Preface

This report is based on research commissioned by the Canadian Council on Social Determinants of Health (CCSDH).

The CCSDH is a collaborative multisectoral stakeholder group established to:

- Provide the Public Health Agency of Canada (PHAC) with advice on matters relating to the implementation of the *Rio Political Declaration on Social Determinants of Health*, including planning, monitoring, and reporting; and
- Facilitate and leverage action on the social determinants of health through member networks and targeted, intersectoral initiatives.

The CCSDH brings together organizations from a wide array of sectors that have a role to play in addressing the factors that shape health. The CCSDH also includes individuals selected on the basis of their knowledge and experience regarding policy, research or intersectoral action on the social determinants of health.

The CCSDH fulfills its mandate through various activities, including the creation or adaptation of tools to leverage action on the social determinants of health. *Maps to Inform Intersectoral Planning and Action* is one such tool. In creating this report, the CCSDH is aiming to provide individuals and organizations with useful knowledge on the potential of mapping for improving health and wellbeing at the individual and community level.

The development of this report was guided by the Local Action First Subcommittee of the CCSDH. It is the hope of the CCSDH that it will be widely shared and used to support intersectoral dialogue and action towards data integration and collaboration in Canada.
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Acknowledgements

This technical report is based on work completed for the Canadian Council on Social Determinants of Health by Acacia Consulting and Research in 2011–12. The CCSDH thanks Acacia Consulting and Research for their contributions to this project.

The CCSDH would also like to thank the members of the Local Action First Subcommittee, who provided guidance on the development of the report.
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Executive Summary

Maps are becoming increasingly popular as research and communication tools. Maps allow a variety of health, social and economic data to be illustrated on a single image, facilitating analysis of the relationships between diverse factors. In particular, they can be used to display information about the social determinants of health, such as the work we do, our level of education, our income, where we live, the quality of our experiences as children and the physical environments that surround us.

The purpose of this report is to highlight for planners, policy-makers, community groups, and professionals the potential role of mapping technologies in supporting action on the social determinants of health by indicating where action is needed at the local level. The report presents two in-depth case studies of collaborative mapping initiatives that integrate health and social data: the Espace montréalais d’information sur la santé in Montréal (EMIS), Quebec and the Community View Collaboration (CVC) in Saskatoon, Saskatchewan. The selection of the case studies was based on a scan of health mapping initiatives from across Canada.

Both EMIS and CVC initiatives have effectively used mapping capabilities to better understand and address the factors associated with health and well-being within their respective communities. Each initiative features a governance model, data sharing protocols, and involvement from partners and organizations in developing and managing the initiatives. Furthermore, both initiatives focus on the ways that data sharing and mapping tools can contribute to evidence-based decisions for intersectoral action.

ESPACE MONTRÉALAIS D’INFORMATION SUR LA SANTÉ (EMIS)

EMIS is integrated into the Québec health care system by virtue of the Public Health Act (2001) which contains a population health surveillance requirement. The EMIS initiative fulfills this requirement and is fully funded by the Agence de la santé et des services sociaux in Montréal (ASSSM), Quebec. Since public health is part of the Quebec Ministry of Health and Social Services (MSSS), collaboration across sectors is facilitated and supported.

EMIS integrates data on social inequalities in health, population health and health services. Data are available on the web, and are aggregated and anonymized. Tools are user-friendly and stakeholders have access to information which contributes to more efficient service delivery.

Data sharing is a key component of EMIS; stakeholders, partners and other collaborators participate in the design and operation of the system, while user committees help manage and design projects.

Data and indicators are presented in a variety of thematic atlases for a range of geographies including data from neighbourhoods, local community service centres, and health and social service centres.
Primary users are health managers and professionals, external partners with interest in health, and the general public. The data available on EMIS have influenced action at the local level in areas such as policy design and budget allocations on school readiness, studies on material deprivation in neighbourhoods, development of healthy eating strategies, physician resource planning, and identification of risk factors tied to inequity in support of suicide prevention programming.

**Community View Collaboration (CVC)**

The initial motivation behind the CVC — a partnership of the City of Saskatoon, The University of Saskatchewan and the Saskatoon Health Region — was to create a tool to inform the status report of the Chief Medical Officer of Health. A more comprehensive approach to health planning was being tested, requiring local data on health determinants to support evidence-based decision-making.

The CVC was purposefully designed as a collaborative initiative to act on the underlying causes of ill health. CVC draws on data from a variety of sources and features user-friendly tools. Data are arranged by social determinants of health and are aggregated by geographic boundaries that are directly related to the mandates of key partners and stakeholders. Data currently includes provincial scale and census data, school enrolment, crime statistics, and selected health indicators.

The CVC is hosted by the Public Health Observatory of the Saskatoon Health Region and operates in collaboration with a range of partners to provide intersectoral and interjurisdictional data sharing and access. The CVC governance model is comprised of committees to address issues including communications, policies and capacity building. Users include provincial government ministries and agencies, community service organizations and the public. CVC maps and data are used to support a range of initiatives, from studies on mapping health disparities between low income and affluent neighbourhoods, to reallocation of physician resources, to allocation of funds for neighbourhood revitalization and low income housing.

**Implications**

In both the EMIS and CVC case studies, a social determinants of health conceptual model guided the selection of data, indicators and themes. A key component of each approach is that neither one exclusively frames its work in terms of health issues, thus generating broad support and collaboration beyond the health sector. This has contributed to the ability to secure resources, enhanced credibility, and increased the potential for sustainability.

The increased accessibility and utility of data, particularly in the form of maps and user-friendly analytical tools, has improved both organizations’ ability to effectively plan and manage programs and services. Both EMIS and CVC allow users to create their own maps, thus increasing the utility of these analytical tools for institutions that do not have in-house mapping technology. Data sharing and standardized products have kept costs low, reduced duplication and increased efficiency.
Both initiatives demonstrate that many factors contribute to the success of collaborative mapping systems. Effective technology is not sufficient on its own. Data must be shared and integrated into a single platform. Clear conceptual models guide the projects’ focus, the selection of variables and indicators, and the organization of data. It is important that the systems meet user needs, contain accurate and current information, be easy to use, be effectively marketed and engage stakeholders in the ongoing development and maintenance of the system.

The institutions that host EMIS and CVC have a history of using maps to inform decision-making, and have been able to demonstrate that maps can contribute to evidence-based intersectoral planning and action.
1. Introduction

Displaying information visually on maps has become increasingly popular as both a research and communication tool. Maps can provide a way to link physical geography with aspects of the social environment — for example, overlaying community, regional or other boundaries with service density, population composition, socioeconomic characteristics, or other metrics.

Maps provide a unique opportunity to present layers of data on a single image to geographically illustrate the relationships between, for example the social determinants of health and other factors, such as the relationship between income and rates of heart disease in different neighbourhoods across a city. They can also help us to better analyze and understand the drivers of health and health inequities in Canada, determine priorities, and target and refocus our intervention efforts.

Mapping is a tool that can help increase awareness and understanding of social determinants of health, the diverse range of social, economic and environmental factors that influence health. Social determinants include the work we do, our level of education and income, where we live, the quality of our experiences in early childhood and our physical environments (the Public Health Agency of Canada PHAC, 2008). Mapping provides a unique opportunity to present a variety of health, social, economic and environmental data on a single image to graphically illustrate the relationships between these factors. The mapping of social and economic variables can also be used to describe health and other community needs.

The purpose of this report is to highlight for planners, policy-makers, community groups, and professionals the potential role of mapping technologies in supporting action on the social determinants of health by indicating where action is needed at the local level. The report is relevant for professionals in the health sector and also for others working on the social determinants of health such as planners and community groups.

The report is organized into sections. Section 2 reviews the social determinants of health in Canada, and provides an overview of mapping technologies and how they can be used to display and analyze information. Section 3 presents two in-depth case studies of collaborative mapping initiatives that integrate health and social data: the Espace montréalais d’information sur la santé in Montréal (EMIS), Quebec, and the CommunityView Collaboration (CVC) in Saskatoon, Saskatchewan. Section 4 summarizes how the factors that shape health and well-being at the local level can be mapped to support intersectoral planning and action on the social determinants of health based on the two case studies. Implications are also addressed in this section. In section 5 the conclusions are presented.
2. Mapping the Factors that Shape Health

2.1 SOCIAL DETERMINANTS OF HEALTH

The work we do, our level of education and income, where we live, the quality of our experiences in early childhood and our physical environments all have an impact on our health (PHAC, 2008). These factors are referred to as social determinants of health (SDH). SDH help to underscore differences in health status that occur among population groups. They mostly result from inequities in the distribution of the underlying determinants of health across populations (Health Disparities Task Group, 2004).

Knowledge of the SDH tends to be limited among Canadians (Canadian Institute for Health Information (CIHI), 2005; Raphael, 2008). Canadians are more likely to believe that health is influenced by behavioural factors (smoking, diet, exercise and access to health care) rather than social and economic factors (adequate income, level of education, employment or social connections) (CIHI, 2005). Part of the challenge of informing people about SDH is the difficulty of describing abstract concepts such as socio-economic status in more concrete terms and linking these concepts to specific health outcomes. Presenting information about SDH visually on maps can simplify these complex messages.

2.2 MAPPING: WHY AND HOW

_In public health, maps have become very important. Spatial information eases knowledge transfer and you see the pattern and you see solutions, you can see the links between issues ... maps help people comprehend issues._

Case Study Interview, 2011

Mapping is a way to capture, manage, analyze and display geographically referenced information. It can be used to help answer questions and solve problems by illustrating data in a way that is quickly understood and easily shared.
APPROACHES TO MAPPING

There are many different methodologies to map data. Three common approaches are Geospatial Data Infrastructure, Web Mapping and Geographic Information Systems. Each of these approaches is briefly described below.

Geospatial Data Infrastructure (GDI)

GDI is a framework of technologies, policies, and institutional arrangements that together facilitate the creation, exchange, and use of geospatial data and related information resources across an information-sharing community (Environmental Systems Research Institute) (ESRI, 2010). Frameworks can be implemented to enable geospatial information sharing within organizations, or more broadly at a regional, national or global level. GDI generally provides a means for posting, discovering, evaluating, and exchanging geospatial information through participating information producers and users.

GeoConnections is the Government of Canada’s program that delivers the Canadian Geospatial Data Infrastructure (CGDI). GeoConnections supports initiatives across Canada to become compliant with CGDI standards. An initiative is considered CGDI compliant if it adopts and implements CGDI open and interoperable standards (i.e. the ability of making systems work together), specifications and protocols.

Some online maps have technological protocols and agreements established to gather data from remote databases to use as base maps or data in their own systems. This is referred to as a distributed mapping system. Users are usually not aware that they are viewing maps created with data accessed in real-time from distributed databases. In a distributed system, data remains with their custodians, which means the data are maintained and updated by subject matter specialists while users can view maps created with the most accurate and current data. This allows data custodian agencies to share and collaborate with other organizations.

Web mapping

Web mapping is the process of designing, implementing, generating and delivering maps on the internet. Web mapping applications disseminate geospatial data rendered in interactive and dynamic maps. Commonly used software applications include GéoClip, MapServer and Arc Internet Map Server (ARC IMS). GéoClip is an online interactive web-mapping tool which extracts information from large databases to generate easy to read maps. GéoClip has gained popularity as it is user friendly and relatively easy to use. MapServer is an open source development environment for building spatially enabled web mapping applications and services. ARC IMS is a tool which allows users to create interactive maps which can be layered to include specific attributes at the user’s discretion. There are also a variety of open source web mapping tools (such as Google Mashups), and many research labs create their own web mapping systems.
What can be mapped?

Where things are: Find places with particular features, and see patterns.

Quantities: Learn what places meet certain criteria. Public health officials might map the number of physicians per 1,000 people in each census tract to identify which areas are adequately served.

Densities: Measure features to see their distribution. This is especially useful when mapping things that vary in size.

What’s inside: Describe what’s in a specific area. The police might monitor drug-related arrests to find out if they are near schools.

What’s nearby: Find out what’s occurring within a set distance of a certain feature.

Change: Document change in an area or indicator to anticipate future conditions, decide on a course of action, or evaluate the results of an action or policy.

Source: Adapted from Environmental Systems Research Institute, 2010 [www.esri.com](http://www.esri.com)

Web mapping technologies do not normally provide the means for analyzing data. They tend to be designed to access datasets and render them into maps, or in some cases charts, tables and metadata. Some web mapping technologies are CGDI compliant or access data remotely in a distributed system. Collaborative web mapping applications allow multiple users to add their own data into a central system and create maps on the web without having in-house technology.

Geographic Information Systems (GIS)

GIS is a computer system for capturing, storing, checking, integrating, manipulating, analyzing and displaying data related to positions on the earth’s surface (Stanford University Library, 2006). GIS is generally understood as a desktop mapping system (such as MapInfo or ESRI) or an enterprise mapping system (such as MapGuide) which provides users with the ability to do spatial analysis on a variety of topics.
2.3. THE EMERGENCE OF MAPPING AS A TOOL FOR PLANNING AND ACTION ON THE SOCIAL DETERMINANTS OF HEALTH

Over the past decade, mapping has become more widely available to various sectors because of its usefulness in analyzing and communicating complex information. In particular, the availability of geographic data, the rise of free, online mapping tools, and the development of networks to support data access have all contributed. With this information and infrastructure in place, stakeholders have increased their ability to incorporate maps into their activities. For example, GeoConnections II included population health as a thematic area, and the Government of Canada has funded a number of population health web mapping initiatives. GeoConnections also produced a Manager’s Guide to Public Health Geomatics (GeoConnections, 2010).

Population health stakeholders involved in mapping recognize the power of mapping health indicators, and are making mapped data available for others to use. Cross-sectoral and interdisciplinary collaboration has played a key role in the adoption of mapping in the health and social sectors. In particular, the cross-sector collaboration required to address the diverse issues underpinning SDH has contributed to efforts to create standardized methodologies (thematically and geographically) that facilitate data sharing.

Some organizations are developing population health web mapping applications that are standards-based and interoperable. These organizations are making available many base framework datasets at the local level (e.g. by health district boundaries or neighbourhoods) (Iton, 2009).
3. Case Studies

Two mapping initiatives have been selected to describe their approaches in practice. The selection of these two initiatives was based on a national scan completed to inform this report.

The initiatives included in the scan met the following criteria:

- is based on a conceptual framework guided by a social determinants of health approach, which supports mapping of socio-economic variables
- is built on a cross-sectoral partnership informed by a governance model and data sharing protocols
- includes partners/organizations with the capacity and assets to manage the initiative (e.g. technological support, physical space, human resources)
- maps data by one or more local geographies (e.g. health distinct, neighbourhood)
- disseminates maps on the internet
- influences/informs decisions at the local level

The two case studies selected were the Espace montréalais d’information sur la santé (EMIS) of the Agence de la santé et des services sociaux de Montréal and the Community View Collaboration (CVC) in the Saskatoon Health Region. EMIS and CVC are both online interactive collaborative web mapping and information infrastructures that include networks of people, organizations, data and technology. Both case studies illustrate the potential of mapping as a tool to better understand and support action in population health, particularly the social determinants of health that shape health and wellbeing. Although neither deals exclusively with health issues, the data they compile and disseminate provide the means to better understand the relationships between socio-economic factors and differences in health outcomes among various populations groups.

3.1 CASE STUDY #1: ESPACE MONTRÉALAIS D’INFORMATION SUR LA SANTÉ (EMIS)

EMIS is a data-sharing and analysis platform that aggregates information on the health status of Montréal residents, the social determinants of health and available health services (EMIS, 2011). The goals of EMIS are to provide data, maps, and information to support health surveillance, planning and evaluation, and to inform residents about the state of their health and its determinants.
INSTITUTIONAL CONTEXT
EMIS is integrated into the Montréal health network, a component of the Québec healthcare system. The collection, sharing and dissemination of population health and surveillance data within the province are required under Quebec’s unique Public Health Act (2001). In Quebec, health and social services are integrated under the Ministry of Health and Social Services (MSSS). MSSS is responsible for both health and social services which supports collaboration across health and social sectors.

The MSSS administers health through a network of 18 health and social services regions (régions sociosanitaires) called Agence de la santé et des services sociaux (ASSS). Each ASSS is responsible for implementing the Programme national de santé publique — the primary measure under the Public Health Act to chart the course of public health action organized at the national, regional and local levels (MSSS, 2002). EMIS is hosted by the ASSS in Montréal (ASSSM), and supports Montréal’s network of health partners.1

POPULATION HEALTH FRAMEWORK
EMIS follows the population health conceptual model used by MSSS (Figure 1), and collects information as required to fulfill the surveillance requirements of the Public Health Act. EMIS data are arranged according to a number of major themes which are reflected in the conceptual model (Figure 1), and many of its indicators are integrated with those of MSSS.

MAPPING SYSTEM
EMIS uses GéoClip as its collaborative and interactive web mapping system. EMIS staff also use MapInfo as the in-house analytical geographic information system.

The EMIS mapping system is CGDI compliant, and adheres to open specifications should other health agencies decide to adopt this approach. EMIS currently has distributed data functionality.

DATA
EMIS disseminates data on population health and health services, which are primarily produced and collected by the DSP (Public Health Directorate), through the Surveillance de l’état de santé à Montréal (SESAM) (Montréal health surveillance), and ASSSM’s office of the assistant director general, through the Service de la gestion de l’information (SGI). These two teams work closely with all of the Agency’s directorates. Although it was challenging to amalgamate the various sets of tools and information, the arrangement provides users with one location from which to access health and social information and allows for data products to be streamlined and technology assets to be pooled. This avoids duplication of effort and reduces costs.

1 The ASSSM includes 12 centres de santé et de services sociaux (CSSS). The CSSS include the Local Community Services Centres, public nursing homes (Centres d’hébergement et de soins de longue durée (CHSLD)) and, in some cases, general and specialized hospitals in their area. The CSSS and its partners form a local health and social services network (RLS). The CSSS coordinate the services provided by all of the RLS partners and facilitate collaboration with the other areas of activity to address the social determinants of health. To coordinate health and social services, the CSSS require a variety of information products (data and maps) to clearly understand the populations they serve as well as the problems they face. http://emis.santemontreal.qc.ca/
Data sharing is a key component of EMIS. Sharing information reduces ad hoc data and map requests, saving staff time, reducing duplication of effort and curbing data acquisition costs. Much of the data is shared without data sharing agreements since health and social services network members are mandated to share information under the Public Health Act.

Although data from the SGI and DSP are integrated on a single website, the programs are responsible for maintaining different data sets. SÉSAM oversees the section on population health, while SGI primarily focuses on the health system information. SÉSAM and SGI collaborate to support EMIS tools (discussed below) and the technological management of the site and data. This collaborative work environment requires dedicated effort.
EMIS offers the option of mapping data and indicators into a variety of thematic atlases and allows users to select from a list of geographic divisions. Maps are also incorporated into many reports. Data and information products are organized according to the following sub-themes:

- Overall picture
- Health status
- Determinants of health
- Intervention areas
- Population sub-groups
- Social inequalities in health
- Reportable diseases

Within each sub-theme, information products can be accessed as reports, indicators or papers. All EMIS information products are accompanied by metadata and methodological information. Many EMIS products are standardized to match those produced by MSSS.

For all themes, users can access raw data or information products under the Data (Données) and Analysis (Analyses) tabs. Users can select data for each of the 12 sub-regions in Montréal (Centre de santé et de services sociaux, CSSS). Users can find PDFs or interactive maps and data on indicators and methodological explanations, geographic divisions and metadata.

Data are available on the web, and are aggregated and anonymized to ensure confidentiality (ASSSM, 2009). The GIS team reduces the complexity of the technology and information infrastructure to facilitate access and use, by engaging stakeholders and users. Users navigate the content with an interface that is user-friendly and intuitive. Transparent access to data is a key factor in creating user loyalty and EMIS tools are well recognized for their ease of use. Stakeholders have access to information that enables them to efficiently manage, monitor and plan the delivery of their services.

Interoperability standards are being implemented with partners in civil society organizations, the City of Montréal and the MSSS. This allows for the exchange of data across various GIS applications and increases the capacity for decision-makers to obtain useful information from different sources in real-time. Web Mapping Service (WMS) and Table Joining Service (TJS) standards enable access to data from many external sources in a distributed fashion. These standards also ensure that EMIS is interoperable with the CGDI which expands options for working with external agencies.

Interoperability also increases data access. An interoperable web infrastructure facilitates the integration of data from multiple sources, and reduces the time to integrate and translate data for multiple uses. Data are standardized in such a way that they can be interchanged between scales to be used more quickly and efficiently, which increases knowledge use and transfer.
Now we need to be convinced to not share data. Community groups trust that we will do the right thing with the data we have, and we have a good track record which gives us the credibility we need to continue to do this work.

Case Study Interview, 2011

TOOLS AND PRODUCTS
EMIS provides three key tools: Chiffres-clés (Key Figures), the Atlas Santé Montréal (Montréal Health Atlas) and Statistiques interactives (Interactive Statistics).

Chiffres-clés (Figure 2) are a set of indicators with data derived from a database that includes variables on a variety of topics (demographics, vital statistics). These data are regularly updated, and are also used to inform other EMIS products (Drouin, 2011). Chiffres-clés indicators are the same as those produced by the MSSS to allow for standardized multi-scalar comparisons.

Figure 2 — Key Figures (Chiffres-clés)

Adapted from: [http://emis.santemontreal.qc.ca](http://emis.santemontreal.qc.ca)
The Atlas Santé Montréal was created in 2006 (Bourguignon, 2006) using GéoClip technology, a CGDI compliant web mapping system. GéoClip functionality includes the ability to generate dynamic tables and charts by a variety of geographic divisions, including information on methodology and data sources. The organization of Quebec health services requires detailed knowledge of the services available in a given area, as well as knowledge of population characteristics, health needs and patterns of health service use. Social and health data are aggregated into different geographies, for example, the Deprivation Index map (Figure 3). The aim of the Atlas is to provide this information to decision-makers and the network of stakeholders. Stakeholders can also create their own maps; these can be saved on the system and exported as images or PDFs. Map creators can also upload their own data, providing the data are arranged according to the standard geographic divisions used in the Atlas.

Figure 3 — Social and Material Deprivation Montréal

Adapted from: Atlas Santé Montréal http://emis.santemontreal.qc.ca/outils/atlas-sante-montreal
Statistiques interactives (SI), a dynamic web table tool that provides access to tabular data, is also part of EMIS. Data are arranged by common themes and sub-themes. It allows users to include or exclude select variables, determine how data will be visualized, and export selected variables.

If an issue is more prevalent in a particular neighbourhood, such as a higher incidence of accidents, we would use these data to introduce the problem, provide ideas for solutions and since these come from the Direction de Santé Publique, these data are considered reliable and trustworthy, and [they] influence change.

Case Study Interview, 2011
(April 4, 2011)

GEOGRAPHIC DIVISIONS
EMIS provides access to maps and data for a set of indicators aggregated by geographic divisions. Data are aggregated into the 12 local health networks, which are associated with the 12 health and social services centres (CSSS). CSSS work to ensure that local services are accessible and of high quality for the populations served. Within the CSSS are 29 Local Community Services Centres (CLSC), which include a total of 41 units responsible for routine health services, and front-line prevention, rehabilitation and reintegration health and social services.

EMIS also provides data for the 111 neighbourhoods. The neighbourhood is the smallest unit created by the SGI and SÉSAM, in collaboration with local network players. Neighbourhood boundaries match CLSC and CSSS boundaries. In addition to neighbourhoods, EMIS aggregates certain data into fire, police, school and hospital administrative or service areas along with electoral districts and postal codes; it also disseminates data by health institution.

EMIS does not aggregate all data by all geographic boundaries. Emphasis is placed on neighbourhoods wherever possible, and EMIS also relies on CSSS and CLSC boundaries. The boundaries are nested within each other which facilitates multi-scalar analyses.

When we produce maps we consider our users, and we try to produce on paper and on the web and not all necessarily using GéoClip. We also recognize that there are different levels of map literacy, we listen to users, and we are simplifying classes, and we have many local groups reproducing maps from GéoClip, and there is a debate on how much control we provide to map makers versus no control at all. There is much learning, and spatial information should be used as much as possible, it is a facilitator of knowledge uptake.

Case Study Interview, 2011
GOVERNANCE STRUCTURE
The EMIS governance structure is based on thematic areas such as population health information, internet/technology, performance and evaluation. EMIS has adopted a user-centred approach whereby stakeholders, partners and other collaborators participate in the design and operation of the system. User committees are consulted to better understand needs related to the content and structure of EMIS.

TARGET USERS
The target users for EMIS are: (i) health managers and professionals with public health or health services planning mandates, (ii) external partners with interest in health, and (iii) the general public. EMIS is a one-stop standardized data access infrastructure enabling diverse users to create comparable information products.

Given that the website is used by many stakeholders, the EMIS team consults and adjusts content as required in response to feedback received. In addition, training is provided so that users can become familiar with the site content and use of the dissemination tools.

PARTNERSHIP AND COLLABORATION
EMIS is a collaborative and partnership based initiative. As discussed above, EMIS integrates SGI and DSP data, and provides information to the ASSSM. Other partners include the MSSS, City of Montréal, Police and fire services, school boards, child care centres, the Comité régional d’utilisateurs d’information sociosanitaire (CRUIS) and the general public.

SÉSAM maintains EMIS web content under the Santé des Montréalais tab, while content under the Système de santé tab is primarily managed by SGI. Other web content is jointly managed to avoid duplication and reduce costs. Creating a single online location required a great deal of time, effort and cooperation.

FUNDING AND SUSTAINABILITY
EMIS is an integral component of the operational budgets of SGI and SÉSAM (DSP), and is fully funded by the ASSSM. EMIS contributes to ASSSM’s information management and dissemination mandate by providing web platforms and therefore receives stable funding. EMIS also received funding for infrastructure support from GeoConnections. These funds were used to ensure that maps and data are CGDI compliant and to support the development of distributed data functionality.

INFLUENCE
EMIS data have been used in a number of research, planning and other initiatives that have influenced action at the local level. For example:

• Data/maps informed policy design and budget allocations on school readiness (DSP, 2011).
• Studies on material deprivation in CLSC and neighbourhoods assessed concentrations and trends in inequity (EMIS, 2014).
• As part of work to inform the development of healthy eating strategies, a study was undertaken to assess accessibility to fruits and vegetables (DSP, 2007). A similar initiative reviewed proximity to parks and recreation facilities (EMIS, 2010).

• Maps are used for physician resource planning to support a more egalitarian distribution of doctors.

• The mental health planning team used maps of the location of health facilities, users and practitioners to inform the creation of partnership zones.

• Maps helped to inform the planning and evaluation of health service wait times.

• Data were used to identify risk factors tied to inequity in support of suicide prevention programming.

3.2 CASE STUDY #2: CommunityView Collaboration

The CommunityView Collaboration (CVC) is a regional multi-partner, web-based community information system. It is located in the Public Health Observatory (PHO) of the Saskatoon Health Region (SHR) and operates in collaboration with a range of partners. The CVC was developed to meet the region’s needs for monitoring and reporting and efficient and timely data dissemination. The goal of the CVC is to provide relevant, reliable, local information and evidence to inform planning, decision-making, and policy for Saskatoon and surroundings. The CVC is therefore intended to build evidence for action (CVC, 2011).

The CVC makes intersectoral and interjurisdictional data sharing possible and provides access to various organizations. It includes a variety of sources of data and user-friendly tools to combine, analyze and visualize data using tables, charts and maps. The primary features of the CVC system are the assembly of data from multiple sources and an information system that facilitates end-user data analysis, including a Geographic Information System (GIS).

INSTITUTIONAL CONTEXT

The first CVC pilot was initiated in the mid-1990s by the SHR in collaboration with the City of Saskatoon and the University of Saskatchewan. The current CVC was released in 2010 for testing, and was officially launched in June 2011.

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2 www.communityview.ca

3 The Saskatoon Health Region (SHR) was established in 1992 and is the largest health region in Saskatchewan, serving 300,000 residents. The SHR is responsible for delivering acute and long-term care, rehabilitative services, home care, mental health services, prenatal and palliative care, and public health services (SHR 2011). The mission of the SHR is to have the healthiest people and communities and to provide exceptional service. SHR boundaries extend outside of the City of Saskatoon to include rural municipalities. There are more than 100 cities, towns, villages, regional municipalities and First Nation communities in the SHR.
The initial motivation behind the CVC was to create a tool to inform the Status Report of the Chief Medical Officer of Health (Muhajarine & Neudorf, 1998). At that time, health care service delivery was being decentralized and local/regional health board mandates were expanding. A new, more comprehensive approach to health planning at the regional level was being tested, requiring local data on health determinants to support evidence-based decision-making. The CVC helped to meet these needs by collecting quantitative and qualitative information that could be monitored over time, enhancing the factual basis for each participating organization or agency for decisions regarding planning, allocation of resources, what services to provide, in what locations, and what research areas to pursue (Neudorf, 2008).

The City of Saskatoon supports the CVC because it provides integrated data to inform planning. It supports the creation of publicly available profiles of Saskatoon’s neighbourhoods that rely on data and maps. The SHR’s need for data on health determinants and the socio-economic information requested by the City provided a lasting collaboration (Holden, 2011). A strong relationship between the city and the CVC has been established through CVC’s desire to pursue data that is not solely health focused (Holden, 2011).

The CVC was designed to eventually permit future use by all health regions in Saskatchewan. CVC officials are working with provincial partners to explore the feasibility of a province-wide roll-out.

**POPULATION HEALTH FRAMEWORK**

The conceptual framework which informs the CVC is depicted in Figure 4. This framework defines the scope of what is meant in health, its determinants, and its consequences. CVC data are arranged by major themes which reflect this conceptual model. As such, the model helps to provide a rationale for the selection of data and the development of specific measures in three areas: (i) health and function, (ii) determinants of health, and (iii) consequences of threats to health.

**MAPPING SYSTEM**

The CVC has adopted GéoClip as its collaborative and interactive web mapping system. It is compliant with the Canadian Geospatial Data Infrastructure, adheres to open specifications and is interoperable and scalable.

**DATA**

CVC data are arranged according to a social determinants of health approach (Figure 5). Users can filter data by geography, sub-category, and year. CVC also includes metadata descriptions (Ugolini, 2011).
Figure 4 — Social Determinants of Health Data and Information Model


Figure 5 — CVC Social Determinants of Health Sub-theme Data Choices

Adapted from the CommunityView Collaboration website: http://www.communityview.ca
Table 1 below provides a brief summary of the data currently included in the CVC. As new partners join, additional data can be integrated into the CVC system. The SHR and the City each purchase custom neighbourhood census data from Statistics Canada under a consortium license.

Table 1 — Data in the CVC System (Ugolini and Holden, 2011)

<table>
<thead>
<tr>
<th>DATA</th>
<th>GEOGRAPHY</th>
</tr>
</thead>
<tbody>
<tr>
<td>School enrolment</td>
<td>Saskatoon neighbourhoods and school catchment</td>
</tr>
<tr>
<td>Crime statistics</td>
<td>Saskatoon neighbourhoods</td>
</tr>
<tr>
<td>Selected health indicators (e.g. communicable and chronic diseases, hospitalization rates)</td>
<td>Saskatoon neighbourhoods</td>
</tr>
</tbody>
</table>

The CVC provides an opportunity for partners to share, access and contribute data. Data sharing is important to reduce duplication of effort and cost involved in cross-sector data acquisition and management, as well as the human resource capacity required to analyze and monitor data. Data sharing also increases opportunities for organizations to access standardized data organized by common geographic boundaries, and increases capacity for evidence-based decision-making and policy development (SHR Personal Communication, 2011).

There are two levels of data access: public access and partner access. Some data are exclusively accessible to partners and are password protected. These data are aggregated at finer geographies.
TOOLS AND PRODUCTS

In addition to providing access to data, the CVC includes a number of user-friendly tools to support users to analyze, interpret and visualize data. The mapping tool is one of the most important features of the CVC. Catalogue resources are also available (Figure 6).

Figure 6 — CommunityView Collaboration Resource Catalogue

Adapted from the CommunityView Collaboration Resource Catalogue:
http://www.communityview.ca/Catalogue/ResourceList
The mapping tool allows one or two layers of information to be mapped (e.g. census variables and indicators, see Figures 7 and 8). The tool allows users to select variables for mapping. The tool also has a number of functions that support customization.

**Figure 7 — Single Variable Map**

Adapted from: CommunityView Collaboration, 2014-09-02
The chart tool permits users to view data in a number of predefined chart formats. Users can also view data in tabular format, or export data into Excel. The map, chart or table export function permits users to select data and create their own maps which they can annotate, save and export. CVC stakeholders and partners specifically requested this functionality as many institutions do not have the technological resources in-house to create their own maps.
GEOGRAPHY

Individuals may have different perceptions of what their neighbourhoods are, but if they are looking for information about neighbourhoods, they will find it according to those [natural neighbourhood] boundaries. Associations and centres form around these, and over time these geographies come together in people’s minds. The City is about communities within communities, we design around these neighbourhoods; planning policy and practice is done at the neighbourhood level.

Case Study Interview, 2011

The CVC aggregates data by geographic boundaries that are directly related to the mandates of key partners (health district boundaries) and stakeholders (e.g., school districts, wards). As well, data are aggregated according to administrative and census boundaries.

CVC uses a unique set of administrative local boundaries called neighbourhoods. There are currently 89 neighbourhoods within the boundary of the Saskatoon Census subdivision, 64 of which are essentially residential in nature. All CVC data are rolled up for these boundaries. Neighbourhoods were originally created in the early years of the city of Saskatoon to serve as catchment areas for the elementary school system, since schools were considered core to neighbourhood communities.

Within the city of Saskatoon, neighbourhoods are seen as the foundation for planning, and are used to deliver local services. They are not officially enshrined in policy, however, are used by the CVC because they are well-known and recognized by residents. This level of aggregation sometimes requires clustering to ensure privacy is maintained. It is expected that the CVC will eventually permit users to choose from a variety of other geographic boundaries.

GOVERNANCE STRUCTURE

The CVC governance model is being redesigned. In particular, a number of committees are being created to address data/technical needs, communications, policies/procedures and capacity building. These committees will bring together collaborators, partners and staff. Each agency that contributes data, the Regional Intersectoral Committee and key experts (as required) will sit on the Steering Committee.

TARGET USERS

CVC users include regional and provincial government human service agencies, community service organizations, research entities, Regional Intersectoral Committees, key provincial government ministries and agencies such as Health, Social Services, Education/Advanced Education, Employment and Labour, Municipal Affairs, Corrections, Public Safety and Policing, First Nations and Métis Relations and Enterprise Saskatchewan (SHR Personal Communication, 2011).
PARTNERSHIP AND COLLABORATION

The precondition of success is the willingness to collaborate.

Case Study Interview, 2011

The CVC was designed as a collaborative and partnership-based initiative. The creators recognized that a coordinated response from many sectors with policies or programs related to determinants of health was necessary (Neudorf, 2008). Although some collaborative relationships were already in place early on, CVC leaders have invested significant effort to foster new relationships with multiple institutions. As a result, the CVC has become a shared project that has solidified existing relationships and helped to create new connections. In addition to founding partners in the SHR, the City and the University of Saskatchewan, other key participants include the Saskatoon Regional Intersectoral Committee (SRIC), the Government of Saskatchewan, Saskatoon Police Services, the United Way, the Saskatoon Public School Division, the Greater Saskatoon Catholic School Division and ProjectLine Solutions (software developer).

Partnerships contributed to build the CVC. Support from the University of Saskatoon was instrumental in developing the conceptual model and evaluation plan and assisting with proposal writing. The resulting academic papers were key in establishing the credibility of the CVC (Neudorf, Muhajarine & Gardner, 1998). Existing information technology infrastructure established through the Provincial Corporate Information and Technology Branch supported CVC data acquisition (Muhajarine & Neudorf, 1998). Endorsement of the CVC by the SRIC4 supported the multi-sectoral nature of the initiative. The CVC helps to advance SRIC goals of cross-agency collaboration and greater centralization of processes and tools (e.g. standardized grant applications). In turn, the SRIC helps to shape the CVC vision, data sharing approaches, identification of core datasets and the selection of interoperable formats. In addition, senior leaders from health, education, social services and justice were also engaged.

FUNDING AND SUSTAINABILITY

CVC funding has come from a variety of sources including the City, the SHR, the provincial Ministry of Community and Social Services, the provincial Geomatics Advisory Committee, the Greater Saskatoon Catholic School Board, the Saskatoon Public School Board and GeoConnections. Partnerships were created incrementally. For this reason, different phases of the CVC were developed when funding became available to cover key milestones (Ugolini, 2011).

Current funding from partners is sufficient to maintain CVC. CVC plans to maintain operations by relying more heavily on in-kind human resource contributions from the SHR and other partners and stakeholders.

4 The SRIC is one of ten multi-jurisdictional committees in Saskatchewan mandated to work in partnership researchers and community organizations to shape policies, programs, and resource deployment to meet the needs of vulnerable families.
INFLUENCE

CVC maps and data are used to support a diverse range of research, practice and policy initiatives. For example, the SHR published a study on mapping health disparities between low income and affluent neighbourhoods using census and locally collected data. This led to the development of programs and services both within and outside the health sector (Neudorf, 2008). Some of the outcomes from this study included:

- The reallocation of 10% of SHR Public Health Services funds toward a Building Health Equity program to target public health services within some of the city’s low income neighbourhoods (SHR, 2012).
- The reallocation of a part-time physician to two low income schools to provide students with access to pediatric services (SHR, 2009).
- Allocation of funds from provincial and municipal governments for low income housing and other neighbourhood revitalization projects (Ibid.).
- Allocation of funds from the United Way of Saskatoon for after school programs in low income neighbourhoods, and a focus on reducing health disparities in overall funding.
- Inclusion of “reducing health disparities” and “improving Aboriginal health” as strategic priorities/goals for SHR (Ibid.).
- Agreement to work on a Health Disparities Reduction research synthesis and evidence-based policy review for the SRIC to be used in the development of a community action plan to reduce poverty and health disparities (Ibid.).

CVC maps have also been used to demonstrate the relationship between low income and housing to show where social and health planning are most needed, and to inform municipal fire and building inspectors about improvements needed in rental housing quality (Neudorf, Muhajarine & Gardner, 1998). Maps showing the relationship between birthrate and income, fertility and teenage mothers have helped to target areas in need of education and birth control services. Finally, maps of cardiovascular disease morbidity and mortality combined with hospital utilization rates and vital statistics helped to inform prevention programs.
4. Summary and Implications

Seeing variables in maps makes sense to people. Tables and figures arranged according to 60 neighbourhoods are harder to conceptualize, and it is harder to glean information from these [tools]. Once data are mapped, the power of maps takes over.

Case Study Interview, 2011

The two case studies, Espace montréalais d’information sur la santé (EMIS) and CommunityView Collaboration (CVC), highlight the value of collaborative interactive online web mapping information infrastructures that generate and disseminate maps, data and related information products. Both initiatives apply a social determinants of health conceptual model to guide the selection of data, indicators and themes, and are led by health stakeholders. However, neither project exclusively frames its work in terms of health issues. Instead, data are available on a diverse range of topics — an approach that has supported both projects to generate a broad foundation for collaboration. Partnerships are integral to both projects, and have contributed to generating funding, credibility and sustainability.

BENEFITS
For both EMIS and CVC, data sharing has increased the accessibility and utility of data to inform research, planning and action. Both initiatives have become ‘one-stop shops’ for standardized data access and analysis/visualization tools, enabling their respective users to build capacity, improve existing products or create new information products, and use relevant and reliable data to inform decisions. As well, the projects have reduced the duplication of efforts across agencies, reduced costs associated with data acquisition, and as such have increased efficiency. Mapping is particularly important and a frequently used approach to presenting health and social data for both projects. Their users consider maps to be important to inform and support their work.

CHALLENGES
Both projects experienced challenges in integrating teams from various organizations and ensuring their products meet the multiple needs of diverse users. For EMIS, the demand for raw data and packaged information needed to be reconciled. This was resolved by incorporating both data and analysis functions in EMIS. The amalgamation of data, tools, products and technologies from two programmatic areas that use and produce data differently also presented a number of challenges. Dedicated effort is required on an ongoing basis to maintain collaborations and to develop new working relationships. Ensuring that EMIS is relevant, easy to use and well-known also necessitates continual consultation and awareness raising of the tool, including within the Agence de la santé et des services sociaux de Montréal (ASSSM) to ensure its continued support.
In Saskatchewan, the absence of legislation mandating collaboration and data sharing, and the location of health and social services in separate provincial government ministries, increased the challenges of establishing cross-sector collaboration. Key CVC representatives invested time and effort to raise awareness of the initiative and foster relationships. Securing funding was also challenging in this context. Although housed in the SHR, the CVC does not focus exclusively on health which could give rise to confusion in relation to areas of responsibility for funding.

**ROLE OF PARTNERS**

EMIS and CVC are information infrastructures created in collaboration with a large number of partners. The experience of both projects indicates that efforts need to be dedicated to the task of keeping users, partners and stakeholders informed and engaged. Both EMIS and CVC have adopted a user-centred approach in which users, clients, partners and collaborators contribute to the project by participating on governance committees and contributing in-kind support.

**TECHNICAL CONSIDERATIONS**

EMIS and CVC use GéoClip collaborative and interactive web mapping systems. Both initiatives are CGDI compliant, adhere to open specifications and are interoperable and scalable, allowing for broader roll-out. EMIS includes distributed data functionality and CVC plans to add this at a later date. Access to census data in both EMIS and CVC are contingent on their respective data licensing agreements with Statistics Canada.

Both EMIS and CVC aggregate data into geographical boundaries that are directly related to the mandates of partners and stakeholders. Each initiative has also created specialized local geographic divisions, i.e. neighbourhoods. Emphasis is placed on these local boundaries because they make sense to users and are compatible with other important boundaries to facilitate multi-scalar analysis. Neither initiative aggregates all data by all possible geographic boundaries. Choices are made based on the function of the information products created and how the original data were provided.

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EMIS and CVC also provide public and private access to their systems. Some data can be freely downloaded, but many datasets are exclusively accessible to certain users in order to ensure data confidentiality and allow access to finer geographies.
LESSONS LEARNED
Both EMIS and CVC have identified conditions for success. Effective technology is a key requirement, although it is not sufficient on its own. The system must also meet user needs, contain accurate and current information, be easy to use, be effectively promoted and engage stakeholders in the ongoing development and maintenance of the system. As well, a clear conceptual model helps to keep the project focused and guides the selection of variables/indicators and the organization of data.

Defining the initiative more broadly rather than focusing on health exclusively helps to build support and engage partners. If EMIS and CVC incorporated only health data or aggregated data only according to health boundaries, other sectors would be unable to access information of relevance to them. Aggregating data into current administrative and/or service area geographies ensures that it will fit into pre-existing decision-making structures.

The institutional context within which the initiative is located should be taken into account. The different ways in which health and social service systems are organized in Quebec and Saskatchewan have influenced the approach, the governance, and the implementation of the two initiatives.

Maps are powerful tools that can be used to convey how health and wellbeing are influenced by a number of social and economic factors. Both EMIS and CVC have received positive attention nationally as key assets in supporting knowledge and action. Allowing users to create their own maps has also increased their use by institutions that do not have in-house mapping technology.

The organizations that host EMIS and CVC have a history of using maps to inform decision-making, and have been able to demonstrate that maps can contribute to effective, evidence-based planning and action. Both initiatives have designed and implemented systems that meet the needs of decision-makers by connecting data to their respective areas of responsibility.
Table 2 below outlines the factors contributing to the success of mapping from the two case studies.

| DATA | Integration of data from diverse partners such as social services, police departments, school boards and health districts, census material, school enrolment, crime statistics and selected health indicators, such as the rates of communicable and chronic diseases. |
| TECHNOLOGY | Use of collaborative and interactive web mapping systems, such as GéoClip which are CGDI compliant, adhere to open specifications and are interoperable and scalable, allowing for broader roll-out. |
| GEOGRAPHY | Data aggregated by not only health boundaries but by geographic boundaries as well as others such as fire, police, school and hospital administrative or service areas along with electoral districts and postal codes. |
| PARTNERS | Involvement of a wide range of partners from health and social sectors such as schools, local universities, provincial governments, non-profit organizations, the private sector and police services. |
| GOVERNANCE | User-centred approaches: clients, partners and collaborators contribute to the project by participating on governance committees and contributing in-kind support. |
| USERS | Broad base of users including regional and provincial government, human service agencies, community service organizations, research entities, regional committees, key provincial government ministries and agencies such as Health, Social Services, Education, Employment and Labour, Municipal Affairs, Corrections, Public Safety and Policing, First Nations and Métis Relations. |
| ACCESS | Public and transparent access to data that is user-friendly and intuitive. Access that allows stakeholders to efficiently manage, monitor and plan the delivery of their services. |
5. Conclusions

This report highlights the role of mapping in supporting planning and action on the social determinants of health by indicating where action is needed at the local level. The two cases studies demonstrate where the integration of health and socio-economic data led to concrete collaborative actions at the local level.

The approaches used in Montréal and Saskatoon reinforce that local and practical action to address shared health and social issues — in this case pooling data and creating analytical tools that served the interests of diverse partners — can yield tangible results. These initiatives also help to reduce duplication of effort, standardize data products, enhance credibility and increase the capacity of organizations to use reliable evidence to inform their work.

While developing partnerships across sectors and integrating information systems is challenging, the benefits are many. Shared data and user-friendly analytical tools lend transparency to decision-making. Mapping tools make community needs clear and apparent. This allows government and non-government organizations, others sectors and the public to respond more effectively to address the social determinants of health based on the best available evidence.
## Appendix 1 — Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ARC IMS</td>
<td>Arc Internet Map Server</td>
</tr>
<tr>
<td>ASSS</td>
<td>Agence de la santé et des services sociaux</td>
</tr>
<tr>
<td>ASSSM</td>
<td>Agence de la santé et des services sociaux de Montréal</td>
</tr>
<tr>
<td>CGDI</td>
<td>Canadian Geospatial Data Infrastructure</td>
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<tr>
<td>CIHI</td>
<td>Canadian Institute for Health Information</td>
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<tr>
<td>CLSC</td>
<td>Centre local de services communautaires (Local Community Services Centres)</td>
</tr>
<tr>
<td>CRUIS</td>
<td>Comité régional d’utilisateurs d’information sociosanitaire</td>
</tr>
<tr>
<td>CSSS</td>
<td>Centre de santé et de services sociaux (Community health and social services centres)</td>
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<tr>
<td>CVC</td>
<td>CommunityView Collaborative</td>
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<tr>
<td>DSP</td>
<td>Direction de santé publique (Public Health Directorate)</td>
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<tr>
<td>EMIS</td>
<td>Espace montréalais d’information sur la santé</td>
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<tr>
<td>ESRI</td>
<td>Environmental Systems Research Institute</td>
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<tr>
<td>GDI</td>
<td>Geospatial Data Infrastructure</td>
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<tr>
<td>GIS</td>
<td>Geographic Information Systems</td>
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<tr>
<td>JTS</td>
<td>Joint Table Service</td>
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<tr>
<td>MSSS</td>
<td>Ministère de la Santé et des Services sociaux</td>
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<tr>
<td>PHAC</td>
<td>Public Health Agency of Canada</td>
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<tr>
<td>PHO</td>
<td>Public Health Observatory</td>
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<tr>
<td>RLS</td>
<td>Réseaux locaux de services (Local service networks)</td>
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<tr>
<td>SDH</td>
<td>Social determinants of health</td>
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<tr>
<td>SGI</td>
<td>Service de la gestion de l’information (Information Management Service)</td>
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<tr>
<td>SHR</td>
<td>Saskatoon Health Region</td>
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<tr>
<td>SI</td>
<td>Statistiques Interactives</td>
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<tr>
<td>SRIC</td>
<td>Saskatoon Regional Intersectoral Committee</td>
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<tr>
<td>SÉSAM</td>
<td>Surveillance de l’état de santé à Montréal (Montreal health surveillance)</td>
</tr>
<tr>
<td>WMS</td>
<td>Web Mapping Service</td>
</tr>
</tbody>
</table>
References


Canadian Institute for Health Information. (2005). Select highlights on public views of the social determinants of health. Ottawa: Canadian Institute for Health Information.


Neudorf, C. (June 11, 2008). *Development of a comprehensive community information system and intersectoral action, through collaboration at the local level*. Presented to the Senate Subcommittee on Population Health of the Standing Committee on Social Affairs.


For more information regarding mapping, refer to the following resources.

EMIS, À propos de l' EMIS : [http://emis.santemontreal.qc.ca/info/a-propos-de-lemis/](http://emis.santemontreal.qc.ca/info/a-propos-de-lemis/)


GANIS, Geographic and Numeric Information Systems: [http://ganis.spno.ca/about/](http://ganis.spno.ca/about/)


Profile at the Geomatics and Cartographic Research Centre, Carleton University: [https://gcrc.carleton.ca/confluence/display/GCRCWEB/Overview](https://gcrc.carleton.ca/confluence/display/GCRCWEB/Overview)


Saskatoon Public Health Observatory: [https://www.saskatoonhealthregion.ca/PHO/](https://www.saskatoonhealthregion.ca/PHO/)