



The Socio-Economic Contribution of Health Sciences North / Horizon Santé-Nord to Northeastern Ontario

Final Report

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Executive Summary

Introduction

Health Sciences North / Horizon Santé-Nord (HSN) is a regional resource and referral centre for more than half a million residents of northeastern Ontario. In addition to providing a comprehensive suite of programs and services, HSN offers regional programs in the areas of cardiac care, nephrology, oncology, rehabilitation and trauma. Some services are offered in nearby communities through outreach and satellite programs. The hospital continues to develop into an academic health sciences centre replete with teaching and research facilities and resources, including faculty who are cross-appointed to the Northern Ontario School of Medicine (NOSM). HSN also has a number of partnerships at the community and regional level with other health service and health education organizations. This study estimated the socio-economic contribution of HSN on the City of Greater Sudbury and other communities as HSN evolves into an academic health sciences centre and continues to develop as a regional referral centre.

Methods

This study was conducted by Centre for Rural and Northern Health Research (CRaNHR) in partnership with Informetrica Limited. Informetrica's Local Impact Model used numbers derived from administrative databases for fiscal year 2010/2011 (FY10/11) to estimate economic contribution. Interviews with key informants conducted in 2012-2013 provided the narratives to expand on the economic contribution as well as to explore the social contribution. The Research Ethics Committee of HSN and the Research Ethics Board of Laurentian University approved all research procedures and instruments.

Informetrica's Local Impact Model was used to calculate the direct, indirect and induced economic contribution of HSN on Greater Sudbury or on satellite communities. Direct effects were estimated from labour expenditures. Indirect effects included new activity in the local economy due to spending on goods and services by HSN. Induced effects comprised new economic activity that originated from spending by people directly employed by HSN and by those employed by businesses within HSN's production chain. The model also estimated the economic contribution of patients and visitors from out of town. The model separately estimated the contribution of physicians with hospital privileges at HSN as these physicians, while not employed by HSN, could attribute part of their earnings to their affiliation with HSN. In all calculations, only those monies spent in the community were used to estimate local economic contribution.

HSN data for FY10/11 included revenues, expenditures, number of doctors with hospital privilege, volunteer hours, number of employees, hours worked and patient volumes. Local property tax information was obtained from the City of Greater Sudbury's financial statements for 2010. The model also used data from Statistics Canada (Labour Force Survey, Business Register, Census data, Input/Output (I/O) tables) and the Canadian Institute for Health Information (CIHI) (National Physician Database).

To get a broader perspective on the socio-economic contribution, we invited key informants from 15 hospitals in communities located within the North East Local Health Integration Network (NE LHIN) and within 500 km of the City of Greater Sudbury to participate in semi-structured interviews. We interviewed seven people from hospitals in five separate communities representing a hospital response rate of 33%. Key informants included hospital CEOs and other senior managers or administrators. All interviews were conducted over the phone and recorded with the permission of key informants. Recordings were analyzed using an iterative analytical approach to generate lists of findings structured around the interview questions plus any other topics that emerged from the interviews. Anonymized quotes illustrated the scope and depth of each theme.

Results

Economic Contribution

In FY10/11, HSN revenues totaled \$409 million and expenses totaled \$415 million. Labour costs were \$289 million (70% of total expenses) and non-labour costs approached \$126 million. Approximately 95% of HSN employees resided in the City of Greater Sudbury.

Through direct, indirect and induced effects, the net economic contribution of the HSN to Greater Sudbury totaled almost \$310 million. There was an additional \$12.3 million in local property taxes that accrued to Greater Sudbury.

HSN has 3,936 employees, equal to 3,068 full time positions, and contributed 4,828 full-time equivalent (FTE) jobs in Greater Sudbury. Volunteers contributed over 92,000 hours per year, which was equivalent to 47 FTE jobs or \$2.5 million in wages.

The total contribution of IT and Research activities to the economy of Greater Sudbury was \$7.2 million and \$1.4 million, respectively, with a combined additional \$326,000 in local property taxes. Collectively, these programs contributed 128 FTE jobs. These contributions were included in the totals noted above.

There were 362 physicians with hospital privileges at HSN, with an estimated 43 – 100% of their earnings directly attributed to their clinical activities at HSN. These earnings contributed a total of \$93.0 million through spending and re-spending of local income, \$3.2 million in local property taxes and 1,114 FTE jobs—a contribution in addition to that estimated for HSN.

HSN outreach and satellite programs contributed \$2.6 million in total in nearby communities. The contribution to individual communities ranged from \$82,000 to \$983,000 per year. These programs supported close to 37 FTE positions through direct, indirect and induced effects. Economic contributions to these communities were also in addition to what was estimated above for HSN.

Broader Socio-Economic Contribution

All key informants stated that the provision of medical and surgical specialist services by HSN was by far the largest socio-economic effect that HSN has had on their hospitals and communities. As one key informant remarked “*The [better] we can access appropriate tertiary and quaternary*

services for our patients, [then] the better the outcome...". Patients may have to travel to Greater Sudbury for some services while other services were delivered via the Ontario Telemedicine Network, visiting specialist programs or satellite clinics. HSN services delivered in the community brought additional benefits associated with less travel for patients and family as well as better access for patients to the informal caregiving network provided by friends and family living in the community.

A few of the key informants mentioned that circumstances that affected HSN's capacity had a similar downstream effect on their organization's capacity. For instance, more alternative level of care (ALC) beds in Greater Sudbury would increase availability of beds at HSN for patients needing to be transferred from the local hospital and that should increase capacity at the local hospital.

All of the key informants mentioned that collaborating with HSN allowed community hospitals to have greater buying power with respect to supplies, infrastructure and business services. The North Eastern Ontario Network (NEON), which enabled the development and sharing of an integrated patient record, and the Picture Archiving and Communication System (PACS) used for X-rays and other medical images were cited frequently as tangible and substantial benefits enjoyed by all residents of northeastern Ontario. HSN's leadership in these and other regional initiatives was widely recognized and appreciated.

In education and training of the health workforce, key informants considered HSN as a collaborator as well as a competitor. As a collaborator, HSN was able to offer a large number and variety of placements for learners in medicine and health by virtue of the diversity of its medical and health programs. For the same reason, HSN was also seen as a major competitor for the graduates of these programs. Even then, some key informants perceived a positive aspect in that the concentration of placements at HSN had created networks for graduates throughout northeastern Ontario and this was particularly useful for graduates who came to work at community hospitals. HSN was also considered a collaborator (and possibly a competitor) in terms of recruitment of other professionals to the community.

A key informant spoke about the influence that HSN has had on the decision-making process involving the NE LHIN, the Ontario Ministry of Health and Long-Term Care (MOHLTC) and other government health agencies:

[W]henever Health Sciences North is at a LHIN table, [then] it benefits our interests enormously because they are our hub hospital sitting at multiple LHIN level committees for various services.... If Sudbury's at the table, ... [then committee members] listen to what we have to say...

Several key informants recognized the potential for increasing collaborative research and/or joint evaluation studies that could link community-specific research needs with regional priorities. The goal was that these collaborative research/evaluation studies between HSN and local hospitals could help improve health service delivery and inform policy.

Key informants mentioned that their community hospitals had adopted a number of policies and guidelines developed by HSN, particularly those related to the clinical routines of satellite programs (i.e., dialysis, chemotherapy and cardiac rehabilitation). There was some reciprocal sharing of policies from the local hospital to HSN, but more could be done according to a few key informants.

The economic effect on outlying communities through purchase of local goods and services was not perceived to be large, though several key informants noted that some local residents were employees of HSN and this represented new money coming into the community. The model estimated that HSN's economic contribution approached \$1 million per year in select communities.

Most key informants remarked that their community hospital had had a reciprocal effect on HSN. One common example was that the demand imposed on HSN by community hospitals for specialist clinical services increased patient volumes such that HSN could successfully argue for and obtain funding for additional clinical positions. In the words of one key informant *"When we get on board with an initiative, ... [it] creates more critical mass and so that benefits all of us when it comes to creating sustainable situations for patient care."* Another example raised by key informants was that HSN's buying power and influence was increased through this collective effect.

Conclusion:

This study showed that HSN makes a substantial economic contribution to the City of Greater Sudbury and a sizeable economic contribution in communities with HSN satellite clinics and services. All hospital CEOs and senior administrators who were interviewed for this study considered that the broader socio-economic contribution of HSN on their communities was mostly positive. The main effect that HSN has had was in providing clinical services that were not otherwise locally available. Other tangible local contributions occurred via facilities, networks and organizations such as North Eastern Ontario Network (NEON) that support local clinical services. HSN was considered to be both a collaborator and a competitor for learners and practitioners, but with a largely positive effect on northeastern Ontario. The multiple roles of HSN in providing Greater Sudbury and the rest of northeastern Ontario with advanced medical care, in serving as a world-class research centre and educating the health workforce was recognized as an ongoing challenge as well as a major strength for HSN. Overall and in the details, the contribution of HSN was widespread and considered largely beneficial to the health of the people and socio-economic well-being of communities in northeastern Ontario.

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1. Introduction

Health Sciences North / Horizon Santé-Nord (HSN) is a regional resource and referral centre for more than half a million residents of northeastern Ontario. In addition to providing a comprehensive suite of programs and services, HSN offers leading regional programs in the areas of cardiac care, nephrology, oncology, rehabilitation and trauma.¹ The hospital continues to develop as an Academic Health Sciences Centre (AHSC) complete with teaching and research facilities and resources, including faculty who are cross-appointed to the Northern Ontario School of Medicine (NOSM). HSN also has a number of partnerships at the community and regional level with other health service and health education organizations. All of these programs and services suggest that HSN may be having a widespread socio-economic effect on the host City of Greater Sudbury and other communities in northeastern Ontario. This study sought to estimate the socio-economic contribution of HSN on the City of Greater Sudbury and other communities in the hospital's service area as HSN develops its teaching mandate, research activities, outreach and satellite programs as well as adding more services as a regional referral centre.

In 1998-1999, the economic contribution of HSN to Greater Sudbury was estimated at \$275 million with an additional \$30 million due to activities of physicians with hospital privileges (McCracken et al. 2001).² The Northeastern Ontario Regional Cancer Centre, which has since merged with the hospital and is now known as the Northeast Cancer centre, contributed another \$28 million of economic activity in 1998-1999. The economic contribution was expected to be higher now, given the changes to the hospital's infrastructure, programs and services over the past decade.

In addition, the previous study did not examine the societal contribution of HSN's clinical, educational and administrative services—contributions that can be quite substantial on Greater Sudbury and communities that participate in HSN's outreach programs. For example, a study of two United Kingdom hospitals that were changing into teaching hospitals found that the conversion was expected to provide mostly positive effects on medical students, clinicians, patients and the hospital organizations (Mathers et al. 2003). It was anticipated that students would “gain a greater appreciation and understanding of the impact of the socio-economic and cultural environments in determining health and health care seeking behaviour” of patients. Clinicians would be motivated to stay up to date on the current evidence. Patients would “get their diseases explained better” as the teacher and students spend time discussing the patient's condition and treatment. The hospital would benefit through improved ability to recruit and retain clinicians, particularly sub-specialists, as well as through increased research activity.

¹ More information on Health Sciences North / Horizon Santé-Nord can be found at: www.hsnGreaterSudbury.ca

² More information on the previous economic impact assessment can be found on CRaNHR's webpages: <http://www.cranhr.ca/past01.html>

A study on the socio-economic contribution of the Northern Ontario School of Medicine (NOSM) reported similar effects on communities and hospitals with the arrival of the medical school in northern Ontario (Hogenbirk et al. 2009). However, CRaNHR's study and that of Mather and colleagues (2003) also reported the potential for reduced benefits if the expanded teaching, research and service initiatives were not provided with sufficient resources (e.g., qualified personnel, infrastructure, funding).

Academic health sciences centres can have a substantial social effect through their clinical, research and educational activities and through the contributions of its highly educated and skilled employees and volunteers (Brimacombe et al. 2010). There are other, less obvious, benefits. For example, presentations by researchers, clinicians or educators to non-scientific audiences provide a positive social effect (Smith 2001) by increasing awareness and knowledge of research findings, especially those findings that affect the type and delivery of services for community members. Civic pride may be enhanced by local achievements in education, research and clinical treatment that help portray the community in a positive light on the provincial, national or international stage. Local sports and arts associations as well as municipal committees, business and environmental groups may benefit from the participation of hospital employees and volunteers. Participation on provincial, national or international committees can also be of benefit to the community (Smith 2001), helping to ensure that community voices are heard and that members of the community are kept informed of developments.

The economic contribution of HSN to Greater Sudbury was assessed previously using data from fiscal year 1998-1999. It was timely to re-assess the economic contribution given the changes in physical and organizational infrastructure as HSN has finished its consolidation of three sites into one, the inclusion of the Northeast Cancer Centre and given HSN's expanded mandate, since 2006, as an academic health sciences centre. It was also appropriate to expand the research in terms of its geographic coverage—to include the economic contribution to outlying communities—and to consider the social effect.

2. Methods

This study was conducted by Centre for Rural and Northern Health Research (CRaNHR) in partnership with Informetrica Limited. We used a combination of quantitative and qualitative methods to examine the social and economic contributions of the hospital. We used numbers derived from administrative databases to estimate the economic contribution using a local impact model. We also conducted interviews with key informants to expand on the economic contribution as well as explore the social contribution. All research procedures and instruments were approved by the Research Ethics Committee of HSN and the Research Ethics Board of Laurentian University.

2.1. Economic Contribution

We used Informetrica's³ Local Impact Model, based on the methods described by Rioux and Schofield (1990), to calculate HSN's economic contribution. We estimated economic contribution (gross change in economic activity directly attributed to HSN) (Watson et al. 2007) and our methods were consistent with recommendations provided by Siegfried and colleagues (2007). The model estimated the direct, indirect and induced economic contribution of the HSN on Greater Sudbury. The model separately estimated the contribution of HSN-supported satellite operations such as dialysis and mental health programs in communities outside of Greater Sudbury.⁴

Direct effects were estimated as the revenue received and expenditures made for labour and capital inputs. The revenue and expenditures were those that could be attributed to HSN and would not have come to the area or have been spent in the area without HSN.

Indirect effects included new activity in the local economy caused by spending on goods and services by HSN. Spending on goods and services by local businesses that provide services to patients and visitors from out-of-town were also included. Indirect effects included an estimate of the cumulative effect as monies were spent and then re-spent in the area by businesses in the production chain. Monies that leave the area, known as leakage, were not available to be re-spent and so spending in each round diminishes, though the cumulative effect can be substantial.

Induced effects comprised new economic activity in the area that originated from spending by people directly employed by HSN and by those employed by businesses within HSN's production chain. Induced effects were estimated as the cumulative effect of spending of the income of these employees and subsequent re-spending in the area, with corrections for leakage.

Informetrica's Excel-based model considered the contribution that an entity has had on a community and reported on income, employment and tax contributions, direct and indirect effects, induced effects and total effects. The model included re-spending by local wage earners. The model comprised five different modules with specific input, calculation and report sheets. These five modules were Hospital (operation of the facility), Physicians, Research, Information Technology (IT) and Construction modules. The Hospital module included Research and IT department information, which were then extracted and displayed separately to show their contribution to Greater Sudbury's economy. The Physician module separated the contribution of physicians with hospital privileges from the operations of HSN. The construction module was not used because there was no new construction and any renovations were included in the Hospital module.

³ More information on Informetrica Limited can be found at www.informetrica.com.

⁴ These communities included Elliot Lake, Espanola, Kapuskasing, Kirkland Lake, Manitoulin Island, New Liskeard (Temiskaming Shores) and Parry Sound.

The majority of hospital operations and financial data were provided by HSN for fiscal year 2010-2011 (FY10/11). HSN data included revenues, expenditures, number of doctors with hospital privileges, volunteer hours, local expenditure, number of employees, hours worked and patient volumes. Local property tax information was obtained from the City of Greater Sudbury's financial statements for 2010 (City of Greater Sudbury 2011). The model also used data from Statistics Canada (2007a,b, 2008, 2009, 2010a,b, 2012a,b) (Labour Force Survey, Business Register, Census data, Input/Output tables) and the Canadian Institute for Health Information (CIHI 2011) (National Physician Database).

Statistics Canada 2011 Census population was applied for Greater Sudbury and satellite communities. The Labour Force Survey (LFS) Historical Review 2010 was used to determine the number of employees (full-time and part-time) aged 15 years and over in Greater Sudbury. This value was used with Ontario's average hours worked for both full- and part-time employees to estimate the number of full-time equivalent employees in Greater Sudbury. This value was used in the calculation of the average property taxes paid by full-time equivalents in the city. Median income for full-time, full-year employees in Greater Sudbury was obtained from the 2006 Census and was based on 2005 earnings. This value was indexed to national wage growth to calculate a value for 2010 and used to quantify the monetary contribution of HSN volunteers. The model used Statistics Canada's 2002 Input-Output tables (W-level industry detail), adjusted to capture suppressed and omitted data. These tables were used in a simplified I/O model to estimate leakage assumptions for second round spending in the Greater Sudbury Area.

Incomes of medical staff employed by HSN were included within the labour expenditures provided by HSN and were included in the hospital module. However, physicians with privileges at hospitals bill the Ontario Health Insurance Plan (OHIP) directly and were consequently not a labour expense for the hospital. The percentage of billings attributable to the physician's activities at HSN were obtained from our previous economic contribution study (McCracken et al. 2001). Data from the Canadian Institute for Health Information's (CIHI) National Physician Database (2008-09) were used to estimate earnings of physicians not employed by the hospital. Physician local property tax information was taken from the values used in the 2001 study (unadjusted for inflation) (McCracken et al. 2001).

The model also made assumptions about monies spent at the hospital by patients and accompanying persons (visitors)—monies that would not otherwise be spent locally. Details of model structure and assumptions as well as further explanations are found in Annex 1.

2.2. Broader Social and Economic Contribution

We planned to interview one to four key informants from selected communities, for a total of 16 interviews, to obtain the views of these key informants on the major social and economic effects

of current and proposed HSN activities. The research team worked with Ms. Michelle Bizier, executive assistant to Dr. Denis Roy, President and CEO, to identify potential key informants from 17 of 27 hospitals in the Northeast Local Health Integration Network (NE LHIN) and within 500 km of Greater Sudbury. Potential key informants were identified from publically available senior leadership team membership lists. We invited participants from 15 hospitals that, jointly with HSN, offer one or more of the following programs: nephrology, chemotherapy, cardiac rehabilitation and mental health and addictions services. Our rationale was that senior leadership team members from these hospitals would be sufficiently knowledgeable about linkages with HSN to inform our study.

Three rounds of email invitations were sent out from Dr. Roy's office by Ms. Bizier on our behalf. The email contained a cover letter from Dr. Roy indicating HSN's support of the study, a cover letter from the principal investigator (JCH), which provided information on the study, and a consent form that could be faxed, mailed or emailed to the research team. Potential participants were invited to contact the research team directly. The research team did not tell HSN the names of invitees who responded or did not respond, participated or did not participate in the study. Interested participants who contacted the research team received a copy of the interview questions and further information about the study one to two days before the scheduled interview.

The research team developed the interview questions with feedback from HSN personnel. Questions asked key informants to identify and, if possible, to quantify the major social contributions associated with the health service, education and research activities of HSN (Annex 2). All interviews were semi-structured, conducted by phone and intended to last 30-45 minutes. All interviews were recorded with the permission of the key informants and were transcribed verbatim. Key informants were invited to review the transcripts for accuracy and completeness and to make any change to the transcript.

The principal investigator analyzed the transcripts by using an iterative analytical approach (Pope et al. 2000; Bradley et al. 2007) to generate lists of topics structured around the interview questions (thematic areas) plus any other topics that emerged from the interviews. Induction was used to identify common issues and propose themes for grouping these issues (Bradley et al. 2007). Transcripts were re-checked to ensure that common issues could be deduced from themes. Exceptions to the themes were noted. A range of anonymized quotes was used to illustrate the scope and depth of each theme. Care was taken to distinguish between researcher's interpretation and key informants' statements (Mays & Pope 1995) by referring back to the transcripts and recordings to confirm context and meaning. Qualitative methods used in this study were similar to the framework methodology described by Gale and colleagues (2013).

3. Results

3.1. Economic Contribution

3.1.1. Contribution of HSN to Greater Sudbury

HSN revenues totaled \$409 million and expenses totaled \$415 million in FY10/11 (HSN 2011) (Table 1). Labour costs were \$289 million (70% of total expenses) and non-labour costs approached \$126 million. Approximately 94.7% (3,727) of HSN employees resided in the City of Greater Sudbury based on the postal code of employee's residence. After adjusting for income tax and other non-local spending such as workplace benefits, there was close to \$175 million of employee income available to be spent and re-spent in Greater Sudbury (Table 2).

Table 1. HSN Revenues and Expenditures (in thousands of dollars) for FY10/11

HSN Revenue and Expenditure		Total Dollars (,000s)
Revenues		\$409,423
Expenditures		
Labour Expenditure	\$289,405	
Non-Labour Expenditure	\$125,737	
		\$415,142

An estimated \$23.6 million (18.8% of \$126 million) of non-labour expenses were estimated to be available to be spent in Greater Sudbury (Table 2). Second round of spending was estimated at \$14.0 million (59.5% of \$23.6 million). Property taxes paid by HSN to Greater Sudbury totaled \$44,000. Based on the postal code of patients, approximately 30% of inpatients and 23% of outpatients resided in communities outside of Greater Sudbury. Spending by out-of-town patients and visitors contributed \$13.1 million to Greater Sudbury's economy. These values were considered in the calculation of the direct, indirect and induced economic effects of HSN on Greater Sudbury.

Table 2. Estimated Local Spending for HSN's Labour and Non-Labour Expenditures in FY10/11 (in thousands of dollars)

Expenditure	Adjusted Amount (,000s) ¹
Labour	
Amount of employee income available to be re-spent in Greater Sudbury ²	\$174,667
Non-Labour	
Amount spent in Greater Sudbury in 1 st round (18.8%)	\$23,594
Amount spent in Greater Sudbury in 2 nd round (59.5%)	\$14,035
Local property taxes paid by HSN to Greater Sudbury	\$44
Spending in Greater Sudbury by out-of-town patients and visitors	\$13,138

¹ Excludes monies or jobs that would be in Greater Sudbury without HSN.

² Excludes employee workplace benefits and income taxes—monies that leave the area.

The net economic contribution of the HSN to Greater Sudbury totaled almost \$310 million (Table 3). There was an additional \$12.3 million in local property taxes that accrued to Greater Sudbury through direct, indirect and induced effects.

HSN has 3,936 employees, equal to 3,068 full time equivalent (FTE) positions based on 1,950 hours per year, of which 2906 FTE (94.7%) live in Sudbury. Our model estimated that only 14 FTE would exist in Greater Sudbury in the absence of HSN and so the net total is 2,892 FTE (Table 3). The total employment contribution was 4,828 FTE jobs in Greater Sudbury. In addition, volunteers contributed over 92,000 hours per year, which was equivalent to 47.2 FTE or \$2.5 million in wages annually.

Interested readers are referred to Annex 1 for a description of differences in assumptions, data sources and results between this report and the 2001 report.

Table 3. Economic and Employment Contribution (in thousands of dollars) of HSN to the City of Greater Sudbury in FY10/11 ^{1,2}

Economic Contribution	Net Income Contribution (,000s)	Net Property Tax Contribution (,000s)	Net FTE
Direct Effect	\$174,667	\$7,398	2,892
Indirect Effect	\$27,104	\$1,246	490
Induced Effect	\$107,875	\$3,678	1,446
Total Contribution	\$309,646	\$12,322	4,828

¹ Excludes monies or jobs that would be in Greater Sudbury without HSN.

² Excludes employee workplace benefits and income taxes—monies that leave the area.

3.1.2. Contribution of HSN IT and Research to Greater Sudbury

The previous expenditures and estimated economic contributions of HSN on Greater Sudbury included that of HSN's Information Technology and Research programs. In this section we show their separate contributions. In FY10/11, the total contribution of IT and Research activities to the economy of Greater Sudbury was \$7.2 million and \$1.4 million, respectively, with a combined \$326,000 in local property taxes (Table 4). Collectively, these programs contributed 128 FTE jobs.

Table 4. Economic Contribution (in thousands of dollars) of IT and Research to the City of Greater Sudbury in FY10/11 ^{1, 2}

Information Technology	Net Income Contribution (,000s)	Net Property Tax Contribution (,000s)	Net FTE
Direct Effect	\$4,176	\$159	63
Indirect Effect	\$638	\$26	10
Induced Effect	\$2,381	\$81	32
Total Contribution	\$7,195	\$267	105

Research	Net Income Contribution (,000s)	Net Property Tax Contribution (,000s)	Net FTE
Direct Effect	\$826	\$39	15
Indirect Effect	\$88	\$4	1
Induced Effect	\$489	\$17	7
Total Contribution	\$1,403	\$59	23

¹ Excludes monies or jobs that would be in Greater Sudbury without HSN.

² Excludes employee workplace benefits and income taxes—monies that leave the area.

3.1.3. Contribution of Physicians with HSN privileges to Greater Sudbury

In FY10/11, there were 362 physicians with hospital privileges at HSN, with an estimated 43 – 100% of their earnings attributed directly to their clinical activities at HSN. Physicians' earnings attributed to HSN were estimated to be just slightly over \$104 million. After correcting for leakage, \$64.8 million was available for local spending and re-spending that contributed a total of \$93.0 million plus \$3.2 million in local property taxes and 1,114 FTE jobs (Table 5). These economic contributions attributed to physicians with hospital privileges at HSN were in addition to what was estimated for HSN in the previous sections.

Table 5. Economic Contributions (in thousands of dollars) to Greater Sudbury of Physicians with Privileges at HSN in FY10/11 ^{1,2}

Physicians with Privileges at HSN	Net Income Contribution (,000s)	Net Property Tax Contribution (,000s)	Net FTE
Direct Effect	\$27,526	\$936	207
Indirect Effect	\$32,917	\$1,199	471
Induced Effect	\$32,514	\$1,108	436
Total Contribution	\$92,956	\$3,243	1,114

¹ Excludes monies or jobs that would be in Greater Sudbury without HSN.

² Excludes employee workplace benefits and income taxes—monies that leave the area.

3.1.4. Economic Contribution of HSN to Nearby Communities

Spending by HSN programs that operate in nearby communities can contribute to the economy of these communities. Expenditures in nearby communities totaled \$3.3 million and, after accounting for leakages, the local income contribution to the economy of these communities totaled \$2.6 million (Table 6). The contribution to individual communities ranged from \$82,000 to \$983,000 per year. These programs supported close to 37 FTE positions through direct, indirect and induced effects (Table 7). These economic contributions that accrue to nearby communities participating in satellite programs were in addition to what was estimated for HSN in the previous sections.

Table 6. Expenditures and contribution (in thousands of dollars) of HSN programs in communities¹⁻³

Expenses	Elliot Lake	Espanola	Kapuskasing	Kirkland Lake	Manitoulin Island	Temiskaming Shores	Parry Sound	Total
Labour Costs	\$488	\$87	\$431	\$306	\$720	\$248	\$268	\$2,548
Non-labour Costs	\$183	\$1	\$138	\$90	\$197	\$83	\$94	\$786
Total Cost	\$671	\$88	\$569	\$396	\$917	\$331	\$362	\$3,334
Economic Contribution (local income contribution only)								
Direct Effect	\$291	\$55	\$260	\$185	\$639	\$148	\$160	\$1,737
Indirect Effect	\$20	⁴	\$15	\$10	\$22	\$9	\$10	\$88
Induced Effect	\$126	\$27	\$113	\$81	\$322	\$65	\$68	\$802
Total Contribution	\$437	\$82	\$389	\$276	\$983	\$222	\$238	\$2,626

¹ Includes nephrology (dialysis) and mental health programs, but not oncology (chemotherapy).

² Excludes displaced revenues/spending—monies that would be spent in area without HSN.

³ Excludes employee benefits and income taxes—monies that leave the area.

⁴ Value was less than \$1,000.

Table 7. Employment Contribution of HSN programs in communities¹⁻³

Employment Contribution	Elliot Lake	Espanola	Kapuskasing	Kirkland Lake	Manitoulin Island	Temiskaming Shores	Parry Sound	Total
Direct Effect	4.6	1.0	4.2	2.9	6.8	2.3	2.5	24.4
Indirect Effect	0.4	0.0	0.3	0.2	0.4	0.2	0.2	1.8
Induced Effect	1.7	0.4	1.5	1.1	4.3	0.9	0.9	10.9
Total Contribution	6.7	1.4	6.0	4.2	11.5	3.3	3.6	36.8

¹ Includes nephrology (dialysis) and mental health programs, but not oncology (chemotherapy).

² Excludes displaced employment—jobs that would be spent in area without HSN.

³ Rows or columns may not sum exactly to totals due to rounding errors.

3.2. Broader Social and Economic Contributions

We invited key informants from 15 hospitals in communities located within the NE LHIN and within 500 km of the City of Greater Sudbury to participate in semi-structured interviews. We interviewed seven people from hospitals in five separate communities representing a hospital response rate of 33%. Key informants included hospital CEOs (n=5) and other senior managers or administrators (n=2). Five of the key informants were male and all interviews were conducted over the phone and recorded with the permission of key informants. This section on broader social and economic contribution was sent to all key informants for their review and revision. All key informants gave approval to the final version and one clarified some comments. All key informant gave explicit verbal and written permission for their names and affiliations to be listed (Annex 3). In the quotes that we use to illustrate the findings, we have removed names and other identifying remarks and have not chosen to label the source to reduce the risk of accidental disclosure. Two additional potential key informants indicated a willingness to participate in the study, but we were either not able to arrange a mutually convenient time for the interviews or potential participants did not respond to follow-up communications. Interviews were conducted over five months from December 2012 to April 2013, lasted 35 – 70 minutes and averaged 50 minutes.

3.2.1. Medical and Surgical Specialist Services

All key informants stated that by far the largest social economic contribution that HSN has had on their hospitals and communities was through the provision of medical and surgical specialist services. Services that were delivered in Greater Sudbury required patients to be referred or transferred to HSN-Ramsey Lake Health Centre site. Cardiology, oncology, nephrology neurology and trauma were the most frequently cited services. The main social economic contribution identified was that patients would receive the specialist care that they required and that this would positively influence their health and well-being. Key informants noted:

[Q]uality and access are very closely aligned. The [better] we can access appropriate tertiary and quaternary services for our patients [then] the better the outcome ...

[I]n many instances we won't be actually providing a service directly to a patient, but we're contributing to their health and wellbeing by facilitating the connection to services. What HSN provides to us is so core that we actually considered those sorts of things as embedded within our mission statement.

The disadvantage was that patients would need to travel and could be away from home for extended periods—a concern more common and considered more of a disadvantage in

communities more distant from Greater Sudbury. However, travelling to alternative locations in southern Ontario was less appealing as key informants noted:

For the patients of our community, accessing specialized services relatively close to home is highly desirable. There are significant hardships, costs and disruption for patients to have to travel to Toronto or Ottawa. It also impacts the economy of the North because ensuring access to care keeps people spending money in the region.

I can honestly say from a cancer care perspective, ... all of my ... connections whenever they speak of cancer care they speak so very highly of Sudbury and how well they service our community, our patients, our families. So I know that cancer and cardiac care from a community layperson's perspective is enormous and has been huge for them. They don't really want to go South, they want to go North [to Health Sciences North].

Other HSN programs provided clinical services in the community and allowed patients to receive high quality care closer to home and with ready access to their informal caregiving support system. One example was the visiting specialist program in which specialist physicians from HSN come to the community to see patients. HSN also provided Sudbury-based specialist support of clinical services delivered locally in the community. Examples included dialysis (Regional Nephrology Program), chemotherapy outreach (Community Oncology Clinic Network) and cardiac pulmonary rehabilitation programs. Key informants also noted that providing or supporting these services locally was considered to have a major positive contribution in terms of improved patient outcomes. The views of several key informants were captured in the following quotes:

[A]ccess to things like visiting specialists, again if we were trying to pull those things from a greater distance there would need to be a larger envelop of funds to get those things done. Being able to ... pick up the phone and to access certain expertise and advise on patient management, I'm sure that that has an economic impact as far as on our operations, for example, from a cost avoidance perspective.

It's not exclusively Health Sciences North, there's some things happening in [other centres] as well, but as our tertiary and quaternary partners become larger, more robust in terms of the health services that they provide, they allow people in our community to stay healthy and to remain in their community longer.

A few concerns were expressed about perceived inadequacies in the level of funding or staffing in support of satellite clinics, but these concerns were generally outweighed by the perceived benefits. However, a few key informants suggested that smaller or more distant hospitals might find that obtaining adequate funding and recruiting staffing would be more of a challenge, particularly if support from HSN was reduced or withdrawn.

Several of the key informants expressed the wish to have HSN provide additional specialist services and/or support of local programs in specialist areas such as ophthalmology, obstetrics/gynecology and orthopedics. Key informants reported feeling frustrated when they were unable to refer patients to HSN for these additional services. Such comments were typically followed by the caveat that the policies that governed these referral decisions were not necessarily attributable to HSN. For example, policies might reflect historical referral patterns, district versus regional hospital responsibilities or political preferences. For key informants, the variable referral policies were a source of much frustration, though not directly attributed to HSN: “So ... we’re often getting “well that’s a district issue”, “no that’s a regional issue”.... And at the end of the day we don’t do the patient any good.”

In related comments, a few of the key informants noted that it would be helpful to their community members if HSN could share human resources, particularly specialists in emergency medicine and surgery. A key informant also noted, “Most of our hospitalist support is coming from [the] Toronto area, London, Hamilton,[and other cities in southern Ontario]... Not too many locums [are] coming from the Sudbury area.” The suggestion was that HSN personnel could be made available to provide local on-site coverage should the community hospital require such support. The logistics were not discussed nor were the possible advantages or disadvantages. Nevertheless, these key informants expressed the need for such a service as a means of providing interim support of programs and services that already existed at the community hospital.

A few of the key informants mentioned that circumstances that affected HSN’s capacity had a similar downstream effect on their own capacity. For example, a lack of specialty care beds would decrease availability of beds at HSN for patients transferred from the other hospitals and that would affect availability of beds at the local hospital and so forth down the line. One key informant noted that:

It’s certainly not HSN’s accountability directly, but if HSN has a large number of beds filled with ALC patients, then it creates a burden for the rest of the system by making their specialty beds inaccessible for patients and thus creating ALC pressures in the local community hospital.

In essence, if the flow of patients was slowed at HSN then, the flow of patients might slow (i.e., occupancy rates or length of stay might increase) at the local hospital.

3.2.2. Travel Avoidance

HSN’s support of local services either through visiting specialist program or through funding and support of satellite clinics such as the chemotherapy and dialysis clinics greatly reduced the need for patients to travel. The provision of service closer to home was considered to facilitate better

treatment outcomes in addition to saving patients their time and money, and reducing anxiety. One key informant stated:

[W]e have a chemo satellite clinic here and a dialysis satellite clinic here that are monitored and mandated by Health Sciences North, which for those two populations it's a huge benefit to them to have services provided in their community with their support group locally rather than having to travel.

In this context, the hospitals' use of the Ontario Telemedicine Network (OTN) as a means to bring treatment closer to home by supporting services at the community hospital was considered a useful and viable tool that increased in importance with greater distance and/or difficulty of travel. A key informant who remarked "The other linkages of course that we have, and HSN participates within that, is within OTN, so that also has become an enabler and something that creates travel avoidance", captured this view.

3.2.3. Leveraging Resources

All of the key informants mentioned that collaborating with HSN allowed their community hospital to have greater buying power with respect to supplies, infrastructure and business services. One key informant remarked that "there's been a leveraging of both the technology and the infrastructure to the point where it becomes cost effective for smaller organizations to get on board". The primary example cited was the North Eastern Ontario Network (NEON), first created in 1998 through a shared software contract with Meditech, followed by a shared information system service agreement in 1999 between seven corporations and subsequently expanded to 19 hospitals.⁵ NEON enabled the development and sharing of an integrated patient record so that patient records from one hospital were available to practitioners at all hospitals. The consensus opinion was that NEON improved continuity of care and, presumably, quality of care and outcomes because patient records were readily available to health care practitioners at all of the partner hospitals. HSN's role in the development of NEON was considered instrumental and all key informants mentioned that the ability of the community hospitals to purchase the necessary equipment in support of NEON and other IT initiatives such as the Picture Archiving and Communication System (PACS), were greatly enhanced by HSN's membership in the consortium. This increased buying power was evidenced in comments by a key informant who said, "[HSN] can also assist in some of the power buying if we were to want to purchase new equipment, if they're purchasing something sometimes we can piggyback on that." Another key informant noted that

⁵ For more information on NEON, please visit: www.neonetwork.ca/newportal/Home.aspx

there were “joint purchasing contracts for laboratory equipment and reagents”. One key informant summarized the consensus by noting:

So things like the NEON Meditech System that has created that shared database across the North East is a huge enabler for smaller hospital organizations. If we were to attempt to create that sort of an infrastructure here on a standalone basis the cost would have been many times what it has been. The same can be said with our shared PACS Network...

Another key informant remarked:

There’s a bigger economy of scale and enhanced purchasing power. By working together, NEON hospitals spread our costs across multiple organizations and work towards creating a single integrated system of patient information ultimately improving the quality of care. It ethically responsible for us to cooperate on information systems. HSN has been a real leader in supporting a regional approach to information technology.

HSN, to give two examples, was able to provide technical support in information technology and biomedical equipment by virtue of its size and expertise. Many of the key informants mentioned that they often looked first to HSN to see whether HSN could provide the services in a cost-effective manner. A key informant remarked “... we contract out ... services [to HSN] ... We don’t have anybody internally with the expertise. It’s actually a very good service.” Typically, only if the services were not available or too expensive would the community hospital look elsewhere or develop the expertise in-house.

One of the concerns, inferred from the comments but not explicitly expressed by key informants, was that the community hospitals could become too reliant on what HSN provided and then might be less able to negotiate agreements that provided the necessary services and fit with the budget of the community hospital. There was also the concern that HSN would become less responsive to the needs of the community hospital, particularly in instances when the priorities of HSN differed from that of the community hospital. A key informant remarked, “Any of the challenges that we have are more to do with aligning expectations or communication.” Maintaining firm lines of communication, providing for real and active participation, shared decision-making, cost sharing (proportional to use, ability to pay, etc.) and managing expectations of all partners (including HSN) was considered essential to successful ongoing partnerships.

3.2.4. Education and Training

A few of the key informants mentioned that HSN provided educational opportunities for those staff delivering dialysis and chemotherapy in satellite clinics as well as advanced training in trauma

and cardiac life support. Most educational opportunities were provided by Northern Ontario School of Medicine (NOSM), Laurentian University, Cambrian College and Collège Boréal. Because HSN was also partnered with these educational institutions, key informants considered HSN as a collaborator as well as a competitor. As a collaborator, HSN was able to offer a large number and variety of placements for learners in medicine and health by virtue of the diversity of its programs. However, HSN was also seen as a major competitor for the graduates of these programs. Some key informants accepted that this was the cost of doing business in the north while some of the other key informants expressed concerns about the influence that HSN had in this regard.

A few key informants suggested that the concentration of placements at HSN created networks for graduates throughout northeastern Ontario and this was particularly useful for graduates who came to work at community hospitals. These findings were effectively summarized by key informants who said:

[T]he ... impact that HSN has is because they take on a lot of students, although they also become a large employer for those students afterwards. There are some students who choose not to be employed [at HSN] once they're finished. And of course we do benefit if they come here [to our hospital].

In the smaller communities in the North East I know there [is a] concern that the larger hospitals are absorbing more of the medical residents coming out of NOSM and not giving them the opportunity to come to communities like [ours].

Medical learners train all over northeastern Ontario. They participate in numerous training rotations, which can include community based, small hospitals and specialized hospitals. The distributed training facilitates connections between other hospitals and HSN, where many graduates wind up and where tertiary care services are provided. By heavily participating in training, hospitals like HSN create a recruitment feeder and can also influence the development of those doctors in the specific organizational nuances.

In summary, key informants agreed that HSN, in providing placement opportunities, had a pervasive influence in the health education and training section in northeastern Ontario. As one key informant remarked, “at the end of the day it is both cooperative and competitive.”

3.2.5. Recruitment and Retention

A few key informants mentioned that the availability of specialist support for local clinical services or proximity to tertiary and quaternary care made the community hospital a more attractive work location for healthcare providers, particularly physicians. As hospitals are “major employer[s] [and] ... represent some of the best wages” in many communities, key informants suggested that anything that made their hospital more viable in terms of the ability to provide services, hire

qualified staff, improve the health of community members, etc., had a considerable positive socio-economic contribution on the host community. A key informant explained:

When a physician comes to practice in a rural environment they want to know what tools of the trade are directly available and then available nearby. And so again, without a robust menu available of specialty services, if those weren't there, [then] it becomes a great dissuader for a provider to choose that community. And there are many communities right now with large holes in their provider pool and so physicians can choose to go practically anywhere and practice medicine and so having a very robust and sustainable situation created for them where tools are at their fingertips is absolutely essential.

In addition, a few key informants remarked that having the services available in the community or within a short travel distance made it easy for other businesses to recruit and retain skilled workers. Skilled workers in high demand who are willing to come to the communities to fill job vacancies would, in the opinion of some key informants, consider the availability and quality of medical and health services that they would require in the short-term and in the long-term (e.g., children's future, parents' retirement, the workers' retirement). This benefit was expressed by a key informant who said:

I've heard it articulated time and time again by individuals who have chosen to come and live here ... that one of their major concerns is access to healthcare services. And some of these individuals may be dealing with some pretty serious chronic health issues and for them to know that they can receive services such as outreach cancer services or hemo dialysis, it is a major deciding factor on where they're going to live. ... And so without those sorts of services being available, those individuals may choose to locate elsewhere.

Having a broad variety of medical services either in the community, supported in the community or available to the community via OTN would make that community much more attractive to jobseekers, particularly those concerned about the current and future availability of medical care for themselves and their family.

3.2.6. Partnerships and Influence

With HSN actively participating in various committees at the LHIN or provincial level and in circumstances when HSN was receptive to the priorities of the community hospital, then the influence of HSN was considered beneficial to the local hospital and, by extension, to the community. When HSN's priorities did not align with that of the community hospitals or when HSN was not at the table, then the community hospitals felt that they were not always able to

have their viewpoints incorporated into relevant policy or guidelines. As one key informant explained:

[W]henever Health Sciences North is at a LHIN table, [then] it benefits our interests enormously because they are our hub hospital sitting at multiple LHIN level committees for various services.... If Sudbury's at the table, [then] they listen to what we have to say if they're in a leadership role. If they're not in a leadership role and it's a different hub that's leading it, [then] they don't want to hear what we have to say. It's very interesting to see that dynamic when Sudbury's at the table in [a] leadership [role], it makes a huge difference for us. So that's a positive.

Several key informants spoke, unprompted, about the need to think at the regional level in addition to the community or hospital level. One key informant summarized the issue by saying:

I think everybody needs to make the ... investment in the system, ... because if you don't solve the capacity in the community [and in the region], you're just going to keep fighting fires, ALC, unnecessary visits to the ER. People are getting older and sicker in our region, they're already significantly more susceptible to chronic disease than anywhere South ... and there is just going to be more hammering at our door and if we don't stop and fix it, [then] we're all going to implode. So it's actually in our collective best interest to do the right thing in terms of community based [and regionally based] care design.

In the words of one key informant, echoing the comments of several others: “People think, well the LHIN that's your problem, you solve the planning, you do the coordination. Guess what? They can't, especially if the big players aren't supportive.” HSN, by virtue of its role as a regional hospital in addition to a considerable community based role, was considered an essential participant along with the NE LHIN and community hospitals in coordinating and providing care to people of northeastern Ontario.

3.2.7. Research and Evaluation

Key informants were either not aware of HSN research and evaluation activities in their communities or felt that the level of involvement was minimal. Several key informants, however, recognized the potential for increasing research collaboration and joint evaluation studies through initiatives such as the Advanced Medical Research Institute of Canada (AMRIC).⁶ As one key informant observed:

⁶ For more information on AMRIC, please visit www.amric.ca.

If we can achieve even a portion of that [research] out of HSN, [then] that's going to increase recruitment for really high-end physicians [who] can do really high specialty care... [These] people drag resources with them ... and create their own economic engines. So the fact that we have this focus on research out of HSN is going to be a positive for the region, there's no question.

A few key informants remarked that they would like to have information at the community level on the success of various HSN services and programs so that they could help to improve the program at the LHIN level or better adapt the program to the community. These suggestions, which connect evaluation and clinical services, were captured in the following quote:

What would be nice ... is a meeting with HSN for those services [for which] they are our primary referral to talk about processes and improvements on referral patterns, methodologies, are requests appropriate, what is their triaging approach for requests, that kind of stuff, is it consistently applied across everybody ... There should be a meeting held by HSN with all the referral facilities who are prime feeders to them to talk about whether service needs are being met, if they're being met in a timely fashion, if there's any service improvements that could be experienced by engagement or talking about some of those requests.

Key informants also mentioned that there was a need for studies at the community level to assess needs, uptake and other pragmatic concerns that affect the delivery and utilization of programs and services. These findings were more fully articulated in the following quote:

[An] example where [networked researchers may] ... study a problem in the future is [to ask] what is the capacity for ... health services in the North? And so we're going to ask those kinds of research questions and probably invest resources in getting answers to that. And the researchers may come back and say "we've done this [research] in [our community] and surrounding region and we noticed a gap ... [in services]" and therefore the patients are stuck in ... [a hospital's] beds as ALC.

Key informants recommended strongly that research projects should be developed to link community-specific research needs with regional medical care priorities. The goal was that this collaborative research would ultimately help improve medical care service delivery and inform policy.

3.2.8. Policies and Guidelines

Most of the key informants mentioned that their community hospitals had adopted a number of policies and guidelines developed by HSN, particularly those related to the clinical routines of satellite programs (i.e., dialysis, chemotherapy and cardiac rehab). As one key informant noted:

[W]ith Meditech and our oncology policies, we would adopt most of [HSN's policies] to ensure that we are compliant with best practices and standards of care because ultimately it's the oncologist up there that has the final say in the medication and the processes.

A few of the key informants mentioned that policy developed at the community hospital had been considered or adopted for use by HSN. However, other key informants mentioned that they felt that HSN was unaware of what happened at the community hospital level because HSN's focus was on its roles and responsibilities as a regional hospital. Improving the attendance of invited HSN representatives at meetings of community hospitals was considered to be an important step to maintain and improve mutual awareness and respect and facilitate the exchanges of policies.

3.2.9. Local Purchases

Almost all key informants considered that there was only minor spending by HSN in the community: purchasing of supplies from local dealers or contracts with local builders for construction or renovations were considered sporadic. However, some of the staff in the satellite clinics were employees of HSN and this has had a direct economic impact because new dollars have been channelled into a community: "So from a local perspective [HSN is] helping here because they're using our nurses as employees of HSN."

3.2.10. Special Populations

Key informants did not identify any HSN program that was specifically targeted towards cultural or linguistic minorities such as Indigenous or Francophone peoples. Key informants mentioned, however, that several HSN led disease-specific initiatives were heavily used by Indigenous or Francophone peoples due to their poorer health status or more advanced disease status. According to key informants, hospitals in communities with sizable linguistic or cultural minorities tended to develop their own culturally safe programs and services. A few key informants noted, however, that HSN by virtue of its location in Greater Sudbury with sizable Francophone and Indigenous populations should have the expertise that could be adopted for use in communities with similar minority populations. This may be an untapped area for HSN to explore and promote as key informants were not aware of any example.

3.2.11. Reciprocal Contribution

Most key informants understood that their community hospital had had some effect on HSN. One common example was that the demand for specialist clinical services imposed by community hospitals increased HSN patient volumes such that HSN could successfully argue for and obtain funding for additional clinical positions. In the words of one key informant “When we get on board with an initiative, [it] creates more critical mass and so that benefits all of us when it comes to creating sustainable situations for patient care.” For instance, the demand for cardiac services summed for all hospitals that refer patients to HSN would require additional full-time equivalents beyond what HSN would require to service the needs of the Greater Sudbury population alone. This increased demand, theoretically, would allow HSN to hire additional cardiologists, for example, in a broader diversity of clinical sub-specialties and thereby improve service availability for people in Greater Sudbury and the region.

Several key informants remarked that HSN and, thereby, citizens of Greater Sudbury had also benefited from having greater buying power. It was argued, for example, that HSN was able to buy more sophisticated or expensive equipment because of the additional demand and financial support available from partnerships with community hospitals. A finding that emerged from the interviews, but which was not directly stated by key informants, was that the development of these buying networks represented a business opportunity, one that HSN by virtue of its connections and capacity might be better situated to advance.

As a few key informants noted, more could be done to facilitate sharing of policies and innovations developed at the community hospital with HSN or other community hospitals. These key informants suggested that the community hospitals were often innovative in how they organized and delivered services and that other hospitals, similarly challenged, might benefit from these innovations.

Key informants described the need to share health human resources in a multi-way exchange from HSN to community hospital and vice versa. While much of the sharing of health human resources could be done via OTN, key informants mentioned that there was an occasional need to move personnel between hospitals: from HSN to the local hospital and vice versa. One key informant told the research team that they had:

... reached out to ... Sudbury to see if there'd be some common ER scheduling or some assistance, are there any of their physicians who may have some capacity, would they like to take on some regular commitments here one, two, four, five shifts per month in our emergency department to assist us.

In describing possible bi-direction exchange of resources, key informants suggested that HSN might be able to take advantage of unused capacity at the community hospital. For example, patients could be referred or transported from HSN to the community hospital for selected

surgeries and procedures. As one key informant noted, “we have an OR that runs maybe 70-75% of the time so [we] have capacity to take overflows so that would allow our district and our region to meet targets” such as those for endoscopy and colorectal screening.

The primacy of the NE LHIN in coordinating these shared services now and in the future was recognized. However, it was also recognized that the hub hospitals and regional hospital had key roles to play in developing and implementing these plans. The benefits could accrue to all, as one key informant noted, “If we can help Sudbury with the answers to [planning questions], then they’re going to help themselves and it’ll actually have a positive impact on other organizations like ours”. In meeting these needs, there were success stories as one key informant observed: “There’s real cooperation, coordinated by the LHIN, but really by the partners themselves in making sure that the capacity for [a specialist service] is there and that we spread it around.” This key informant later added that “The health leaders in all the lead organizations including HSN really have to own leadership (not just management) in the NE LHIN inside and outside of hospital service decisions.” Without the NE LHIN and major hospitals at the table, attempts to advance regionally integrated plans and the realization of reciprocal benefits would be much more difficult.

3.2.12. Community Awareness of HSN’s Contribution

Key informants remarked that HSN had a diverse and positive socio-economic contribution on their community—an effect of which local community leaders and residents were not always aware. Any reduction in HSN services and programs would have a far-reaching and potentially negative impact on the communities.

Conversely, key informants thought that leaders and residents of Greater Sudbury did not fully appreciate the reciprocal effect that community hospitals had on HSN and on Greater Sudbury. For instance, key informants reasoned that residents of Greater Sudbury had also benefited because the additional demand from the region allowed HSN to develop services and programs that would not otherwise be available or hire skilled personnel that would not otherwise find suitable employment. “We ... contribute to that critical mass, particularly for tertiary and quaternary services,” remarked one key informant.

3.2.13. Summary of Interview Findings

Key informants from five community hospitals spoke of the widespread and largely positive contribution that HSN has had on the health and well-being of people in their communities. The suite of clinical services provided or supported by HSN was cited as the biggest positive and most widespread benefit. Other positive benefits emerged by virtue of the leveraging of resources in

information technology, biomedical technology and related services. There was mixed effect on recruitment and retention of health care personnel because HSN was both a collaborator and competitor, but the net contribution was considered positive for the region. Key informants suggested other opportunities by which HSN could increase its positive influence over the region by expanding its suite of services and becoming more attuned to needs of individual communities and hospitals. Overall and in the details, the effect was widespread and considered largely beneficial to the health of the people and to the social and economic well-being of communities in northeastern Ontario.

4. Discussion

In FY 2010/2011 HSN had revenues of \$409 million and expenses of \$415 million. HSN's employees represent 26-33% of the total workforce employed in the health care and social assistance industry in Greater Sudbury (Statistics Canada 2013). As the second biggest employer in Greater Sudbury (City of Greater Sudbury, undated) HSN employees' earnings and spending have a substantial effect on the local economy.

Economic modelling showed that the net economic contribution of HSN to Greater Sudbury totaled almost \$310 million plus an additional \$12 million in local property taxes. We were unable to obtain directly comparable data owing to differences in study methodology and hospital organizational structure as well as a lack of published or publically available studies. The closest comparator was a socio-economic contribution study on the Hospital for Sick Children (SickKids) in Toronto (KPMG 2012). This study, which used similar (but not identical)⁷ methodology (i.e., Statistics Canada's I/O model), reported a contribution to Ontario's economy of \$1,035 million (KPMG 2012). Depending on which expenditure value published by KPMG (2012) that we used, the estimated crude ratio of the economic contribution for all of Ontario divided by expenditures for SickKids ranged from 1.1 to 1.7, which is comparable to a value of 1.5 derived from Informetrica's model results calculated for HSN. Note that this simple ratio reflected the net effect of very specific estimates of the economic contribution and may not apply to other contexts.

In assessing the economic impact of hospital closures in Ontario, Somerville (2009) estimated that if 5,000 fewer employees were working in the hospital sector, then the GDP of Ontario would decrease by \$549 million in the first year. Adjusting Somerville's estimates to 3,068 FTE, which is the number of FTEs at HSN, yielded a crude estimated income impact of \$337 million for all Ontario. This value is approximately 9% higher than what was estimated by Informetrica's model

⁷ For example, in the SickKids study, income taxes and employee benefits were included in the calculation of economic contribution, whereas these costs were excluded in Informetrica's calculations.

for Greater Sudbury. However, the values seemed reasonably close, given the differences in modeling approach and assumptions.

Data show that the economic contribution of Academic Health Sciences Centres (AHSC) in the United States of America can be substantial (Tripp-Umbach 2012). However, data are even less comparable to our results because, in the United States of America, universities own and operate the medical school and associated teaching hospital (Lozon and Fox 2002). As such, organizational structure and priorities as well as revenue and expenditure patterns differ from the situation in Ontario where AHSCs are stand-alone organizations, though with strong links to medical schools and host universities (Lozon and Fox 2002; Brimacombe et al. 2010).

HSN contributed 4,828 FTE jobs to Greater Sudbury's economy—a crude employment contribution ratio of 1.6. This compares favourably to SickKids' employment contribution ratio of 1.7 for all of Ontario, which we calculated from values published by KPMG (2012). Somerville (2009) estimates a total job loss of 7,125 FTE in Ontario if 5,000 hospital jobs are lost—a crude ratio of 1.4. Adjusting Somerville's job loss estimates to 3,068 (HSN's FTEs) yielded a crude total employment effect of 4,372 FTEs due to direct, indirect and induced effects. This value was 9% lower than what Informetrica's model estimated for HSN for Greater Sudbury, but, again, comparable given differences in the models.

Physicians with hospital privileges at HSN contributed an extra \$93 million due to spending and re-spending of local income, over \$3 million in local property taxes and over 1,100 FTE jobs—all of which accrued to Greater Sudbury. Kralj and Manfield (2013) report that physicians in Ontario contribute \$5.5 billion per year based on practice overhead expenditures that exceed \$4 billion. Using Kralj and Manfield's data, we calculated a crude ratio of contribution to expenditures of 1.4 and this was identical to the ratio we calculated from Informetrica's model output. Kralj and Manfield (2013) report that each physician annually supports 4 FTEs, and generates an economic contribution of \$205,000 in GDP and \$50,000 in tax revenue to local, provincial and federal governments. Although Kralj and Manfield's estimate is an average for all Ontario, a similar contribution might be expected in Greater Sudbury.

Whereas the economic contribution of independent physicians accrued primarily to Greater Sudbury, key informants noted that the health and well-being of people living in other communities in northeastern Ontario benefited from the suite of services provided by these physicians and, in particular, specialists and sub-specialists associated with tertiary and quaternary levels of care. Improvements to the health and well-being to the people of northeastern Ontario were not formally assessed, though most key informants were convinced that the change was largely positive and attributed in part to HSN and physicians with hospital privileges at HSN.

HSN programs contributed \$2.6 million annually to nearby communities. The contribution to individual communities ranged from \$82,000 to \$983,000 per year. These programs supported close to 37 FTE positions through direct, indirect and induced effects. In addition to the economic

benefit, key informants spoke of the widespread and largely positive contribution that HSN has had on the health and well-being of people in their communities when clinical services were provided closer to home.

Key informants also reported that partnership agreements with HSN helped improve the buying power of their community hospital through the leveraging of resources in information technology, biomedical technology and related services. The North Eastern Ontario Network (NEON), which enabled the development and sharing of an integrated patient record, and the Picture Archiving and Communication System (PACS) used for X-rays and other medical images were cited as tangible and substantial benefits enjoyed by all residents of northeastern Ontario. This is consistent with Lozon and Fox's (2002) finding that academic health science centers (AHSC) play an important role in implementation of systems that leverage technology to optimize patient care, teaching and research. HSN's impact also extends to the policy arena through its influence with the NE LHIN and MOHLTC.

HSN had many influences on communities in northeastern Ontario. For example, HSN was perceived as a collaborator and a competitor for health care personnel, but most key informants considered the net effect to be positive for the region. AHSC such as HSN play a salient role in training the current and future health workforce (Brimacombe et al. 2010; Fraher et al. 2013). The distributed medical education model used by the Northern Ontario School of Medicine likely raises additional challenges for HSN, other AHSCs and community hospitals throughout Northern Ontario.

Key informants suggested other opportunities by which HSN could expand its positive influence over the region by expanding its suite of services to further meet the health care needs of Greater Sudbury and other communities in northeast Ontario. HSN's challenge to fulfill these multiple and occasionally competing roles was well recognized by all key informants and effectively captured by one key informant who stated:

HSN has a difficult mission in that they are both a large community hospital from the standpoint of serving the broader needs of Sudbury itself ..., but they're also the Northeast's tertiary centre and as well trying to fulfill a mission of teaching hospital and research. So those are difficult chunks to mesh together culturally.

Awareness of and the economic contribution of HSN's research activities was not well known by key informants, but all recognized the need for research or evaluation activities in Sudbury and throughout northeastern Ontario. Ongoing initiatives such as AMRIC may help to raise the profile and impact of research at HSN.

The assumptions and limitations of the economic modelling approach used in this report are detailed in Annex 1. The main advantage of the local impact model used in this study was that the model can be applied to sub-provincial levels such as cities and towns to permit a more specific and local analysis. Particular care was taken not to over-estimate the local economic contribution

by identifying spending that was truly local (i.e., occurred in Greater Sudbury or satellite communities rather than elsewhere) as well as ensuring that we only included the spending that was directly attributable to HSN.

Our five interviews involving seven key informants was slightly below the 8-12 interviews that are recommended for research designed to understand common perceptions and experiences among a group of relatively homogeneous individuals (Guest et al. 2006). However, the CEOs and senior administrators that we interviewed came from a variety of hospital sizes and travel distances from Greater Sudbury and so we are reasonably confident that we have obtained a range of perspectives from within this group. While it seems unlikely that the views of all hospital CEOs or senior administrators in northeastern Ontario have been recorded, we note that many of the responses summarized in this report were expressed by two or more key informants from different hospitals and are less likely to be isolated effects. Overall, we are reasonably confident that we have captured many of the main contributions of HSN on local hospitals and some of the main effects on the people and other businesses in outlying communities.

5. Conclusions

Health Sciences North makes a substantial economic contribution to the City of Greater Sudbury and a sizeable economic contribution in communities with HSN satellite clinics and services. The broader socio-economic contributions to nearby communities were considered to be mostly positive. All hospital CEOs and senior administrators who were interviewed for this study recognized the need for ongoing collaborative efforts whenever challenges were identified. Key informants noted that the main effect of HSN occurred through the provision of clinical specialist services—services that the community hospitals would be unable to provide locally without HSN or without another Academic Health Sciences Centre. Other tangible local contributions occurred due to facilities, networks and organizations such as North Eastern Ontario Network (NEON) that had been formed in support of clinical services. The multiple roles of HSN in providing advanced medical and health care services to residents of Greater Sudbury as well as to the rest of northeastern Ontario, in serving as a centre for world-class research as well as educating the health workforce was recognized as an ongoing challenge for HSN, but also as a major strength. Overall and in the details, the effect of Health Sciences North was widespread and considered largely beneficial to the health of the people and to the social and economic well-being of communities in northeastern Ontario.

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Annex 1: Informetrica's Report on the Economic Contribution of HSN

Note: Informetrica Limited's report is provided as a separate file.

Annex 2: Key Informant Interview Guide

- 1) *Based on your experience in the last few years, what has been the impact of Health Sciences North (HSN) on your organization?*
- 2) *Has there been any major impact on specific populations served by your organization?*
 - a) *Francophone?*
 - b) *Aboriginal?*
 - c) *Any other populations?*
- 3) *Has there been any major impact on:*
 - a) *Access to programs or services? [with probing questions, as needed, about clinical care, education, health promotion, research or evaluation]*
 - b) *Quality of programs or services?*
 - c) *Funding in support of programs or services?*
 - d) *Population health status or well-being?*
 - e) *Patient or provider travel?*
 - f) *Recruitment of providers? Other professionals? Other employees?*
 - g) *Local economic impact such as hiring people from the community? Purchases from local suppliers? Local construction? Renovation?*
 - h) *Innovation?*
- 4) *Has there been any major impact on the relationship between your organization and:*
 - a) *Health care service providers (in your community or NE Ontario)*
 - b) *Post-secondary educational institutions (e.g., NOSM, Laurentian University, Colleges)*
- 5) *Looking at it from the other direction, has there been any impact of your organization on Health Sciences North?*
- 6) *In your opinion as a member of the broader community, what have been the major impacts of Health Sciences North in the community?*

Annex 3: List of Key Informants

(listed alphabetically by first name)

Cynthia Désormiers RN BScN MHA, President & CEO/Directrice Générale, West Nipissing General Hospital/Hôpital Général de Nipissing Ouest, Sturgeon Falls, Ontario

Derek Graham, MLT MBA(H), President & CEO, Manitoulin Health Centre, Little Current, Ontario

Donald Sanderson, BA MHA, Chief Executive Officer, West Parry Sound Health Centre & Lakeland Long Term Care, Parry Sound, Ontario

Glenn Scanlan, Chief Executive Officer, Kirkland and District Hospital, Kirkland Lake, Ontario

Jim Hanna, BA(hon), MA, Communications and Public Relations Officer, West Parry Sound Health Centre, Parry Sound, Ontario

Paul Heinrich, LL.M. C.Dir. CMA CHE, President & CEO, North Bay Regional Health Centre, North Bay Ontario

Shannon Burrows, RN, BScN, MN, Quality & Risk Manager, West Parry Sound Health Centre, Parry Sound, Ontario