EXPLORING THE SOCIO-ECONOMIC IMPACT OF THE NORTHERN ONTARIO SCHOOL OF MEDICINE

CRaNHR
Centre for Rural and Northern Health Research

Exploring the Socio-Economic Impact of the Northern Ontario School of Medicine

Final Report

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MAIN MESSAGES

- The Northern Ontario School of Medicine (NOSM) makes a substantial contribution to the economy of Northern Ontario, with direct spending in Fiscal Year 2007-2008 (FY07/08) of $36 million and an additional $1 million per year spent by undergraduate medical students. In total, NOSM's activities were estimated to contribute $67 to $82 million per year to the economy in Northern Ontario through direct, indirect and induced economic effects.
- The bulk of the economic contribution occurs in Sudbury and Thunder Bay, but other communities in Northern Ontario may experience an estimated contribution of up to $1.4 million per year, depending on their involvement in NOSM activities.
- In FY07/08 NOSM funded 232.5 full time equivalent positions located mostly in Sudbury and Thunder Bay. It is estimated that NOSM supports a total of 420-510 FTE positions in Northern Ontario through various economic effects. NOSM also pays stipends or honoraria to committee members, Aboriginal elders and to more than 670 preceptors in over 70 Northern Ontario communities.
- Interviewees reported that NOSM is a source of civic pride and an affirmation of the north's potential as the region enlarges its knowledge-based economy. According to interviewees, NOSM has enriched the reputation of the host universities and affiliated health care institutions, thereby enhancing the ability to recruit new physicians, researchers and scientists to the north.
- Interviewees anticipated that NOSM graduates will ultimately relieve the chronic physician shortage experienced across Northern Ontario. Interviewees also remarked that Francophone and First Nations students enrolled at NOSM and the school's commitment to cultural competency training should help alleviate the shortage of physicians serving these population groups.

- Study participants acknowledged that the influx of new learners brought new people and new knowledge into the health care delivery sector. However, they were concerned that teaching activities might be impeding the delivery of care. There were also concerns around the capacity of teaching sites to support additional learners, should the numbers increase as expected. Although participants believed in the long run that the positive benefits would out-weigh the negative benefits, the current situation posed challenges that needed to be addressed.
- NOSM's operations are highly dependent on effective communications and consultation with its university, hospital and community partners. Although there was a sense that the situation was improving, poor communication, causing disruption, confusion and lack of coordination with partners was still occurring. Given that poor communication was deemed to have a dampening effect on community participation and created negative attitudes towards some NOSM initiatives, interviewees suggested that consultative processes involving all partners must continue, becoming a routine part of NOSM operations.
- NOSM has resulted in considerable administrative, infrastructure and technological developments, all of which will require continual upgrading and, therefore, future investments. While the short-term impact of these initiatives was largely positive, several participants expressed concern about long-term sustainability. Interviewees suggested several areas in which synergies between NOSM and its partners could be improved, specifically to address administrative issues, research opportunities and joint educational endeavours. They believed that collaborative initiatives involving close consultation with the universities, hospitals, family health teams and other community partners would ensure that NOSM continues to offer effective programs.

EXECUTIVE SUMMARY

Since its inception five years ago, the Northern Ontario School of Medicine (NOSM) has established multiple teaching and research sites across Northern Ontario. Because of its social accountability mandate, the school was interested in finding out what socio-economic impact its activities have had on the communities involved. Consequently, with support from the Ontario Ministry of Health and Long-Term Care, NOSM commissioned the Centre for Rural and Northern Health Research (CRaNHR) to undertake a study to document the impacts—both actual and perceived—that have occurred in the education and health care sectors, as well as in the communities in general.

The study used a mixed-methods approach, combining quantitative and qualitative data collection techniques. The quantitative component focussed on the short-term economic contributions that have occurred since the school's founding and those likely to extend into the next two to three years. The qualitative portion documented the experiences and views of a broad range of stakeholders. Two follow-up focus groups were held, one in Thunder Bay and another in Sudbury, to validate impact themes that emerged from the interviews.

The study looked at the socio-economic impact of NOSM as a whole and did not specifically address the impact of any one program, department or activity. The study identified impacts for some of the larger communities and assessed the collective impact on other communities in Northern Ontario.

Economic Contribution

A local economic model was developed to assess the short-term effects of NOSM's implementation on the economies of the cities of Thunder Bay and Sudbury and those of selected smaller communities. The model assessed the economic

contribution of NOSM by comparing the economic activity due to its presence with the economic activity that would have occurred if the school did not exist. This provided useful information about the collective contribution of the medical school and the pre-existing programs that the school inherited.

Direct spending by the school and its undergraduate students was estimated at $37 million per year in Fiscal Year 2007/2008 (FY07/08). Taking into account the re-spending of this money, it is estimated that NOSM annually generates between 67 and 82 million dollars of economic activity in Northern Ontario. Most of the economic contribution occurs in Sudbury and Thunder Bay, but other communities in Northern Ontario may experience an estimated economic contribution of up to $1.4 million per year, depending on the extent of their involvement with NOSM programs and activities.

In FY07/08, NOSM funded 232.5 full time equivalent positions located mostly in Sudbury and Thunder Bay. It is estimated that NOSM's educational programs and research activities support a total of 420-510 FTE positions in Northern Ontario through direct, indirect and induced economic effects. NOSM also pays stipends or honoraria to committee members, Aboriginal elders and to more than 670 preceptors or tutors in over 70 communities located in Northern Ontario.

Social Impacts on Universities, Health Care Organizations and Communities

Semi-structured interviews were conducted with fifty-nine individuals from the partner universities, regional health care institutions and opinion-leaders in sixteen communities. Broad themes were identified based on recurring descriptions of impacts described during the interviews. These themes were validated and extended by nine participants in two separate focus groups. All participants in the focus groups had previously been interviewed.

Both positive and negative social impacts were identified by those interviewed, though the balance clearly tipped to the positive side. Civic leaders, for example, took great pride in NOSM as a symbol of their own accomplishments—because they fought for it—and as evidence of the opportunities that exist in the north. The establishment of the medical school also was seen as a large step in the transformation of the north, as it adds knowledge-creation economic activities to a resource-extraction economy.

A more immediate transformation has already occurred in Northern Ontario's health care system, as some hospitals have transitioned from community hospitals to teaching hospitals. NOSM students, considered among the "best and brightest" now have a very visible presence in hospitals: the fact that they are learning from local practitioners in local institutions, has been seen as boosting community members' confidence in both. There also is evidence, even at this early stage, that learners are valued for their role in knowledge translation, helping to bring "the latest information" and technology with them while on community placements.

Interviewees noted that both short and longer-term job creation was seen as a direct economic spin-off of NOSM, primarily in the cities of Thunder Bay and Sudbury. Short-term effects were linked mainly to the construction of new buildings on Lakehead and Laurentian campuses. Full-time faculty and administrative appointments are thought to have substantial economic effects, because of the salaries associated with these new positions. Other benefits derive from the skills of newly arrived spouses, who find employment in health, education or other sectors, though there can be competition for jobs with current citizens.

There was general agreement among interviewees that the presence of a medical school has enhanced the reputation of Lakehead and Laurentian—the two universities that partnered in its creation. With NOSM on campus and the acquisition of several successful research team grants in partnership with NOSM faculty, the universities have reinforced their reputation as comprehensive, research-intensive universities. The

creation of the medical school has been perceived as contributing to university faculty recruitment and has opened up possibilities for establishing other programs in the health field at both institutions.

The perceived boost in academic reputations also has translated into increased numbers of students interested in studying at Lakehead or Laurentian. Both universities have seen increased applications to health-related graduate programs, though not all of the increase can be attributed to NOSM. A few interviewees remarked that some students hold a perception that a degree from either of the two universities will give them a competitive advantage when applying to the medical school. While northern and rural backgrounds are important, Lakehead and Laurentian graduates do not receive preferential treatment based on that fact alone.

Interviewees believed that the full economic and social impact of NOSM will be realized when NOSM graduates relieve the chronic physician shortage experienced across Northern Ontario. The third-year clerkship was seen as a key opportunity for communities to attract future physicians. Also, it was recognized that the medical school had succeeded in attracting Francophone and Aboriginal students. It was expected that this trend would continue and, combined with the school's commitment to cultural competency training, would ultimately alleviate, to some extent, the shortage of physicians serving these two population groups. NOSM has also contributed to the recruitment of specialists. Interviewees thought that the chance to engage in teaching and research, as well as clinical practice, has made institutions affiliated with the medical school more attractive to some medical specialists.

However, because it has multiple partners and functions through a network of widely distributed sites, NOSM faces enormous communications challenges. A number of issues around communications and consultative processes were identified, though many of these occurred in the first few years of operation. Poor communication, causing disruption, confusion and lack of coordination with hospital and community

partners was particularly evident when NOSM was undergoing adjustments in its organizational structure and staffing during its initial phase of development. Nevertheless, there was a sense that the communications situation was improving. At the same time, interviewees cautioned that consultative processes must continue and become a routine part of NOSM operations. Communication concerns may be undermining the more positive impacts of NOSM on health care institutions and communities. Poor communication may also be delaying awareness of some of the real or perceived negative impacts and, hence, delaying mitigating action.

NOSM is, in effect, a wholly owned subsidiary of the two host universities. The creation of NOSM has been accompanied by significant administrative, infrastructural and technological developments that provide a full range of services and supports for the school. New buildings were constructed to house administration, laboratories and classrooms on both university campuses and renovations were made at teaching sites across the north. Additional technological supports were developed for NOSM's distributed learning model. Some interviewees expressed concerns about unnecessary duplication of existing capacity, while others thought that the expansion was needed.

The operation of NOSM's distributed learning model, however, has not been without challenges. Some of the interviewees felt that unanticipated economic costs were incurred by teaching sites and preceptors, for example, when delays in care occur as preceptors combine teaching with care delivery such as in emergency or operating rooms. Interviewees shared concerns that teaching obligations will put additional pressure on the teaching sites, as well as on the medical school—obligations that may be difficult to sustain as the province endures a protracted period of economic constraint. There was a belief, however, that the future benefits of having physicians trained in the north to practice in the north would be worth the additional costs.

Elaborating on issues that were introduced in the interviews, focus group discussions identified impacts in four additional areas including: health workforce

development; community placement processes; connections with partners; and potential synergies. Regarding health workforce development, they emphasized that NOSM cross-appointments were now having mixed effects on physician recruitment and retention, both encouraging and deterring physicians who were interested in northern practice.

Focus group participants saw a need to enhance positive impacts by ensuring that all community partners were engaged in NOSM's discussions around placement processes, coordination of placements, physical capacity to support learners and preceptor compensation issues. Connections between NOSM and its partners also could be improved through more timely consultations, improved internal communications within NOSM and additional public relations efforts.

In addition, those who took part in the focus groups believed that synergies between NOSM and its university, hospital and community partners could be enhanced through additional administrative and academic collaborations. Study participants felt that this would help mitigate some of the negative impacts experienced by partners as the relationship with NOSM continues to evolve. They saw opportunities for NOSM to work with its partners, to address administrative issues, explore research possibilities and develop joint education endeavours, to ensure that NOSM continues to offer effective medical and health education programs.

1 INTRODUCTION

The Northern Ontario School of Medicine (NOSM) represents a unique model of medical education for the north and was created with the support of northern communities, health care organizations and universities. NOSM began operations in 2002, with the charter class of medical students starting in September 2005 and graduating in May 2009.

Although graduates will earn an MD degree equivalent to all other Canadian medical schools, their clinical experiences are to a large extent unique. The average NOSM undergraduate student spends nearly forty per cent of his or her time studying in Aboriginal communities, small towns and larger urban centres in Northern Ontario. Graduates of NOSM will be ready and able to undertake postgraduate training anywhere in Canada. They will, however, have had special training for clinical practice in northern, rural and remote communities.

NOSM, in addition to its main campuses in Sudbury and Thunder Bay, has multiple teaching and research sites distributed in large and small communities across Northern Ontario. It seems reasonable that the activities of this distributed medical school would have a broad impact on all of these communities. However, the magnitude, direction (positive or negative) and type of impact as well as the spatial and temporal distribution of the impact are not easily discerned. This research study is one attempt to understand and measure this impact.

The main objective was to focus on the short-term and demonstrable impacts that have occurred since the inception of NOSM and were likely to extend into the next two to three years. In addition, the research study sought to identify potential long-term and less tangible impacts arising from the implementation of NOSM on urban, rural

and remote communities in Northern Ontario, including those representative of Aboriginal and Francophone populations.

The study looked at the socio-economic impact of NOSM as a whole and did not specifically address the impact of any one program, department or activity. In addition, the study identified impacts for some of the larger communities and assessed the collective impact on other NOSM communities in Northern Ontario. This approach was chosen for pragmatic reasons and well as to ensure confidentiality and anonymity of study participants. In practical terms, NOSM's distributed medical and health education program has many different components operating in communities across Northern Ontario. The socio-economic impact of some components may also range in magnitude in these communities such that the sum of the impacts of components may be quite large even though the individual community impact could be quite small.

2 METHODS

A combination of quantitative and qualitative methods were used to ascertain the immediate and potential long-term impact of NOSM. Study methodology was informed by the University of British Columbia's evaluation of the initial impact of the Northern Medical Program's UNBC campus and similar studies of the impact of medical schools in Canada and elsewhere.

A local economic model was developed to assess employment and overall economic effects, using information derived from administrative databases. Key informant interviews explored a broad range of effects experienced as a result of the development of NOSM, as perceived by universities, health care organizations and communities in Northern Ontario. Two follow-up focus groups were held, one in Thunder Bay and another in Sudbury, to validate themes identified.

All research procedures and instrumentation associated with administrative data collection, key informant interviews and focus groups were approved by the Research Ethics Boards of Lakehead and Laurentian Universities.

2.1 Economic Model

An economic model was developed to assess the short-term effects of NOSM upon the economies of Thunder Bay and Sudbury, on selected communities and collectively on the economy of Northern Ontario. In this study, Northern Ontario was defined as the area encompassed by the Northeast and Northwest Local Health Integration Networks (LHINs) as well as the northeast section of the North Simcoe Muskoka LHIN.

The local economic model applies economic base theory and employs economic multipliers (as per McDermott et al. 1991; McDermott et al. 1994; McCracken et al. 2001). Additional information, including explanation of key terms are provided in Appendix C. The model was used to estimate the *economic contribution* ("gross change in economic activity") of the medical school (as per Watson et al. 2007: 142).

2.1.1 Assumptions

Assessing the economic contribution or gross change compares the economic activity due to the presence of the medical school to the economic activity in its complete absence. This provides useful information on the collective contribution of the medical school and all of the programs that it inherited from its predecessors. This is the approach taken in the current study. However, medical and health educational programs in existence prior to NOSM and the provision and administration of these programs would already have had a economic impact on communities in Northern Ontario prior to the arrival of the medical school. Estimates of net economic impact are

not presented in this report, though some of the more salient differences between net and gross impact are mentioned.

2.1.2 Data Sources

Data on revenues and expenditures came from NOSM administrative and financial records (Appendix D). Where possible, researchers also obtained data from other sources, including the Ontario Ministry of Health and Long-Term Care (MOHLTC), publications and web archives. Income and employment multipliers were assumed equal and were estimated based on population size using formulae in Moore (1975) and McCracken et al. (2001). Economic multipliers were similar to that from the peer-reviewed and grey literature, including studies done in Sudbury, Thunder Bay and other communities in Northern Ontario (Dunkley 1981; Kubursi 1994 (as cited in Enterprise Canada Research, 2001)); MacLennan 1995; McCracken et al. 2001; Lakehead University 2007).

The economic contribution (gross impact) was estimated based on NOSM expenditures by community. This spending included, administrative, office, research, travel, salary or wages and benefits paid to NOSM employees, preceptors and to Family Medicine Residents[1] as well as any other spending directed to a specific community. Spending location was based on the mailing address of the company or individual—it was considered a reasonable estimate even though payment location may not always coincide with spending location. The economic contribution represents the cumulative impact of NOSM spending in a given community or groups of communities in Northern Ontario. Reasonable estimates of spending were used when detailed data were lacking. These estimates and assumptions are described below.

[1] In fiscal year 2007/2008 NOSM assumed responsibility for paying the salaries, benefits and on-call stipends of 30 Family Medicine Residents (PGY1s) under the Paymaster program. In subsequent years, NOSM will assume responsibility for paying additional residents. Funds for the Paymaster program come from the MOHLTC.

2.1.3 Human Resources Data

The human resources component examined the impact of NOSM as an employer in Sudbury, Thunder Bay and other communities in Northern Ontario. This study examined changes in the numbers of employees and their location of work since the inception of the medical school. Human resources data were provided by NOSM. The economic effects of changes in the health workforce was included in the local economic model described above. Supplemental information on health workforce impact was gathered through key informant interviews. Data, obtained from NOSM, reflect employment status as per December 1 of each calendar year with Full Time Equivalent (FTE) status calculated on the basis of 35 hours per week using the number of hours specified in each employee's contract.

2.2 Qualitative Interviews

This component employed semi-structured interviews, conducted face-to-face, to assess the impact of NOSM on three broad overlapping sectors: Universities; Health Care; and Communities. Potential interviewees were identified by the research team and by other knowledgeable experts including some of the initial interviewees. Dr. Bruce Minore, Research Director, CRaNHR-Lakehead, conducted interviews with key informants located in Thunder Bay and in selected communities in Northwestern Ontario, while Dr. Raymond Pong, Research Director, CRaNHR-Laurentian, conducted interviews with key informants located in Sudbury and in selected communities in Northeastern Ontario.

2.2.1 Interview Content

Interview questions were open-ended to allow key informants to explore the nature and extent of NOSM past and future impact (Appendix A). The interviews were

organized around a common set of questions, designed to explore general impacts on organizations, populations and communities, with additional questions tailored to capture the unique impacts experienced by each sector:

- Senior university officials were asked for their views of the impact that NOSM has had on education and research programs. These included assessments of effects on the institution, on the special student populations served and on relationships between institutions.
- Key informants from senior management and clinical positions in hospitals, district health units, health centres, professional associations and Local Health Integration Networks were asked to describe the impact that NOSM has had on the structure and operations of their facilities or organizations.
- A wide variety of community leaders were asked to comment on NOSM's impact on communities and on Aboriginal and Francophone populations. Interviewees included municipal leaders, community business leaders, local politicians, economic development officers and other knowledgeable individuals.
- Some of the key informants were sufficiently knowledgeable or had practical experience in more than one area of potential impact and the study benefited from these broader views.

2.2.2 Participation

Fifty-nine individuals, representing 12 senior academic officials, 25 health care sector administrators and 22 community leaders, were interviewed from August 2008 to March 2009. The total number of interviews are well above the minimum 30 interviews that is recommended as the optimal to achieve information saturation (Jackson 2003). The numbers from the university, hospital and community sectors also meet the

recommended targets of 8-12 interviews in each sub-category required for more in-depth thematic analysis (Guest et al. 2006).

2.2.3 Analysis of Interview Data

With permission, interview data were transcribed into machine-readable formats and analyzed using a qualitative analysis program (*Nvivo 8*). Members of the team analyzed the data independently, then compared and consensually validated findings to confirm the results. The analysis of the interviews followed inductive procedures whereby the volume of information collected was reduced by focusing on recurring concepts and their relationships with one another (Bradley et al. 2007).

Working with an initial set of issues identified from the academic literature and evaluation reports on similar analyses of development of medical schools in Canada and elsewhere, the team examined NOSM's impact on: (i) universities, health care organizations and communities; (ii) reciprocal relationships between universities, health care organizations and communities; (iii) special populations, including students, Aboriginal and Francophone groups; and (iv) regional impacts, with a focus on the northwestern and northeastern Ontario region.

These issues constitute the analytical framework. Collectively they provide what Patton (2001) refers to as "sensitizing concepts", which were used to help organize and analyze interview data. A range of quotes were used to illustrate the scope and depth of each theme.

2.2.4 Focus Group Discussions

Preliminary findings from the economic and health human resources analyses were combined with findings from the interviews to generate ten major conclusions. These conclusions were shared in advance with a select group of interviewees and

discussed in focus groups held in Sudbury and Thunder Bay. There was a total of nine participants, predominantly from the hospital sector, but knowledgeable about other sectors. An experienced consultant, Ms. Eileen Mahood, facilitated the focus group discussions, which lasted approximately 2.5 hours at each site.

3 RESULTS & DISCUSSION: ECONOMIC EFFECTS

3.1 Economic Contribution

For a regional public-sector institution such as a medical school, it is convenient and appropriate to think of the school in economic terms as a combination of import substitution and service exports. NOSM replaces some training that would or could otherwise be provided elsewhere—most significantly, the undergraduate medical education program with 56 students in each of four program years.[2] NOSM also manages undergraduate and graduate student placements and programs that had previously been managed, at least in part, from southern Ontario. NOSM employs faculty members, researchers, administrators and other NOSM personnel, plus it supplements the income of local teachers. Some of the people and a good portion of the employment income is new to the region. In addition, the expertise developed at NOSM and people trained at NOSM can move to other regions thereby exporting clinical, educational and research-oriented services or products. All of these components contribute to the regional economy.

Payments made by the government to the school, student fees and other revenue accruing to the regional institution as well as student expenditure on housing and other goods and services, represent new or partially new revenues for Northern Ontario,

[2] Currently there are 32 undergraduate medical students in Sudbury and 24 in Thunder Bay. The total number of places will increase to 64 in 2010.

though they are not new revenues for the Province. Figure 1 illustrates the most significant expenditure paths.

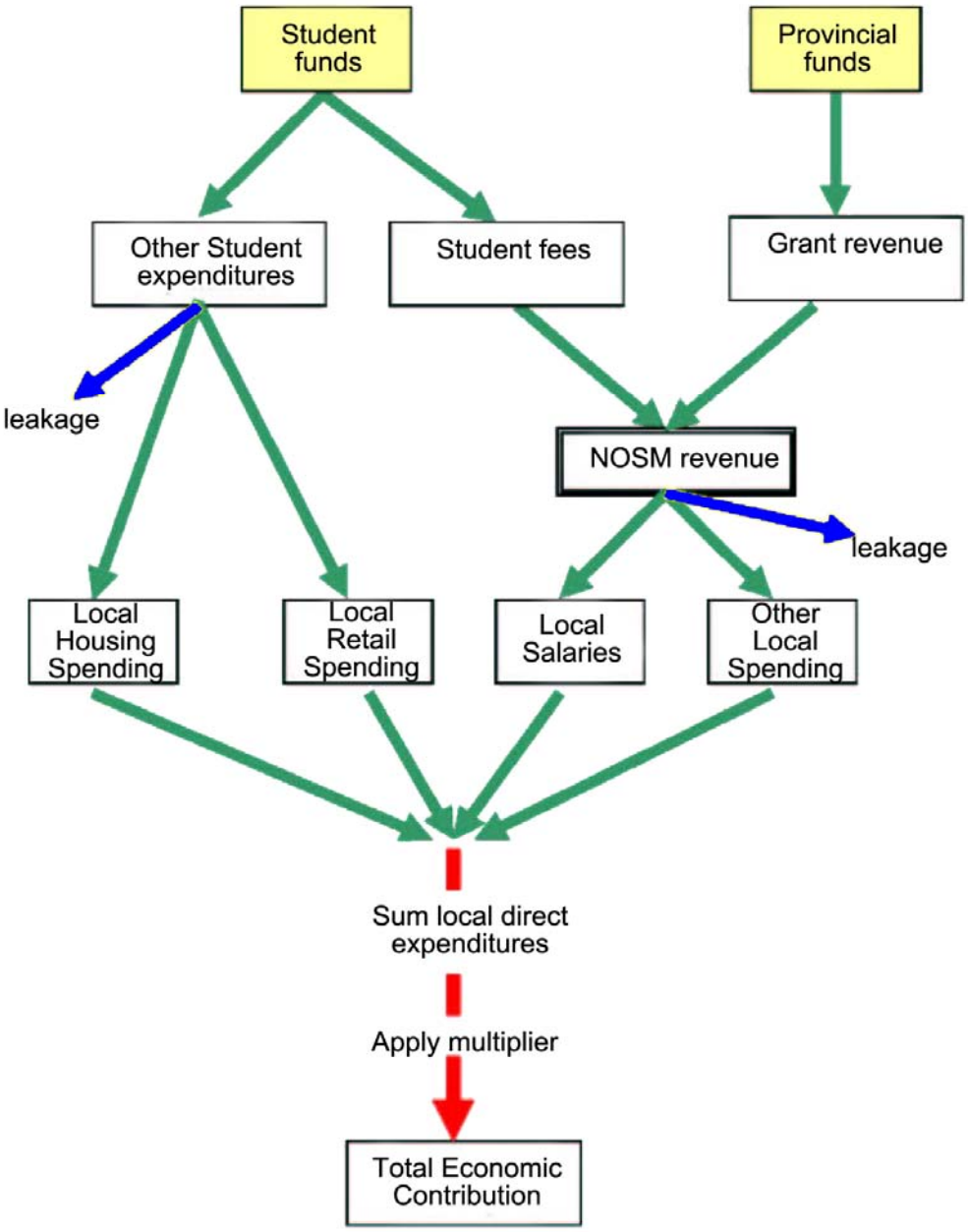

Figure 1. Major Expenditure Flows Arising from NOSM
Modified from Robinson (2008)

Programs that would have continued or even expanded if NOSM had not been created were incorporated into the economic contribution. Included in this category of programs that NOSM inherited were medical placements in northern communities, postgraduate programs in Family Medicine and other medical specialties, rehabilitation studies, dietetic internships and interprofessional health education. It is reasonable to assume that NOSM has increased the scale of these placements, but it is also reasonable to assume that the programs that placed learners in communities would have continued to develop without NOSM. Only some of this spending by these learners would represent new revenues for Northern Ontario. The number and diversity of inherited programs posed difficulties for the estimation of economic impact ("net changes in new economic activity", Watson et al. 2007: 142). Consequently, this study assessed the economic contribution ("gross change in economic activity", Watson et al. 2007: 142) of all of NOSM's new and inherited programs.

3.2 Economic Contribution of Revenue

NOSM receives revenue from the provincial government, students, research agencies and other sources. In fiscal year 2007/2008 (FY07/08) NOSM received almost $42 million and had expenses slightly over $41 million according to audited annual financial statements.[3] Direct NOSM spending (in thousands of dollars) for FY07/08, corresponding to the lower right side of Figure 1, disaggregated by community are shown in Table 1. The $36,284,000 of total spending in Northern Ontario represents approximately 95% of the $38,196,000 total expenditures (excluding amortization of capital assets of $3,012,000) reported for FY07/08.

[3] This includes $3,012,000 in capital contributions (amortization of capital assets), which appear as both revenue and expense.

Table 1. NOSM expenditures (in thousands of dollars) for selected Northern Ontario communities-FY07/08

	Sudbury	Thunder Bay	Sault Ste Marie	North Bay	Timmins	Kenora	Sioux Lookout	All Other Communities	Total
Non-Salary [a]	$5,976	$6,225	*Values suppressed due to privacy/confidentiality issues*						$16,517
Salary [b]	$10,583	$8,988							$19,767
Total [c]	$16,560	$15,213	$671	$555	$506	$319	$237	$2,224	$36,284

[a] Includes bursaries, stipends and honoraria as well as administrative and research expenditures, see Table 7 in Appendix D for a full list of spending categories.
[b] Includes salary and benefits paid by NOSM to 30 Residents in post graduate programs (PGY1s).
[c] The sum of row or column values (in all tables) may differ from totals due to rounding.
Note that these estimates exclude expenditures in support of the fourth year of undergraduate medical education and the salaries and benefits of residents in postgraduate years 2-5. These expenditures started in the next fiscal year FY08/09.

3.3 Spending By Undergraduate Students and Families

The values in Table 1 omit the effect of spending by undergraduate medical students and their families—spending that does not pass through NOSM. Student expenditures net-of-tuition fees have been estimated for the proposed Northern Ontario School of Architecture (Robinson 2008) and these estimates are used in the model as reasonable estimates of medical undergraduate student spending. Housing expenditure was estimated to be $4,000 per year and other local spending at $4,154 per year on the assumption that 90% of school-related spending flow into the local economy. Most spending goes to the economies of Sudbury and Thunder Bay, with the exception of spending by third-year undergraduates. Third-year undergraduates live 8-months in other Northern Ontario communities and this is accounted for in the model. Expenditures paid directly to the aboriginal and rural communities in years 1 and 2 were included in Table 1. To avoid double counting, bursaries provided to students by NOSM were subtracted from student spending. Additional spending by NOSM

undergraduate students was estimated to be approximately $981,000 per year, with 43% spent in Sudbury, 32% in Thunder Bay and the remainder in other northern communities (Table 2).

Table 2. Estimated undergraduate student spending in Northern Ontario-FY08/09

	Sudbury	Thunder Bay	Sault Ste Marie	North Bay	Timmins	Kenora	Sioux Lookout	All Other Communities	Total
Number of under-graduate students (years 1-4) [a]	96	72	12	12	8	4	4	16	224
Total expenditures [b]	$782,784	$587,088	$97,848	$97,848	$65,232	$32,616	$32,616	$130,464	$1,826,496
Bursaries (proportional disbursement)	$362,143	$271,607	$45,268	$45,268	$30,179	$15,089	$15,089	$60,357	$845,000
Net additional local student spending	$420,641	$315,481	$52,580	$52,580	$35,053	$17,527	$17,527	$70,107	$981,496

[a] FY08/09 was modelled because it included all 4 undergraduate years (FY07/08 only had undergraduate years 1-3).
[a] Based on $8,154 expenditure per student over 8 months

The economic contribution of expenditures vary according to the population size of the community. Leakages in smaller communities are relatively high and so the multipliers are relatively low. Population-size-adjusted multipliers (Table 6, in appendix) have been applied to the total spending in Table 1 plus Table 2 to calculate the estimated economic contribution (Table 3). Low estimates are based on multipliers from McCracken et al. (2001) while the high estimates are from Moore (1975).

Simply summing the effects on individual communities results in an underestimate of the regional economic contribution. Expenditures that leak from smaller communities tend to flow to the regional centers. The final column applies a regional multiplier to total spending rather than summing local effects. The multipliers

used to estimate the regional contribution were based on the size of the largest city rather than on the population of the entire region.

Table 3. Estimated economic contribution for NOSM spending (in thousands of dollars) for selected communities in Northern Ontario-FY07/08

	Sudbury	Thunder Bay	Sault Ste Marie	North Bay	Timmins	Kenora	Sioux Lookout	All Other Communities	Total	Total based on Regional Multiplier [c]
Non-Salary Expenditures										
Low [a]	$10,698	$10,707	*Values suppressed due to privacy/confidentiality issues*						$26,738	$29,730
High [b]	$12,252	$12,387							$31,382	$36,337
Salary Expenditures										
Low [a]	$18,944	$15,460	*Values suppressed due to privacy/confidentiality issues*						$34,663	$35,581
High [b]	$21,696	$17,887							$39,904	$43,488
Undergraduate Student Expenditures (using estimates for FY08/09 with all 4 undergraduate years)										
Low [a]	$753	$543	$84	$81	$51	$22	$19	$72	$1,624	$1,767
High [b]	$862	$628	$99	$97	$62	$28	$25	$95	$1,897	$2,159
Total Expenditures										
Low [a]	$30,395	$26,710	$1,157	$935	$784	$424	$279	$2,341	$63,025	$67,078
High [b]	$34,810	$30,902	$1,367	$1,123	$957	$535	$368	$3,120	$73,183	$81,984

[a] Low multiplier estimated from formula in McCracken et al. (2001)
[b] High multiplier estimated from formula in Moore (1975)
[c] Multiplier values of 1.80 and 2.20 were assumed for the regional economy

Direct spending in the north by NOSM and its undergraduate students was estimated at $37 million per year (Table 1 and Table 2). This spending contributes a total of $63-73 million per year to local economies of communities in Northern Ontario (Table 3) Taking into account that money spent in these communities will be re-spent elsewhere in the north yields an estimate of $67-82 million per year based on direct, indirect and induced economic effects.

3.4 Employment Effects

The relationship between expenditures and employment is complex and variable, depending on the state of the local economy, the economic sector, whether services can be provided from larger communities nearby and on the availability of specialized labour. Table 4 approximates employment effects under the assumption that the multipliers for employment are the same as the multipliers for income in the short run. These estimates suggest that NOSM supports approximately 418-511 full time equivalent positions across the Northern Ontario region though direct, indirect and induced economic effects. Additional jobs may be supported by the activities of the 670 or so clinical preceptors located in over 70 communities in Northern Ontario.

Table 4. Estimated NOSM employment contribution for selected communities in Northern Ontario-FY07/08

	Sudbury	Thunder Bay	All Other Communities	Total	Total based on Regional Multiplier
2008 FTE (35 h/w)	112.4	106.1	14[a, b]	232.5	
Low Multiplier	201	182	18	401	418
High Multiplier	230	211	22	463	511

[a] Includes 10 Site Administrative Coordinators paid indirectly by NOSM but hired by local hospitals or other health service agencies to coordinate the 3rd year clerkships in FY07/08.
[a] Excludes clinical preceptors and committee members.

3.5 Trends in Human Resources

The Founding Dean of the Northern Ontario School of Medicine (NOSM), Dr. Roger Strasser, was hired on July 1, 2002. By the year 2003, NOSM had 34 full time employees, with equal numbers working at each of the main campuses in Sudbury and Thunder Bay (Figure 2). This workforce doubled in each of the next two years to reach 144 employees when the school opened its doors to students in September 2005. The

workforce increased by 50% in 2006 as additional years were added to the undergraduate medical program and as the administrative responsibilities for postgraduate programs were transferred to NOSM. The number of employees was more or less stable in 2007 and 2008, with 245-246 employees working the equivalent of 222.5 full time jobs.[4]

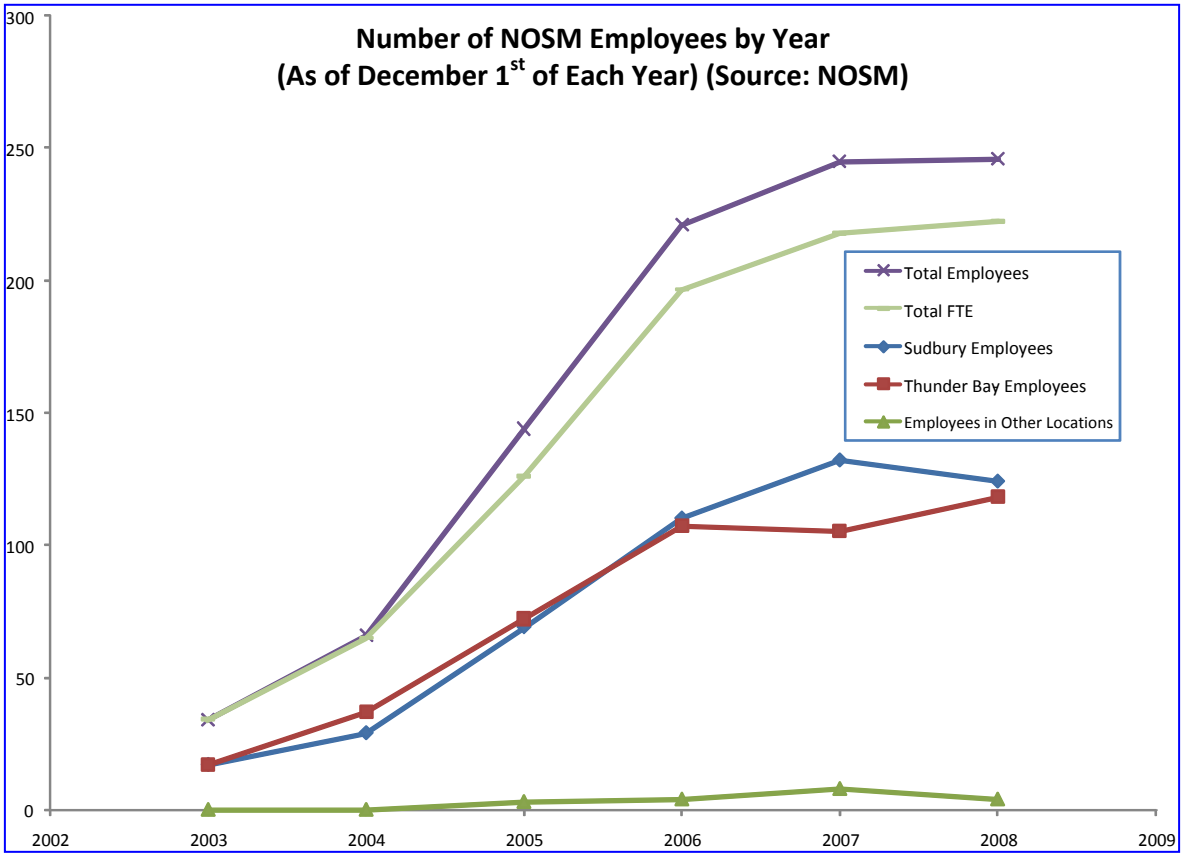

Figure 2. Number of NOSM Employees By Year by Location

The majority of employees worked in Sudbury (44-54% over the six years) or in Thunder Bay (43-56%) with 2-3% in other Northern Ontario communities. The majority were employed as support staff (56-71% over the years). The number of senior

[4] Numbers exclude clinical preceptors, committee members and Site Administrative Coordinators.

leadership administrators increased over the years, though their percentage of the total gradually decreased from 29% to 15%. Beginning in 2004, faculty positions accounted for 6-11% of the total number of employees.

In addition to those counted as NOSM employees, numerous people in Northern Ontario currently serve as teachers, preceptors and committee members. During 2008-2009, there were over 670 preceptors who oversaw the placement of learners in 330 clinics or Family Health Teams in over 70 communities, supporting NOSM's undergraduate and graduate programs in medicine and allied health professions (personal communication, Grace Vita, Planning and Risk Manager, NOSM). Examples of preceptor involvement are shown in Table 5.

Table 5. Number of preceptors associated with different programs administered by NOSM

Program [a]	Placement Duration (# weeks)	2007/08 (# preceptors)	2008/09 (# preceptors)
Undergraduate (UG)			
106	4	25	29
108	4	29	35
110	4	33	29
Community clerkship (3rd year)	30	103	99
Northern Academic Health Science Network (NAHSN)	4	66	50
Northern Ontario Elective Program (NEP) UG	4-6	*Not available*	146
Postgraduate (PG)			
Family Medicine	4-16 [b]	168	150
Northern Ontario Stream Residency (NOSR) program	Variable [c]	161	146
NEP PG	4-6	172	91
Northern Ontario Postgraduate Specialty (NOPS) program	4-12	24	29
Other			
Rehabilitation Studies Program	6	139	150
Northern Ontario Dietetic Internship Program	3-4 [d]	10	10

[a] Individuals may serve as preceptors with one or more programs. See Appendix B for more information on programs.
[b] Family Medicine Residents complete 16 rotations of 4-16 weeks over the course of their residency program.
[c] Specialty Medicine Residents spend at least 40% of their program in Northern Ontario.
[d] There are one or two of these 3-4 week placements over the 46 week program.

4 PERCEIVED IMPACTS ON UNIVERSITIES, THE HEALTH CARE INSTITUTIONS AND COMMUNITIES

The qualitative component of the assessment focused on NOSM's impacts on education and research, health care institutions and local communities across the north, synthesizing information from all 59 interviews. Many interviewees had knowledge related to NOSM's impacts on more than one sector. They were often also aware of broader impacts on their communities and regions, including the north's Aboriginal and Francophone populations. The focus group component of the assessment was designed to provide validation of interview data regarding NOSM's impacts on education and research, the health care institutions and local communities across the north. Two video-conferenced sessions were held, one in Sudbury and another in Thunder Bay, with Ms. Eileen Mahood moderating both groups. All nine participants had previously been interviewed.

The goal of the qualitative assessment was to identify broad impacts on education, health services and communities. The degree of consensus among the individuals interviewed was striking, given the diversity within the group, not only in terms of their locations and positions, but in their connections with the medical school.

The research team identified ten themes based on recurring descriptions of impacts shared by interviewees (Figure 3). Opinions were widely shared on six of ten themes and the first five themes had to do with NOSM's impact on: civic images; academic reputation; enrolments at the partner universities; job creation; and the recruitment of physicians. The sixth theme spoke to the mixed impact of communications between the school and its stakeholders. In addition, there were four other themes of interest to a number of individuals, but these tended to concern particular categories of interviewees, rather than the group as a whole. These were: administration, infrastructural and technological issues; the impact of learners on the

care delivery process; medical school admissions; and cultural competency training. An additional four areas of specific concern were elaborated in focus group discussions: workforce development; community placements; connections with partners; and synergies. Overall, the analysis confirms there is widespread agreement that NOSM has produced significant benefits across the north, to host universities, health care organizations and communities.

In summarizing qualitative information, the report makes extensive use of quotes from the interviews to retain the "tone" of people's comments and allow the reader to gauge both the speakers' intentions and the accuracy of the authors' interpretations. Because the report is organized thematically, however, insights from the university, health care institutions and community interviews are grouped together. As well, since respondents' comments tend to be quite specific, but at the same time refer to diverse aspects of a given topic, we opted to summarize comments under topic areas, identifying the sources in general terms to help protect the anonymity of participants.

4.1 Civic Images

Civic leaders held one key belief in common—the medical school exists because they fought for it and it exists in its current form, a dual campus with distributed learning sites, because the communities fought with the government and, as some frankly admitted, among themselves, so it would be so. One person summed the experience up, by saying, "Yeah, the fight was on and we just didn't back off and that was the whole reason that it actually arrived." Pride in this perceived success was evident in communities across the north. "[NOSM's presence is] a tremendous boost to the community. I think it's one of the things that helps give civic pride, in terms of saying 'we have a symphony, we have a medical school, we're not just a northern outpost' … I think it allows people to stick their chest out and say 'we are more!'" As

well as pride, it is a point of reference when other large ventures are contemplated—succeeding against the odds with the medical school now serves as an affirmation of the communities' potential. "They are looking at having other opportunities because they know it can be done."

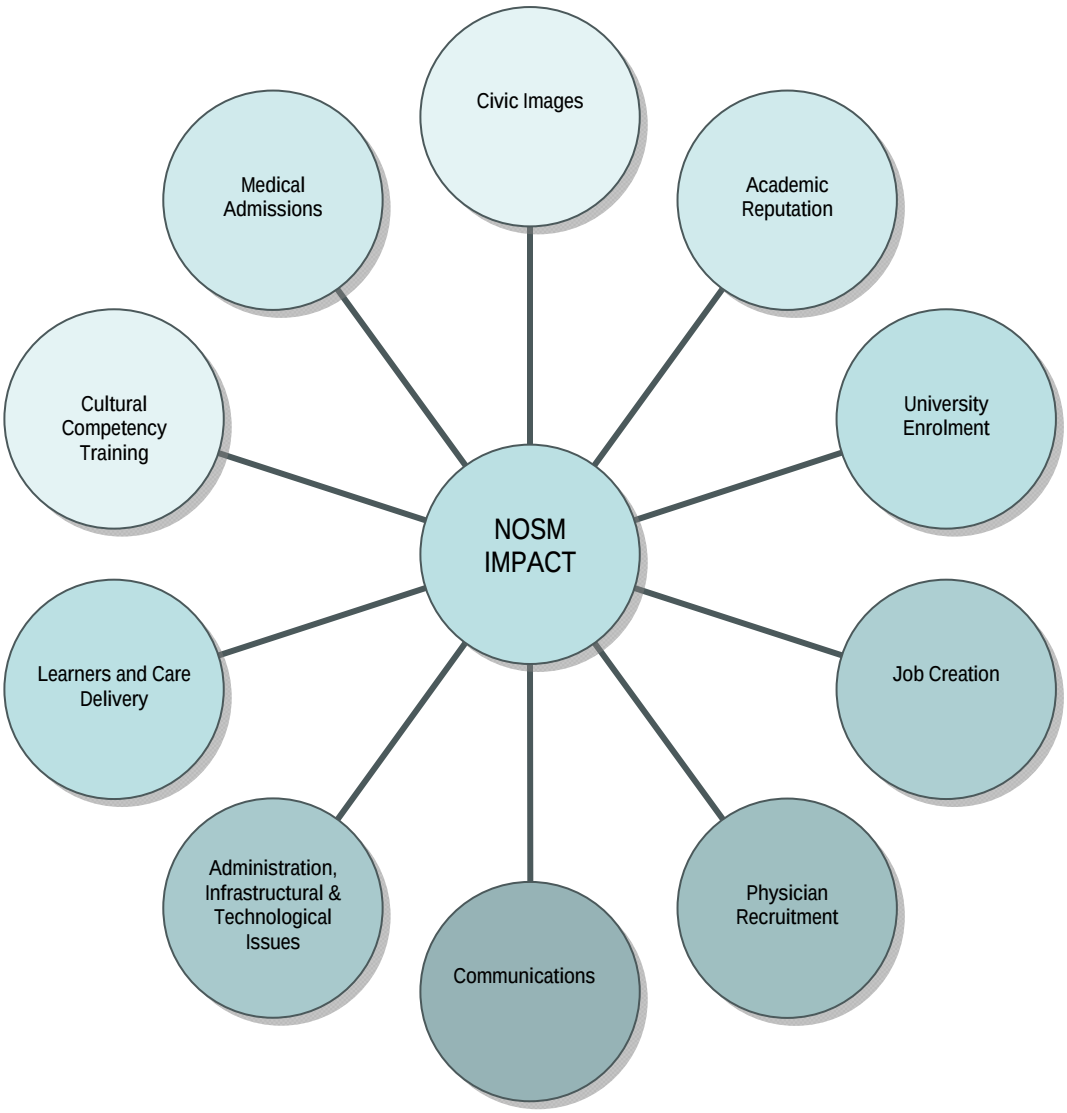

Figure 3. Qualitative Themes Identified from Interviews

The establishment of NOSM is widely seen as a large step—even a leap—in the evolution of Northern Ontario's resource-dependent economy to one that includes knowledge creation. With long-term declines in traditional industries, "it has been very good for the moral of the community to know that we have more than just forestry or mining." Indeed, people incorrectly assume that other new initiatives, like the multi-million dollar Thunder Bay Regional Research Institute, were contingent on the existence of the school. Nonetheless, there is a belief that: "Twenty years from now [research at the medical school will] create … new life cycles to products and innovations … not just pharmacology [but] whole areas of health. We [can] become national leaders in that." In other words, those who believe that NOSM is a key step to founding a knowledge-based economy imagine the future in optimistic terms.

A more immediate impact has already occurred in Northern Ontario's health care institutions. Some hospitals have transitioned from community hospitals to teaching hospitals. Interviewees said this shift has enhanced the hospitals' image with the public. People are aware that NOSM students, now a very visible presence in hospital corridors, were selected from among thousands of candidates. The fact that the "best and brightest" are learning from local practitioners, in local institutions, boosts confidence in both. "We know … there are a lot of negative views and feelings out there [so] the fact that we're involved with the Northern Ontario School of Medicine engenders confidence in this hospital … that [we do] the right thing health care-wise." When a fundraising campaign exceeded expectations at one hospital, it was attributed in part to the NOSM connection and special events linked to the hospital's teaching function.

4.2 Academic Reputation

There was general agreement that the presence of a medical school has enhanced the reputation in research and education of the two universities that partnered in its

creation. "This is all completely subjective [but] my impression is that having a medical school makes [a] university a little bit more prestigious … and that has changed the profile of … Laurentian and Lakehead." Both are now categorized as comprehensive universities, whereas previously they were designated as primarily undergraduate institutions. The "external perception of the quality of [an] institution" may not be objective, but "in the eyes of most people, if you're good enough to have a medical school you're probably … a good university." Moreover, the northern focus of the medical school has lent support to defining features of the two institutions "to name, if you like, what our strength is … that we are not urban … we have been able to better define [our strengths in rural and northern health]."

Interviewees saw the arrival of the medical school on campus as a vital contribution to the maturation of both universities into more research-intensive institutions: "The idea of having a medical school somehow helped turn the corner toward research … all of a sudden research started to become exciting." A few interviewees remarked that the research infrastructure at NOSM, particularly laboratory facilities, also has contributed to university faculty recruitment, especially in the natural sciences. When potential candidates consider their options, they may say, "oh, there is a medical school here so there is a possibility that we can collaborate with medical school [faculty] and take advantage of their facilities." Already, there have been several successful "team grant" collaborations between NOSM and university faculty members in the areas of life sciences, biomedicine, biotechnology and behavioural sciences. It is important to note that both universities had substantial and excellent research programs prior to the inception of the medical school. It seems reasonable, however, to argue that NOSM has increased the visibility of recent and emerging research.

Although NOSM has been employing the research and administration services of the universities, the overall "level of engagement that one would have anticipated"

between the medical school and its partners around research and joint educational ventures has been less than expected. A few interviewees opined that some of NOSM's strategic research initiatives are seen as "going in a different direction" than those of its partners. For example, the medical school had "gradually faded out" of involvement in research with the academic health centres in Thunder Bay and Sudbury. In another example, NOSM embarked on activities, such as the pan-northern bio-prospecting centre, only consulting its Aboriginal community partners after the fact. More recent developments, such as the school's expansion in the areas of interprofessional education and physician assistant training, in the view of some interviewees, were also undertaken independently.

Those interviewed believed that the reputations of all parties would grow, if NOSM and its partners took all available opportunities to "combine efforts and really do some meaningful things on a larger scale." "Better coordinated activities, so people do not go out to compete by themselves" and discussions "before not after" were beneficial for all concerned. The comments by study participants suggest that NOSM's impact on research activities has been mixed, but that opportunities still exist to realize greater positive impacts.

4.3 University Enrolments

The perceived boost in their reputations has translated into increased interest among potential undergraduate and graduate students in studying at either Laurentian or Lakehead. Interviewees remarked that enrolments, which went up during the flow-through of Ontario's double cohort a few years ago, have not fallen back to former levels. "It may have had something to do with the perception of [the universities] with this new medical school. There was national publicity … [we] became something that people knew about."

Although not all of the enrolment gain can be attributed to the arrival of NOSM, individuals at both institutions reported an increase in students applying to specific health related graduate programs. There has been, for example, increased interest in the PhD programs in Biotechnology at Lakehead and Biomolecular Sciences, along with Rural and Northern Health at Laurentian. It was believed that the presence of the school would encourage enrolment in other programs, such as Lakehead's Masters in Public Health or Laurentian's programs in Orthophonie and Radiation Therapy.

At the same time, a few interviewees thought that some undergraduates have been attracted to the universities because they believe that a degree from either Laurentian or Lakehead will give them a competitive advantage over students from other universities when they apply to NOSM. "Many students think that way. Fortunately, that helps increase our enrolment." While northern and rural background is an important factor, acceptance to NOSM is not in any way dependent on where applicants completed their degree: Lakehead and Laurentian graduates do not receive preferential treatment based on that fact alone.

4.4 Job Creation

Both short and longer-term job creation was seen as a direct economic spin-off of NOSM, but primarily in the cities of Thunder Bay and Sudbury. The short-term effect was linked principally to the construction of new buildings on the campuses of Laurentian and Lakehead. As one health provider said, from the community perspective, "there seem[ed] to be a lot of infrastructure [being built] and a lot of jobs … [which meant] new money coming to town." And, a civic leader noted, "those are all dollars that stay here and when those dollars are here they move around the community, they are spent here and re-spent here." Outside the cities of Sudbury and Thunder Bay, the impact in terms of employment or investment was considered to be minimal.

The chance of longer-term employment at the medical school for people from the communities was mentioned, but not recognized as a significant factor. For example, one person said: "there is another building [so] we might get people [hired] to clean that building." On one hand, given the number of faculty and administrative positions at NOSM in both cities, this low level of acknowledgement is somewhat surprising. On the other hand, full-time faculty and administrative appointments, though characterized as "imported [or] … not jobs that come from the community," are thought to have "a huge economic" impact, partly because of the salaries associated with these positions. Similar benefits may derive from the skills of newly arrived spouses, who fill vacancies in the industrial, health or educations sectors—provided they don't compete with local candidates. As well, anticipated opportunities for cross-appointments to NOSM, along with the possibility of joint research ventures, are seen as increasing the attractiveness of the partner universities as employers, thereby bringing new talent to the communities.

4.5 Physician Recruitment

People in virtually every city or town visited for this study believed that NOSM graduates will ultimately relieve the chronic physician shortage across Northern Ontario. For example, a hospital administrator in a smaller centre said, "at least three of the students from last year's class have indicated [that] they want to come back here and practice." Indeed, several smaller communities saw the third-year clerkship as an important time in which to "pitch" their communities as possible practice sites. "Smaller communities that have had trouble attracting medical doctors may find themselves now able to attract the students who came there [for their clerkship]."

Consequently, community members invest considerable time and effort in making the medical students feel welcome and valued. One individual saw a major benefit of community-based training as "being able to recruit these doctors when

they're finished their residency," because "they know that they are needed here" and "I think [their clerkship here] was a positive experience." It was noted that in some cases students are returning to their home towns, but others "came and fell in love with the community and [plan] to practice here."

NOSM's contribution to recruitment is not just anticipated, but already occurring with respect to specialists as a few interviewees noted. "The fact that we're affiliated with the medical school [was] a positive influence in getting an orthopaedic surgeon to come here … as well as an obstetrician-gynaecologist." In fact, the mere presence of the school has become a factor in physicians' location decisions. "I would say every single physician recruit, whether they've come here or they haven't, identified [NOSM] as being key to the reason why they would consider [this community] as opposed to another community." This may reflect changing career expectations among younger practitioners. One interviewee observed: "we are recruiting a different type: they want to be involved in research, they want to be involved in teaching." Of course, the chance of affiliating with a medical school opens up opportunities to do both, as well as maintain a clinical practice.

4.6 Communications

Because it has multiple partners and functions through a network of widely distributed sites, NOSM faces enormous communications challenges. Therefore, perhaps it is not surprising that this is an area where there was quite a bit of criticism, much of it related to events in the inaugural and mid-point phases of the school's start-up. For example, interviewees in health care agencies reported that their staff felt extremely valued during the initial stages of planning, but that early consultations gave way to a time when there was virtually no communication, as NOSM established its administrative structures. The nature of communications may have negated or delayed

some of the positive benefits—it has adversely impacted the perceived relationship with NOSM for some study participants.

NOSM's establishment phase was marked by several periods of adjustment, during which turnover in staff contributed to a sense of disruption in the lines of communication. As one person complained: "People change[d] positions so much, just even to make sure you ha[d] the right names" made follow-through difficult. As a result, communications between NOSM's administrative or support staff and their counterparts at other institutions were described as "inconsistent." It was, as an administrator said, "difficult to know who your key contacts [were]."

Added to this, communication was uncoordinated. Requests to health care institutions from individuals affiliated with NOSM were being made through various channels, creating confusion. A hospital administrator recounted one event, by way of illustration: "So we had a manager saying 'I've got one of our physicians bringing in all these students to watch and do infant exams in the nursery. Are we allowed to let them touch the baby? We don't know what they're allowed to do.'" In this case NOSM's request was made to a front-line manager, before the hospital had a chance to consider the implications, or to establish protocols.

Nevertheless, there was a fair degree of understanding that "NOSM has spent the better part of the last four-to-five years – appropriately -- with a myopic focus," given the large number and great complexity of tasks associated with launching itself and undergoing the rigors of accreditation. Moreover, it was thought that the situation with respect to communications was improving. For instance, interviewees from rural communities reported a sense of exclusion until very recently, describing NOSM's community engagement process as "a little bit slow coming … but now functioning well."

They caution, however, that the consultative approaches established must continue and become a routine part of the medical school's operations so as to maximize positive impacts and minimize negative impacts. Interviewees also stated that it is especially important for NOSM to ensure that its success stories are reported in the media of smaller towns. A case in point was the story told in one service centre. The foundation of the local hospital had contributed a substantial sum to the school's scholarship fund, a matter that was widely publicized at the time. However, the school did not follow-up and provide information about the beneficiaries until the hospital pursued the matter. The interviewee felt that their enquiry should not have been necessary, rather that the foundation should have been informed and a public announcement made. The person added that future fundraising in smaller places will depend on the school maintaining a high profile across the region and active engagement with communities.

From a communications perspective, concerns were expressed at both universities about the relative isolation of NOSM on the campuses and the lack of communication between the respective students and staff. As an administrator observed, "there is very little interaction between our students and the med school students." There also had been few communications, aside from formal meetings, between NOSM staff and their university counterparts, "because their offices were in a different building and we didn't have … that hallway informal communication which is important."

There was also concern, from a public relations perspective, that NOSM's branding underplays the legal relationship that the school has as a faculty of both universities. It was pointed out, for example, "if you look at the logo of the medical school, there is a little circle and it does say in the little circle, Laurentian and Lakehead – if you read the fine print." Although communication issues tend to be situation specific, they were raised by people from all sectors. In this regard, NOSM was

considered by many study participants to have both negative and positive impacts on social and professional networking.

The following sections address five concerns that emerged exclusively in interviews with stakeholders from only one category, either the community, health care institution or university.

4.7 Administration, Infrastructure and Technology Issues

NOSM is a wholly owned subsidiary of the two universities with the educational programs under the auspices of the university senates. In the opinion of some interviewees, administratively NOSM was "heavily reliant" on both universities during its initial phases, whereas today the school functions more independently, with a full range of administrative, infrastructure and technological services.

This increased capacity to deal with the influx of students and demands of the distributed medical model has met with mixed reviews. As an interviewee observed, "there's very little synergy between [NOSM] and the two universities in terms of trying to reduce administrative and operating costs. They have their own administrative staff, use their own administrative systems and have very little to do with the universit[ies]." The perceived "duplication of services" was generally viewed as "a not very positive reality" because, in the long-term, it created fiscal obligations that might be difficult to sustain. An administrator remarked, "What worries me down the road is when … they don't have the start-up funding, what's going to happen and what the [anticipated] role the universities would have, vis-a-vis dealing with [any fiscal] issues that NOSM might face."

The creation of NOSM also had been accompanied by significant infrastructural and technological developments in hospitals, family health teams and other teaching sites. Investments were made for renovations at sites across the north, in most cases

through capital grants from the Ministry of Health and Long-Term Care.[5] Specifics varied, depending on requirements, but "things like lockers, video-conferencing rooms, library space" were funded in this way. In at least one place, however, the community financed a new building that contained dedicated office and board-room space for the students' use. In addition, all teaching sites were fitted with video conferencing equipment and wireless Internet access: essential supports for distributed learning.

Comments by those interviewed at hospitals and healthcare clinics about the infrastructure upgrades were consistently positive. For example, the fact that medical staff occasionally used the technology for continuing medical education sessions counted as a substantial benefit. Overall, the pressures on the host institution's infrastructures were considered minimal or endurable given the potential long-term benefits that the students represent. In certain places, however, the extent of the improvements did not fully meet the needs. As one person said: "it's great, it's fantastic, to have new learners, but physical space is a challenge".

Noting the speed with which technologies change and the high maintenance costs for such systems, concern was expressed about the sustainability of NOSM's technology-dependent model of distributed learning. As an interviewee commented, supporting a separate technological infrastructure for the school, when both universities had their own networks, created ongoing costs for maintenance and upgrades that could be avoided, in part, "if we shared the cost of operating a network." The key impact related to NOSM's administrative, infrastructure and technological supports is one of funding: will the school's annual funding provide for continual improvements? If not, will future system costs end up borrowing from other budgets, not only within the school, but from other programs as well?

[5] For example, on September 13, 2006, the Ontario Ministry of Health and Long-Term Care announced a total of $5 million in funding to over 40 hospital sites to help ensure students have the necessary hospital facilities.

4.8 Impact of Learners on the Care Delivery Process

While the presence of medical students affects the care delivery process in both positive and negative ways, it was clear that study participants felt that the positive outweigh the negative by a considerable measure. As one health administrator commented, in clinical areas it can create crowded "conditions [that] are horrendous, but the rewards are long-term." On the plus side, several people noted that having medical students challenges "our physicians to keep up-to-date as preceptors." The students are "wired" for access to the latest information, "whether it is [by using] a tablet, a laptop, they have all kinds of search tools [at hand]." Moreover, they are being taught "the latest approaches, the latest standards … so they bring some of that here." A hospital staff member summed the situation up by saying: "a teaching environment drives a culture … of innovation and it drives a culture of questioning." Not only is this shift seen as important, it is welcomed within health care institutions, particularly in smaller communities.

At the same time, some interviewees noted that the presence of students creates some pressures on the delivery of care and may place additional economic burdens on teaching sites, their staff and physician preceptors. One hospital administrator summarized a common perception by saying: "[Physicians] are slowed down in their rounds … or seeing patients, because they're taking time to teach." A physician might express the dilemma as follows: "how many hours do I have in the day to manage my patient load [given that] I want do something with NOSM." Other physicians, it was suggested, may be less willing "because they believe it is going to reduce their income and increase their workload."

These differing points-of-view require changes in the way group practices work "if the group has agreed to take students, but some of the doctors don't want … to be involved in academics", as one health administrator remarked. Periodic losses from the

physician workforce can add to the pressures in small-town settings. "We have to limit the number of students coming … we could accommodate them in the past, but at this point in time, because of a [loss of physician services], we have serious problems accommodating students." In another case, with only [a few] physicians in town, it is difficult to have a student "for seven or eight months at a time."

The time burden was believed to have associated costs. As one health administrator related, "If you're teaching in an operating room, it takes longer to do [procedures]" because of the time it takes to explain, "so, you can probably do fewer surgeries … and you'll end up using more supplies when you're teaching." Some of the additional costs are specifically linked to residents' training. Residents write orders, which has an "impact in terms of our efficiency … because" as one administrator opined, "what we're seeing is more orders being written that have to be changed." Residents also have a "tendency to order more tests, but that is part of teaching." They "seem to dictate longer and longer, so that has some impact in the medical records area." In the view of one senior hospital administrator, these extra costs should be built into the hospital's base grant from the Ontario Ministry of Health and Long-Term Care, in recognition of the hospital's teaching role.

4.9 Medical School Admissions

Community leaders report hearing from applicants who were unsuccessful in applying to NOSM. "I've gotten calls from people [who are] disappointed that their application wasn't considered worthy." Of course, these interviewees admit, "you don't know what the qualifications the candidate [has] … but there is some expectation out there that perhaps … students in the [north] kind of get a leg up." In other words, the school has been marketed as "in the north, for the north", which may have given rise to misconceptions about the admissions procedures. As one person said, disappointed applicants complain that "people from southern Ontario [are] getting in

and I'm not getting in … that kind of thing." In passing along these comments, interviewees recognize that standards are high. As one person said, if there are "over 2,000 … applicants and there are only 56 seats, there are a lot of students that are not going to be in [those] seats."

At the same time, there are "people that we think are great … that potentially have a long-term role here in the community and yet they are not getting into the medical school." Community members start asking: "What's wrong with our students … should we be doing something else to help these students along the way?" Generally, it was felt that the medical school could do more to manage expectations by ensuring that information about the admissions process is widely disseminated, using avenues accessed not only by possible applicants and educational personnel such as "guidance counsellors in high schools," but the larger community as well. Apparently this information was publicized when the first cohort was accepted. It was suggested that it should be distributed again, perhaps even annually, to increase the level of understanding, acceptance and confidence about the decisions made. These actions might mitigate some of the negative impacts on applicants and their communities should applications be unsuccessful and, perhaps over time, improve the quality of applicants and applications.

Although in its first cohort the school accepted more individuals of First Nation heritage than anticipated, in succeeding years "there's [been] a decline in applicants," according to one concerned interviewee. This person thought the decline was partially because "some of the [Aboriginal] placement areas didn't go as well as they would have hoped." Consequently, there was negative talk "out in the community, so people shy away [from applying]." Nonetheless, "generally there's still a lot of interest" in First Nation communities and the school has worked hard to create and maintain it. Some concern was expressed about perceived inequities in the efforts to recruit First Nation students within the school's catchment area. "There is a perception in some of the

communities in northeastern Ontario that more attention is paid to the [north]west than the northeast."

4.10 Cultural Competency Training

Northern Ontario's population includes two large cultural groups—First Nations people and Francophones—whose heritage must be taken into account by the health care system. "We need to be sure that our doctors, whether Anglophone or Francophone, are culturally competent … [and] we're hoping … that cultural competency [remains] an integral part of [NOSM's] curriculum."

An interviewee with a hospital that serves clients from isolated northern communities, notes that "over 82 per cent of our clients are First Nations," many of whom are most comfortable speaking their Nishnawbe language. Hence, cross-cultural patient safety issues are of considerable concern and the hospital has identified eight or nine areas in which extreme caution is required by practitioners. "Many of our incident reports identify things [like] a medication error – but the medication error probably would not have happened had somebody understood better the language, or the cultural context, or the community context." Similarly, Francophone interviewees note that being able to communicate with a client in their language of preference is essential. "If you don't understand the people you're trying to serve and don't understand [their] culture, there is a great risk of a false diagnosis and everything going [wrong] with that."

One of the unique features of NOSM's mandate is the commitment to "reflect the socio-economical and cultural vision of Northern Ontario . . [specifically] the Francophone and First Nations". Generally, NOSM was seen as doing well with regard to cultural competence training. In particular, there were favourable comments about the compulsory four-week Aboriginal community placement for first-year students, which makes a degree of immersion possible, albeit of brief duration. Indeed, there

were suggestions that the length of time was not sufficient, though there was recognition that the curriculum also has to accommodate other learning imperatives.

Similarly, the school's commitment to providing a portion of undergraduate training in French was seen as important and something that should be increased wherever possible. However, the fact that English is the dominant language of instruction was considered a benefit for Francophone students, because English is a standard language for medical practice across much of Canada. Indeed, one interviewee commented that Francophone students, "do not see themselves as Francophone. They see themselves as medical students of Northern Ontario." When they set up their practices, if their clients prefer to speak French, they will need to explain diagnoses or treatment plans in plain language; then their bilingual knowledge will come to the fore. Culturally appropriate treatment was seen as another of NOSM's major long-term impacts on the health and well-being of special populations, in addition to the potential for improved access for all northern Ontarians.

4.11 Health Workforce Development

While acknowledging the measurable socio-economic benefits associated with the development of NOSM, especially in "Sudbury and Thunder Bay as the home bases," focus group participants emphasized that the most significant impacts of the school will be evident in the health workforce: specifically in the ability of smaller towns, as well as rural and remote areas, to recruit and retain physicians and other health professionals. "The benefit of the NOSM isn't how many dollars they're putting into the community, but eventually how many doctors will end up here and in other communities. [It has not meant] millions [of dollars] into the community here, but what is happening is very important."

Elaborating themes identified in the interviews, focus group participants provided several examples of the way that NOSM was driving positive social and

cultural changes in the health care system, by introducing "new life" and "new ways of thinking" about education, research and health care. For example, the school's emphasis on interdisciplinary approaches was "reinforcing the health team concept." There were expectations that NOSM's graduates would want to work in a "shared practice model", which supports positive relationships with physicians, nurses, allied health professionals and staff.

There was awareness, however, that NOSM cross-appointments could have mixed effects on recruitment and retention, either attracting or deterring physicians who were interested in northern practice. While some physicians "relish the opportunity to be involved in a teaching program" and see it as "anchoring" them to their communities, others who are attracted to northern practice "didn't want to be academics." Indeed, one hospital had already "turned some folks away who have said they are not interested in an academic portfolio." As organizations move forward with this commitment, it was felt "we're going to lose some physicians and we're going to gain some physicians." Closer attention needs to be paid to these effects, so NOSM understands "how to get the best fit" between the needs of learners and physician preceptors while ensuring that communities are able to met the medical care needs of their populations.

4.12 Community Placements

On the subject of community-based learner placements, focus group participants acknowledged there continues to be "a little bit of confusion" about the way that placement coordination processes work. One community, for example, was perplexed because they were" getting medical students all the time and residents all the time, but they're not coming from NOSM." Another location hosted students on an irregular basis, believing that this occurred only when there was "an overflow" from nearby

communities. Other sites experienced an over-subscription of NOSM learners and had "to turn away" requests.

Similarly, there was a perceived lack of clarity around the school's role in coordinating placement requests from students at other Canadian medical schools and internationally. Some administrators responded to such requests directly, others advised interested students to "contact people at NOSM and get back to us if problems occur." Ongoing consultation between NOSM staff and community representatives would ensure that placements were "custom made … for our circumstances in our community."

Given the increasing volume of learners in the system, participants pointed out that the physical capacity of teaching sites had already been exceeded: "We're out of space … Right now when we do take students, they don't get an area to work in that might be designated for them. They have to sit in a crowded office with a couple of other physicians. We can maybe find a chair for them." Not surprisingly, there were concerns around capacity should NOSM enrolments increase as expected. "We currently have a very nice space … for the four med students that come here and residents. It seems to be adequate [but] … if there's going to be expansion in the future … there might need to be some additional capital renovations done."

The most serious issue believed to be affecting the sustainability of community placements, however, was the ability of NOSM to attract and retain "enough preceptors to really cover the undergrad, the specialty types and the residents." The chief concern was that "the financial compensation for preceptors is so … low for physicians, that you will lose them." Focus group participants remarked that family physician preceptors found that "days they have students in residence, they decrease their volume of patients coming in, so at the end of the year they've probably lost some money." Specialists, who supervised up to six residents for a period of a month, were, according to focus group participants "literally taking a massive cut in pay to provide that

service." Given the implications for NOSM's learning model, discussants suggested preceptor compensation issues should be examined further, beginning by quantifying "the loss of income for our family docs and our teaching physicians." Alternative preceptorship models, including "layered learning, with clerks and junior residents and senior residents and chief residents" could also be explored.

4.13 Connections with Partners

While acknowledging that many of these issues reflected a process of "learning and growing and trying to make sure people know who they need to talk to and how to get things done," focus group participants emphasized the importance of strengthening the connections between NOSM and its partners. In the past, this the degree of collaboration has varied considerably. Some organizations, with representatives on advisory committees, council or board, had "an active and ongoing dialogue" with the school. Other partners, without such connections, found out about changes at NOSM "months after something has happened." More timely dissemination of information would ensure that all organizations were able to share in decision-making: "You need to hear about it when you can participate, not after, especially if you are somebody who should participate … otherwise, you get really angry … and go against whatever is being proposed."

As well, focus group participants noted that connections between NOSM and its partners could be strengthened by addressing some of the internal communications problems that have occurred within NOSM's complex organizational structure from time to time. As a participant observed, "there's the post graduate program and the undergraduate program and within each of those programs are all these little silos and this person doesn't talk to this person … and that drives me absolutely mad that they cannot cross the hall and say there must be a way to work this out." Staff "cross-appointments" between NOSM, the universities and hospitals were also recommended

as a way of ensuring that communications flowed smoothly, creating a "win-win" outcome for all concerned.

Additional public relations efforts, directed towards reporting what NOSM, its students and preceptors are doing, also reinforced the bonds between NOSM and its communities. The example of medical students in a remote First Nation who had helped a women through a difficult delivery (with video-conferenced support from their preceptors) "would make tremendous headlines and very good press for the School, because those students probably saved the life of the mother and the baby in that situation … [It was] a good news story! And there's quite a number of them."

4.14 Synergies

Focus group discussions, while confirming the issues around synergies identified in interviews, highlighted a number of additional areas for improvement in the relationships between NOSM and the universities, hospitals and other partner organizations. Administratively, there was a need recognize that "partnering with the university in a full sense really is a smart thing to do … within the university there are huge banks of talent that are not being used because the medical school tends to sort of do its own thing." Specifically, there was a need for ongoing consultations to avoid unnecessary duplication of administrative services, such as had occurred in the past when NOSM had developed "all sorts of additional support to service the medical school." This was "an area of friction" that needed to be worked on.

Academically, focus group participants identified opportunities for NOSM to engage more fully in collaborative research involving the universities, hospitals and other community partners. Some hospitals, for example, were "very interested in pursuing a research portfolio" and recognized that "NOSM and the universities have some of the expertise" required. Others were interested in expanding research around "the practical applied aspects of medicine" and "engaging younger doctors" in research

activities. Participants believed that Aboriginal communities were also interested in joint research ventures, provided "there was some real understanding as to the partnership and how it's going to happen."

In addition, there were suggestions that NOSM should explore further possibilities for joint interprofessional educational endeavours. Specifically, participants suggested that NOSM physician placements could be coordinated with those for allied health professional programs, including nurses, pharmacists, physiotherapists, occupational therapists, audiologists and dietitians. Collaborative placements that were "sensitive to the outlying communities", it was argued, would contribute to a more integrated, comprehensive and sustainable northern health workforce. Expansion of placements that encourage "understanding of the Aboriginal population" and support development of "Francophone health care professionals" were seen as equally beneficial. One focus group participant remarked: "We can't have health care with just physicians. We all know that … if people come here and spend some time here and are educated here, they're more likely to stay here."

Summing up issues around synergies, focus group participants emphasized the need to work on relationships at all levels, between NOSM and the universities, hospitals, family health teams and other community partners. The goal was to ensure that everyone involved in joint initiatives, including administration and staff, were "talking to one another" so that things were done "collaboratively" and not "unilaterally." Furthermore, it was suggested that addressing "issues around synergies and communications has to start within NOSM and then probably in the university and then within its greater community because … those issues … are right within [NOSM's] organization." As a participant noted, "We have to be on the same page and we have to be collaborative for it to be an effective program."

5 CONCLUSIONS

The Northern Ontario School of Medicine represents a bold new venture in distributed medical education, drawing from models in Australia and the United States of America, but also building on medical and health education programs that have been part of Northern Ontario for several decades. The distributed medical model raises the potential for a socio-economic impact that permeates throughout Northern Ontario. However, the distributed model also raises difficulties in assessing the impact, in part due to issues of attribution (not all changes—good or bad—can be attributed to the medical school), but also due to difficulties in measuring changes in such a broad and diverse geographical area.

This study used a mixed-methods approach, combining quantitative and qualitative data collection techniques to examine the socio-economic impact of NOSM as a whole, rather than assess the impact of any one program, department or activity. The study identified impacts for some of the larger communities and assessed the collective impact on other communities in Northern Ontario.

The economic model employed in this study estimated that for every dollar that the medical school takes in as revenue, it contributes roughly one additional dollar to the economy of Northern Ontario and for every direct job that the school provides, it contributes at least one more job to the region. Its economic contribution is pervasive throughout Northern Ontario.

There is evidence from the interview data, however, that the arrival of NOSM simultaneously created both positive and negative economic and social impacts on its partners from the academic, health care and community sectors. Interviewees suggested that preceptor payments, for example, do not fully compensate for lost revenues due to lower fee-for-service billings. In addition, some of the teaching sites may experience reductions in clinical efficiency due to teaching commitments and the

extra costs may not always be recognized by current provincial funding arrangements. Nonetheless, many study participants felt that this was the logical consequence of opening their doors to learners and that there were benefits to the institution and community at large, benefits such as embracing an institutional culture of learning.

There were equally mixed effects associated with NOSM's development of a full spectrum of administrative and technological services and associated infrastructure, that was largely independent of Lakehead and Laurentian universities. While it was acknowledged that the infrastructure had positive impacts, economically and academically on the universities, health care organizations and communities, concerns were expressed about the long-term sustainability of the original investment.

There was also awareness that the NOSM's offers of academic cross-appointments were having both positive and negative effects on physician recruitment and retention. Some interviewees believed that the medical school had improved recruitment of both family physicians and specialists; others reported that some job candidates were disinterested and, in some cases, deterred by the prospect of academic appointments. What is known, however, is that NOSM factors into the recruitment process.

In some instances, benefits were presented with limited supporting evidence. For example, some interviewees mentioned that the medical school had affected recruitment, but it proved difficult to support this assertion with numbers. In other instances, interviewees described perceived impacts that had yet to be realized. The hope that NOSM graduates would help alleviate the chronic doctor shortage in the north was one such example of a potential impact.

The lack of evidence to support some of what was asserted by participants was a limitation of this study. There was, however, consistency in many of these assertions by several interviewees from different sectors across Northern Ontario. Other limitations

related to some of the assumptions of the economic model and the use of spending estimates in instances when actual data were lacking. The economic model is believed to be conservative,[6] compensating for the underlying uncertainty of economic impact estimates in the general and specific assumptions used in this model.

The simultaneous identification of positive and negative impacts was quite common in many of the themes—the arrival of NOSM issued challenges to the status quo and offered opportunities for change. Overall, the socio-economic impact of the Northern Ontario School of Medicine was considered to be mostly positive and was cited as an example of a force for continued change as Northern Ontario decreases its reliance on a resource-based economy by developing more knowledge-creation economic opportunities. But these impacts and changes are grounded in the reality of the north—optimistic assertions of positive benefits and hopes for the future were typically followed by articulation of pragmatic concerns that must be addressed to ensure that NOSM continues to offer effective medical and health education programs.

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[6] Three examples may serve to illustrate the potential for underestimation: (1) monies paid to hospitals, such as the $5 million announced by the MOHLTC in 2006; (2) monies paid in support of the fourth undergraduate year that started in FY08/09; and (3) the approximately $1.6 – 2.0 million in resident salaries that in 2007/2008 were flowing though McMaster University or the University of Ottawa for Family Medicine PGY2s and other Specialty Medicine Residents. These amounts were not included in the economic model that assessed NOSM revenues and expenditures in FY07/08.

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APPENDIX A. INTERVIEW QUESTIONS

Universities

1. I would like to ask you, based on your experience in the last few years, what has been the impact of the Northern Ontario School of Medicine on Laurentian/Lakehead University? [Clarifying questions (for almost all of the main questions)]
    a. Any evidence/data to support these impacts?
    b. Any mitigating/contributing factors?
    c. Any (other) Positive impacts?
    d. Any (other) Negative impacts?
    e. What has been the timeframe for these impacts? Past? Present? Future?
2. Has there been any major impact on specific student populations served by the university?
    a. Francophone?
    b. Aboriginal?
    c. Any other populations?
3. Has there been any major impact on:
    a. Research activities at Laurentian/Lakehead?
    b. Research opportunities?
    c. Research funding?
4. Has there been any major impact on the relationship between Laurentian/Lakehead University and:
    a. Other Universities
    b. Hospitals
    c. Other health care institutions
5. Has there been any reciprocal impact of the university on the medical school?
    a. On NOSM organization or structure?
    b. Funding?
    c. Personnel?
6. In your opinion as a member of the broader community, what has been the major impacts of the Northern Ontario School of Medicine…
    a. On Sudbury/Thunder Bay?
    b. On other communities served by Laurentian/Lakehead University?

Health Care Institutions

1-6. Questions were similar to university questions, but asked about impact on institution, populations served, relationships with other health service institutions and communities served by institution.

Communities

Similar to university questions, but asked about impact on community.

1. Has there been any major impact on your community in terms of:
    a. Measureable impacts such as changes in funding, capital projects, infrastructure, job opportunities, etc.
    b. Difficult to measure impacts such as community cohesion, community capacity, attitude, networking, etc.

2. Has there been any major impact on the relationship between your community and:
    a. Post-secondary educational institutions (e.g., Universities, Colleges)
    b. Health care institutions (in your community or NE/NW Ontario)

3. Has there been any reciprocal impact of your community on the medical school?

4. In your opinion as a member of the broader community, what has been the major impact of the Northern Ontario School of Medicine on Northeastern/Northwestern Ontario?

Interviewees were offered the opportunity to review the transcripts for accuracy.

APPENDIX B. EDUCATIONAL PROGRAMS

<table>
<tr><th>NORTHERN ONTARIO MEDICAL EDUCATION AND ALLIED HEALTH PROFESSIONAL TRAINING PROGRAMS PRIOR TO NOSM</th><th>NORTHERN ONTARIO MEDICAL SCHOOL (NOSM) EDUCATION AND TRAINING PROGRAMS</th></tr>
<tr><td colspan="2">MD Program</td></tr>
<tr><td></td><td>The MD program started in 2005/2006. The average NOSM student spends nearly forty per cent of his or her time studying in Aboriginal, small Northern and larger urban Northern communities. NOSM Graduates will be able to undertake postgraduate training anywhere in Canada; however, they will have had special affinity for training and clinical practice in northern, rural and remote communities.
Duration: 4 years
Enrolment: The program offers 56 places, 32 at Laurentian University in Sudbury and 24 at Lakehead University in Thunder Bay. Increasing to 64 places per year in 2010.
Communities: 40 in Northeastern Ontario and 23 in Northwestern Ontario</td></tr>
<tr><td colspan="2">Postgraduate/Family Medicine Residency Programs</td></tr>
<tr><td>Northeastern Ontario Family Medicine Program (NOFM), administered by the Northern Ontario Medical Education Corporation (NOMEC), started in 1991 as a two-year certified family medicine residency program affiliated with the University of Ottawa. It offered clinical learning placements in community-based family medicine leading to certification by the College of Family Physicians of Canada. Residents were prepared for eventual practice in any community, but especially for those in Northern Ontario, including rural and remote areas.
Duration: 2 years
Enrolment: 1991 (5 residents). Grew to offer 16 places per year. Total 164 graduates from 1993 to 2005. Administrative responsibility was transferred to NOSM in 2006. NOSM accredited program began in 2007.
Communities: Sudbury, North Bay, Sault Ste Marie and Timmins.</td><td rowspan="2">Family Medicine Residents of the Canadian Shield (RoCS) program is a accredited two-year residency in Family Medicine that merged programs in Sudbury and Thunder Bay. It offers clinical learning in community-based family medicine leading to certification by the College of Family Physicians of Canada. Residents, assigned to individual preceptors, are provided with community-based family medicine rotations in a variety of culturally diverse communities at sites throughout Northern Ontario.
Duration: 2 years
Enrolment: Residents were registered with NOSM beginning in 2007. In 2007 the program enrolled 30 residents, 16 in Sudbury (East Campus) and 14 in Thunder Bay (West Campus). In 2009, 39 residents enrolled.
Communities: Five training sites in Sudbury, Thunder Bay, North Bay, Sault Ste Marie and Timmins, plus 12 other communities in Northeastern Ontario and 9 in Northwestern Ontario.</td></tr>
<tr><td>Family Medicine North (FMN) program, administered by the Northern Ontario Medical Program (NOMP), started in 1990, was a full two-year academic and clinical family medicine residence program based solely in the</td></tr>
</table>

NORTHERN ONTARIO MEDICAL EDUCATION AND ALLIED HEALTH PROFESSIONAL TRAINING PROGRAMS PRIOR TO NOSM	NORTHERN ONTARIO MEDICAL SCHOOL (NOSM) EDUCATION AND TRAINING PROGRAMS
north and affiliated with McMaster University. The program offered clinical learning in community-based family medicine leading to certification by the College of Family Physicians of Canada. **Duration:** 2 years **Enrolment**: 1991 (5), increasing to 12 and then 16 per year. Total (1993-2005) 164. Administrative responsibility was transferred to NOSM in 2006. NOSM accredited program began in 2007. **Communities:** Thunder Bay and 12 other sites (Atikokan, Dryden, Ear Falls, Emo, Fort Frances, Geraldton, Kenora, Manitouwadge, Marathon, Nipigon, Rainy River, Red Lake, Schreiber, Sioux Lookout, Terrace Bay and Wawa).	
Postgraduate/Family Medicine PGY3	
Northeastern Ontario Family Medicine - PGY3 Advanced Skills Program and Northeastern Ontario Re-entry Program (administered by NOMEC) started in 2001 provided 3rd year family medicine residencies in Emergency Medicine, Anesthesia, Maternity Care, Palliative Care and Care of Elderly. **Duration:** 1 year **Enrolment:** First enrolment in 1991 (1), in 1992-2000 (2 per year). In 2001, expansion under NAHSN funding from 2 to 13 positions per year 2001, Emergency Medicine (6 places); Anesthesia (3 places); Maternity Care (1 places); Palliative Care, part time in Northeastern Ontario, collaboration with University of Ottawa (2 places); Care of Elderly, part time in Northeastern Ontario, collaboration with University of Ottawa (1 place) **Communities:** Sudbury, North Bay, Sault Ste. Marie and Timmins.	**Family Medicine PGY3 Program**, merging east and west programs, provides additional learning opportunities that enhance family physicians' scope of practice and further develop competencies and skills sets. The goal of the PGY3 programs are to offer practical and relevant northern-based training yet, at the same time, maintain flexibility to encourage self-directed learning for well focused and tailored educational opportunities. **Duration:** 1 year (except Maternity Care which is 6 months) **Enrolment:** Emergency Medicine (6 places), Anesthesia (3 places), Maternity Care Enhanced Skills (2 places, 6 months each), Self Directed Enhanced Skills (3 places). In 2009, 14 residents were enrolled at both campuses. **Communities:** Five training sites: Sudbury, Thunder Bay, North Bay, Sault Ste Marie and Timmins .
Northwestern Ontario Specialty - PGY3 Program (administered by NOMP) started in 2002 in partnership with McMaster University. Provided a 3rd year of training in Community Internal Medicine and Community General Surgery. **Duration:** 1 year **Enrolment:** Internal Medicine (1) and Community General Surgery (1) **Communities:** Thunder Bay as primary site, with additional 2 months in Internal Medicine at 2 sites (Kenora and Sioux Lookout) and in Community Surgery at 4 sites (Dryden, Fort Frances, Kenora and Sioux Lookout).	

NORTHERN ONTARIO MEDICAL EDUCATION AND ALLIED HEALTH PROFESSIONAL TRAINING PROGRAMS PRIOR TO NOSM	NORTHERN ONTARIO MEDICAL SCHOOL (NOSM) EDUCATION AND TRAINING PROGRAMS
Specialty Residency Training Programs	
Northeastern Ontario Stream Residency (NOSR) Program (administered by NOMEC) started in 2002, provided two full specialty training programs (Medicine and General Surgery), accredited through University of Ottawa. Program offered comprehensive training, with focus on regional, rural and remote practice. **Duration:** 5 years **Enrolment:** First enrolment in 2002. General Surgery (1 place) and Internal Medicine (2 places) **Communities:** North Bay, Sudbury, Sault Ste. Marie, Timmins	**Royal College Specialty Training Programs** provide training in eight specialties with 3 programs accredited through NOSM (Community Medicine**,** General Surgery and Paediatrics); 4 programs accredited through University of Ottawa (Internal Medicine, Anaesthesiology, Obstetrics and Gynaecology and Psychiatry); and 2 programs accredited through McMaster University (Orthopaedic Surgery and Internal Medicine). The program offers residents a comprehensive training experience from which they will gain the skills necessary for successful regional, rural and remote practice. **Duration:** Community Medicine, General Surgery, Orthopaedic Surgery, Obstetrics and Gynaecology and Psychiatry (5 years); Paediatrics and Internal Medicine (4 years). **Enrolment:** In 2006, the program offered 18 places, 12 at Laurentian University in Sudbury and 6 at Lakehead University in Thunder Bay. In 2009, 8 residents enrolled in NOSM accredited programs (General Surgery, Paediatrics and Community Medicine), while another 11 residents were enrolled in joint programs with either McMaster University or the University of Ottawa. **Communities:** 15 communities, including Sudbury, North Bay, Sault Ste Marie, Sioux Lookout, Timmins and Thunder Bay.
Northwestern Ontario Medical Program Community Specialty Programs (administered by NOMP) started in 2002, provided two full specialty training programs, in affiliation with McMaster University. About half of the time is spent in Northwestern Ontario, primarily in Thunder Bay. **Duration:** 5 years **Enrolment:** Community General Surgery (2 places) and Community Internal Medicine (2 places) **Communities:** Thunder Bay, surgery sites (Dryden, Fort Frances, Kenora, Sioux Lookout) and internal medicine sites (Kenora and Sioux Lookout)	
Undergraduate/Postgraduate Electives and Clinical Rotations	
The Northeastern Ontario Electives (NEP) Program was developed by NOMEC in 1995 with the **Northeastern Ontario Postgraduate Specialty (NOPS) Program** added in 2000, both affiliated with University of Ottawa. Offered rural and remote clinical learning core rotations and electives for undergraduates and postgraduate residents in Family Medicine and Specialties. **Duration:** 4-8 weeks (average 12 weeks) **Enrolment:** 185 students per year (120 undergraduate and 65 postgraduate). NOPS: total 63 residents in 2000-2005 **Communities:** 12 northeastern communities (Sudbury, North Bay, Sault Ste. Marie, Timmins and smaller communities)	**The Northern Ontario Electives Program (NEP)** provides a variety of high quality rural, remote and small urban clinical learning opportunities in Northern Ontario. It is designed for undergraduate medical students and postgraduate residents from both family medicine and specialty programs. Medical trainees from all Ontario Faculties of Medicine are eligible. **Duration:** 4-6 weeks **Enrolment:** 224 (2007); 290 (2008) **Communities:** Principal clinical learning sites are located in Thunder Bay, Sioux Lookout, Wawa, Kenora, Sudbury, North Bay, Timmins and Sault Ste. Marie, with electives available in smaller communities. Total 33 sites involved, 11 in Northwestern Ontario and 22 in Northeastern Ontario.

NORTHERN ONTARIO MEDICAL EDUCATION AND ALLIED HEALTH PROFESSIONAL TRAINING PROGRAMS PRIOR TO NOSM	NORTHERN ONTARIO MEDICAL SCHOOL (NOSM) EDUCATION AND TRAINING PROGRAMS
Northwestern Ontario Medical Programme (NOMP) was established in 1972 as partnership between Thunder Bay Medical Society, Northwestern Ontario Medical Society and McMaster University. Community-based elective and core rotations were provided for undergraduates and postgraduates in Family Medicine and other Specialties (Anaesthesia, Emergency Medicine, General Surgery, Orthopaedic Surgery, Paediatrics, Psychiatry, Obstetrics and Gynaecology and Internal Medicine, including Infectious Disease, Respirology, Gastroenterology, Endocrinology, Rheumatology, Cardiology, Geriatrics, Medical And Radiation Oncology, Supportive and Palliative Care). **Duration:** 4 weeks (some took two or more placements) **Enrolment:** Annual Average (125 placements). **Communities:** Thunder Bay and 21 communities (Atikokan, Dryden, Ear Falls, Emo, Fort Frances, Geraldton, Hornepayne, Ignace, Kenora, Longlac, Manitouwadge, Marathon, Nipigon, Red Rock, Pickle Lake, Rainy River, Red Lake, Schreiber, Sioux Lookout, Terrace Bay and Wawa). Some rotations were also offered with family physicians and other specialists serving remote First Nations communities in Health Canada's Sioux Lookout Zone.	
Undergraduate /Summer Studentships/Medicine and Allied Health Professionals	
NAHSN (Northern Academic Health Sciences Network)– Summer Student Studentship Program (SSP) –Originally started as pilot project in 1982 at Health Sciences North in Thunder Bay as OT/PT summer learning experience for McMaster Students. The program was delivered by Health Sciences North from 1990-1998. In 1999, the program was integrated into NAHSN and expanded to include learners from 24 regulated health profession programs. While geared for northern students, southern students could apply for studentships and were considered if there were vacancies. **Duration:** May – August (8 weeks) **Enrolment:** HSN program - 12 (1990), 27 (1991), average 24 per year**;** NAHSN – 32 (1999); 39 (2000); 45(2001) **Communities:** Thunder Bay, 7 communities in Northwestern Ontario and 6 in Northeastern Ontario	**Northern Ontario Summer Studentship Program (SSP)** gives priority to health professional students of any school in Ontario who come from Northern Ontario. The SSP provides paid jobs in health care settings. The work is varied and may include research, special projects or "shadowing". The intent of the SSP is to enhance the learners' knowledge of healthcare in the North. **Duration:** 4-8 weeks **Enrolment:** 75 students in 2008 **Communities:** 28 communities, including 11 in Northwestern Ontario and 17 in Northeastern Ontario.

NORTHERN ONTARIO MEDICAL EDUCATION AND ALLIED HEALTH PROFESSIONAL TRAINING PROGRAMS PRIOR TO NOSM	NORTHERN ONTARIO MEDICAL SCHOOL (NOSM) EDUCATION AND TRAINING PROGRAMS
Rehabilitation Studies	
Rehabilitation Studies - Northern Studies Stream – began 1990 in Thunder Bay at HSN as a northern studies stream for graduate OT/PT learners. Provided training required for northern and rural practice, including knowledge of determinants of health, First Nations concerns and unique skills required for rural practice. In 1999, the program was affiliated with the Rehabilitation Studies Stream of NAHSN. **Duration:** 14 weeks (8 week academic unit, 6-week clinical placement) **Enrolment:** 18 learners per year. Total (1990-2004) 600 students **Communities:** Thunder Bay and 7 NWO communities	**The Rehabilitation Studies** program is a pan-Northern initiative administered by NOSM. Learners from audiology, occupational therapy, physiotherapy and speech language pathology are offered a wide range of challenging clinical learning experiences in equally challenging health care settings across Northern Ontario. Clinical placements expose learners to varied caseloads in a hands-on learning environment that provides insight into the unique cultural and geographic challenges to health care practice and delivery in the North. **Duration:** 6 weeks in northern communities. **Enrolment:** 74 (2007), 198 (2008) **Communities:** 22 communities, including 7 in Northwestern Ontario and 15 in Northeastern Ontario.
Northeastern Ontario - Rehabilitation Studies Stream (NAHSN) Program started in 1999. The program is offered to Rehabilitation Sciences students in Physiotherapy, Occupational Therapy, Speech and Language Pathology and Audiology, in NEO. Placements highlight unique cultural and geographic challenges of northern practice. **Duration:** 6 weeks **Enrolment:** 30 (1999), 51 (2000), 60 (2001), 51 (2005) **Communities:** 9 communities (Sudbury, North Bay, Timmins, Parry Sound, Moose Factory, Hearst, Little Current, New Liskeard, Sault Ste Marie)	
Dietetic Internship Program	
Health Canada First Nations and Inuit Health (FNHIB) Dietetic Internship Program started in 2002, in partnership with Dietetics Association of Canada, to place interns in NWO urban, rural and remote hospitals, nursing homes, aboriginal health access centres, community health centres, public health units and clinics. **Duration**: 42 weeks **Enrolment:** Initial intake (4 students), average 5 learners per year **Communities**: Sudbury and Thunder Bay, with regional placements in NWO and NEO	**Northern Ontario Dietetic Internship Program** started in 2007, it is a pan-Northern initiative with multiple facilitators, sites and facilities throughout Northern Ontario. Program highlights the interdisciplinary, geographic, demographic, linguistic and cultural realities of Northern Ontario. **Duration:** 46 weeks (a minimum of 4-6 weeks in northern communities) **Enrolment:** 10 students per year with 12 beginning in 2009. **Communities:** 10 communities (4 Northwestern and 6 Northeastern)

NORTHERN ONTARIO MEDICAL EDUCATION AND ALLIED HEALTH PROFESSIONAL TRAINING PROGRAMS PRIOR TO NOSM	NORTHERN ONTARIO MEDICAL SCHOOL (NOSM) EDUCATION AND TRAINING PROGRAMS
Interprofessional Continuing Education	
The Northern Outreach Program (NOP) was initiated in 1980 by the Health Sciences Faculties at the University of Western Ontario. Purpose involved enriching health services offered by professionals practicing in Northern Ontario. The program supported education, research and additional supports around Communicative Disorders, Library Science, Nursing, Occupational Therapy and Physical Therapy. **Duration**: Workshops, average 150 sessions per year, delivered on-site and via teleconferencing **Enrolment:** Average attendance – 550 learners per year **Communities:** Served communities across Northwestern Ontario	**Lakehead University and NOSM** established Northern Interprofessional Centre for Health Education (NICHE) in 2008. Program will deliver inter-professional education that highlights the geographic, demographic, linguistic and cultural realities of Northern Ontario. **Duration:** Ongoing, weekly tutorial sessions held with peers **Enrolment:** Variable **Communities:** All Northern communities with practicing health professionals; also southern Ontario sites may host sessions.
Health Sciences North (HSN) – **Interprofessional Education** – began 1991 in Thunder Bay. Offered case-based small group interprofessional continuing professional development, with focus on enhanced cultural sensitivity and increased knowledge and understanding of population demographics and health problems encountered by professionals in NW Ontario. Also supported communities of practice, tele-learning CPD events, learning partnerships (OT,PT, SLP/Audiology) and Practice-Based Research tutorials. Supports included the Northern Ontario Virtual Library (NOVL). **Duration:** Delivered through North Network tele-learning and web-streaming system. **Enrolment:** Varying **Communities:** Served communities across Northern Ontario	

NORTHERN ONTARIO MEDICAL EDUCATION AND TRAINING PROGRAMS PRIOR TO NOSM	NORTHERN ONTARIO MEDICAL SCHOOL (NOSM) Education and Training Programs
Sources	
Major sources of information about NOMP, NOMEC and other pre-NOSM programs were: 1. Northern Ontario Medical Education Corporation (NOMEC). A Partner with the Northwestern Ontario Program (NOMP) in the Northern Academic Health Science Network (NAHSN). May 2001 Report. 2. Web-site of the Society of Rural Physicians of Canada: http://www.srpc.ca/elective.html. 3. McCready, W., J. Jamieson, M. Tran and S. Berry. The first 25 years of the Northwestern Ontario Medical Program. *Canadian Journal of Rural Medicine.* 2004; 9(2): 94-100. 4. NOMP newsletters, brochures and other publications from Health Sciences North, Thunder Bay. 5. Personal communication with Sue Berry, Miriam MacDonald and Jeanette Salmi.	Major sources of information about NOSM programs were: 1. NOSM web-site: http://www.normed.ca/. 2. NOSM administrative data. 3. Personal communication with Sue Berry, Joe Lipinski, Denise Raftis and Karen Tokaryk.

APPENDIX C. ECONOMIC EVALUATION METHODOLOGY

The local economic model was founded on economic base theory and employed multipliers to estimate the total economic contribution and impact of the Northern Ontario School of Medicine (NOSM). The following text provides an explanation for some of the key terms, steps and assumptions defined for the economic evaluation of NOSM. For an overview of the approach, see Robinson (no date) and OMAFRA (2007). For a more technical treatment, see Stimson et al. (2006), Wang and vom Hofe (2007) and the references therein. For a discussion of some of the methodological challenges see Siegfried et al. (2007) and Watson et al. (2007).

Economic Base Theory: A theory of regional economic development, "which assumes that local regional economies are composed of two parts:

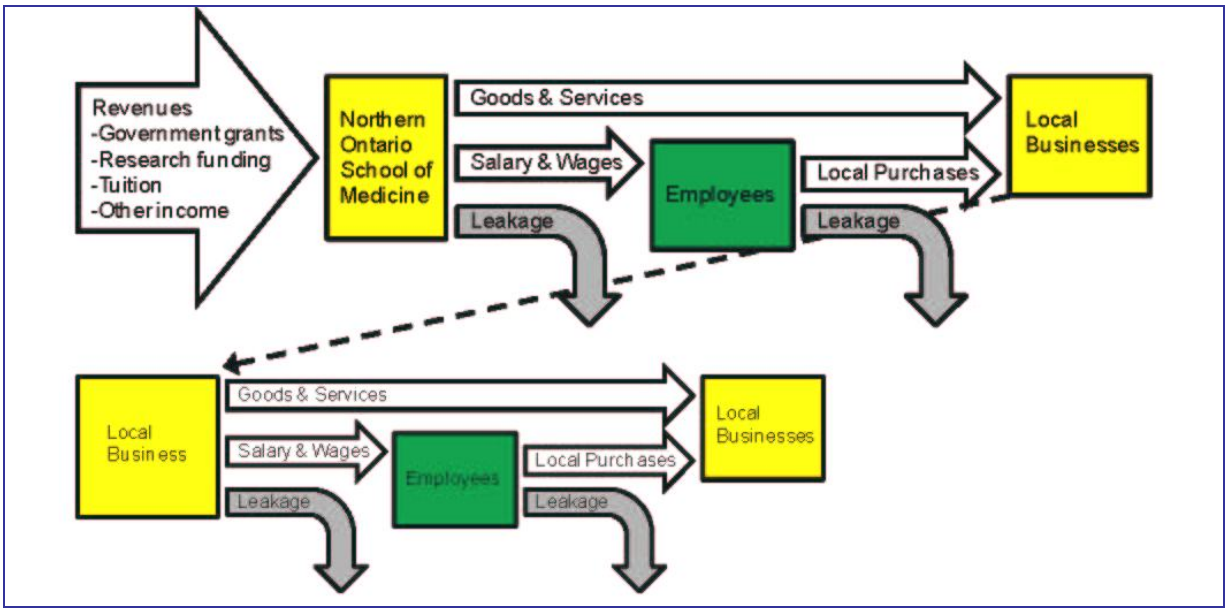
(a) a non-basic component which exists to serve the needs of the local resident population (local consumption);
(b) a basic component which produces goods and services for consumption outside the local region (export consumption)." (Stimson et al. 2006: 19)

Applied to this study, government grants and other revenue that come from outside of the region purchase "services" and "products" from the medical school (left-most arrow, upper part of Figure 4, labelled "revenues") (Figure and text modified from Robinson (no date)). NOSM spends money in the region (arrows labelled "Good & Services", Salary & Wages") and outside of the region (arrow labelled "Leakages"). Money that leaves the community (leakage) does not contribute to the local economy.

Some of the money goes to workers in the region and some of these wages are re-spent in the region (arrow labelled "Local Purchases"). Some household spending by employees leaks out because people save or spend outside Northern Ontario. Local businesses also pay wages and spend locally, so there is another round (lower part of Figure 4) and so on. At each round the effect is smaller. Adding up all of the rounds

provides a measure of the total multiplier effect on money and jobs. The economic base multiplier is used to estimate this total effect.

Figure 4. Economic Base Model



Source: modified from Robinson (undated)

Economic Base Multiplier: This is a measure of the cumulative impact that funds and jobs have on the regional economy (Wang and vom Hofe 2007: 141-2). Theoretically, the economic base multiplier equals the sum of all re-spending divided by initial revenues. Multipliers can be estimated from regional economic data or can be based on population size using the Minimum Requirements approach (Wang and vom Hofe 2007: 188ff). Typically larger population centres (cities) or clusters of smaller centres have a higher multiplier than smaller population centres (towns) because the industries and businesses are more likely to be located in cities or clusters than in towns (Stimson et al. 2006: 27; Wang and vom Hofe 2007: 154). Multipliers can be estimated separately for income and employment.

The multipliers are given in Table 6, which illustrates the range and the relationship between community population size and the multiplier. The lower estimates are from McCracken et al. (2001) and were computed for Ontario communities. These estimates will be dominated by communities in southern Ontario and are likely to overestimate the leakages from more remote Northern communities. The Moore estimates were derived for the USA before 1976. Later estimates by Moore and Jacobsen (1980) are slightly lower. Estimates from other sources tend to fall in the same range (Dunkley 1981; Knight 1991; Kubursi 1978; Kubursi 1994 (as cited in Enterprise Canada Research, 2001)); MacLennan 1995; The Duffy Group 1997; Lakehead University 2007).

Table 6. Economic multipliers based on population size for selected communities in Northern Ontario

	Sudbury	Thunder Bay	Sault Ste Marie	North Bay	Timmins	Kenora	Sioux Lookout	All Other Comm-unities [c]	NE + NW LHIN [d]
Census Population	157,857	122,907	80,098	63,424	42,997	15,177	5,183	2,500	810,400
Low [a]	1.79	1.72	1.60	1.54	1.45	1.26	1.10	1.02	1.80
High [b]	2.05	1.99	1.89	1.85	1.77	1.59	1.45	1.36	2.20

[a] Low multiplier estimated from formula in McCracken et al. (2001)
[b] High multiplier estimated from formula in Moore (1975)
[c] 2006 census population assumed typical of all other communities
[d] 2006 population values from LHIN websites. Multiplier values of 1.80 and 2.20 are approximately +/- 10% of the maximum multiplier estimated for any community in Northern Ontario, namely, Moore's estimated multiplier of 2.05 for Sudbury.

It is important to note that the relatively low multipliers for the smaller communities do not imply that the impact on Northern Ontario is smaller when expenditure occurs in the small communities. Multipliers for small communities are low because the expenditures "leak "out to other communities more quickly than it

would in larger communities. Much of the leakage is to regional centers, such as Sudbury, Sault Ste Marie or Thunder Bay.

The correct procedure to estimate the regional impact of expenditures scattered across a number of communities is to use a multiplier based on the population of the entire region, adjusted for actual flow of monies. This detailed information may not be available for Northern Ontario. Estimates of regional impact used a multiplier that was +/- 10% of the highest local economic multiplier (Moore's estimate for Sudbury).

Direct impact: This is the spending by NOSM on the purchase of good & services from local businesses and salary or wages paid to NOSM employees. This include stipends or honoraria paid to preceptors, clinical teachers, etc., who are not NOSM employees.

Indirect impact: This is the spending on local goods and services by preceptors, committee members and elders, who are not NOSM employees, as well as spending by local businesses. More specifically, the part of the spending by preceptors, etc., and businesses that is in response to the direct spending by NOSM. For instance, a preceptor needs to hire more local staff or a local business needs to purchase more local goods to meet the demand for goods and services from the medical school.

Induced impact: This is household spending by NOSM employees, preceptors and employees of local businesses. Typically estimated by the economic base multiplier.

Economic activity: "Dollars spent within region that are attributable to a given industry, event or policy." (Watson et al. 2007: Table 1, p 142)

Economic activity analysis: "An analysis that tracks the flow of dollars spent within a region (market values). Both economic impact and economic contribution analysis are types of economic activity analysis." (Watson et al. 2007: Table 1, p 142)

Economic contribution: "The gross change in economic activity associated with an industry, event or policy in an existing regional economy." (Watson et al. 2007: Table 1, p 142)

Economic impact: "The net changes in new economic activity associated with an industry, event or policy in an existing regional economy" (Watson et al. 2007: Table 1, p 142) This analysis requires identification of the counterfactual—the programs and services that would be in place in the absence of the medical school (Siegfried et al. 2007).

Region: This is the geographic area in which the economic activity will be evaluated in terms of economic contribution and economic impact (Siegfried et al. 2007). In this study the region is defined as: (1) all of Northern Ontario; (2) Sudbury & Thunder Bay (separately); and (3) selected communities based on the extent of their involvement in NOSM activities. [7] Northern Ontario is defined to include all of the Northeast and Northwest Local Health Integration Networks (LHINs) plus the northwest section of the North Simcoe Muskoka LHIN (primarily the area defined as the Muskoka Regional Municipality).

[7] Communities may participate in 1st and 2nd year teaching modules, in the 3rd year clerkship and 4th year specialty rotations with the undergraduate program, in family medicine and specialty medicine residency postgraduate programs and other professional education opportunities.

APPENDIX D. ADMINISTRATIVE AND FINANCIAL DATA

Table 7. Description of administrative and financial data shared by NOSM

Item	Description/Details [a]
List of communities with information on type of involvement with NOSM educational programs	Type of involvement (Educational Program) • Undergraduate (UG) o 1st year-4 weeks in Aboriginal communities o 2nd year-4 weeks (x2) in remote/rural communities o 3rd year-Comprehensive Community Clerkship (CCC) (8 months) o 4th year-Specialty Rotations (4 weeks each) o Summer scholarships • Postgraduate (PG) o Family Medicine (PGY1-2/3) o Specialty Programs (PGY1-5/6) • Northern Elective Programs o UG & PG • Dietetic Internship • Rehabilitation Program • Northern Elective Programs o UG & PG Data Provided o Number of students/residents, preceptors/staff o Duration of stay
Annual Financial Statements	Audited Annual Financial Statements • FY04/05 to FY07/08 • Revenues o Government Grants o Other Grants o Tuition o Other Income • Expenditures o Salaries and Benefits o Other Expenses o Bursaries • Capital Expenditures Data Provided o Dollars
Distribution of expenditures by community	Actual expenditures • FY04/05 to FY07/08 • By Northern Ontario community

Item	Description/Details [a]
	• Expenditure Category o Accommodation o Advertising o Bursary o Community Partnership o Consulting Fees External o Furniture & Equipment o Meeting Expenses o Parking o Professional Development o Professional Fees o Repairs & Maintenance o Research Expenses o Stipend/Honoraria o Supplies & Office Expenses o Telecommunications o Travel <u>Data Provided</u> o Dollars (total of $16,517,000) o Spending in Sudbury and Thunder Bay represented 36 and 38% of the total, respectively. Spending in other communities ranged up to 4%.
Human Resources	<u>Human Resources</u> • By broad category of employment o Faculty o Senior Level Group - administration o Support Staff o Students (summer employment) • By workplace • By fiscal year <u>Data Provided</u> o Number of personnel and FTE (based on 35 hours per week) o Salary& Benefits amount (by fiscal year) o Preceptor data provided separately with typical stipend/honoraria amounts

[a] No identifying information was shared.

APPENDIX E. COMMUNITY INVOLVEMENT

Table 8. Community Participation in NOSM Programs-FY07/08

Communities	LHIN	Undergraduate							Postgraduate				Professional		
		106	108	110	CCC	NAHSN	UG NEP	NAHSN SSS	Family Medicine **	NOSR	PG NEP	NOPS	Rehabilitation Studies **	Dietitians **	count of programs
Number of weeks: Average/Typical (min-max)		4	4	4	30	4-6	4-6	4-8	6 (4-16)	4-16	4-6	4-6	6 (4-8)	4 (3-8)	
Atikokan	NW		✓	✓		✓	✓		✓				✓		6
Attawapiskat	NE	✓													1
Barrie*	NSM								✓						1
Batchewana	NE	✓													1
Bear Island	NE	✓													1
Big Trout Lake	NW	✓													1
Birch Island	NE	✓													1
Blind River	NE		✓	✓									✓		3
Bracebridge	NSM				✓	✓	✓		✓	✓		✓	✓		7
Burks' Fall	NE		✓	✓											2
Calstock	NE	✓													1
Chapleau	NE												✓		1
Cochrane	NE		✓	✓		✓			✓						4
Cutler	NE	✓													1
Deer Lake	NW	✓													1
Dryden	NW		✓	✓		✓			✓				✓		5
Ear Falls	NW												✓		1
Elliot Lake	NE		✓	✓			✓		✓				✓		5
Emo	NW		✓	✓			✓						✓		4
Englehart	NE		✓	✓					✓				✓		4
Espanola	NE						✓		✓				✓		3
Fort Frances	NW				✓		✓		✓				✓		4
Fort Hope	NW	✓													1
Garden River	NE	✓													1
Geraldton	NW		✓			✓	✓		✓				✓		5
Gore Bay	NE			✓		✓	✓		✓				✓		5
Hearst	NE		✓	✓			✓		✓				✓		5
Heron Bay	NW	✓													1
Hornepayne	NE		✓	✓									✓		3
Hudson	NW	✓													1
Huntsville	NSM			✓	✓		✓		✓	✓		✓	✓		7
Ignace	NW												✓		1

Communities	LHIN	Undergraduate							Postgraduate				Professional		
		106	108	110	CCC	NAHSN	UG NEP	NAHSN SSS	Family Medicine **	NOSR	PG NEP	NOPS	Rehabilitation Studies **	Dietitians **	count of programs
Number of weeks: Average/Typical (min-max)		4	4	4	30	4-6	4-6	4-8	6 (4-16)	4-16	4-6	4-6	6 (4-8)	4 (3-8)	
Iroquois Falls	NE		✓	✓					✓				✓		4
Kapuskasing	NE		✓	✓		✓	✓		✓				✓		6
Kenora	NW	✓			✓	✓	✓		✓			✓	✓		7
Kirkland lake	NE		✓	✓			✓		✓				✓		5
Little Current	NE	✓	✓	✓		✓	✓		✓				✓		7
Longlac	NW												✓		1
Manitouwadge	NW			✓		✓	✓						✓		4
Marathon	NW		✓	✓		✓	✓		✓				✓		6
Massey	NE	✓													1
Matheson	NE		✓	✓											2
Mattawa	NE		✓						✓				✓		3
Mindemoya	NE		✓	✓		✓			✓						4
Mississauga*	MH								✓						1
Moose Factory	NE	✓				✓	✓						✓		4
Muskrat Dam	NW	✓													1
Nairn Centre	NE						✓								1
Naughton	NE	✓													1
Nipigon	NW								✓				✓		2
North Bay	NE		✓	✓	✓	✓	✓		✓	✓		✓	✓		9
Parry Sound	NE				✓		✓		✓				✓		4
Pickle Lake	NW												✓		1
Powassan	NE								✓						1
Rainy River	NW		✓	✓			✓						✓		4
Red Lake	NW		✓	✓		✓	✓		✓				✓		6
Richard's Landing	NE								✓						1
Sandy Lake	NW	✓													1
Sault Ste Marie	NE				✓	✓	✓		✓	✓		✓	✓	✓	8
Schreiber	NW								✓				✓		2
Sioux Lookout	NW				✓	✓	✓		✓	✓		✓	✓		7
Smooth Rock Falls	NE												✓		1
South River	NE			✓											2
Sturgeon Falls	NE	✓							✓				✓		3
Sudbury	NE					✓	✓		✓	✓		✓	✓	✓	7
Summer Beaver	NW	✓													1
Temagami	NE								✓						1
Temiskaming Shores	NE				✓	✓	✓		✓				✓		5
Terrace Bay	NW		✓	✓					✓				✓		4
Thessalon	NE		✓												1

Communities	LHIN	Undergraduate							Postgraduate				Professional		
		106	108	110	CCC	NAHSN	UG NEP	NAHSN SSS	Family Medicine **	NOSR	PG NEP	NOPS	Rehabilitation Studies **	Dietitians **	count of programs
Number of weeks: Average/Typical (min-max)		4	4	4	30	4-6	4-6	4-8	6 (4-16)	4-16	4-6	4-6	6 (4-8)	4 (3-8)	
Thunder Bay	NW	✓				✓	✓		✓			✓	✓	✓	7
Timmins	NE	✓			✓	✓	✓		✓	✓			✓	✓	8
Vermillion Bay	NW		✓	✓											2
Wawa	NE			✓		✓	✓		✓				✓		5
West Bay	NE	✓													1
count of communities	*75*	*24*	*25*	*27*	*10*	*22*	*29*	***	*39*	*7*	***	*8*	*44*	*4*	

Notes:

* These sites in Southern Ontario are used to provide specialized clinical training that can not be provided in Northern Ontario.

** Sites are those that were offered in 2009/2010 and may differ from those offered in 2007/2008.

*** Data on community involvement in NAHSN SSS and PG NEP programs were not available at the time of this report.

Program Acronyms (See Appendix B Educational Programs for additional details)

106: A first-year undergraduate course in which students spend four weeks in an Aboriginal community in Northern Ontario. Remainder of 8 months is spent on Campus

108/110: Second-year undergraduate courses of four-week's duration spent in small rural or remote Northern Ontario communities. Remainder of 8 months spent on Campus.

CCC: Comprehensive Community Clerkship: Third-year undergraduate course in which students spend the entire academic year (30 weeks) in a host community in Northern Ontario.

NAHSN Northern Academic Health Sciences Network

NASHN SSS: Northern Academic Health Sciences Network Summer Studentship

NEP: Northern Elective Program: offered to undergraduates and postgraduates

NOSR: Northern Ontario Residency Stream Program (Specialty Medicine)

NOPS: Northern Ontario Postgraduate Specialty Program

Centre for Rural and Northern Health Research
Laurentian University and
Lakehead University
Sudbury and Thunder Bay, Ontario

CRaNHR
Centre for Rural and Northern Health Research