.


Clement, C. (2007) Telehealth Enables Psychiatric Outreach to the Bellas. Vancouver Coastal Health Newsletter: April: 2. In this short article Clement interviews Dr. Charles Brasfield and Dr. Michelle Haring about the use of videoconferencing in psychiatric outreach. Brasfield notes that sharing secrets or discussing trauma can be easier over videoconferencing because of the distancing effect that technology can have. He also noted that residents of Bella Bella went 2 years without psychiatric visits until the services were offered over videoconference. In November 2006 the service was extended to Bella Coola. Dr. Haring asserts that cognitive behavioral therapy (CBT) can also be conducted over videoconference, and the article notes that in March 2007, Haring conducted the first CBT over videoconferencing in BC. Other possibilities for the technology include involving three additional counselors and using the system for diabetic education.
Commission on the Future of Healthcare in Canada (2002) Building on Values: The Future of Healthcare in Canada (The Romanow Report). Roy J. Romanow, Commissioner, Final Report, November. This key report commissioned by the federal government is a far-reaching and visionary assessment of the future of healthcare in Canada. Chapter 7, Rural and Remote Communities, includes an overview of the disparities in health, access to healthcare, access to healthcare providers, and differences in health experienced by members of remote and rural communities. Recommendation 32 is to use the rural and remote access fund to support the expansion of telehealth approaches. The report also suggests that priorities for future expansion of Canada’s broadband infrastructure should take central account of how telehealthcare can improve access to healthcare in rural and remote communities across the country.

Community Action Based Development (2005) Aboriginal Canadians & Web-4-All. This report presents a feasibility study of setting up “Web-4-All” technology (to address common disabilities) in rural and urban Aboriginal communities based on pilots that ran in Burnt Church and Big Cove First Nations in New Brunswick. Aboriginal people have double the rate of disability of the national average and usually do not have the support or infrastructure they need in their communities. The report suggests that Aboriginal people with disabilities need to band together and speak up with confidence - as individuals and as a group - to get the services and supports they need because they have no real champions working for them. The paper acknowledges the lack of awareness and understanding of the potential and aspirations of people with disabilities and identifies disability less as a health issue, and more of a social issue because it affects housing, transportation, education, home support, self-reliance. Discrimination is a real problem both inside and outside the community, and technology may help empower people with disabilities and enable them to participate in community.

Community Learning Project (2009) RAIN Project: Resource Access and Information Network. Presentation at the First Nations ICT Summit, Vancouver, February. The North Coast Region of BC was experiencing significant economic challenges in 2000. RAIN was a coalition of 17 North Coast community partners (average community size outside of Prince Rupert is 275 people). The project, which began in 2002, is a forum for empowering people through learning, accessing new personal, employment and business information, creating a new way for remote communities to connect to the outside, and fostering a sense of optimism about the future.

Cook, S. J. (2005) Use of traditional Mi’kmaq medicine among patients at a First Nations community health centre. Canadian Journal of Rural Medicine, 10(2): 95-99. Cook reports on the results of questionnaires administered to 100 Mi’kmaq patients at a First Nations community health centre. 66% of respondents reported using Mi’kmaq medicine, and 92.4% of those using traditional medicine did not discuss traditional medicine with their physician. Cook found that Aboriginal people obtaining healthcare in Western medical facilities still consider traditional healthcare beliefs and values important.

Coulson, H. (2010) Tele-rehab: Delivering Services to Remote First Nations Communities .E-Health COACH Conference, Vancouver, May 29-31. The Tele-rehab Research Pilot program was launched in April 2009 and it ended in February 2010. The pilot will study if remote monitoring can support follow-up rehabilitation visits in remote communities. The project is a partnership with the North Western Ontario Regional Stroke Network Region rehabilitation and Keewaytinook Okimakanak Telemedicine and Keewaytinook Okimakanak Home and Community Care. It provides consultations to stroke survivors after they have finished their therapy at the hospital. Two visits are scheduled after the client returns to their community, at 6 weeks, and 3 months. Clients can choose a portable remote monitoring camera brought into the home, or the video unit at the community nursing station. The consultation will follow-up on problems that may have been identified after the stroke, such as weakness, falls, pain, speech, swallowing, difficulty with dressing or eating and accessing funding for equipment. Clients and their families will receive much needed support that is not otherwise available in their communities.
Coulson, H., Vermette, M. (2008) How Telemedicine is Bringing Home Care Services to First Nations in Remote Communities. Canadian Society of Telehealth (CST), Ottawa, October 5-7. The KO Telemedicine (KOTM) Home and Community Care Program (Telehomecare) initiative provides home-based support services to clients in 6 remote First Nations communities in northwestern Ontario. The program uses videoconferencing to train, monitor, evaluate and assess home based client care. Equipment includes a camera and monitor placed in the client’s home. The equipment is encrypted, securely locked and connected to the KO Telemedicine network with access to over 400 hospitals and health centres in Ontario. The HCC nurse and other professionals are able to assess the client’s requirements and develop a responsive plan of care that would not be possible without Telemedicine. Services brought to the clients in their home are: diabetes education/support, specialist/doctors visit, palliative care, nursing support, case management, mental health visits, and family visitations. In addition, the Nurse Supervisor can monitor and support community-based staff in real-time while they are working in the client’s home.

Crawford, P. G. R. (2008) Using Technology to Improve Indigenous and Remote Health: A Systematic Review of Telehealth Initiatives in North America. 136th Annual APHA Meeting and Expo, San Diego, California. In this abstract Crawford details the findings of a literature review on telehealth in Indigenous remote communities. Studies included the use of telehealth for mental health, education, oncology, radiology, ophthalmology and dermatology. These studies demonstrated that telehealth encouraged follow-up that normally would not occur if travel was necessary, and that telehealth can fill healthcare gaps in remote Indigenous communities.

Crossing Boundaries. (2004) Aboriginal Digital Voice: National Roundtable Summary of Proceedings. Ottawa, March 23. The Aboriginal Voice project was both a study and an effort to promote recommendations for policy and decision-making about future Aboriginal e-government initiatives. These are the proceedings of a round table of national and regional Aboriginal organizations, federal and provincial government officials, and Aboriginal representatives. The three pillars of e-government identified are: to improve service delivery in a citizen-focused way, to provide information as a public resource, and to engage citizens in governance. The opportunities of ICT might be more important to Aboriginal people than to other Canadians for overcoming isolation (geography, size, distance) and addressing social, cultural and economic needs. The roundtable looked at what was being done as well as the challenges and advantages were; it also tried to help focus development efforts. Infrastructure and capacity were identified as the most important issues to address, and collaboration and partnership are key to the success of any development effort.

Crossley, M., D. Morgan, Lanting, S., Bello-Haas, V.D., Kirk, A. (2008) Interdisciplinary research and interprofessional collaborative care in a memory clinic for rural and northern residents of western Canada: Unique training ground for clinical psychology graduate students. *Australian Psychologist* 43(4): 231-238. Barriers to assessment and healthcare of seniors include their geographic location and cultural context. Access is an issue for those living in rural, remote or Northern regions, and more research needs to be done related to culturally appropriate health services for Indigenous seniors with dementia. The authors discuss the interdisciplinary research that takes place at The Rural and Remote Memory Clinic (RRMC) in Saskatchewan. The RRMC was created to provide diagnosis and management of dementia for the elderly in remote, rural and Indigenous communities, using ICT to improve service delivery.

Deschenie, T. (2007) Community Health and Wellness Start With Our Individual Commitment. *Tribal College Journal, 18*(4): 8-9. This article offers a US perspective on community health and wellness. In particular the author showcases efforts at community wellness at the TCU (tribal councils and universities) and discusses the need for positive imagery and positive Native power. Initiatives to create more positive community health and wellness and Native power include college wellness centers and exercise classes as well as “talking circles,” writing classes and creating artwork to recover from the impact of suicide.

discusses holism in Aboriginal health and wellness and its complexities, noting that cultural practices have positive impacts that can be measured. The importance of the landscape and other factors such as the effects of colonization are key to understanding the complexity of who individuals, their families and communities are.

Dick, R.W., Manson, S.M., Hansen, A.L., Huggins, A., Trullinger, L. (2007) The native telehealth outreach and technical assistance program: A community-based approach to the development of multimedia-focused healthcare information. *American Indian and Alaska Native Health Research: The Journal of the National Center: 49-66*. Dick and colleagues’ article examines the Native Telehealth Outreach and Technical Assistance Program (NTOTAP) which has the goal of enabling Native community members to develop projects to disseminate healthcare information within their own community. Support was provided by NTOTAP through financial and technical resources, mentorship and technical training. The project led to the creation of multimedia tools specific to the health needs of the community, including web sites, an interactive CD-ROM and a video focusing on drug and alcohol use and abuse, preventative information on Hepatitis C, information on birth control methods accessible within the community, diabetes information from a Native perspective, information on nutrition and physical activity and more.

Dobbelsteyn, J. L. (2006) Nursing in First Nations and Inuit communities in Atlantic Canada. *Canadian Nurse, 102 (4): 32-35*. In this article Dobbelsteyn discusses issues in nursing in First Nation and Inuit communities in Atlantic Canada. Nurses need to be aware of and integrate traditional healing if the client wants or needs it, including the use of sweetgrass, healing circles, sweat and healing lodges and other ceremonies to promote health. Confidentially is a major issue in small communities where everyone knows each other, and a lack of confidentiality could negatively affect the health center’s reputation; therefore confidentiality is key and must be respected by nurses working in First Nation communities.

Doessel, D. P., Travers, H., & Hunter, E. (2007) The use of touch-screen technology for health-related information in Indigenous communities: some economic issues. *Prometheus, 25(4): 373-392*. Doessel and colleagues discuss the use of touch-screen technologies in the Health Information Touch-screen (HIT) project to present health information for Aboriginal and Torres Strait Islanders in Queensland. Touch-screen kiosks can be a solution to one aspect of the digital divide – access to relevant hardware and software – and have been used to provide education materials on maternal and child health, cancer and Alzheimer’s disease. The HIT project incorporates games and quizzes in order to present information on diabetes, musculoskeletal conditions, and alcohol use interactively.

Donelle, L., & Hoffman-Goetz, L. (2008) An exploratory study of Canadian Aboriginal online healthcare forums. *Health Communication, 23(3): 270-281*. Online forums can be a significant source of social support. This article examines two discussion forums dedicated to Aboriginal health issues where the participants are Aboriginal. They found that while the first forum took a holistic approach to health, the second was more narrow, emphasizing the importance of physical, mental, emotion and spiritual aspects of health and health. Both forms were interactive and potentially provided emotional support to participants in a culturally-sensitive way.

Dyson, L. E., & Brady, F. (2009) Mobile phone adoption and use in Lockhart River Aboriginal community. Eighth International Conference on Mobile Business, ICMB. Dalian, China, 27-28 June. Through an ethnographic study of mobile phone use in Cape York, Australia, a remote and rural Aboriginal community Dyson and Brady found a high rate of adoption, higher than other ICT. This paper gives a thorough overview of the community as well as 36 semi-structured interviews with community members about mobile phone use.

Dyson, L. E., & Hendriks, M., eds. (2007) *Information Technology and Indigenous People: Issues and Perspectives*: Hershey: Information Science Publishing. Indigenous peoples have expressed growing interest in information technology; however they still experience digital divide issues, including cost, geography, computer literacy, and the need for greater IT awareness. Cultural concerns are also important, especially Indigenous knowledge is used, language, and cultural appropriateness. This book was written as a tool for researchers, educators, students, community
leaders and policy makers and deals with both theoretical and empirical topics. Half of the contributors to the text are Indigenous peoples, while others have experience working with Indigenous communities. The articles demonstrate how IT can fit into Indigenous social practices and culture, not how these cultures and practices can be adopted to suit IT.

Ebare, S. (2006) First Nations Remote Communities Connectivity and Health: Identifying Opportunities and Challenges for British Columbia. School of Communication, Simon Fraser University: Vancouver, British Columbia. The focus of this report is on the current state of Aboriginal health administration and the broadband infrastructure in Canada. Evaluation reports of past and current programs are outlined here in order to contribute to informed use of ICT-based health services in rural and remote areas in British Columbia. Existing projects featured include K-Net and KOTH (now KOTM) and Project Outreach in Ontario, Ikajuruti Inungnik Ungasiktumo (IIU) Network Telehealth Project in Nunavut, WestNet Telehealth Program in the Northwest Territories, and the Alberta First Nations Telehealth Program.

Ellis, I. (2004) Is telehealth the right tool for remote communities? Improving health status in rural Australia. Contemporary Nurse. 16(3): 163-168. Ellis offers a criticism of telehealth in this article. She notes that at best telehealth is a good back up system for when face-to-face sessions are not feasible, as is the case in rural and remote areas, or to act as a way to gain access to a second opinion. According to Ellis, satisfaction with the patient physician relationship using telehealth needs to be investigated in depth. Also, Ellis states that telehealth is usually broken down into sub-specialties which can make co-morbidity diagnosis difficult.

Eriks-Brophy, A., Quittenbaum, J., Anderson, D., & Nelson, T. (2008) Part of the problem or part of the solution? Communication assessments of Aboriginal children residing in remote communities using videoconferencing. Clinical Linguistics & Phonetics, 22(8): 589-609. The authors investigate the results of speech-language sessions over videoconference with Aboriginal children in remote communities in Ontario. The authors then discuss the pilot project of 7 assessments. Assessments were conducted over videoconference and responses scored both by the remote and an on-site speech-language pathologist (SLP). Agreement was very high for language tests and relatively high for articulation measure.

Fiddler, J. (2008) UN Declaration on the Rights of Indigenous Peoples: The Role of ICTs. Presentation at the First Nations ICT Summit, Vancouver, February. In this presentation, Fiddler outlines how the UN Declaration on the Rights of Indigenous Peoples was adopted by the UN General Assembly in September 2007 after many years of hard work and lobbying by Indigenous peoples world wide. Canada was one of only four nations to vote against the Declaration. The Declaration is a building block and guideline that Indigenous Peoples and their States can use to pursue their collective rights and freedoms. Even without Canada's support of the Declaration, many First Nations across Canada have been actively pursuing these rights. ICTs are powerful tools that can be used to realize these rights. ICTs can be developed and used in new ways that First Nations never thought possible. Many First Nations meet the criteria to participate in the Information Society. For those who don't have the infrastructure, policies need to be changed so everyone is included and minimum ICT levels are met. As global leaders, First Nations need to set the stage for the use of ICTs in Indigenous communities and nations.

First Nations Education Council (2009) 2008-2009 Annual Report. Conseil en Education des Premieres Nations – First Nations Education Council. Wendake, Quebec. The annual general report of this organization reviews progress in a number of areas, including: technology; development of post-secondary services; representation, visibility and mobilization; and training, support and advice on educational services in the communities.

First Nations Technology Council (2005) Information and Communication Technologies in B.C. First Nations Communities. Report on an Environmental Scan Conducted by the FNTC. March. In 2003 and 2004, FNTC contacted170 First Nations communities in BC and asked a series of questions on the communities’ use of and access to technologies. This report includes the results of that survey.
Fiser, A. (2010, forthcoming) A map of broadband deployment in Canada’s Indigenous and Northern communities: access, management models, and digital divides (circa 2009). Communication, Politics & Culture 43(1) RMIT Publishing. This article is a comprehensive analysis of broadband access by First Nations communities in Canada. In 2009, Indian and Northern Affairs Canada’s First Nations SchoolNet Program sought to map broadband access (≥ 1.544 Mbps) in Canada’s Indigenous and northern communities. The article reports on the data collected to date, and examines that data in the context of several business models hypothesized from the data-set.

Fiser, A., & Clement, A. (2009) K-Net and Canadian Aboriginal communities. IEEE Technology and Society Magazine, 28 (2): 23-33. Fiser and Clement offer a short history of K-Net and describe collaborative research with Keewaytinook Okimakanak (KO) tribal council over four years using participatory research methods to understand the community-based telecom initiative. Researchers conducted interviews with network-related professionals, residents and staff and other community participants. Trust and relationship-building were two main themes that emerged from the research. The authors note that the K-Net broadband telecommunications network reflects a compromise between the local autonomy of the community and the socio-economic realities.

Fiser, A., & Seibel, F. (2009) From National Technology Experiment to Regional Socio-economic Development: Policy Measurement, Social Enterprise, and the Demands of Aboriginal Community Networking Beyond the Connecting Canadians Agenda. Aboriginal Policy Research Conference. Ottawa, March 9-12. Fiser and Seibel’s research concluded that the Connecting Canadians (CC) program in Canada overemphasized the technological side of the equation and undervalued the human side of building public-private partnerships for community-based networks designed to overcome the digital divide for rural, remote and underserved urban communities. Drawing on research from the Keewaytinook Okimakanak Research Institute and the national CRACIN project, the investigators compared the investment paradigms of Connecting Canadian (CC) Agenda programs (Schoolnet, CAP, CHIPP etc.) to the regional clusters paradigm in the US and other OECD countries. They also compared Aboriginal community-based networks created under the CC to research and development networks so policy lessons could be learned.

Fiser, A., Clement, A., & Walmark, B. (2005). The K-Net Development Process: A model for First Nations Broadband Community Networks. Presented at the Telecommunications Conference (TPRC) September 23-25, 2005, held at George Mason University School of Law in Arlington, VA. This paper reviews the history and development of K-Net in northwestern Ontario. Far more than a provider of basic carriage services, K-Net brokers relationships among various agencies to provide a wide range of public and civic services in remote communities (e.g. telehealth applications, Industry Canada's First Nations SchoolNet, the Keewaytinook Internet High School (KiHS), personal homepages and email addresses, video conferencing and webcasting/archiving of public events). K-Net constitutes a (nearly) full-spectrum, vertically integrated service provider oriented to meeting the social and economic development needs of its primary constituents.

Forbes, D. A., & Edge, D. S. (2009) Canadian home care policy and practice in rural and remote settings: challenges and solutions. Journal of Agromedicine, 14(2): 119-124. Remote and rural populations in Canada (and most notably First Nations and Inuit populations) who must rely heavily on home care programs to meet their health needs report poorer overall socioeconomic conditions and reduced quality of public health services. To address this and other related dilemmas, Health Canada instituted the First Nations and Inuit Home and Community Care Program, which was aimed at instating home care services in the local communities to enable easier access. In this article Forbes discusses the challenges faced during the implementation on the program.

Fricton, J., & Chen, H. (2009) Using teledentistry to improve access to dental care for the underserved. Dental Clinics of North America, 53(3): 537-548. Access to dental care is particularly hard for ethnic minorities, those from low income families and people with disabilities. Further barriers to dental care include geographic remoteness (accessibility dependant on weather and road conditions), sparse population, lack of public transportation, scarcity of dentists and specialists, and culturally specific need of groups, in particular, First Nation groups. Fricton and Chen’s article
explains what teledentistry is by discussing various case uses of teledentistry in the United States and Scotland.

Friedman, D.B., Hoffman-Goetz, L. (2007) Assessing cultural sensitivity of breast cancer information for older Aboriginal women. *Journal of Cancer Education, 22* (2): 112-118. Cancer education resources for Aboriginal peoples should be respectful of cultural beliefs. The authors conducted interviews with 25 older Aboriginal women in Ontario to determine their opinions about Internet resources on breast cancer. Participants read 2 Web articles on breast cancer: 1 article from a national cancer organization and the second from an Aboriginal health department. Aboriginal women better understood the Native web site and they preferred to read this culturally relevant resource that discussed Native women's breast cancer risk. Culturally sensitive breast cancer information should incorporate health attitudes and behaviors of Aboriginal women and present plain language information to encourage informed decision-making.

Gagnon, M. P., Duplantie, J., Fortin, J. P., Jennett, P., & Scott, R. (2007) A survey in Alberta and Quebec of the telehealth applications that physicians need. *Journal of Telemedicine and Telecare, 13*(7): 352-356. In order to gauge physician needs and interest in telehealth applications, the researchers conducted a survey of physicians from remote and rural areas of Alberta and Eastern Quebec. Physicians in both Alberta and Quebec considered the following telehealth applications as most useful: access to lab results and prescription information, tele-education and teleradiology.

Gagnon, M.P., Duplantie, J., Fortin, J.P., Landry, R. (2006) Implementing telehealth to support medical practice in rural/remote regions: what are the conditions for success? *Implementation Science 1*(18): 1-8. In order to investigate why telehealth utilization remains limited, the authors interviewed physicians and managers in four remote regions of Quebec about the effects of telehealth on remote clinical practice. This article outlines the conditions for successful telehealth implementation.


Garrick, R. (2004) Changes Internet technology has brought to northern Ontario. *Indian Life, 24*: 7. Garrick writes about K-Net’s Computer services becoming Industry Canada’s Aboriginal Smart Demonstration project in 2000. He describes how ICT, including Internet access and hosting services, email, videoconference, teleconference, and telephones in particular communities have been used for child and adult education, improving communications between people in different communities and for band members who live outside of their communities. ICT also provides greater access to medical care, tele-psychiatry and research.

Gerein, H. J. (1998) Community Wellness in the Northwest Territories: Indicators and Social Policy. *Thesis, Gonzaga University*. Gerein developed his thesis in order to define what healthy Northern communities are, to develop a tool for measuring community wellness (the wellness index) and to measure wellness in 58 communities within the territories. His findings have implications for policy recommendations, future work and changes.

Gibson, K., Simms, D., O'Donnell, S., & Molyneaux, H. (2009a). Clinicians’ Attitudes toward the Use of Information and Communication Technologies for Mental Health Services in Remote and Rural Areas. *Canadian Society for Telehealth Conference, Vancouver, BC, October 3-6*. Little research exists regarding clinicians’ attitudes towards the use of information and communication technologies (ICT) in clinical service provision – particularly within populations such as First Nations and Operational Stress Injury (OSI) clients. These clients may be particularly well served by technologies such as videoconferencing which allow clinicians to service these clients, many of
whom are located in remote and rural geographical locations. However, adoption of these services is dependent upon clinicians’ willingness to use these technologies. In this paper the results of qualitative and quantitative analysis of both survey and interview responses are discussed with a specific emphasis on clinicians’ attitudes towards use of ICT in service delivery in the present and future. Further, successes, challenges and barriers to the use of technology are explored as well as suggestions for future directions for research.

Gibson, K., Kakepetum-Schultz, T., Coulson, H., O’Donnell, S. (2009b) Telemental Health with Remote and Rural First Nations: Advantages, Disadvantages, and Ways Forward. National Aboriginal Health Organisation (NAHO) Conference. Ottawa, November 24-27. Community members living in remote, isolated communities requiring mental health services are usually faced with two choices: having no service or leaving their community to access services in larger centres. Certain First Nation communities offer a third choice: using telemental health delivered via videoconferencing to provide clinical mental health services for community members. Like all technology uses, telemental health services have advantages and disadvantages, both for the individual and the community. Understanding mental health workers’ experiences of telemental health and its benefits and drawbacks for remote and rural First Nations people was the focus of the study. Advantages include allowing community members to remain within their community for treatment and connecting First Nations trauma survivors to each other; disadvantages include increased difficulty building and maintaining clinical relationships via videoconference and ethical concerns of using the technology. Certain ways forward that seem promising are proposed, including incorporating traditional practices and the seven teachings into telemental health initiatives. Finally, policy recommendations are offered.

Gibson, K. O’Donnell, S., Rideout, V. (2007) The project-funding regime: Complications for community organizations and their staff. Canadian Public Administration, 50(3): 411-435. Various levels of government contract-out the provision of public services such as health and education to community organizations, which had traditionally received core funding for these services. This article explores the ways in which the daily lives of these workers have been organized and influenced by project-funding regime procedures and rules, which benefit the state but create hardships for workers. The analysis draws on staff interviews and focus group data collected from three community organizations in three provinces across Canada.


Gideon and colleagues wrote this position paper commissioned by the AFN that describes telehealth and the application of telehealth in First Nation communities. An environmental scan and analysis of the current state of First Nations telehealth is then explored by summarizing the main points of AFN-sponsored First Nations Telehealth consultations.


Gordon, J. (2009) Namgis First Nation: Building a Successful ICT Network in a First Nations Community. Presentation at the First Nations ICT Summit, Vancouver, February. To be relevant an ICT network must be designed with the needs, objectives and procedures of its owners (the users) in mind. An ICT network is a provider of an assortment of services. The users are there to provide services to their organizations – in this case the First Nation, Tribal Council or other regional authority. These in turn provide services to the community. Networks need to: grow gracefully, support new technologies when they appear, adapt to changing needs, allow quick, easy diagnosis and repair, allow monitoring of use, and be secure.

Government of Alberta (2004) Final Report. Aboriginal Information Communication Technology Forum, Edmonton, Alberta. This forum was organized to develop the technological capacity of urban and rural Aboriginal communities as per the Aboriginal Policy Initiative of 2003-4; to develop strategies help Aboriginal communities use technology for economic development; and to improve administration, learning and training, business opportunities. The key messages from the forum were that Aboriginal government and agencies must increase their capacity in order to improve program and service delivery using ICT, and in addition to issues of access, Aboriginal people need to build a culture of use. Industry was encouraged to build relationships and sponsorships with communities, individuals and businesses using ICT; and to assist buying and maintaining hardware, technical training, cooperative work placements and mentorship programs.

Gratton, M-F., O'Donnell, S. (2010, forthcoming) Communication Technologies for Focus Groups with Remote Communities: A Case Study of Research with First Nations in Canada. Qualitative Research. This article presents an overview of a research method developed in collaboration with research partner K-Net and KORI (Keewaytinook Okimakanak) in northwestern Ontario. The specific study investigated preferences for online health information for First Nations people living in remote communities. Working with K-Net, the authors developed a method to use multi-site videoconferencing for focus groups – live visual and audio exchange between the researcher in Ottawa and participants in multiple remote First Nation communities in northwestern Ontario. The paper presents some of the challenges of research with remote communities, an overview of the study, the methodology, the technology used, a profile of the research partner and research participants, the process for the focus groups, what went well and the advantages of using this method and some of the challenges experienced. The conclusion encourages other researchers to try this innovative method to include more remote First Nation community members in participatory research projects.

Greskiw, G., Innes, J.L. (2008) Comanaging communication crises and opportunities between Northern Secwepemc First Nations and the province of British Columbia. Canadian Journal of Forest Research, 38 (7): 1935-1946. The Northern Secwepemc First Nations of central British Columbia are facing serious communication challenges in relation to the comanagement of natural resources in their traditional territories. For First Nations' managers, communication by speaking and listening and by sharing stories continues to be important for maintaining traditional ecological knowledge and culture. However, currently emphasis is placed on communication products represented in reading and writing, often in electronic format. This dichotomy is leading to communication crises, with traditional ecological knowledge being required to fit within a rigid technology of literacy. Results indicate there is potential for transformation towards forest comanagement in Northern Secwepemc territories in times of crises; however, certain conditions such as adequate staffing, funding, and training must first exist at the site level of management for both provincial and Aboriginal managers, to make the best use of emergent opportunities for collaboration.

Griffiths, K. M., & Christensen, H. (2007) Internet-based mental health programs: a powerful tool in the rural medical kit. Australian Journal of Rural Health, 15(2): 81-87. Internet-based depression information and therapy programs can be utilized in rural settings. In this article Griffiths and Christensen conducted a literature review to determine the utility of two web-based mental health programs in Australia: MoodGYM and Bluepages Depression Information. A total of 12 papers were reviewed with sample sizes from 78 to 19,607 people. Although the interventions are not specifically tailored for rural and remote populations, a large portion of users are from rural or remote areas (20.5%). The literature suggests that these programs are linked to improvements in mental health
education, attitudes towards depression and mental health in general and that these programs might be particularly useful for rural consumers experiencing mental health issues.

Gurstein, M., Beaton, B., Sherlock, K. (2009) A Community Informatics Model for e-Services in First Nations Communities: The K-Net Approach to Water Treatment in Northern Ontario. Journal of Community Informatics, 5(2). Keewaytinook Okimakanak (KO), a tribal council in northern Ontario, has developed and is implementing a highly innovative approach to the community delivery of water treatment services in remote northern communities. The approach includes the use of two-way videoconferencing for mentoring and continuing education, and support and remote monitoring and electronic servicing of community water treatment plants. The paper examines the innovative KO approach in light of Community Informatics research and theory.

Hancock, B.R., and O'Donnell, S. (2009) New Media and Self-Determination: Publicly Made and Accessible Video and Remote and Rural First Nation Communities. Canadian Communication Association, Ottawa, May. This working paper explores the potential for new media to provide a means for members of remote and rural First Nations communities to challenge problematic mainstream representations of First Nations identity. Video on public access sites such as YouTube and Google Video, as well as on websites that act as hubs for First Nations internet users in remote and rural areas, allow for the accumulation of a critical mass of videos, providing complex, contemporary, and fluid images that “speak” to one another across distance and time. Such an accumulation may provide the means for a social movement—the public dissemination of self-determined identities by members of remote and rural First Nations communities thus growing in power to become a counter-hegemonic practice that undermines the misrepresentations of First Nations culture and identities in mainstream Canadian media.

Hanley, S. (2009) FNTC: Working on Behalf of all First Nations in BC, ICT Summit. Presentation at the First Nations ICT Summit, Vancouver, February. In BC there are 203 First Nations governments, many rural or remote. Most have fewer than 250 people, the majority lack either broadband or community infrastructure, and lack of capacity is a big issue. FNTC’s vision: every First Nation in BC has their information and communication technology needs met. FNTC’s Mission: the FNTC works collaboratively to ensure that First Nations in BC have their information and communications technology requirements identified and met, while adhering to First Nations’ values and principles.

Hanley, S. (2006) First Nations Technology Council: Working on Behalf of all First Nations in BC. Presentation at the First Nations ICT Summit, Vancouver, February. This presentation outlines the history and development of FNTC in BC. The FNTC approach is to support the development of FIT communities (Fully Integrated Technologies). With connectivity, culture and language can be revitalized; education achievement rates can improve; health services can be improved through e-health solutions; Aboriginal business can access markets anywhere, anytime; and off-reserve community members can play a more active role in governance.

Harding, R. (2006) Historical representations of Aboriginal people in the Canadian news media. Discourse and Society, 17 (2): 205-235. Understanding historical news discourse on Aboriginal issues is a first step towards situting Aboriginal policy matters within a contemporary socio-political context. Using methods of critical discourse analysis, selected newspaper coverage of four 'flashpoints' in the history of Aboriginal-non-Aboriginal relations in Canada is examined. A significant finding of this study is the degree to which news discourse about Aboriginal people has remained constant over the last century and half. in the 1990s, these issues were framed, much as they were in colonial times, in ways that protect dominant interests and signify Aboriginal people as a threat.

Harper, D. G. (2007) BC-Yukon First Nations' Health Network. World Conference on Educational Multimedia, Hypermedia and Telecommunications (EDMEDIA). Harper’s report outlines a “work in progress” portal project dedicated to health and wellness issues in First Nation communities. This portal is intended to be designed, implemented and kept up by First Nations community members in order to create a virtual community with access to education, information on health and wellness and greater opportunities within the community.
Healey, G.K., Meadows, L.M. (2008) Tradition and Culture: An Important Determinant of Inuit Women’s Health. *Journal of Aboriginal Health*, 4(1). The researchers conducted face-to-face interviews with 9 women in a Nunavut community who self-identified as Inuit. The authors found that key determinants of health included culture and traditional knowledge. When the Inuit women spoke about health they discussed mental, emotional, spiritual and physical health. Their discussions were framed by their gender roles, traditional beliefs, education, value and knowledge. Topics discussed included leaving the community to give birth (and the effects of that practice), the experience of language loss and its impact on a sense of belonging and collective identity.


Health Canada (2004a) Backgrounder on Telehealth Activities in First Nations and Inuit Communities: Aboriginal Crossing Boundaries-On-line Discussion Document. eHealth Solutions Unit: First Nations & Inuit Health Branch Canada. The report Backgrounder on Telehealth Activities offers an overview of Canadian telehealth activities in 2004 as well as outlines the key drivers and issues with telehealth. The drivers include an ageing population, a shift in healthcare from treatment to prevention, changes in models of care, an expansion in options for diagnosis and treatment, changes in performance and cost of ICT, market forces, the need to reduce healthcare costs, patient demand and urbanization/globalization. Barriers include lack of bandwidth and connectivity, need for a uniform regulatory system, impact of ICT in the health field and the need for long term funding and sustainability. The report notes the various telehealth applications employed in Canada.

Health Canada (2004b) Telemental Health in Canada: A Status Report. Health and the Information Highway Division Information, Analysis and Connectivity Branch Health Canada: Ottawa. This status report concerns the lessons learned from the current state of telemental health in Canada. Chapter 6 focuses on First Nations and Inuit Communities, noting that telemental health services have been limited due to staff shortages, lack of infrastructure and capacity and funding and cultural issues. However, there are examples of success stories, including the Ontario Keewaytinook Okimakanak Telepsychiatry Pilot Project, the expansion of Nunavut’s Ikajuruti Inungnik Ungasiktumi (IIU) telehealth network and Ontario’s NORTH network. Key issues include reimbursement, licensing, standards and funding. The report concludes by recommending the alignment of funding priorities, promoting telemental health as preventative, developing Canadian standards and best practices, ensuring that the communities benefit and creating effective change management strategies.

Health Canada. (2003) Framework for Remote and Rural Readiness in Telehealth: Final Report. Health Canada: Ottawa. In this report telehealth ‘readiness’ – the degree to which people and organizations are prepared to implement telehealth – is investigated in rural and remote Canadian communities. The researchers conducted interviews, community awareness sessions and focus groups and determined that there were in fact four types of readiness including include core readiness (dissatisfaction with the status quo), engagement (questioning and assessing risk), structural readiness (building structures and supports) and non-readiness (where need is not recognized). As a result of this study five policy recommendations are made by the researchers, which includes the need for understanding readiness, conducting readiness assessment, getting input from stakeholders, adopting culturally sensitive and aware telehealth programs and an increased awareness and understanding of telehealth opportunities. The report also contains a chart on the perceived risks and solutions for telehealth readiness.

Health Canada. (2002) How Canadian eHealth Initiatives are Changing the Face of Healthcare: Success Stories. Office of Health and the Information Highway, Health Canada: Ottawa. ICT implementation success stories across Canada are documented in this Health Canada report. Within the report, these success stories are grouped according to geographical region, and include Atlantic Canada, Central Canada, Western Canada, Northern Canada and National. Stories include the
implementation of telehealth technologies in rural and remote areas of Newfoundland, Northern Labrador, Eastern Ontario, Northern Ontario (NORTH Network), and Manitoba (MB telehealth Network). Applications for telehealth mentioned in the report include teleoncology, telehospice, teleosychiatry, telestroke, pediatric care, dermatology, diabetes care and education and training. These applications were delivered primarily through videoconference, although recorded video, telephone, EHR and other information systems such as the Picturing Archiving and Communication System (PACS) are also mentioned.

Health Canada (2001) Community Services in the 21st Century: First Nations & Inuit Telehealth Services. National First Nations Telehealth Research Project HTF-NA402 1998-2001. Health Canada: Ottawa. This is the report of an extensive pilot project by Health Canada First Nations and Inuit Health Branch (FNIHB), called the National First Nations Telehealth Research Project. The pilot involved five isolated First Nation communities, and the report contains evaluation outcomes collected and analyzed by an independent evaluation team. The report covers lessons learned and includes seven policy recommendations: taking a concerted approach to the lack of connectivity in remote and rural communities; undertaking new research to fully explore the issues involved; offering telehealth opportunities in an equitable and sustainable manner across all First Nation and Inuit communities; undertaking research on the system-wide impact of telehealth on various funding envelopes and on human resources infrastructures of FNIHB, the provinces and communities; elaborating strategies to ensure that telehealth effectively contributes to capacity-building, service integration and sustainability in First Nation and Inuit communities; building increased awareness of First Nations and Inuit stakeholder perspectives; and ensuring linkages and a concerted approach between telehealth and other health infrastructure development.


Heinrichs, M., Hiebert, D. and the people of Mishkeegogamang (2009) Mishkeegogamang: The Land, the People and the Purpose. Rosetta Projects. This book documents the history of Mishkeegogamang First Nation in Northwestern Ontario. It includes a discussion of what the land provides to the peoples of Mishkeegogamang, the story of Tready No. 9 and the land issues and claims process.

Helmer, N. (2010) Mushkegowuk First Nations: Telemedicine, Digital Imaging and EMR Planning and Implementation. Chiefs of Ontario Health Forum, February 24. This presentation provides a brief overview of the digital health services covering Attiwapiskat, Kashechewan and Moosonee on James Bay in northern Ontario. When telemedicine (videoconferencing) began in 2004, there were 50 referrals; by 2009, there were almost 600 referrals. Videoconferencing is used for clinical, administrative and educational purposes. The advantages to date include cost savings (reduced travel costs), decreased wait times for clinical visits, less time away from the communities translating into increased quality of life for patients and family members, increased patient satisfaction and increased compliance with appointments. Digital imaging, a key component of the service, uses a picture archive communications (PAC) system, and includes a 4-D ultrasound machine. In 2005, the service instituted the 2nd digital mammography program in Canada, which provides enhanced screening for patients. The electronic medical record (EMR) system was established in July 2009. It monitors follow-up and vital signs. The EMR is also a chronic disease management tool and a cancer screening tool. In the future, the service plans to link its EMR to Kingston and Timmins, Ontario.

Hill, D. L. (2006) Sense of belonging as connectedness, American Indian worldview, and mental health. Archives of Psychiatric Nursing, 20(S): 210-216. Hill presents the American Indian worldview in this article, noting the connections between American Indian peoples, their families, communities, tribes and the universe. Within this worldview a sense of belonging is critical. The balance between
the spiritual, emotional, physical and mental is discussed, while the author emphasizes the importance of belonging and social connections within the First Nation cultural identity. Factors creating a loss of belonging include prejudice, poverty and cultural breakdown.

Hill, D.M. (2009) Traditional Medicine and Restoration of Wellness Strategies. *Journal of Aboriginal Health* 5 (1): 6-25. Traditional medicine and knowledge can act as protective factors for at risk communities. Hill’s article reviews the literature on communities in crisis and the role of traditional knowledge, medicine and culture. Colonialism and mental health were common themes explored, with a focus on intergenerational trauma. Factors creating communities at risk include colonialism, assimilation via education, loss of value and support for women, and youth suicide. Protective strategies include the use of traditional knowledge and medicine as tools for empowerment, prevention and self-determination. Greater resources are needed to recover and retain traditional knowledge, medicine and culture in Aboriginal communities.

Ho, I. (2006) The role of Tele-opthalmology As Part of a Community Health Service to Remote Top-End Northern Territory Communities. Phd Thesis, University of Sydney. Indigenous people in Australia have a high prevalence of diabetes and diabetic retinopathy, a leading cause of visual impairment. This issue is compounded by limited access to specialists in rural and remote communities. In his dissertation Ho reports on the pilot study of the Topcon TRC-NW5S non-Mydriatic Digital Fundus camera, a tool for detecting diabetic retinopathy for rural and remote screening. Ho found that the system was an effective means for screening, increased screening rates in remote and rural communities and was a cost effective screening methods (rate of return greater than 60% of initial investment, projected savings of $111,121 Aus. over 7 years).

Ho, K., Jarvis-Selinger, S. (2006) A Pan Canadian Environmental Scan of Clinical Telehealth Activity Evidence Companion. Vancouver: University of British Columbia. This comprehensive document offers a picture of Canadian telehealth programs. The first part of the report offers a synthesis of findings while this second part details each territory and province individually and in-depth. While telemedicine programs were diverse, the researchers found growth in the use of clinical telemedicine across the country.

Ho, K., Jarvis-Selinger, S. (2004) The Role of Telehealth in Improving Access to Health Services and Education in British Columbia's Rural and Remote First Nations Communities. Vancouver: UBC Continuing Medical Education. Ho and Jarvis-Selinger note high rates of individual and community ill health among Aboriginal peoples – a situation intensified in rural and remote communities that lack sufficient access to health services and professionals. In this report they investigate telehealth readiness in rural and remote Aboriginal communities, identify the benefits and issues related to telehealth deployment in these areas, explore the impact of telehealth connectivity and discuss appropriate telehealth strategies.

Ho, L.S., Gittelsohn, J., Harris, S.B., Ford, E. (2006) Development of an integrated diabetes prevention program with First Nations in Canada. *Health Promotion International*, 21 (2): 88-97. Type 2 diabetes mellitus is a major cause of death among First Nations in Canada. The authors used multiple research methods to develop an integrated multi-institutional diabetes prevention program based on the successful Sandy Lake Health and Diabetes Project and Apache Healthy Stores programs. In-depth interviews, a structured survey, demonstration and feedback sessions, group activities, and meetings with key stakeholders were used to generate knowledge about the needs and resources for each community, and to obtain feedback on SLHDP interventions. First Nations communities were eager to address the increasing epidemic of diabetes. Educating children through a school prevention program was the most popular proposed intervention. Remote communities had poorer access to healthy foods and more on-reserve media and services than the smaller semi-remote reserves. While the reserves shared similar risk factors for diabetes, variations in health beliefs and attitudes and environmental conditions required tailoring of programs to each reserve.

can provide these women with health knowledge support and motivation. They preformed a content analysis on 101 health-related online conversations within a forum for Aboriginal women and noted that the postings reflected three levels of social support; emotional, informational and instrumental support. The chat forum created a virtual community for the women where shared experiences not only offered support but also encouraged self-efficacy, assertiveness and confidence. Aboriginal women also used the chat forum to shared stories about cultural traditions – serving to inform and promote Aboriginal medicine and culture.

Hoffman-Goetz, L., Friedman, D.B (2007) A qualitative study of Canadian Aboriginal women’s beliefs about "credible" cancer information on the Internet. *Journal of Cancer Education, 22* (2): 124-128. Criteria for evaluating the quality of cancer information on the Internet include source credibility and accuracy and currency of content. The cultural relevance of cancer resources is often overlooked in assessments of quality of Web sites. Interviews with senior Aboriginal women (n = 25) were conducted in Ontario to determine their beliefs about "high quality" and "credible" cancer prevention resources. Participants did not regard online cancer information from the medical community to be completely credible. They recommended that cancer resources include contact information for traditional healers in addition to local cancer agencies. Cultural appropriateness of cancer information should be assessed. Web resources considered credible according to published criteria may not be as relevant for Aboriginal populations.

Hogenbirk, J.C. (2009) Impact of Telehealth on Health Services Utilization by Members of First Nations Communities in Northwestern Ontario: Preliminary Investigations. *Canadian Society of Telehealth, Vancouver, October 3-6.* The net effect of telehealth on healthcare is not well-known. A comparative time series approach was used to examine hospital in-patient, day procedures, emergency department and provincial hospital insurance use by residents of First Nation communities with and without telehealth. Additional research is needed to more fully understand the specific impacts of telehealth provision on healthcare utilization.

Hogenbirk, J.C. (2008) Economic Evaluation of Keewaytinook Okimakanak Telemedicine: Federal and Provincial Cost Avoidances. *Centre for Rural and Northern Health Research, Laurentian University.* Keewaytinook Okimakanak Telemedicine (KOTM) provides telehealth services to First Nations communities in northwestern Ontario. In this report Hogenbirk discusses the results of the KOTM economic evaluation. Topics discussed include background information on KOTM, utilization of the network, and financial impact. Hogenbirk concludes that KOTM is already operating at “70% of the breakeven point for the telehealth service.”

Hogenbirk, J., Ramirez, R., Ibanez, A. (2006) Final Evaluation Report: KO Telehealth / NORTH Network Expansion Project. *Centre for Rural and Northern Health Research, Laurentian University; the School of Environmental Design and Rural Development, University of Guelph.* The Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project began with 5 First Nations communities and then expanded to 19 more First Nations communities located in the Sioux Lookout Zone in Ontario. This evaluation represented a comprehensive effort to measure short-term changes in access and sets the stage to measure potential long-term health effects. From April 2003 to December 2005, KOTH usage varied from 55 to 319 sessions/month (average= 128/month). First Nations communities averaged 12 sessions/month. Clinical consultations comprised 42% of the 2926 sessions, followed by education (19%), training (18%), meetings (13%) and demonstrations/tests/family visits (8%). The number of medical specialties, educational events and health programs offered via telehealth also increased. The stories and the statistics suggest that telehealth has “virtually” decreased the geographic distances that have, in the past, restricted access to health information and health services.

Hoolahan, B., Grosvenor, J., Kurtz, H., & Kelly, B. (2007) Utilizing technology to raise mental health literacy in small rural towns. *Learning in Health & Social Care, 6*(3): 145-155. In order to improve mental health literacy in isolated communities, a small study involving six interactive mental health information sessions was funded by the Australian Government’s Regional Health Service Program. Participants included over 250 health workers, carers, consumers and community members in 89 rural towns in New South Wales who were involved in one or more information sessions. Evaluations
were completed by 222 participants. Most participants (87%) found the mental health education topics valuable or very valuable for rural and remote communities. Participants felt that the access to information in general and local information that the videoconference sessions provided was very important (66%). Other benefits identified by the participants included the ability to network with other services and individuals (20%) and eliminating the necessity of travel (14%). The authors state that well designed, interactive educational sessions are beneficial to rural and remote towns.

Howard, P. N., Busch, L., Sheets, P. (2010) Comparing Digital Divides: Internet Access and Social Inequality in Canada and the United States. Canadian Journal of Communication, 35(1): 109-128. The authors compare the different policy interventions in Canada and the United States for addressing the digital divide – the difference among socio-economic groups in their access and use of ICT. Their research found that in terms of income, the digital divide in Canada closed more dramatically, and that in the United States the digital divide remains more pronounced in terms of education levels.

Hunter, L. M., Logan, J., Goulet, J. G., & Barton, S. (2006) Aboriginal healing: regaining balance and culture. Journal of Transcultural Nursing, 17(1): 13-22. Urban-based First Nation peoples and their healing traditions are examined in this ethnographic study. The study was conducted in a city in east-central Canada. Through interviews with clients and staff at an Aboriginal health center, as well as other community members, the researchers found that positive family and community relationships were part of following a cultural path.

Hunter, E., Travers, H., Gibson, J., & Campion, J. (2007) Bridging the triple divide: performance and innovative multimedia in the service of behavioural health change in remote Indigenous settings. Australasian Psychiatry, 15, S44-48. The authors argue that health literacy is the triple divide, and that some populations learn not through literacy-dependant media but through watching and listening. This paper discusses a program in North Queensland, Australia that addresses health issues through audio-visual media, using touch screens to access health information that is culturally appropriate.

INAC (2009) Evaluation of the First Nations SchoolNet Program. Final Report. Indian and Northern Affairs Canada, Evaluation, Performance Measurement and Review Branch. Ottawa, February 16. This evaluation report published by INAC reviews the First Nations SchoolNet (FNS) program that provides broadband infrastructure and services to First Nations schools and communities. The evaluation found that FNS remains an integral part of First Nations education on-reserve. The program has enhanced the educational experience of First Nations students, provided them with valuable skills and capabilities which have increased their competencies, improved their outlook on learning as well as their confidence in their futures. The program has also provided students with the option of staying in their communities with their families as they complete their education through distance learning which has positively affected retention and graduation rates while providing access to opportunities similar to students from provincial schools. This is in line with the Government of Canada’s commitment to increasing educational outcomes for First Nations students as well as INAC’s commitment to improving overall education programming.

Industry Canada (2001) The New National Dream: Networking the Nation for Broadband Access. Report of the National Broadband Task Force. Ottawa: Industry Canada. The National Broadband Task Force started with the belief that all Canadians should have access to broadband network services so that they can live and prosper in any part of the land and have access to high levels of education, health, cultural and economic opportunities. The report includes an action plan for achieving basic broadband access by 2004.

Isaak, C. A., & G. Marchessault (2008) Meaning of Health: The Perspective of Aboriginal Adults and Youth in a Northern Manitoba First Nations Community. Canadian Journal of Diabetes, 32(2): 114-122. In-depth interviews were conducted with adults involved with youth, and focus groups with youth were conducted in a northern First Nations community in Manitoba to explore how the two groups conceive of ‘health’. Data were analyzed using a modified grounded theory approach. Fewer youth than adults talked about balancing health through the Medicine Wheel, although they
consistently discussed all four elements of the wheel and maintaining good health. Traditional activities like sweat lodges, pow-wows, hunting and fishing were cited as being important for everyday life and health, as well as being in harmony with cultural values.

Iseke-Barnes, J., Danard, D. (2007) Indigenous Knowledges and Worldview: Representations and the Internet. In Dyson, L.E., Hendriks, M., Grant, S. Information Technology and Indigenous People. Hershey: Information Science Publishing: 27-36. The authors note that the representation of Indigenous peoples has been contextualized to an outsider worldview, thereby distancing information about Indigenous peoples from those whom it represents. This can create a loss of control over representation, and can be seen in the marketing of First Nation products online, such as Lakota medicine. The internet lacks context and is distant from many Native peoples. The authors argue that this distancing is part of an ongoing process of colonization, where individuals are separated from their selves, family, community, nation, land and world as well as their history, culture and traditions. Cyberspace reflects Western thought, which is fragmented and disconnected but at the same time dominant. The internet is impersonal, separating people in power from their subjects, but also encourages power among those who are active participants and can be used as an instrument of globalization, considered an expression of the colonial process. At the same time the internet can be used for anti-colonial education, and in the hands of First Nations peoples can be empowering.

Ives, N. G., & Aitken, O. (2008) Technology and Access: Responding to the Social Work Education Needs of First Nations and Inuit Communities, Social Work Education, 27: 683-692. Ives and Aitken discuss the outcomes of delivering social work education at a distance to Community Services staff members in Kahnawake, a First Nation community near Montreal. Course modules were offered via McGill University's MyCourse website and included readings, audio and video clips, reflection logs, quizzes and downloadable toolkits. Instructional support was available online via email and videoconferencing. Responses were positive, but issues included computer problems and access issues. The authors conclude that communities need to be involved and course material needs to be adapted for Indigenous communities otherwise social work could contribute to continued cultural imperialism and colonization.

Jacklin, K. (2009) Diversity within: deconstructing Aboriginal community health in Wikwemikong Unceded Indian Reserve. Social Science & Medicine, 68(5): 980-989. Through 350 interviews obtained during a community-wide needs assessment, Jacklin examines the community health of the Wikwemikong Unceded Indian Reserve (WUIR) in Ontario. Wikwemikong is composed of seven villages, and Jacklin suggests that the differences in the health status and risk-taking behaviors among the members of the various communities may be related to the differing colonial histories the villages faced. The author calls for a closer examination of the role of culture and colonialism in determining health for First Nations.

Jenkins, S. (1991) Community Wellness: A Group Empowerment Model for Rural America. Journal of Healthcare for the Poor and Undeserved, 1(4): 388-404. Rural communities need to empower themselves by establishing Community Wellness programs. Jenkins discusses what Community Wellness is and what is necessary for the implementation of Community Wellness Programs. Four case studies from Georgia are described and the barriers to implementation and lessons learned are discussed.

Jennett, P., Jackson, A., Ho, K., Healy, T., Kazanjian, A., Woollard, R., et al. (2005). The essence of telehealth readiness in rural communities: an organizational perspective. Telemedicine Journal and e-Health, 11(2): 137-145. The success of an innovation like telehealth depends on the readiness of practitioners and organizations that are implementing change due to the affect they have service delivery types and methods, work practise, power structures, time, learning and routines. It is important to assess readiness before expenditure on any technology starts. This is a study to assess the “essence” of readiness for telehealth of patients, practitioners, the public and organizations in rural Canadian communities using qualitative phenomenological research to ascertain the meaning of telehealth readiness.
Jock, R., Simon, M., Fox, G., & Nickerson, M. (2004) Finding an Aboriginal Digital Voice (Newsletter). E-government is using ICT to improve service delivery to citizens, collect, manage, use, share and protect information as a public resource, and have greater engagement with all of its citizens, including Aboriginal peoples. These applications may help communities overcome isolation, and address critical cultural, economic and social needs, but at the same time, they must not erode Aboriginal culture. A lack of infrastructure and capacity are the biggest obstacles, and a dialogue is needed with Aboriginal groups and Canadian society to address issues and problems further exasperated by technology such as issues of culture, identity, intellectual property, ownership of knowledge, symbols and other culturally sensitive information, reliability of information, ease of access to and navigation through information stores. There is no one-size-fits-all solution, so community-based input and control is needed to set appropriate priorities and apply the technology in a meaningful and useful way. Community champions can encourage uptake and citizen engagement, and guiding principles are needed in key areas to help facilitate planning, hence the Aboriginal Voice Cultural Working project.

Johnston, T. (2008) A Telehealth Initiative: Health Education By Video Conference. Presentation at the First Nations ICT Summit, Vancouver, February. Access to services and training is an issue for all Aboriginal communities. Telehealth technology has an important role to play in connecting health professional in the North to other resources. The project chose videoconferencing technology for delivery of courses on health and wellness. Videoconferencing can minimize the impact on the local organization; reduce the impact on students; reduce the cost of course delivery; eliminate geographical barriers; and enable a live classroom interaction. In Fall 2007 UBC Learning Circle and Inter Tribal Health Authority (ITHA) formed a partnership, with UBC providing content and speakers and ITHA providing promoting and scheduling services. In Fall 2007, ITHA Telehealth and ITHA Vancouver Island Chronic Care Project teamed up with Malaspina University College to bring mini credit courses to First Nations Communities via videoconference. In Fall 2007 ITHA began offering educational programming to all 51 First Nation Communities with videoconferencing capabilities. Video conferencing is a viable tool that can be used for course delivery to isolated nations. The author is Health Informatics Engagement Coordinator, Community Development, Informatics, and Research, Inter Tribal Health Authority in BC.

Jong, M., Kraishi, M. (2004) A Comparative Study on the Utility of Telehealth in the Provision of Rheumatology Services to Rural and Northern Communities. International Journal of Circumpolar Health 63(4): 415- 419. Due to a shortage of rheumatology services in rural and northern communities, Jong and Kraishi conducted a study comparing satisfaction rates of various referral methods. In the study three rural communities in Newfoundland and Labrador were each assigned one method of outreach rheumatology services; scheduled videoconference consults, email access to the rheumatologist or a visiting clinic. Although all of the physicians responded positively to the methods, the response from the physicians using videoconference was the most positive because of immediate feedback, case based learning and knowledge transfer. This study was limited due to the small number of participants.

Jong, M. (2004) Managing Suicides Via Videoconferencing in a Remote Northern Community in Canada. International Journal of Circumpolar Health 63(4): 422-426. Due to the large number of telemedicine pilot projects, there are few studies that determine the cost-effectiveness of telemedicine over a lengthy period of time. In this article Jong adds to the literature on the cost-effectiveness of telepsychiatry. By calculating the cost of flying patients from the rural community of Nain to secondary care facilities for assessment and comparing this cost to that of video-consultants, Jong demonstrates that the system saves $1,500 per consultation. Additionally, user satisfaction was assessed with positive results.

Jules, J., Steves, J. (2008) AOA Process and Model for Forest Development in the Kamloops TSA. (AOA = Archaeological Overview Assessment); (TSA = Timber Supply Area). Presentation at the First Nations ICT Summit, Vancouver, February. This presentation is an outline of AOA model, a digital tool to assess the risk or potential for finding archaeological evidence. The scale of zoning is for forestry. The model suggests areas of high and medium potential- that could require more detailed field assessments and suggests areas of low potential – that could have no further
assessment. It can be used as a tool to support expedited processes. The original (2002) model for the AOA was to involve First Nations more directly in the archeological assessment process by developing a business relationship with licensees to conduct the archaeological assessments. They also sought greater precision in the model’s ability to predict the occurrence of archaeological evidence by the incorporation of traditional use and cultural information. And to increase the operational accuracy of the model to the 1:20,000 scale. The final goal was to make the process more cost effective and efficient for all interested parties. That model is currently being revamped.

Keewaytinook Okimakanak (2005) Position Paper: Turning the Corner with First Nations Telehealth. Prepared by John Rowlandson & Associates. May. This report includes an overview of the development of KO Telehealth (now KO Telemedicine), Canada's busiest and largest First Nations telemedicine program, encompassing more than 25 sites by the end of 2005. KO Telehealth designed, implemented and refined a First Nations service model that supports and sustains telehealth services in Ontario’s most remote and northern communities. The report covers KO Telehealth’s Accelerated Access Plan, an overview of the direct service benefits of telehealth, an assessment of telehealth as an agent of change, First Nations capacity and socio-economic development, and a history of the growth of KO Telehealth. The report contains a range of very useful information and analysis, including an appendix outlining how KO Telehealth relates to the WHO determinants of health.

Keewaytinook Okimakanak Research Institute (2008) MMW Mental Health Project Evaluation 2005/2006 2006/2007. Hasham Consulting. This report details an overview, evaluation and recommendations of The Keewaytinook Okimakanak (KO) Mental Health Mashkikiwininiwag Maziinaatesijigan Wichiiwiwin (MMW) Non-Resident Project from 2005-2007. The MMW project provides capacity building and mental health services in six remote First Nations communities in Ontario’s far North. Outcomes included increased continuity of care, healing, and education through prevention and promotion activities. Activities included training courses offered through videoconferencing, and telecounseling and telepsychiatry. Recommendations include further developing support for training (both online and videoconference) as well as clinical videoconferencing, as well as developing a Mental Health Web Portal.

Keewaytinook Okimakanak Research Institute (2005) C-Band Public Benefit - Keewaytinook Okimakanak's Kuhkenah Satellite Network work 2001-2005: Summative Overview - Assisting Remote Communities Across Canada to Access & Use C-Band Public Benefit. March 28. The report provides a detailed description of the teamwork by the K-Net team beginning in 1998 as it looked beyond its own regional partners in the Sioux Lookout region in Ontario’s far north and began to work with partners in the Kativik Regional Government (KRG) in northern Quebec and the Keewatin Tribal Council (KTC) in northern Manitoba. The K-Net team utilized the C-Band Public Benefit to provide KRG in particular with the necessary support to extend connectivity to their remote communities in northern Quebec. The formation of the Northern Indigenous Community Satellite Network (NICSN) is the result of this pioneering work.

Kenny, C., Walmark, B., O'Donnell, S. (2005) Report From the Field: The RICTA Meeting Video. Journal of Community Informatics 1(3). This article describes a short video created as part of the RICTA network (Research on ICT with Aboriginal Communities). The video, which includes interviews with leading academics working in this field, discusses the importance of working in close collaboration with Aboriginal communities on this research topic.

Kimber, M., & Peterson, G. (2006) Telepharmacy - Enabling Technology to Provide Quality Pharmacy Services in Rural and Remote Communities. Journal of Pharmacy Practice & Research, 36(2): 128-133. Telepharmacy programs in the United States have been successful: the results of telepharmacy in Australia have been mixed. This article reviews the state of pharmacies in rural Australia as well as telepharmacy models in the United States before discussing the situation in Australia.

King, M., Smith, A., Gracey, M. (2009) Indigenous health part 2: The underlying causes of the health gap. Lancet 374: 76-85. In this article the authors provide clinicians with a framework to
promote more culturally appropriate ways to assess, treat and interact with Aboriginal peoples. Their main argument is that there needs to be an Indigenous perspective on the causes of poor health, drawn from experiences of Indigenous peoples in North America (Canada specifically) as well as New Zealand and Australia. They note that health issues arise from a combination of general socioeconomic factors as well as cultural and historical factors particular to the individual group or community.

Kirmayer, L. J., Brass, G. M., & Tait, C. L. (2000) The Mental Health of Aboriginal Peoples: Transformations of Identity and Community, *Canadian Journal of Psychiatry* 45: 607-616. Mental health problems can have social origins, and, in the case of First Nations communities, mental health issues can be the result of the colonization legacy. In this article the authors place an important emphasis on the differences experienced within individual Aboriginal communities. The authors present a thorough overview of first contact and colonization, including the removal of children to residential schools. Next they examine levels of suicide, violence and alcoholism within communities, examining data from the First Nations and Inuit Regional Health Surveys (1997) and epidemiological studies in Quebec (Cree and Inuit, 1991, 1992).

Klinck, J., C. Cardinal, K. Edwards, N. Gibson, F. Bisanz, and J. Da Costa (2005) Mentoring Programs for Aboriginal Youth. *Primatisiw: A Journal of Indigenous Community Health* 3(2): 109-130. Mentoring programs for Aboriginal youths, and literature on such programs, is rare. Researchers conducted focus groups and interviews among First Nation leaders, family members and youths of local First Nation rural and urban communities (First Nation and Métis) in Alberta and test piloted a national Aboriginal mentoring program. Key factors necessary for program success include the need for community member collaboration (including youth), inclusion of mentee's family, inclusion of traditional and local cultural values, and adequate resources for sustainability (non-monetary support and incentives for volunteers, community ownership, embed programs into existing ones).

Kokesh, M.D., Ferguson, A.S., Patricoski, C., LeMaster, B. (2009) Traveling an Audiologist to Provide Otolaryngology Care Using Store-and-Forward Telemedicine. *Telemedicine and e-Health* 15(8): 758-763. In this project, an audiologist travelled to remote Alaska to communicate with an otolaryngologist using store-and-forward consultation. The analysis is based on 1,458 patient encounters over a 57 month period. The cost of the project was $141,114 and the cost of the travel saved was $496,420. The services were provided at a significantly lower cost and presented fewer burdens to patients compared with standard referrals.

Krieg, B., Martz, D. (2008) Meeting the Healthcare Needs of Elderly Métis Women in Buffalo Narrows, *Saskatchewan Journal of Aboriginal Health*, 4(1). This article outlines a community-based research project conducted with elderly Métis women. A community researcher (and resident) was trained and conducted semi-structured interviews in the language of the participants. The researcher found multiple barriers to access of health care services including availability (delays, staffing issues), accessibility (problem of transportation), affordability (prescriptions, ambulance, meal delivery, travel costs), acceptability (social isolation/lack of interaction; language barriers) and accommodation (lack of flexibility in office hours/appointment time).

Kruse, J.A., White, R.G., Epstein, H.E., Archie, B., Berman, M., Braund, S.R. et al. (2004) Modeling sustainability of Arctic communities: An interdisciplinary collaboration of researchers and local knowledge holders. *Ecosystems*, 7 (8): 815-828. How will climate change affect the sustainability of Arctic villages over the next 40 years? This question motivated a collaboration of 23 researchers and four Arctic communities (Old Crow, Yukon Territory, Canada; Aklavik, Northwest Territories, Canada; Fort McPherson, Northwest Territories, Canada; and Arctic Village, Alaska, USA) in or near the range of the Porcupine Caribou Herd. The team drew on existing research and local knowledge to examine potential effects of climate change, petroleum development, tourism, and government spending cutbacks on the sustainability of four Arctic villages. They used data across eight disciplines to develop an Arctic Community Synthesis Model and a Web-based, interactive Possible Futures Model. Scientists and stakeholders agreed that (1) although simulation models are incomplete abstractions of the real world, they helped bring scientific and community knowledge...
together, and (2) relationships established across disciplines and between scientists and communities were a valuable outcome of the study.

Ladner, K. (2009) Understanding the Impact of Self-Determination on Communities in Crisis. *Journal of Aboriginal Health* 5(2): 88-101. The author conducted a comprehensive review of the literature on self-determination and communities in crisis over the past 15 years and concludes that the research demonstrates a link between self-determination and community well-being. The specific model of Aboriginal governance is important and the author calls for a radical restructuring of Aboriginal governance models that focus on decolonization and gender issues.

Laird, S. (2009) Living Made Easy: A Nurse-led Telemedicine Service for People Living with Epilepsy in Remote Areas Benefits Patients and Health Staff. *Nursing Standard* 23(31): 18-20. In Northern Ireland and Scotland epilepsy patients can attend specialist consultations via videoconference. Laird notes that this service is of particular importance to many epilepsy patients because they may not be able to drive. Such consultations have been going since 2001, and patient satisfaction has risen from 90% to 100% by 2003. The system is also used for teaching family physicians and nurses in rural areas epilepsy awareness. In future the service will be extended to other areas in Ireland and Scotland.

Lalonde, C.E. (2009) Can a Community be Called ‘Mentally Healthy’? Maybe, but Only When the Whole Really is Greater Than the Sum of Its Parts. In Canadian Institute for Health Information, ed. *Mentally Healthy Communities: Aboriginal Perspectives*. Ottawa: CIHI: 33-37. Lalonde states the importance of assessing communities individually, and not proclaiming the existence of an epidemic of suicide in all First Nation communities. Recounting his work with more than 800 youth, Lalonde discusses the identity formation process and what it means to declare a community “healthy.” In the identity formation process young people go through stages of reasoning which is influenced by their cultural background. First Nation youth generally employ a “narratives style” which connects the individual and their cultural world. Failure in the identity formation process is linked to suicide. In this article Lalonde shares community-level indicators that can assess cultural continuity – those communities who score highly in the indicators have lower levels of suicide and injury.

Lane, P., Bopp, M., Bopp, J., Norris, J. (2002) Mapping the Healing Journey: The Final Report of a First Nation Research Project on Healing in Canadian Aboriginal Communities. Ottawa, Ontario: Aboriginal Corrections Policy Unit. This report is the result of intense community-based consultations with six Aboriginal communities: Eskasoni in Cape Breton, NS, Esetemc in Alkali Lake, B.C., Hallow Water in southeastern Manitoba, Mnjikaning at Rama, ON, Squamish near Vancouver, BC, and Waywayseecappo in southwestern Manitoba. As a result of these consultations the study examined intergenerational trauma resulting from numerous “shock waves” including: disease; loss of traditional economies, identity, culture, language, Indigenous forms of governance; the breakdown of healthy individual, family and community life resulting from the introduction of alcohol, drugs, and loss of relationships leading to anger, rage, abuse and depression. The authors note that this cycle needs to be disrupted with Aboriginal healing programs that focus not just on the individual but also the family and the community. The goal of the report is to provide a comprehensive “map” of the healing process based on a literature review, project documentation review, case study site visits, consultation meetings and key informant interviews and consultative support. By providing clear definitions, principles and processes, the authors see the documents as important for Aboriginal communities and all levels of government.

Lavoie, J., Williams, D. (2009) Managing changes in First Nations’ healthcare needs: is telehealth the answer? *Journal of Community Informatics* 5(2). Lavoie and Williams investigate the health needs of First Nations people living on-reserve. Due to chronic conditions with complex morbidity resulting in the need for specialized care, they argue that healthcare services on-reserve are facing increasing challenges that telehealth can help address. More specifically, the authors investigate how the Keewaytinook Okimakanak Telemedicine program helps close the information gap between funded programs and changing needs.
Law, S.F., Hutton, E.M. (2007) Community psychiatry in the Canadian Arctic – reflections for a 1-year continuous consultation series in Iqaluit, Nunavut. *Canadian Journal of Community Mental Health* 26(2): 123-140. Mental health issues in the Canadian Arctic are connected with interpersonal, socioeconomic and societal changes. In their one-year study of client charts from psychiatric consultations in Iqaluit, Nunavut, the authors found extensive interpersonal and socioeconomic stressors leading to psychiatric crises, including the following negative health determinants: overcrowding, substance abuse, domestic violence, unemployment and legal charges. They note that in order for community mental services to address mental health issues in Nunavut, they must expand beyond the medical model.

Leclair, C., Warren, S. (2007) Portals and Potlach, In *Information Technology and Indigenous People*, eds. L.E. Dyson, M. Hendriks, S. Grant. Information Science Publishing: Hershey PA: 1-13. Leclair and Warren are Métis scholars and members of the Métis Women’s Circle. In this article they discuss the importance of sharing in Métis culture and the potential benefits and issues surrounding the use of information technology (IT). IT can be an important resource for sharing knowledge, creating new opportunities and partnerships and can reduce “brain drain” in rural and remote communities. At the same time the use of IT might breach communal and individual rights when reciprocity, respect and responsibilities are not met.


Lessing, K., Blignault, I. (2001) Mental Health Telemedicine Programmes in Australia. *Journal of Telemedicine and Telecare*. 7: 317-323. The article outlines the results of a national telemedicine program in Australia. Mental health is the most common telehealth application in Australia, making up 1/3 of all telehealth applications. 25 programs were surveyed and 23 organizations responded. 16 of the programs handled 526 clients, 75% (397) of whom were located in rural or remote location and 7% were Aboriginal or Torres Strait Islanders (Indigenous people culturally akin to the coastal peoples of Papua New Guinea). Videoconferencing was used less for clinical activities and more for education (medical education) peer support, administration, professional supervision and connecting families.

Lewis, J.L. Sheppard, S.R.J. (2006) Culture and communication: Can landscape visualization improve forest management consultation with Indigenous communities? *Landscape and Urban Planning*, 77 (3): 291-313. Members of Indigenous communities may find it difficult to engage with technical information presented using typical resource management planning media, such as maps and reports. One technique that has been successful in public consultation in other fields is the use of realistic three-dimensional (3D) visualizations of the future landscape under different scenarios. This study represents one of the first to assess the acceptability and effectiveness of photo-realistic landscape visualizations with First. This study with the Cheam Band of the Fraser Valley in BC presented a small sample of community members with various landscape management scenarios in the form of simple GIS maps and photo-realistic images. The newer visualization medium was readily accepted by the community members, despite its novelty. Band members commented on some shortcomings of the maps, but generally found the visualizations to be helpful and more meaningful. However, further studies are needed to replicate these exploratory findings with other First Nations communities, to validate the information provided by visualizations, and support more robust guidance for their use in practice.

Lowe, J. (2002) Cherokee Self-Reliance. Journal of Transcultural Nursing 13(4): 287-295. Self-reliance is a key concept to the health and well-being of the Cherokee, so much so that it is part of their Nation's constitutional mission statement. Lowe points out that few studies have been conducted on adult or elderly Native Americans concerning Native concepts of ‘self’. Moreover, those that do exist are based on results from tests standardized on other populations that are grounded in different cultural belief systems. Lowe summarizes studies of the concept of ‘the self’ in Native Americans from early anthropological studies, to more recent psychologically oriented studies.

Lulua, M., Flannery, M. (2009) An Introduction to the Tsilhqot’in Stewardship Planning Portal. Presentation at the First Nations ICT Summit, Vancouver, February. This presentation, from the Carrier Sekani Tribal Council in British Columbia, gives an overview of the portal, which became operational in 2007. The portal is an interactive, web-based land use information management and planning support system. It includes interactive display of map data. The portal was designed to increase First Nation participation in land and resource management, to ensure compatibility of current land uses with traditional uses and values, and to encourage interest and involvement of First Nation youth by using technology.

Maar, M.A., Seymour, A., Sanderson, B., Boesch, L. (2010) Reaching agreement for an Aboriginal e-health research agenda: the Aboriginal telehealth knowledge circle consensus method. Rural and Remote Health, January. This research project developed an Aboriginal e-health research agenda designed to address the substantial knowledge gaps impeding e-health deployment and adoption particularly in rural and remote Aboriginal communities in Canada. The article outlines the method used to develop this research agenda, and the results of the process.

Maar, M., Seymour, A.M. (2008) Development of the Aboriginal Telehealth Knowledge Circle Research Agenda. Canadian Society of Telehealth, Ottawa, October 5-7. The mission of the Aboriginal Telehealth Knowledge Circle (ATKC) is to improve the health of Indigenous peoples by expanding the use of telehealth services, supporting health providers and increasing the involvement of Indigenous peoples in telehealth. The ATKC believes that Aboriginal telehealth research must involve communities at the grass roots level and be guided by cultural traditions.


Magiera, V., Cleary, M., White, T., McCulloch, K., White, L., Crowshoe, C., Sarin, C. (2008) Building Partnerships and Clinical Telehealth between Siksika Nation and Calgary Health Region. Canadian Society of Telehealth, Ottawa, October 5-7. This presentation reviews the results of this service. Successful tele-psychiatry consults to Elbow River Healing Lodge in Alberta went live in April 2008. Endocrinology and dermatology services will commence in summer 2008. The authors believe that telehealth will develop through mutual respect for partnerships.

Mahmood, O. (2006) Blend of Technologies to Facilitate Health Practitioners in Remote and Rural Australia. Journal on Information Technology in Healthcare, 4(6): 366-372. In Northern Australia 20% of Indigenous populations live in very remote areas. Access to these areas for medical or therapeutic purposes is slow and expensive, and migration of patients in these areas results in a lack of continuity of healthcare. To resolve this issue Mahmood discusses a Data Grid and Data Recharging management system used with wireless data communication protocols and technologies – a blending of wireless and software technologies.

Maki, Don (2008) What NOT to do in Building a Network: Lessons Learned. Presentation at the First Nations ICT Summit, Vancouver, February. This presentation is an overview of the network that was started in 2001 to save the Ktunaxa language but is not there yet. There are about 20 First Nation Nondominant Carriers on the CRTC federal register of 230 major and small carriers registered. This number is growing. Why? Because First Nations are taking a stand on building their own connectivity since other providers are not able to come in and find a business model to support it.
What does it mean to build your own network? It means to come up with a vision of what you want, decide how you will finance the project, review your territory or geographical needs, develop possible partners, have some knowledge of current technology, and make decisions early on if you are just an owner, or an owner operator. The vision of their network is still to use this technology to further the work in language renewal. Using digital language files in all of the communities required broadband. The presentation is a step-by-step overview of how to develop a network. The author is Sector Director, Traditional Knowledge and Language, Ktunaxa Nation Council, Cranbrook, BC.


Margolis, S. A., & Ypinazar, V. A. (2008) Tele-pharmacy in remote medical practice: the Royal Flying Doctor Service Medical Chest Program. Rural & Remote Health, 8(2). The Royal Flying Doctor Service is a telemedicine consultation service in Australia that has been in operation since 1942. It involves a Medical Chest Program – a chest containing medications and equipment that are prescribed for emergency care and treatment of minor conditions via telehealth consultation. In this article the authors outline the history of the program and the current utilization of the Royal Flying Doctor Service.

Marlin, A., & Bruce, D. (2005) Broadband Adoption, Use, and Impacts in Eel Ground First Nation, New Brunswick: A Case Study. This paper describes a research study that drew on primary and secondary data, to provide a benchmark of broadband use, and to understand social and economic impacts of broadband in four case study communities. The study identifies key criteria and success factors for economic development via broadband through a literature review and identifies and measures economic changes. The results cannot be generalized and may not be representative, but the authors suggest that there is some economic, social, institutional and community impact on business and households. The study recommends future research.

Masum, H., Brooks, M., Spence, J. (2005) MusicGrid: A case study in broadband video collaboration. First Monday [Online], 10(2). The authors describe a study to demonstrate how video-based technologies can promote collaboration and learning. The MusicGrid Project (2002 to 2004) ran more than 100 multi-site videoconferencing education and performance sessions. Two Inuit communities were involved, connecting schools in Kangiqsualujjuaq (northern Québec) and Iqaluit (Nunavut). The remote Inuit community of Kangiqsualujjuaq had no music program prior to MusicGrid. MusicGrid provided a group of ten fifth- and sixth-grade students weekly violin lessons for one and a half school years, and another group of eight children with weekly keyboard lessons for one school year. Later, a teacher in Ottawa was found to teach a group of six high school girls traditional throat singing and drum dancing. This knowledge had been lost from the community, but through the project it was being rediscovered from experts elsewhere who have kept alive the ways of traditional music. Girls from the community have performed via broadband video for audiences in North America, Europe, and Hawaii.

McBride, B. A. (2003) Aspects of community healing: experiences of the Sault Sainte Marie Tribe of Chippewa Indians. American Indian & Alaska Native Mental Health Research, 11(1): 67-83. McBride is a Chippewa member of the Bawaating (Sault Sainte Marie) community, in Michigan, US. Little research has been conducted on the topic of community healing, and in this article she summarizes the few reports to be found.

McClelland, L., Faulkner, K., Gale, J., Johnstone, K. (2003) A Partnership model for the delivery of health education to rural and remote communities using multipoint videoconferencing. Journal of Telemedicine and Telecare, 9(suppl. 2): 30-32. Women’s Health Queensland Wide (WHQW) has been using multipoint videoconferencing to deliver health education. This article discusses the education program as well as a follow-up study conducted via telephone interviews. The authors found that the project did improve social capital and that the success of the project was not just
measurable in clinical outcomes and cost-effectiveness but also social and community effects. Researchers found evidence of greater interaction and collaboration in communities, with three social capital prerequisites achieved – bonding with people, bridging networks and linking people to institutions and governments.

McGrath, P., Holewa, H., & McGrath, Z. (2007) Practical problems for Aboriginal palliative care service provision in rural and remote areas: equipment, power and travel issues. Collegian, 14(3): 21-26. Little is written on palliative care services provided to Australia’s Indigenous population living in remote and rural areas. McGrath and colleagues report on a research project funded by Australia’s National Health and Medical Research Council (NH&MRC) which collected 72 interviews regarding Indigenous palliative care in rural, remote and sparsely populated areas in Northern Australia. Participants included patients, Aboriginal health workers, healthcare workers, carers and interpreters. This article focuses on the obstacles associated with palliative care in rural and remote locations, including equipment (lack of equipment, funds, awareness re: the types of equipment available, delays between ordering and getting equipment), transport (cost), power (no electricity, issues with solar powered sources or generators, cost), telephone access (solar power phones or sometimes no access at all) and distance (physical geography and weather).

McFatridge, C., Muller, N. (2009) Protecting Mother Earth Through First Nations Telemedicine. Canadian Society of Telehealth, Vancouver, October 3-6. Keewaytinook Okimakanak Telemedicine has calculated the amount of CO2 emissions averted through telemedicine clinical consults. In 2008, KOTM held 2,574 clinical consults, leading to a CO2 reduction comparable to removing 216 passenger cars from the roads for the same year. Through personal interviews, Elders and leadership voiced the traditional value placed on respecting First Nations land by decreasing the carbon footprint.

McIvor, O., Napoleon, A., Dickie, K.M. (2009) Language and Culture as Protective Factors for At-Risk Communities. Journal of Aboriginal Health 5 (1): 6-25. Language and culture have important roles to play in Aboriginal communities, but few scholars examine the links between language, culture and health. In this article McIvor and colleagues review foundational literature linking culture and health; the majority examine the cultural appropriateness of delivering Western healthcare services. Nevertheless, five cultural themes influencing health emerged in a few studies examined in the literature review. These themes were: A connection between land and health; traditional medicine; spirituality as a protective factor; traditional food and traditional activities. The literature search revealed that traditional language does act as a protective factor which cannot be overemphasized. The authors note that these five cultural themes, and a six, that of language need to be examined further.

McKelvey, F., O'Donnell, S. (2009) Out from the Edges: Multi-site Videoconferencing as a Public Sphere in First Nations. Journal of Community Informatics 5(2). This article examines multi-site videoconferencing as a public sphere. The theory of the public sphere highlights the political effects of multi-site videoconferencing and how the technology contributes to the well-being of the community. To analyze the political effects of videoconferencing, the paper describes a case of community use of multi-site videoconferencing based on video analysis and semi-structured interviews. The case occurred in 2007 and connected a number of First Nation communities across Canada for simultaneous audio-visual exchange. The case meeting shows a potential new opportunity to further integrate videoconferencing into community development.

Mignone, J., & Henley, H. (2009) Implementation of Information and Communication Technology in Aboriginal Communities: A Social Capital Perspective. Journal of Community Informatics 5(2). The study - based on a literature review, interviews with key informants and roundtables across Canada – assesses the plausibility of the impact of ICT on communities from a social capital perspective, particularly how ICT is a potential tool for strengthening communities’ resources, networks and ethos. The report includes several policy recommendations: ICT infrastructure needs to be considered a right; the importance of ICT infrastructure to social enterprises and social economies; the crucial role of government and the need to move toward longer-term funding models; the need for investment in human resource capacity building to support ICT development in communities; the
addressing the significant differences between urban and remote-rural settings; the obvious need for further research; and emphasizing that ICT is in essence about relationships.

Mignone, J. (2003) Measuring Social Capital: A guide for First Nations Communities. Ottawa: Canadian Institute for Health Information. This report investigates healthy First Nation communities by looking at social capital as a determinant of health. Conducted by First Nation communities, The Assembly of Manitoba Chiefs and the Centre for Aboriginal Health Research at the University of Manitoba, the report is meant to inform others about the research conducted in Manitoba. Mignone provides a framework and tool for understanding social capital in First Nations communities.

Miller, E. L. (1999) Native American tribal websites. Social Education, 63(1): 54-55. This is a listing of websites with their URLs, which have been created and maintained by different Native American nations in the United States.

Milliken, M., O'Donnell, S., Gorman, E. (2009) How K-Net and Atlantic Canada's First Nation Help Desk are using videoconferencing for community development. Journal of Community Informatics 5(2). When the costs associated with travel to and from remote and rural First Nation communities are calculated, social and geographic relations still restrict opportunities for face-to-face communication and access to resources. Technology such as videoconferencing has been a powerful tool for overcoming these barriers; it enables people to stay where they are “from”, and still engage in face-to-face audio and visual communication with people at one or more locations anywhere in the world. This paper draws on interviews with the technical and administrative staff of K-Net in Sioux Lookout Ontario and the Atlantic Canada’s First Nation Help Desk in Cape Breton, Nova Scotia to explore the ways that videoconferencing between two or more sites has facilitated local community development.

Mitchell, D. (2007) Broadband at the Margins: Challenges to Supernet Deployment in Rural and Remote Albertan Communities. In D. Taras, M. Bakardjieva & F. Pannekoek, (eds.) How Canadians Communicate II: Media, Globalization, and Identity. Calgary: University of Calgary Press: 261-287. Canadians are using new media in different ways that demonstrate interactive levels of communication; as a result the experience of users online has become more like searching in a library rather than watching television. Platforms like inexpensive videoconferencing allow people to pick up on no verbal cues missing from telephone of text-mediated modes of technology. Broadband networks enable these types of online interactions. In this article Mitchell discusses the construction of the Alberta SuperNet – a broadband network subsidized by the provincial government that will cover 95% of communities across Alberta for a fixed rate irrespective of location in order to further develop the province socially, culturally and economically.

Modai, I., Jabarin, M., Kurs, R., Barak, P., Hanan, I., & Kitain, L. (2006) Cost effectiveness, safety, and satisfaction with video telepsychiatry versus face-to-face care in ambulatory settings. Telemedicine Journal and e-Health, 12(5): 515-520. The use of videoconference for mental healthcare allows for assessment and treatment for those who live in rural and remote communities. This study investigates the use of videoconference for mental healthcare compared to in person treatment in Or Akiva and Hadera, Israel. 39 patients completed the study, and there were 42 in the comparison group (in person treatment) Over the year both patients and physicians meeting over videoconference were satisfied with the method; however the researchers found that the videoconferencing method was more expensive than in person treatment, with a trend towards increased hospitalization. This was the case because the distance between the rural communities and the main clinic was between 15-20 km.

Molyneaux, H., O'Donnell, S. (2009a) ICT and Health and Wellness in Remote and Rural First Nations Communities: A Social Determinants of Health Perspective. Canadian Society of Telehealth, Vancouver, BC, October 3-6. The topic of information and communication technologies (ICT) for health is generally framed as telehealth and other technology processes that enable delivery of mainstream health services. However First Nation communities are also using ICT for community development activities that contribute to improved health and wellness. Based on the preliminary results of a literature review on how ICT is being used in remote and rural First Nations, this paper
uses a social determinants of health perspective to begin to create a broader understanding of how ICT can contribute to community health and wellness in remote and rural First Nations.


Moo, S., & Fletcher, J. (2007) Northern Territory HealthConnect: shared electronic health record service implementation experiences and benefits realized in Indigenous health. Studies in Health Technology & Informatics, 129(Pt 1): 297-301. This article outlines the findings from the trial to implementation of Health Connect Northern Territory (HCNT) Shared Electronic Health Record Service (SEHR) in Australia. The trial began as a way to improve care in remote and rural areas of Australia through a secure Health Connect repository. In this system medical and hospital discharge summaries were sent over a secure network to a repository where authorized providers access the documents (with consumer consent). 1,800 consumers and 49 registered providers participated in the trial.

Muttitt, S., Vigneault, R., Loewen, L. (2004) Integrating telehealth into Aboriginal healthcare: the Canadian experience. International Journal of Circumpolar Health 63(4): 401-414. Challenges to implementing telehealth are not unique to Aboriginal communities; however Aboriginal communities face additional issues as a result of political, cultural and jurisdictional issues as well as issues concerning geography, cross-jurisdictional services, technical infrastructure, human resources, and community readiness. This article examines these issues in detail.

Naditz, A. (2008) Canada's IT Leader funds Native Telehealth. Telemedicine Journal and e-Health, 14(1): 8-9. According to the First Nations Region Longitudinal Health survey almost 20 % of adult native Canadians do not have access to a doctor or nurse within their own community. Telehealth is seen as a way to overcome barriers to healthcare access, and this news article reports on Canada Health Infoway’s plan for funding telehealth deployment in First Nation communities.

NAHO (2009) Honouring Life Network: New Media in Suicide Prevention. Presentation at the National Aboriginal Health Organization (NAHO) National Conference, Ottawa, November. This presentation gives an overview of the Honouring Life Network website, which was launched in April 2008. The website is a resource to address the crisis number of suicides in First Nations, Inuit and Metis communities. The primary focus is to provide information and create networks to increase resiliency and reduce suicide in communities. The Network is the result of an agreement between the Indian Health Service in the US and Health Canada First Nations and Inuit Health Branch (FNIIHB). Information on the website is available in English, French and Inuktitut. The four components are: a referral page for at-risk youth, a youth corner, a resource centre and a youth workers’ forum. The website offers culturally relevant information and resources on suicide prevention to help Aboriginal people deal with a problem that has reached crisis proportions. It offers support for awareness-raising, self-reflection, inspiration and learning.
Napoli, M. (2002) Holistic healthcare for native women: an integrated model. *American Journal of Public Health, 92*(10): 1573-1575. In this article the importance of Native women gathering together for support is emphasized. The integrated healing approach taken in a Native women’s health group in the Yavapai community in Arizona is discussed. Women in this group were grandmothers who have diabetes or arthritis and were recovering from alcoholism. They met weekly at the community healing center and participated in group activities including storytelling, meals, yoga, walks, retreats and field trips and education sessions (with guest speakers). Naopli notes how the integrated model – which involves not only theory and technique but also bonding experiences – is effective when working with Native women, who view body, mind and spirit as parts of what make them a whole person.

Native American Times (2009) VA’s telemove program offered to Native veterans. *Native American Times, 15*(19): 2-2. Recognizing that among all minority populations Native Americans have the highest rate of serving members in the armed forces, this newspaper article announces that Native American veteran participants in Oklahoma are currently being sought for the TeleMOVE program. A national VA program for weight loss involving home monitoring, the TeleMOVE program uses a home health monitor, digital scales and a phone line to track daily health and offer positive reinforcement.

Nickerson, M., Kaufman, J. (2005) *Aboriginal Culture in the Digital Age* (Aboriginal Voice Cultural Working Group Paper) Toronto. The Crossing Boundaries Aboriginal Voice is a multi-stakeholder project involving national Aboriginal organizations, federal government departments, provincial and territorial governments, and the KTA Centre for Collaborative Governance. The project is designed to build understanding, develop recommendations, and influence policy and development of Aboriginal e-Government. In the cross-country regional forums for consultation run by the project, both the possibilities and concerns for ICT were raised. Possibilities are: to promote language, culture and community connectedness, and strengthen Aboriginal identity. Concerns are the impact on traditional culture and knowledge, who controls information and what information goes public, as well as how it will be accessed and used have been raised. This paper recognizes renaissance in Aboriginal cultures, the presence and power of ICT in daily life and how that is transforming economy, society and culture, and preserving and protecting Aboriginal language, ecology and heritage.

O’Connor, J., O’Connor, C., Anderson, K., Boyes, M., Mah, S. (2008) From Nova Scotia to Alberta, A General Medicine Telehealth Clinic for a First Nations Community. *Canadian Society of Telehealth, Ottawa, October 5-7*. An evaluation of a cross-jurisdictional general medicine telehealth application was developed and implemented. The analysis found that patients saved more than 1.54 hours per visit and repeated telehealth use increased as people accepted the service. A significant level of satisfaction and acceptance was measured by the band members.

O’Donnell, S., Walmark, B. and Hancock, B-R. (2010) Videoconferencing and Remote and Rural First Nations. In White, J.P., Peters, J., Beavon, D., Dinsdale, P. (eds). *Aboriginal Policy Research VI: Learning, Technology and Traditions*. Toronto: Thompson Educational Publishing: 128-139. First Nations are using videoconferencing not only for health and education but also in other ways for community, economic and social development. This paper discusses findings from a SSHRC-funded study of First Nations organizations that are supporting the use of video communications by rural and remote communities. The discussion explores why visual communication is important for First Nations, the prevalence and purposes of videoconferencing in non-institutional settings, and the challenges the communities experience using this technology. The paper includes recommendations for policy makers to support the more widespread use of this powerful communication technology by remote and rural First Nations.

O’Donnell, S., Perley, S., Simms, D., & Hancock, B-R. (2009) Video communication roadblocks facing remote Indigenous communities. *IEEE Technology and Society Magazine, 28*(2): 16-22. This article discusses the challenges for video communications in remote and rural First Nation communities. Central to the analysis are social and technical issues as well as the ICT experiences of community-based organizations and community members. The authors use an analytical framework to identify challenges in four categories: technical infrastructure, the interactions of the
users with the technical infrastructure, the production and reception of audio-visual content, and the organizational and social relations. The findings underline the need for community capacity building to address these challenges and use video communications to its full potential.

O'Donnell, S., Perley, S., Walmark, B., Burton, K., Beaton, B., & Sark, A. (2009) Community-based Broadband Organizations and Video Communications for Remote and Rural First Nations in Canada in Stillman, L., Johanson, G., and French, R., editors, Communities in Action. Newcastle upon Tyne, UK: Cambridge Scholars Publishing: 107-119. The chapter describes how two community-based First Nations organizations in Canada are using video communications on broadband networks to support economic and social development in remote and rural First Nations. This study situates these two organizations within a broader social movement working toward self-determination for First Nations in Canada, exploring their use of video communications in this context. Video communications using broadband networks includes videoconferences (live and archived) and online videos. The research methodology for this study includes a content analysis of hundreds of archived videoconferences and videos on the servers of the two organizations as well as interviews with key informants using these technologies to develop remote and rural First Nations communities.

O'Donnell, S., Beaton, B., and McKelvey, F. (2008) Videoconferencing and sustainable Development for Remote and Rural First Nations in Canada. Community Informatics Research Network (CIRN 08), Prato, Italy. Videoconferencing can be used to connect remote and rural First Nation communities to work together on sustainable development priorities. This paper presents two case studies of videoconferencing events. In both cases, a real-time high-bandwidth connection provided rich visual and audio data to be exchanged among communities separated by vast distances. The host communities for these videoconference events are small First Nations with traditional lifestyles connected to the land. Despite their remoteness and traditional cultures, these communities have the capacity to use advanced high-bandwidth technologies in innovative ways to contribute to sustainable development of their communities.


Ohinmaa, A., Roine, R., Hailey, D., Kuusimaki, M.L., Winblad, I. (2008) The use of videoconferencing for mental health services in Finland. Journal of Telemedicine and Telecare. 14: 266-270. Assessing and treating mental health is one of the biggest healthcare challenges. Ohinmaa and colleagues discuss the use of telemental health services in Finland. They note that rural health sites use telemental health over 20% of the time, and that utilization rates are even higher in Canada.

Oliveira, J.M., Austin, A.A., Miyamoto, R.E.S., Kaholokula, J.K., Yano, K.B., Lunasco, T. (2006) The Rural Hawai'i Behavioral Health Program: Increasing Access to Primary Care for Native Hawaiians in Rural Settings. Professional Psychology Research and Practice 37(2): 174-182. In this article Oliveira and colleagues describe the Rural Hawai'i Behavioral Health Program (RHBHP) and how it supports culturally appropriate healthcare by incorporating Native Hawaiian cultural beliefs, values and practices. The authors note that traditional beliefs might determine the effectiveness of different types of interventions given to community members. They give two examples of successful
programs – a diabetes management and an afterschool program – that incorporated traditional events, healthy food and dances.

**Oncology News International (2007) Satellite Allows Digital Mammography Screening for Rural Native Americans.** *Oncology News International, 16*(3): 47-47. While breast cancer mortality rates are declining in the overall population, the rates are rising for Native American women. This short article describes a mobile mammography unit that services rural and remote Native American reserves. The images are transmitted by satellite from North Dakota to the University of Michigan Breast Imaging Division in Ann Arbour, a process which takes from 30 to 50 minutes, allowing for follow-up while the unit is still in the community.

**Palakiko, D. M., Siu, A., & al. (2008) Community Delivery of a Web-based Diabetes self-management Project for Native Hawaiians.** *Diabetes Research and Clinical Practice, 79*, S49-S50. This conference abstract details the findings of an evaluation of the MyCareTeam website, a diabetes self-management care system used by Native Hawaiian clients on O‘ahu. Participants uploaded glucose readings on the site and used the site on a weekly basis to communicate with healthcare providers. This interaction was followed up monthly via telephone. Recruitment efforts produced 25 participants, 17 whom had limited technology access. Those with access reacted positively to gaining instruction and education from the website that was specifically relevant to their individual lifestyle and conditions. The site was also found to be a cost-effective way to monitor clients with chronic conditions, promoting self-management and decreasing medical office visits as well as improving participant retention.

**Pannekoek, F. (2001) Cyber Imperialism and the Marginalization of Canada’s Indigenous Peoples.** *Presented at The Handing Down of Culture, Smaller Societies and Globalization, Université Laval, May 25-26*. This paper argues that the Internet is proving to be another avenue of victimization for marginalized communities as it reinforces the pre-existing tendency to erode and undermine Aboriginal culture and self-identity. Sites created by Aboriginal governments are the best examples of the effort to promote and sustain the culture. The limited amount of Aboriginal content developed by other sources usually had a Euro-Canadian view that was colonial, patronizing, and harmful. The absence of government support for content generation in languages other than the two official languages English and French has contributed to the current overwhelmingly English Internet reflecting the dominant culture and imbued with the middle class values of the primary stakeholders and content generators.

**Peddle, K. (2007) Telehealth in Context: Socio-technical Barriers to Telehealth use in Labrador, Canada.** *Computer Supported Cooperative Work (CSCW 2007)*. Springer 16: 595-614. The author notes that currently telehealth is being offered as an innovative solution to austerity, staffing issues and problems accessing care in Canada’s rural communities but many of these promises have not been realized. The Labrador region is a large and sparsely populated area that was vested with a federal “Smart Community” project making it one of the most connected locales in the country. While telehealth was a key component, there has been limited uptake of newly available technologies for this purposes. Peddle’s research reveals constraints limiting the usage of new technologies for health communication in Labrador. The user context must be considered in the design of telehealth programs and policy if the desired outcomes for telehealth are to be realized. The barriers to telehealth use are not simply technical, but relate to issues of privacy, culture and trust.

**Perley, S. (2009) Representation and Participation of First Nations Women in Online Videos.** *Journal of Community Informatics 5*(2). With the rise in websites for video sharing on the Internet and the increase in resources to create and upload videos, there is potential for First Nations women to make use of this alternate public sphere for representing issues they cannot normally address through mainstream media. A critical analysis of the representation and participation of First Nations women in online videos provides some insight into how First Nations women are currently using new information and communication technologies to question and challenge mainstream media assumptions and representations of First Nations women. The article explores the potential of online
videos produced by First Nations women to provide an alternate public sphere to represent themselves and their perspectives and promote social change.

Perley, S., & O'Donnell, S. (2006) Broadband Video Communication Research in First Nation Communities. Canadian Communication Association, London, June. This paper provides an overview of policies and strategies for broadband infrastructure and access, and broadband video communication development and use in First Nation communities in Canada. Although using broadband for video communication remains underdeveloped in First Nation communities as a whole, successful initiatives have been underway for many years, particularly in the areas of distance education and telehealth applications. There has been little research on other kinds of applications. The authors discuss approaches to doing research with Aboriginal communities. Clearly there are many opportunities for researchers to investigate and explore the possibilities of broadband video communication for First Nations across Canada. However researchers working on these projects in First Nation communities will face a number of challenges. The authors discuss these challenges and outline some ways forward.

Phillips, M. (2009) Podcasting for the Benefit of Aboriginal Languages: How to Establish a Podcast Website via iWeb. Presentation at the First Nations ICT Summit, Vancouver, February. This podcasting tutorial is a complete step-by-step guide to building a site. Topics include locating and working with the dock, working with the iWeb template, creating a podcast page, adding video content, submitting podcast pages to iTunes, and copyright issues. The resource was developed by the Ktunaxa Nation Council. The author is the First Voices Language Administrator at the Ktunaxa Nation Council, Cranbrook, BC.

Picot, J., Power, C. (2007) Premières’ Nations du Québec: Plan Stratégique de Télé-santé 2007-2010. CSSPNQL. Quebec. This report is a strategic plan developed in collaboration with First Nations communities and community members in Quebec. The plan discusses the infrastructure and activities of the project, and the use of videoconference for clinical applications as well as education. The report is the result of interviews with administration, other employees and community members as well as an analysis of the literature.

Polovoy, C. (2008) Audiology Telepractice Overcomes Inaccessibility. The ASHA Leader, June 17. Audiology telepractice is not widespread. This article describes three cases of audiology telepractice: diagnostic audiology brainstem response (ABR) in Ontario, pediatric cochlear implant (CI) in Florida, and otolaryngologist consultations (ENT) in Alaska. In Ontario, all infants in the province receive hearing screening at the time of birth, and those referred for further testing also receive a screening ABR in or near their own communities. But diagnostic ABR is difficult to provide in remote communities, especially because the health service will transport infants and their families by air for medical care but not for audiology testing. The Thunder Bay District Health Unit began its remote diagnostic ABR service in early 2008. The system requires videoconferencing so the audiologist can see the infant at the remote site and interact with the technician, infant and family; and a secure data stream that allows the audiologist to control the remote ABR equipment. Although there are drawbacks to doing these diagnoses remotely, without this service, infants and their families in remote communities would not have any access to ABR diagnosis, and infants would miss the opportunity for follow-up and further testing.

Pumpa, M., & Wyeld, T. G. (2006) Database and narratological representation of Australian Aboriginal knowledge as information visualisation using a game engine. Presented at Information Visualization. London, UK. 5-7 July. This paper details the use of a multi-dimensional database in a 3D environment that enables Australian Aboriginal people to use traditional landscapes to narrate their cultural practices. The authors argue that form, not just content, is important for Aboriginal knowledge practices. They also state that multi-dimensional database they developed is a tool that complements (not supplants) traditional knowledge practices.

Pumpa, M., Wyeld, T. G., & Adkins, B. (2006) Performing traditional knowledge using a game engine: communicating and sharing Australian Aboriginal knowledge practices. Sixth International Conference on Advanced Learning Technologies. Kerkrade, Netherlands, 5-7 July. The preservation and communication of Australian Aboriginal culture has accelerated recently due to the storage capacity of digital environments. However, three important issues need to be considered when designing digital environments, including the ownership, purposes and representations of knowledge practices. The authors argue that there is often a conflict between the database and narrative tools of knowledge and there needs to be a tool that complements the experience of traditional knowledge practices, which is based on performance practices (storytelling, music, dance, the environment, etc). To address this issue in 2003 the Digital Storylines project (which uses a computer game engine) was created in order to immerse participants within a landscape created through collaborations with Indigenous peoples.


Ramirez, R. (2007) Appreciating the Contribution of Broadband ICT with Rural and Remote Communities: Stepping Stones Towards an Alternative Paradigm. The Information Society 23(2): 85-94. This paper challenges conventional project evaluation approaches that emphasize the instrumental side of technology, that seek to demonstrate a direct link between investments and results. The contribution of ICT to rural economic, social and cultural wellbeing is increasingly difficult to demonstrate beyond short-term measurable indicators. The author proposes an alternative approach using socio-technical systems, stakeholder engagement, an acknowledgement of the multiple dimensions at play, and the growing evidence of unpredictability of ICT.


Ramirez, R., Richardson, D. (2005) Measuring the impact of telecommunication services on rural and remote communities. Telecommunications Policy 29 (4) 297-399. This article reports on the authors’ evaluation of the K-Net network of SMART First Nations, a project that was part of Industry Canada’s SMART demonstration projects that ended in 2004. The article discusses the elements for measuring the impact of telecommunication services on remote and rural communities and proposes some specific ways forward.

Raphael, D. (2003) Addressing the social determinants of health in Canada: Bridging the gap between research findings and public policy. Policy Options March: 35-40. Raphael notes that in Canada because of concerns with the cost and delivery of healthcare services there are no current policies related to the social determinants of health. As a result in 2002 health researchers and community representatives took part in the “Social Determinants of Health Across the Life-Span” conference at York university to discuss social determinates of health and their implications. The article identifies various definitions of the (social) determinants of health.
Reid, B. (2008) Mental Health: Hailika’as Heiltsuk Health Centre. Presentation at the First Nations ICT Summit, Vancouver, February. In March 2007, the telepsychiatry project of Hailika’as Heiltsuk Health Centre in collaboration with North Shore Anxiety & Stress Clinic and Vancouver Coastal Health Authority was approved by Health Canada FNIHB. The funding has provided approximately 150 hours of consultation for client care in the community. The project goal is to focus on the social needs of the community and to provide healing processes so that the community once again becomes a place where children are safe, families are healthy and pride in cultural traditions and values can again flourish. This presentation is an overview of the successes and the challenges of the project.

Richmond, C.A.M., Ross, N.A. (2009) The Determinants of First Nation and Inuit Health: A Critical Population Health Approach. Health & Place. 15: 403-411. There has been little written on the effects of environmental dispossession – the reduction of access to resources of tradition environments – on Aboriginal people’s health. In this article the researchers report findings from the narratives of 26 Community Health Representatives (CHR). Researchers found that the CHR described the determinants of health “as balance, life control, education, material resources, social resources and environmental/cultural connections.” The final determinant is not mentioned in Canada's official social determinants of health list.

Ricken, T., Conibear, F., Michel, C., Lyall, J., Scott, T., Tanaka, M., Stewart, S., Riechen, J. & Strong-Wilson, T. (2006) Resistance through Re-presenting Culture: Aboriginal Student Filmmakers and a Participatory Action Research Project on Health and Wellness. Canadian Journal of Education, 29 (1): 265-286. The article describes a participatory research project designed to promote student use of digital video to explore concepts of health and wellness. Students choose a health topic of interest to them then they plan, research, and develop a video with their message that they then present to their community to share what they had learned. For the student videomakers, the process provided not only a means of communication and action but also a way for them to acknowledge and promote aspects of Aboriginal culture that have a transformative effect.

Rieke, J.L. (2005) Linking Native Americans to quality health information on the internet: A tribal college library collaboration. Journal of Consumer Health on the Internet9(2): 27-42. Rieke notes that many Native Americans have major health issues and suggests that education on accessing health information online could aid in disease prevention and greater awareness about various illnesses. The article describes as partnership among 6 North Dakota libraries to make internet health information more accessible to North Dakota Native Americans.

River Valley Health (2006) Telemental health and Teleaddictions partnership project – Mawi Wolakomiksultine Evaluation Report: Fredericton, NB: River Valley Health. The Upper River Valley area of Health Region 3 in New Brunswick has limited resources for mental health treatment. With the goal of improving access to treatment for First Nations individuals, the Mawi Wolakomiksultine – which stands for “together, let’s have good healthy minds” in Maliseet - was initiated in Tobique First Nation. An evaluation of the project included data from interviews and focus groups, an administrative and utilization database, evaluation forms, and a review of documents related to the project. Participants reported positive experiences with the treatment they received as part of the project –96% were satisfied with their telehealth session and many preferred it to travelling to Fredericton.


Rogers, B. (2001) Path of Healing and Wellness for Native Families. American Behavioral Scientist, 44(9): 1512-1514. Coming from his Plains Aboriginal perspective, the author presents a path of
healing and wellness for Native families. The article begins with teachings from a Kiowa Elder, which describe the circles of life, starting with the circle of families, and the first circle of the young ones. The second circle is the people, from whom the children learn important knowledge through listening and watching. Once they have learned this knowledge, the children “become part of the third circle – the circle of all things connected.”

Rose, J. L. (2007) Improved and expanded pharmacy care in rural Alaska through telepharmacy and alternative methods demonstration project. *International Journal of Circumpolar Health, 66 Suppl 1*: 14-22. Rose’s article details the pharmacy services to Native and non-Native patients attending the outlying health clinics in the rural Anchorage Service Unit. The Alaska Native Medical Center acts as the central pharmacy that dispenses to those remote pharmacies with the network. In 2003 a six-month comparison of two telepharmacy equipment systems was conducted. Two automated pharmaceutical dispensers with live videoconferencing, Telepharmacy Solutions and PickPoint, were deployed at remote clinic sites. Afterwards the program was expanded to include eight additional sites. As a result, pharmacy programs were expanded to rural and remote communities, and more sites are being considered for future service expansion.

Roth, L. (2005) Something in the Air: The Story of First Peoples Television Broadcasting in Canada. *Montreal: McGill-Queen's University Press*. Roth’s book focuses on the regional, national and global implications of the APTN, the only dedicated Aboriginal television service in the works. She shows that Aboriginal peoples, by making their programming an integral part of the Canadian broadcasting infrastructure, have succeeded in creating a model for media resistance.

Rowlandson, J., Williams, S., Williams, D. (2008) Report on Federal and Provincial Change Requirements and Priorities. Change Requirements for a Federal and Provincial FN Telemedicine partnership in Ontario. *July*. This report outlines how Ontario First Nations have demonstrated national leadership in the delivery of comprehensive on-reserve telehealth services. KO Telemedicine (KOTM), the pioneer First Nations telehealth and telemedicine integrator in northwestern Ontario, has created a community-based point-of-entry to clinicians and health educators and trainers and has enabled health administrative capacity for 26 remote First Nations. Although making headway in advancing the health services for some of Ontario’s most isolated communities, the sustainability of KO Telemedicine remains in jeopardy while Federal and Provincial stakeholders identify funding models that support Telemedicine investments for First Nations in Ontario. This paper explores the gaps in Federal and Provincial policy.

Rowley, S., Sparrow, L., Schaepe, D. (2009) Musqueam and the Reciprocal Research Network. *Presentation at the First Nations ICT Summit, Vancouver, February*. This presentation explains the network bringing together information from selected museums around the world to a computer at Musqueam. The network allows Musqueam to send information back to the Museums. Musqueam has three reasons to be involved: co-develop the network to gain the most from the development of this new technology; engage Musqueam community members in learning about our objects, songs, and other material that are found in museum around the world; and share information with the museums around the world to ensure a Musqueam voice is being heard.

Royal Commission on Aboriginal Peoples (1996) *People to People, Nation to Nation: Highlights from the Report of the Royal Commission on Aboriginal Peoples*. Ottawa: Minister of Supply and Services Canada. This report offers an overview of the main themes and conclusions from the final report. Chapters include health, housing, economic development, Métis perspectives and the North.

Russell, C., Gregory, D., Hultin, D., Care, D., Courtenay, M. (2005) Cultures Within Cultures: Canadian Aboriginal Students’ Experiences in Online Learning Communities. *Technologies, Colleges and Communities (TCC) Online Conference, Honolulu, Hawaii, April*. This paper describes the results of an exploratory descriptive study examining Canadian Aboriginal nursing students’ experiences while participating in an online degree program that used various delivery modalities. The researchers conducted 22 focus groups with Aboriginal students in 3 locations in the province of Manitoba (n=60 participants) and 4 individual interviews with Aboriginal students who were unsuccessful in their educational programs. Their analysis revealed issues affecting students’
learning experiences, including technology, faculty, support staff, students at other distance sites, and the learner's community.

Sanderson, B., McKenzie, C., Clarke, L., Ramchandar, S., Asgarali, A. (2009) Building Partnerships for Sustainable Telehealth in First Nations Communities. Canadian Society of Telehealth, Vancouver, October 3-6. Telehealth is rapidly growing in First Nations in Manitoba. There are currently 15 First Nation communities with telehealth capabilities and overall its use has increased by more than 300% in the past year. The most utilized specialties include oncology, anesthetics, respirology, psychiatry and dermatology. The climate of change in First Nations healthcare delivery in Manitoba is well underway.

Saqui, O., Chang, A., McGonigle, S., Purdy, B., Fairholm, L., Baun, M., et al. (2007) Telehealth videoconferencing: improving home parenteral nutrition patient care to rural areas of Ontario, Canada. *Journal of Parenteral & Enteral Nutrition, 31*(3): 234-239. In rural and remote areas telehealth using videoconference is an important means for healthcare professionals to provide for their patients. The Northern Ontario Remote Telecommunication Health (NORTH) Network is a provincial program that provides healthcare access to rural and remote communities in Ontario. This article reports on the results of a telehealth satisfaction survey administered to 13 people participating in the Toronto General Hospital's Home Parenteral Nutrition (HPN) Program. Participants enjoyed the convenience and quality of care offered through videoconference, and saved on both travel costs and time. Clinically there was no increase in the line sepsis rate.

Schnarch, B. (2004) Ownership, Control, Access, and Possession (OCAP) or Self-Determination Applied to Research: A Critical Analysis of Contemporary First Nations Research and Some Options for First Nations Communities. *Journal of Aboriginal Health, 1*(1): 80-95. This ground-breaking article has been widely-cited and has spawned a change in how research is conducted with First Nations communities. OCAP principles developed from the First Nations Regional Longitudinal Health Survey. The principles relate to the collective ownership of group information, First Nations’ control over research and information, First Nations’ management of access to their data, and physical possession of the data. The benefits of OCAP include the rebuilding of trust, improved research quality and relevance, decreased bias, meaningful capacity development, and community empowerment to make change.

Sequist, T. D., Cullen, T., Hays, H., Taualii, M. M., Simon, S. R., & Bates, D. W. (2007) Implementation and use of an electronic health record within the Indian Health Service. *Journal of the American Medical Informatics Association, 14*(2): 191-197. There are few studies on the implementation of electronic health records (EHR) in rural and remote First Nation settings. Sequist and colleagues evaluate an EHR implemented in the Indian Health Service (IHS), a federally funded health system in the United States. They surveyed 223 clinicians at 26 health centers in order to assess attitudes towards EHR implementation and attitudes towards the use of information technology in underserved locations. Clinicians felt that information technology such as online sources, telemedicine and EHR, could improve care in rural and underserved areas.

Sequist, T. D., Ayanian, J. Z., & Cullen, T. (2005) Information Technology as a Tool to Improve the Quality of American Indian Healthcare. *American Journal of Public Health* . 95: 2173-2179. This article examined the current state of healthcare for American Indians and then explores how the Indian Health System (IHS) uses information systems to improve healthcare performance. The HIS provides services to 1.5 million American Indians and Alaska Natives. The health of these populations depends on various factors, including geography. The basis of the IHS information system is the internally developed Resource and Patient Management System (RPMS) with over 50 software applications for clinical data storage (lab and radiology reports, prescription information, physical examination reports) and administrative use (billing information). Plans are underway to integrate more information.

health research with rural, native and veteran or service member populations. The five key issues for telehealth research include using the appropriate research methodologies, placing greater emphasis on understanding how models of care can change with eHealth, understanding how access and quality changes with eHealth, fostering collaborative models, and adapting eHealth programs and models for underserved populations.

Shore, J. H., Bloom, J. D., Manson, S. M., & Whitener, R. J. (2008a) Telepsychiatry with rural American Indians: issues in civil commitments, Behavioral Sciences & the Law 26: 287-300. Videoconferencing for telepsychiatry has real potential for improving mental health treatment on remote reservations; however, little has been written on the topic. In particular, the authors review the current state of civil commitments – the involuntary commitment of a potentially dangerous mental ill person – on reservations.

Shore, J. H., Brooks, E., Savin, D., Orton, H., Grigsby, J., & Spero, M. M. (2008b) Acceptability of Telepsychiatry in American Indians, Telemedicine Journal & E-Health 14: 461-466. In this article Shore and colleagues compare the videoconference administered and in person psychiatric assessments of 53 American Indian Vietnam veterans. After the interviews patients were asked questions regarding the usability of the assessments, their experience with patient-provider interaction, cultural competence and satisfaction. Overall participants reacted positively to videoconference (94%) and found the equipment easy to use (96%). 45% of participant indicated a preference for live interview, while 92% stated they would use videoconference technology again. Interviewer ratings were lower than the participants regarding comfort level and overall satisfaction. Overall telepsychiatry was well received.

Shore, J. H., Brooks, E., Savin, D. M., Manson, S. M., & Libby, A. M. (2007a) An economic evaluation of telehealth data collection with rural populations. Psychiatric Services, 58(6): 830-835. Shore and colleagues compared costs of in person clinical interviews with American-Indian veterans to interviews conducted over videoconferencing. In 2003 interviews conducted over videoconferencing in both new and established clinics were more expensive than those conducted in person; however by 2005, with reduced transmission fees and less expensive equipment, this trend was reversed. Currently clinical interviews over videoconference are more cost effective than in person interviews, and the authors conclude that telehealth is a promising means to reduce health disparities in rural and remote communities.

Shore, J. H., Savin, D., Orton, H., Beals, J., & Manson, S. M. (2007b) Diagnostic reliability of Telepsychiatry in American Indian Veterans. American Journal of Psychiatry, 164(1): 115-118. In this article Shore et al. examine the reliability of in person Structured Clinical Interview for DSM-III-R (SCID) compared to real-time videoconference assessment for PTSD within a rural American Indian population of military veterans. 53 subjects were interviewed by videoconference and in person (in random order). There were no significant differences in outcomes found between the two modalities.

Shore, J. H., Savin, D., Novins, D., & Manson, S. M. (2006) Cultural aspects of telepsychiatry. Journal of Telemedicine and Telecare, 12(3): 116-121. This article investigates methods of delivering culturally appropriate psychiatry sessions via videoconference, using the outline for cultural formulation provided by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) as a guide. The authors offer seven recommendations for telepsychiatry providers: (1) Regularly enquire about the patient’s level of comfort with the technology before, during, and after treatment; (2) Become familiar with local communication styles (e.g. talking circles) and adapt if necessary; (3) Consider using clinical facilitators (preferably people who are also respected members of the community) at remote sites to help establish trust and rapport; (4) Be aware of ‘system transference’, or the tendency of patients to shift their negative attitudes about a system of care onto the provider him/herself; (5) Educate patients on matters of confidentiality associated with telepsychiatry, and assess their feelings towards their personal security; (6) Understand how the remote setting may affect communication between provider and patient; (7) Visit remote sites to gain awareness of the care facility and surrounding environment, as well as the potential effects of telepsychiatry on the community.
Shore, J. H., & Manson, S. M. (2005) A Developmental Model for Rural Telepsychiatry. *Psychiatric Services, 56*(8): 976-980. Shore and Manson note both the benefits and limitations of telepsychiatry for rural and underserved populations. The article discusses the American Indian Vietnam Veterans Project, which examines American Indian Vietnam Veterans for PTSD via the University of Colorado Health Services Center’s American Indian and Alaska Native Programs (AIANP) telepsychiatry service’s five clinics. The clinics provided medication and case management as well as individual and group psychotherapy via videoconferencing, focusing on education, PTSD skills training and supportive therapy. The article then presents a model of a development planning process for rural telepsychiatry clinics.

Shore, J.H., Manson, S. (2004a) Telepsychiatric care of American Indian veterans with post-traumatic stress disorder: Bridging gaps in geography, organizations, and culture. *Telemedicine Journal and eHealth, 10*: 64-69. Shore and Manson’s paper describes a weekly telepsychiatric clinic treating PTSD in northern Plains American Indian Veterans. Results indicate a high degree of patient satisfaction and comfort with the clinic which suggests that multi-site videoconferencing may be a viable means for providing psychiatric care to rural, isolated populations such as American Indians.


Simms, D., O'Donnell, S., & Perley, S. (2008) Attitudes Toward and Use of Video Communications by Educators in First Nation Schools in Atlantic Canada. Fredericton: National Research Council. January. This National Research Council report presents the results of a survey of teachers and other staff in First Nation Schools in the Atlantic Region. The study focus was to understand their attitudes toward and use of video communications. The study identified a need for more support and training for teachers to use videoconferencing and share videos online.

Simpson, S., Bell., L., Britton, P., Mitchell, D., Morrow, E., Johnson, A.L., Brebner, J. (2006) Does Video Therapy Work? A Single Case Series of Bulimic Disorders. *European Eating Disorders Review 14*: 226-241. Simpson and colleagues discuss the use of cognitive behavioral therapy (CBT) for Bulimia Nervosa delivered to sufferers living in remote and rural areas via weekly videoconferencing between rural hospitals in north-east Scotland and the Aberdeen Eating Disorders Service. Treatments and assessments were both conducted over videoconference. While it was not feasible to conduct a comparative in-person control group, findings suggest that videoconferencing may be beneficial to rural and remote bulimic clients.

Smith, A. C., Perry, C., Agnew, J., & Wootton, R. (2006) Accuracy of pre-recorded video images for the assessment of rural Indigenous children with ear, nose and throat conditions. *Journal of Telemedicine and Telecare, 12*, S3:76-80. In this Australian study, assessment of pre-recorded history and video of ear nose and throat was compared to in person assessments. The researchers found while there were differences in opinions, some were the result of the quality of the baseline history rather than the examination. Overall the study indicates that pre-recorded video for early assessment of ear, nose and throat conditions can be useful, especially to detect and monitor Indigenous children at high risk for developing chronic disease and hearing loss.

Smith, R. (2008) First Nations Communication Research: Final Report. School of Communication and Centre for Policy Research on Science and Technology. Vancouver: Simon Fraser University, April 30. This report summarizes the findings of a multi-year study on the impact of the introduction of broadband into First Nations in British Columbia. The study method included a literature review, interviews and focus groups, and case studies. The study findings include lessons learned related to implementation issues (business strategy, funding, skills and training, and technical issues), and outcomes (positive, negative and uncertain). The report concludes with policy implications in four areas: building systems, sustaining systems, training users, and aligning policy.
Smylie, J. (2008) The Health of Aboriginal Peoples. In D. Raphael (Ed.), Social Determinants of Health: Canadian Perspectives. Toronto: Canadian Scholars’ Press: 280-301. Smylie focuses on the social determinants of health of Aboriginal peoples living in Canada, from an Indigenous-specific and decolonizing perspective. The magnitude of poverty and inequality as a result of colonial policies is described in the areas of income, employment, education, food security, and housing. Additional determinants included: the marginalization of Indigenous peoples and perspectives from the planning and implementation of health policies, programs, and services; attitudinal and systemic racism; attitudinal and barriers to health services access.

Sochting, I., Cohen, I., Ley, R.G., Brasfield, C. (2007) Traumatic Pasts in Canadian Aboriginal People: Further Support for a Complex Trauma Conceptualization? BC Medical Journal 49(6): 320-326. Sochting and colleagues coded 127 case files of former students of the residential schools in British Columbia in order to systematically analyze mental health and psychosocial issues. They discovered risk factors for complex trauma and complex posttraumatic stress disorder, which suggests that PTSD or extreme stress disorder may be relevant frameworks for assessing Aboriginal people who have experienced trauma. The authors note that more work needs to be done on these connections between residential school experience and mental health issues.


Stewart, S., Riecken, T., Scott, T., Tanaka, M., & Riecken, J. (2008) Expanding health literacy: Indigenous youth creating videos. Journal of Health Psychology, 13(2): 180-189. Stewart and colleagues describe a collaborative video research project undertaken by community members, university researchers, Canadian Indigenous youth and their teachers. The use of video was chosen for the health literacy project as it could be seen as culturally appropriate because it relies on an oral traditional. Several themes emerged, including the importance of community (accessing community knowledge, having the support of the community); culture (access to cultural resources, following culture protocols like circle sharing time, etc); confidence (students gain confidence as a result of the project, and as they gain skills); and control (control over self, ownership/control over the project, ability to make changes.


Sullivan, D. H., Chapman, M., & Mullen, P. E. (2008) Videoconferencing and forensic mental health in Australia. Behavioral Sciences & the Law, 26(3): 323-331. Videoconferencing is commonly used in Australia forensic mental health services to link remote courts, prisons and clinics with specialists. In this article Sullivan and colleagues describe the use of videoconferencing for forensic mental health. In particular they note that Australia Aboriginals and Torres Strait Islanders are incarcerated at rates 15 times higher than the general population, often in remote and rural areas. Videoconferencing can be used for court evaluations, tribunals, and even therapy and can lower the risk of transferring patients. Although administrative, legal and ethical concerns are discussed, the
authors note that there has been no civil litigation in Australia related to the use of videoconference for psychiatry.

Tait, C. (2008) Canadian Aboriginal Women and Health Journal of Aboriginal Health 4(1): 2-4. Several issues impact the health of Aboriginal women, including a global system that will not fully embrace or nurture a broader worldview and the effect of deep-rooted practices that oppress Aboriginal women throughout Canada, such as gender subordination combined with economic and cultural marginalization. The idea of being personally responsible for health outcomes adds to this marginalization, as Aboriginal women are viewed as responsible for not only their own health but also the health of their family and community. Tait states the need for a thorough understanding of socio-cultural, historical and gendered perspectives concerning health.


TeleCommons Development Group (2004) Kuhkenah SMART First Nations Project Final Evaluation Report 2001-2004. November. This evaluation report about the journey of the Kuhkenah SMART First Nations project appreciates the value of the project in terms of its contribution as a learning opportunity. As Industry Canada’s “Aboriginal” Smart Communities Demonstration initiative, Keewaytinook Okimakanak (KO) of Northwestern Ontario embarked on a journey to become a centre of expertise in the integration of information and communication technologies into communities, organizations and families.

Thomson, A.J. (2000) Elicitation and representation of Traditional Ecological Knowledge, for use in forest management. Computers and Electronics in Agriculture, 27 (1-3): 155-165. First Nations wish not only to preserve their heritage but also to see that heritage given its proper place in decisions that affect the land. Each community is unique in the diversity of problems and concerns that it faces. Modern knowledge-based systems permit customized solutions to complex issues, but there is currently no good method of representing traditional knowledge in the computer, in a way that helps the needs of communities to be individually addressed. Most traditional knowledge information is presented in anecdotal form and is therefore difficult to classify and analyze. Elicitation, representation and use of knowledge is a major area of research in the field of Artificial Intelligence, leading to development of knowledge bases and expert systems. The present study describes the elicitation and representation of the traditional knowledge from bands belonging to the Nicola Tribal Association in British Columbia. The study aims to represent the interaction of community and environment in a manner that can be used to show the differences among communities.

Timmins, L. (2003) Research as a Spiritual Contract (Book Review). Pimatzwin: A Journal of Aboriginal and Indigenous Community Health 1(1): 177-178. This review begins with explanation of Cree concept ‘pastahow’ – spiritual harm or debt that results from taking without giving proper thanks or payment for teachings and knowledge. The author notes that giving thanks or payment keeps everything in balance, and as such, all knowledge becomes spiritual.

Todd, L. (1996) Aboriginal Narratives in Cyberspace. In Immersed in Technology: Art and Virtual Environments. Cambridge, MA: MIT Press: 179-194. The author explores whether the native world view can find a place online by examining the operating ideology of cyberspace and the impact of the Internet on Aboriginal and First Nation people. Of particular interest is whether the Internet provides new opportunities, or furthers old colonial interests. In First Nation culture, the universe has spirit and intelligence and ideas come from there; there is no separation of mind, body, spirit and heart. All life is connected through the universe, and there is no disconnection from the material world. Typically, the native view is based on the desire for harmony, balance, unity, and mutually affective connection between the individual and the universe. The individual can share emotions and thoughts through narrative, ceremony and ritual to communicate with community. Guidance for
current actions built on a concern for future generations so the future can be predicted if one is mindful of the world and current actions within it.

Tomkinson, K. (2009) In Search of Community Champions: Researching the Outcomes of K-Net’s Youth Information and Communications Technology Training Initiative. *Journal of Community Informatics* 5(2). The Youth ICT Training initiative (YICT) has been providing IT skills training and short-term employment opportunities to First Nations youth in Ontario’s far North for 15 years. Initially funded by Industry Canada, YICT is developed and guided by the Kuhkenah Network (K-Net) based in Sioux Lookout Ontario. This study, initiated through the partnership between a University of Guelph graduate student and K-Net, has evolved from an evaluation of program outcomes to a search for community champions. This journey in research has revealed the importance of capturing the stories of individual creativity, ingenuity, needs, and relationships for community IT development.

Treaty 7. Information and Communications Technology for First Nations (ICTFN) (2004) Treaty 7 Aboriginal ICT Forum Session Summary. Calgary, March 30 & 31. $280 million has been spent by the province of Alberta on the broadband initiative SuperNet, intended to connect all provincial government institutions such as offices, libraries and health facilities. Treaty 7 was designed to promote the ICT agenda to support cultural, economic and social growth and well-being of First Nation people. The ICT Forum was organized to give information to First Nation people about AB SuperNet, to explain opportunities and challenges, to look at the potential of ICT for First Nations, and to start developing connectivity and partnership strategies. The summary gives highlights of the ICT Forum discussions about ICT in First Nations, and tries to develop key priorities of the Treaty 7 ICT strategy. The rest of the report describes the Digital Divide, SuperNet description, CAP sites, questions about infrastructure and priorities, building successful partnership, First Nation uses of ICT, e-health and telehealth, other community ICT priorities, and moving forward.

Tri-Council (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, Social Sciences and Humanities Research Council of Canada, 2009) Research Involving Aboriginal Peoples in Canada (Chapter 9). *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, (Revised Draft 2nd Edition)*, 93-116. This chapter acknowledges the unique status of the Aboriginal peoples of Canada. It interprets how the value of respect for human dignity and the core principles of respect for persons, concern for welfare, and justice apply to research involving Aboriginal peoples. It accords respect to Indigenous knowledge systems by ensuring that distinct world views are represented wherever possible in planning and decision making, from the earliest stages of conception and design of projects through to analysis and dissemination of results. It affirms Aboriginal rights, interests and responsibilities as reflected in community customs and codes of research practice in order to better ensure balance in the relationship between researchers and participants and mutual benefit in researcher-community relations. The purpose of this chapter specifically, and the Policy in general, is to provide guidance to researchers on ethical conduct in research involving Aboriginal peoples.


Van Gaalen, R.P., Wiebe, P.K., Langlois, K., Costen, E. (2009) Reflections in Mental Wellness in First Nations and Inuit Communities. In Canadian Institute for Health Information, ed. *Mentally Healthy Communities: Aboriginal Perspectives*. Ottawa: CIHI: 9-16. In this article non-Aboriginal Health Canada employees discuss their findings in mental health as developed through collaborative work with First Nations and Inuit communities. They state the importance of a strengths-based approach to mental health by understanding wellness as a positive expression of strength and well-being rather than just the absence of illness. Social determinants of health are crucial in promoting wellness; In particular the authors state the importance of community cultural continuity in decreasing the risk of suicide.
Varcoe, C., Dick, S. (2008) The Intersecting Risks of Violence and HIV for Rural Aboriginal Women in a Neo-Colonial Canadian Context. *Journal of Aboriginal Health* 4(1). In this article the authors discuss the challenges for women resulting from the neo-colonial and racist context of Canadian society. Researchers using an ethnographic design conducted focus groups and individual interviews with women who experienced intimate partner violence (IPV) and were at risk for HIV. Researchers found that powwows and traditional dance had an important role in mental health, cultural and spiritual healing and that HIV prevention policy and services needs to address not just substance abuse but also the underlying violence.

Vermette, M. (2008) How the Telehomecare Project Supports Homecare Staff in Remote Communities. *Canadian Homecare Summit, St. Andrews-by-the-Sea, NB, October.* The Keewaytinook Okimakanak (KO) Home and Community Care Program (KO HCC) provides home based support services to clients in 5 remote First Nations communities in Northwestern Ontario. The KO HCC has partnered with KO Telemedicine to enhance home based services through the use of telemedicine to support clinical and administrative services. Each community employs 1 full-time HCC Coordinator and depending on community size, 1 to 2 personal support workers. The program is supervised by the community health directors and nurse supervisor based out of Balmertown, Ontario. By using videoconferencing technologies to train, monitor, evaluate and assess home based client care, the KO HCC Program can enhance home based client services. The HCC nurse is able to assess, train, support, monitor and evaluate staff skills from a distance.

Vickers, P.J. (2009) Ancestral Law and Community Mental Health. In *Canadian Institute for Health Information*, ed. *Mentally Healthy Communities: Aboriginal Perspectives*. Ottawa: CIHI: 17-20. Vickers, an ethno-consultant, emphasized the need to integrate ancestral law for positive change in First Nation communities in this article. In order to address the issue of suicide, both scientific and spiritual terms need to be addressed. Spiritual balance needs to be regained through traditional ceremonies with the Indigenous community in order to create positive change.

Vickery, K. (2005) Telemedicine: a cost-effective solution - center studies dementia in Native Americans. *Provider, 31*(4): 63-64. This short article describes the use of satellite videoconferencing for follow-up appointments between the University of Texas Southwestern Medical Center’s Alzheimer’s Disease Center and patients from the Choctaw Nation. Vickery reviews several studies that demonstrate the effectiveness of videoconferencing for therapy and treatment, noting the service is especially valuable for those in rural areas. To enable the use of videoconferencing for follow-up the Centre has issued guidelines for covering physician’s fee schedules and approved codes for reimbursement.


Walmark, B. (2010) Digital Education in Remote Aboriginal Communities. In White, J.P., Peters, J., Beavon, D., Dinsdale, P. (eds). *Aboriginal Policy Research VI: Learning, Technology and Traditions*. Toronto: Thompson Educational Publishing: 140-146. The Keewaytinook Internet High School (KiHS) is the first Ministry of Education approved digital high school in Ontario. KiHS provides youth living in remote First Nations communities in Ontario’s far north with the opportunity to pursue a high school education under the supervision of accredited teacher specialists without the need to travel south and attend school far from the influences of their families and communities. This paper explores the First Nations educational environment in the Sioux Lookout zone which KiHS was created. It will document the migration of broadband services in Ontario’s far north that made it possible for the establishment of KiHS and it will examine how KiHS overcame some of the technical challenges which stymied other First Nations educational institutions in the Sioux Lookout zone which were given a similar mandate by the First Nations leadership.

Walmark, B., O'Donnell, S., Beaton, B. (2005) Research on ICT with Aboriginal Communities: Report from RICTA 2005. Community Informatics Research Network (CIRN 2005) Cape Town, South Africa, August 24-26. A Canadian research cluster, RICTA – Research on ICT with Aboriginal Communities – is building a national network of connectivity, knowledge and relationships committed to using social science and humanities perspectives for ICT development. The RICTA cluster is a critical mass of knowledge that Aboriginal communities can both contribute to and tap into on their paths to achieving their aspirations. RICTA 2005 – the founding RICTA meeting held in March 2005 in the remote community of Balmertown in Northern Ontario – was linked by videoconference to multiple sites across three time zones. The meeting provided an opportunity for members of Aboriginal communities across Canada to contribute their perspectives on using ICT for education, health and wellness, governance, language and culture, and economic development.

Ward, G. (2009) Privacy 101: Bringing Practical Privacy Principles to First Nations Telemedicine. Canadian Society of Telehealth, Vancouver, October 3-6. During 2008, Keewaytinook Okimakanak Telemedicine (KOTM) conducted more than 2,500 clinical specialists consults through telemedicine, carried out in some of Canada’s most remote First Nations communities. Protecting the personal health information of patients serviced should be of utmost importance to any telemedicine organization. Furthermore, those dealing with First Nations must also protect the collective privacy rights of the community itself.

Warden, N., Joe, B., Wisner, K., Liman, Y. (2009) A Step-by-Step Guide to Delivering a Youth Music Technology Workshop. First Nations Technology Council, Vancouver, May. Over the last several years, there has been a groundswell of emerging talent among the Ktunaxa youth in music and art. There was a need for an outlet for youth to record and develop their passion for creating music. The Ktunaxa Community Learning Centres (KCLC) project team began developing a music technology workshop for youth. More than 20 participants attended the workshop, ranging in age from 15 to 27. Rex During the workshop, participants collaboratively created a song titled “Stomp”, and left the workshop with a thirst for more. This led to the organization of regular Friday evening music recording sessions at the CLC, and a Facebook group that is receiving increasing community support. This document transforms successes and lessons learned from the Ktunaxa workshop into a step-by-step guide for delivering a music technology workshop for youth in other Aboriginal communities in BC.

Watson, J., Gasser, L., Bilgnault, I., Collins, R. (2001) Taking telehealth to the bush: lessons from north Queensland. *Journal of Telemedicine and Telecare* 7(suppl.2): 20-23. Community involvement and access are important drivers for successful telehealth projects. Watson and colleagues report on the Networking North Queensland (NNQ) project implemented to improve rural and remote access to health services. The NNQ was a two year project created to ensure reliable basic videoconferencing in 21 North Queensland communities.

Weaver, H. N. (2002) Perspectives on Wellness: Journeys on the Red Road. *Journal of Sociology & Social Welfare* 29: 5. The author of this article is a Lakota woman who wanted to write about the positive wellness work. Elements of wellness differ between tribes (are defined differently) but the basic idea of balance is constant. Weaver notes that positive moves are being made, such as spiritual leaders reinstating traditional teachings and ceremonies and passing town traditions to the young people. Cultural values and Native language is also being incorporated in Native schools. People within the communities are working together to promote wellness.

Transcultural Psychiatry 39 (4): 516-530. This article is written from the perspective of the staff and looks at the barriers American Indians and Hispanic Americans face when seeking mental health services for PTSD, panic and phobic disorder, etc. The authors interview staff members at the Albuquerque and Minneapolis VAMCs and discuss the most commonly mentioned barriers: veterans have difficulty discussing personal matters, the VA system doesn’t understand their needs, the VA system is difficult to access, these veterans do not trust the VA system, the system is inflexible, the system doesn’t do any outreach to the communities, AI/HA veterans prefer mental health services from tradition healers, VA mental health staff does not understand their culture, and others.

White, J. (2007) Working in the Midst of Ideological and Cultural Differences: Critically Reflecting on Youth Suicide Prevention in Indigenous Communities. Canadian Journal of Counselling 41(4): 213-227. White is a non-Aboriginal author who writes reflexively and critically on the ways in which Western-based therapy can be respectfully and appropriately used for dealing with suicide among First Nations youth. White’s article draws attention not only to the unique issues facing First Nations youth, but also the parallels with non-Aboriginal youth.


Whiteduck, J. (2010) Building the First Nation e-Community. In White, J.P., Peters, J., Beavon, D., Dinsdale, P. (eds). Aboriginal Policy Research VI: Learning, Technology and Traditions. Toronto: Thompson Educational Publishing: 95-103. This position paper from the Assembly of First Nations (AFN) outlines a strategy for an equipped First Nations broadband network. It is part of a broader plan for economic, social and cultural change as a result of a comprehensive economic strategy based on knowledge and information. Since 2002, the AFN has passed 5 resolutions at their annual general assemblies related to broadband connectivity and e-communities. Since 2008, the AFN has also been working with a team of ICT experts (AFN IT Experts Think Tank) to develop the strategic plan. The AFN’s “e-Community ICT model” builds upon a common network model employed by Canadian institutions and corporations. The Think Tank has outlined policy recommendations along five themes: First Nation capacity development, First Nation connectivity, human resources development, information management, and service delivery and partners.


Williams, D. (2009) Expansion Requirements for First Nations Telemedicine. Canadian Society of Telehealth, Vancouver, October 3-6. This presentation proposes a funding model for telehealth expansion for Keewaytinook Okimakanak Telemedicine, which services 26 remote First Nations communities in northwestern Ontario. The main categories for funding requirements include Change Management, Human Resources, Connectivity and Networks Upgrades/Equipment. A multi-stakeholder approach is required. Multiple funding stakeholder partnerships are required to support First Nations telemedicine.

Wilson, K. (2003) Therapeutic landscapes and First Nations peoples: an exploration of culture, health and place. Health & Place, 9(2): 83-93. Wilson writes from the perspective of Health Geography, which is “the role of therapeutic landscapes in shaping health.” Wilson found that concepts of health were presented through the medicine wheel and the image of Mother Earth. The way land contributes to holistic health and the particular landscape features are discussed.

Wolsko C., C. Lardon, S. Hopkins, & E. Rupert (2006) Conceptions of Wellness among the Yup’ik of the Yukon Kuskokwim Delta: The Vitality of Social and Natural Connection. Ethnicity and Health, 11(4): 345-363. The Yup’ik are geographically isolated when compared to other Native peoples in Canada, which has enabled them to preserve and continue practicing their language and many traditional life-ways. The article includes many excellent direct quotes from men, women, younger people, and elders. Topics discussed were often framed around their expressed importance of living traditional lifestyles, such as harvesting food and being in the landscape, practices through which participants argued they can ensure better nourishment, strong and healthy bodies, social and spiritual fulfillment, connection through relatedness with others and all of creation.

Wyeld, T. G. (2007) Visualising Australian Indigenous knowledge practices using the game engine. 11th International Conference on Information Visualization. Zurich, Switzerland, July 4-6. Acknowledging that ways of representing cultural knowledge differ according to cultural group and region the researchers identified that Australian Indigenous peoples capture traditional knowledge through song, dance and sand paintings. At the same time, these 3 dimensional representational forms have become two dimensional, photographed, for example, to be sold to collectors, depicted on the internet, and so on. The authors call for the use of a 3D game engine as a way for Indigenous people to preserve and share cultural knowledge within the medium of storytelling in a virtual environment that represents sacred and spiritual lands.

Wyeld, T. G., & Pumpa, M. (2007) Narratological constructs in the Gestalt of the 3D game environment: Aboriginal knowledge and its connection to the data landscape metaphor. 11th International Conference on Information Visualization. Zurich, Switzerland, July 4-6. The Australian CRC for Interactive Design (ACID) funded a project investigating the use of 3D game engine as a place of narrative construction for traditional knowledge practice and dissemination for Australian Aboriginals. The system offers a means to empower Aboriginal socio-cultural practice by enabling a means of experiencing notions of Aboriginality. Researchers worked with local Aboriginal activists, artists and Traditional Owners in rural areas of Australia to develop the 3D game engine as a ‘landscape metaphor’ that allows for preformative special narratives. The system is a capturing and archiving tool as well as a culturally-appropriate environment that acts as a way to collaborate, share and develop community content.
Information and Communication Technologies to Support Health and Wellness in Remote and Rural First Nations Communities: Literature Review.

May 2010, National Research Council Canada

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