

Economic Evaluation - Table of Contents

Worksheet (Tab) Name	Description
Introduction	Brief description of Pilot Project, economic evaluation approach and model steps.
Theoretical Assumptions	Theoretical assumptions of the economic model.
Model Format	Brief description of model format, type of comparison and explanation of colour-coding scheme.
Telehealth versus Travel	Details of approved medically necessary travel by type of appointment and implications if telehealth replaces some of this travel.
Health Travel Data	Data used to create figures in previous worksheet.
TH use by type	KOTH utilization data by major type of use. These data help drive the model for the Pilot Project.
TH use by time	Duration of telehealth sessions and comparison of percent use based on total time to percent use based on frequency of use.
TH use by community	KOTH utilization data by location (First Nation community, service or administrative centre). These data are used to determine per capita use to drive the model for a Sustainable Program. This worksheet contains population estimates for each First Nation community.
Chart-Usage by Type	Graphical display of telehealth utilization by type of use.
Chart-Average Community Use	Graphical display of average use per First Nation community by month and number of First Nation communities with telehealth services by month.
Telehealth Module	Brief description of the telehealth cost module.
Telehealth Costs	Details of the telehealth cost module, with assumptions and cost drivers for the Pilot Project and Sustainable Program.
Travel Module	Brief description of travel cost module. Explanation of estimates, averted travel and valuation factor for “new” telehealth.
Travel Savings	Details of the travel savings (averted costs) with assumptions and cost drivers for the Pilot Project and Sustainable Program.
Cost Comparison-Pilot	Tabular comparison of telehealth costs and estimated travel savings for the Pilot Project.
Cost Comparison-Sustainable	Tabular comparison of telehealth costs and estimated travel savings for the Sustainable Program.
Summary of Assumptions & Output	Summary of major assumptions in the model. Graphical summary of model outputs for the comparison of telehealth costs to estimated travel savings for the Pilot Project and Sustainable Program.
Questions and Issues	Brief description of major assumptions of the model.

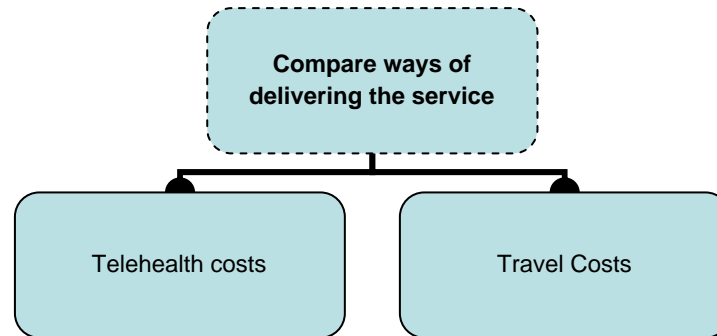
Economic Evaluation

Background

The Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project will run for 31 months from September 2003 to March 2006. The telehealth network was expanded, in stages, from 5 sites to a total of 24 sites located in the Sioux Lookout Health Zone. The telecommunications network used ground and satellite links to provide health consultations, educational/training sessions and administrative meetings for people living in First Nations communities.

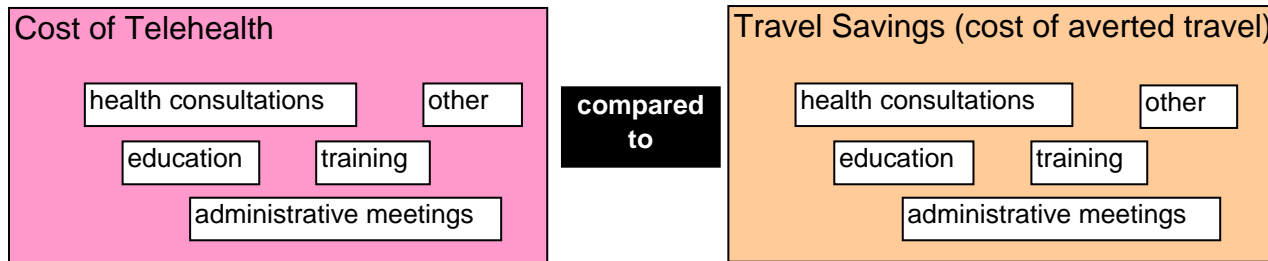
Approach

The economic evaluation uses a modeling approach that compares the cost of delivering the service by telehealth to the cost of delivering the service by transporting the user.



Model Steps

1. Calculate the total cost of all telehealth sessions for all major categories of use. Major categories include: health (clinical) consultations, education, training, meetings and other (family visits, equipment testing, demonstrations)
2. Estimate the percentage of telehealth sessions that would have required travel in the past and calculate, for each major category of use, the total cost if the user would have travelled. (percent of telehealth that replaced travel)



3. Apply an appropriate Valuation Factor to the potential savings for the percent of telehealth sessions that represent an expanded service. (In the past, people were less likely to travel for these types of sessions)
4. Vary key estimates in the model to see the effect on the result.

Separate models were created for:

- (1) Pilot Project (actual usage and total funded costs during the 31 month pilot project).
 - (a) Actual utilization data were adjusted to 12 months (based on 24-29 months of data)
 - (b) Telehealth funded costs were spread out over 31 months and pro-rated to 12 months.
- (2) Sustainable Program (assumes all 24 communities are fully operational over 3 years)
Includes annual operational costs (connectivity, personnel, equipment upgrades and replacement, etc.)
Excludes major capital start-up costs.
 - (a) Available utilization data were adjusted to 12 months (based on 24-29 months of data) and used to calculate per capita utilization rates for each First Nation community.
 - (b) Then per capita utilization rates of the First Nations communities with the longest running telehealth service were used to estimate total annual telehealth use for the entire network of 24 communities.
 - (c) Telehealth costs were calculated on an annual basis (12 months) for a sustainable network with some replacement of equipment.

Theoretical Assumptions of the Economic Model

This economic evaluation used a cost-analysis approach based on Drummond et al. (1997). The societal viewpoint was assumed, focusing on monetary costs/savings to patients, educators/learners and meeting attendees in First Nations communities and costs/savings to government. This economic evaluation was based upon examination of the following tangible monetary costs and savings.

Tangible Monetary Costs/Savings

* *cost of the Expansion Project (Telehealth Network costs)*

- *Money from the funders (Primary Health Care Transition Fund (Health Canada), FedNor (Industry Canada), Northern Ontario Heritage Fund)*

* *cost of the a Sustainable Program (Telehealth Network costs)*

- *costs of operating an established network, with some opportunity for growth*

* *averted cost of travel (potential savings) (the main alternative to telehealth is to travel for services)*

- *travel by patients to visit health care providers*

- *travel for education/training; -travel for administrative meetings*

[travel costs include: transportation, accommodation, food and incidentals (parking, registration fees, etc.)]

Less-Tangible Costs/Savings that were not included

* *increase/decrease in patient health status, anxiety, quality of life, well-being, etc.*

* *increase/decrease in risks associated with increase/decrease in travel (patients and learners)*

* *delayed/timely intervention*

* *re-direction to inappropriate/appropriate health care service*

Limitations and Cautions

The **efficacy** and/or **effectiveness** of the telehealth service relative to the alternative service was not assessed. The assumption is that health care professionals/educators/administrators realize the limits of the technology and use videoconferencing or travel (the alternative modality), as appropriate.

The availability of telehealth varied as equipment became operational at different times in the communities and as new services were added.

Costs/savings also accrued at different times over the project. These differences in start-up and the timing of monetary costs/savings pose challenges for the economic model.

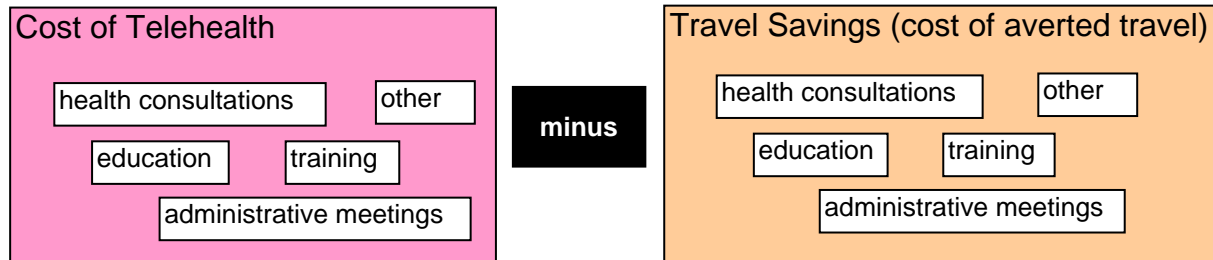
The models estimated average annual costs/savings.

Sensitivity analyses were used to examine the effect of different values and assumptions on results.

Marginal and opportunity costs were not calculated.

Reference: Drummond, M. F., O'Brien, B., Stoddart, G. L. & Torrance, G. W. 1997. *Methods for the Economic Evaluation of Health Care Programmes*. 2nd Edition. Oxford University Press, Oxford, UK.

Model Format



The economic model consists of two main modules:

1. Cost of the Telehealth Network
2. Travel Savings (the cost of averted travel, or averted costs)

Each main module estimates costs/savings for sub-modules:

(a) health (clinical); (b) education; (c) training; (d) meetings; & (e) other

Model results are calculated for Telehealth Costs *minus* Travel Savings and are calculated for each sub-module separately and for all sub-modules combined.

NOTES:

The unit for comparison is the cost per event. The event is either a telehealth session or a return trip.

Telehealth session: may connect 2 or more sites and involve 2 or more people.

Usually 1 site provides the clinical service or educational session to the receiver site(s). For meetings, 1 site hosts the chair or organizer of the meeting and for modelling purposes is defined to be the provider site. Other site(s) participating in the meeting are defined as the receiver site(s).

Telehealth costs are assigned to each session type (clinical, education, training, meeting and other) based on percentage utilization in a specified time period.

Return Trip: involves 1 or more people travelling to 1 or more locations and then back home.

Travel savings are estimated only for those people at the receiving site(s). In the past, the people at the receiving site(s) would have been most likely to travel. Exceptions to this rule are dealt with in the model by the changing the average savings due to averted travel, percent of travel averted, average number of people travelling, etc.

Module/Worksheet Colour Codes

lavender	Telehealth utilization data
rose	Telehealth module
tan	Travel module
light blue	Cost comparison

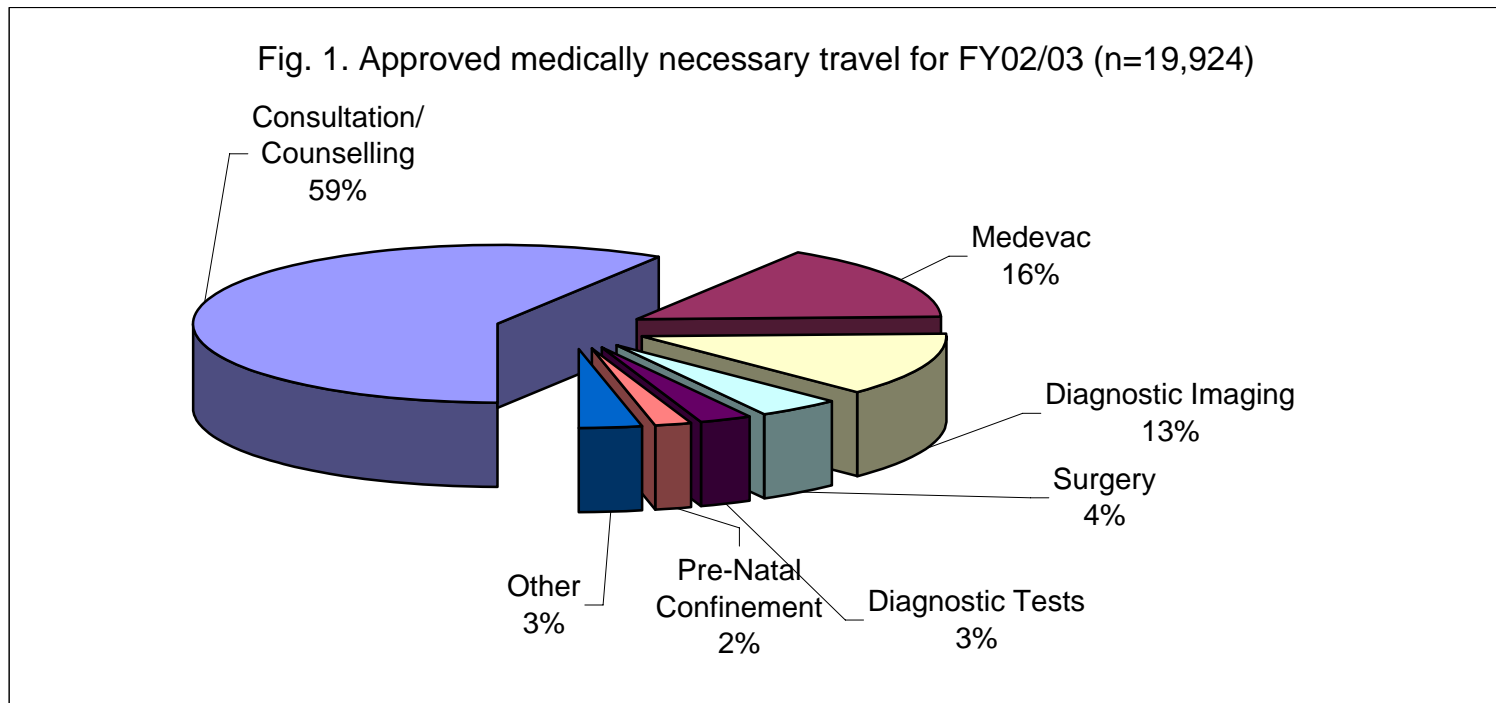
Variable Colour Codes

bright green	user input
light turquoise	data from another sheet
yellow	key output data

Telehealth versus Travel

Telehealth sessions may replace travel or may be in addition to travel.

Figure 1 shows approved medically necessary travel (NIHB) for the Sioux Lookout Health Zone for fiscal year 2002-2003 (Source: PHCTF application, May 23, 2003).



In the PHCTF application (page 23), it was estimated that 15-20% of patient consultations and follow-ups (consultation and counselling) could be done by telehealth. It seems likely that some of the diagnostic imaging might be done by teleradiology. Only a few medevacs, travel for surgery or for prenatal confinement are likely to be replaced by telehealth.

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Figure 2 shows approved medically necessary travel for the Sioux Lookout Health Zone for consultations/ counselling only. The 11,750 trips for fiscal year 2002-2003 were extrapolated over 6 years at a rate of 5% / year. This would be the expectation of the amount of travel in the absence of telehealth and no significant changes in travel policy. Note that the extrapolated values are for purposes of illustrating the potential impact of telehealth on travel and should not be inferred to be a robust prediction of future travel or future telehealth use.

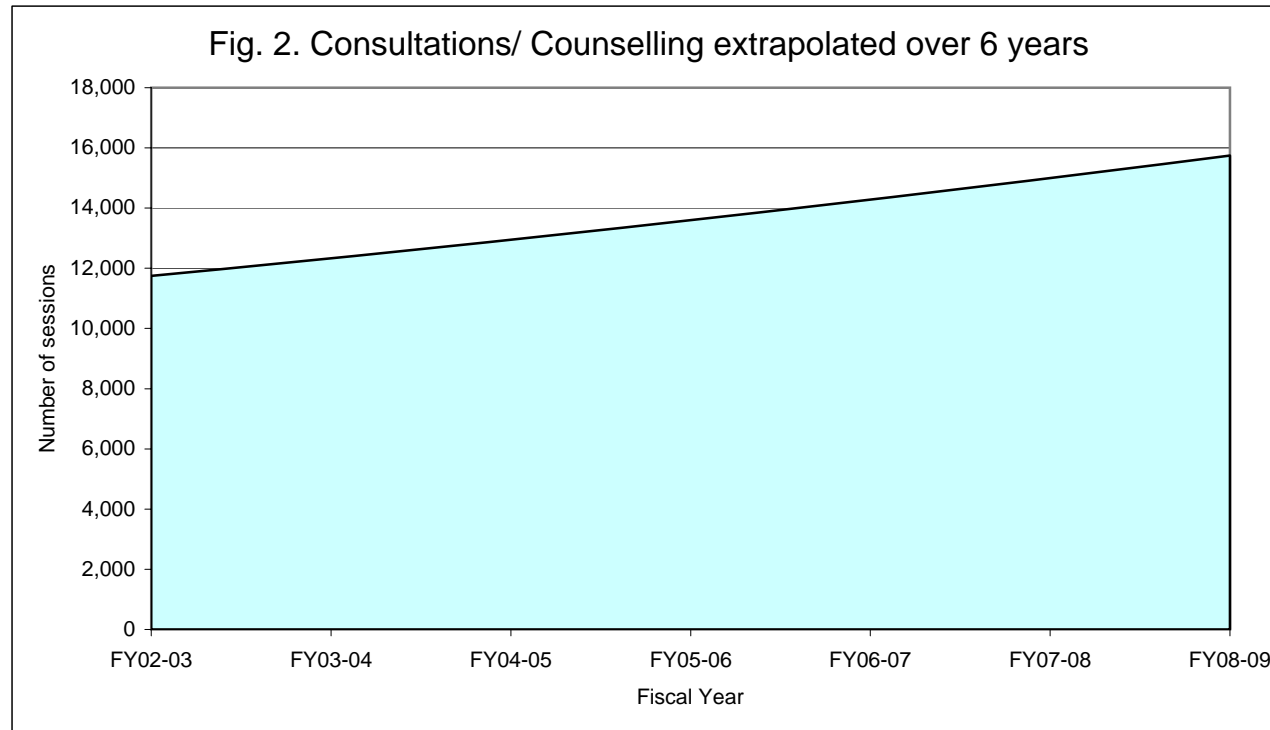


Figure 3 shows approved medically necessary travel for the Sioux Lookout Health Zone for consultations/ counselling only. The 11,750 trips for fiscal year 2002-2003 were extrapolated over 6 years and grouped by mode of service delivery (e.g., travel or telehealth).

Telehealth was estimated to replace a given percentage of travel for consultations/ counselling.

"Telehealth replaces travel" + "Travel" (Fig. 3) = Travel in the absence of telehealth (Fig. 2).

One might expect that additional telehealth sessions would be conducted because of the increased availability and convenience--this is "Telehealth in addition to travel" (also called "new" telehealth).

Note that the extrapolated values are for purposes of illustrating the potential impact of telehealth on travel and should not be inferred to be a robust prediction of future travel or future telehealth use.

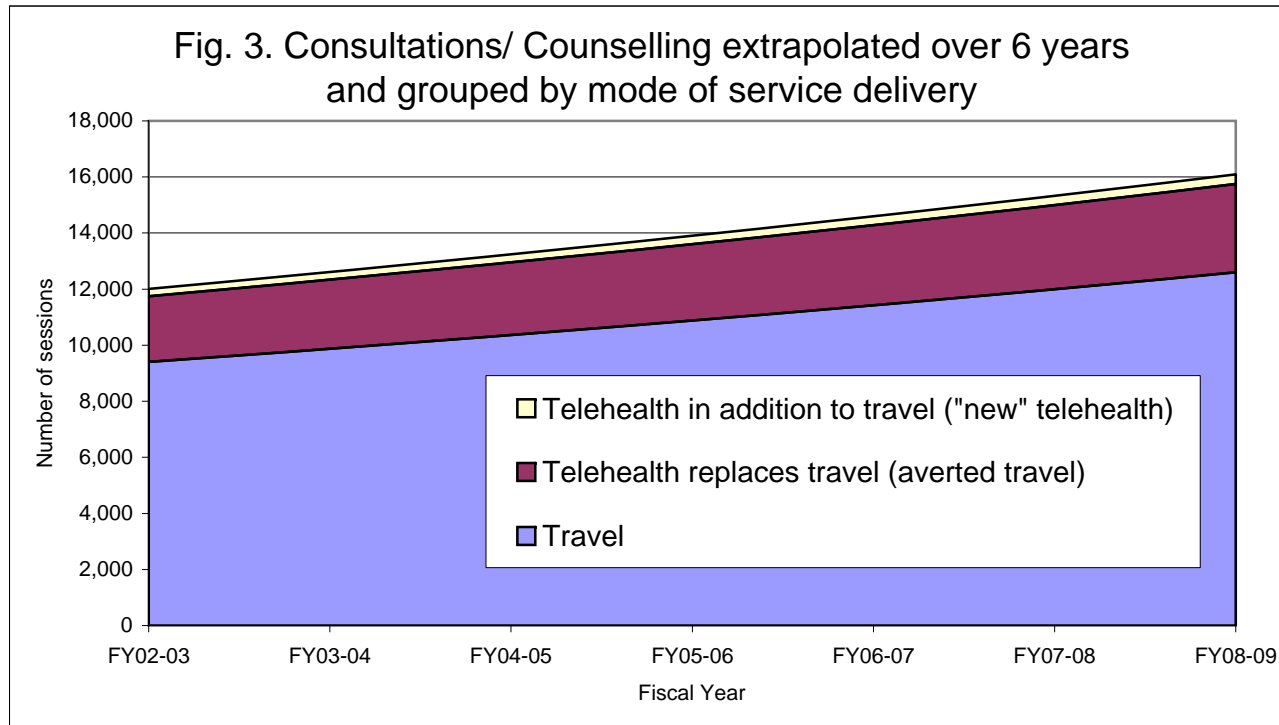


Figure 3 is interactive: change values in green highlighted cells

- 5% annual growth rate (suggested range 0-10%, default 5%)
- 20% percent of travel that is replaced by telehealth (suggested range 15-40%, default 20%) **Averted travel**
- 10% percent of all telehealth that is new (suggested range 0-40%, default 10%) **"New" telehealth**

Averted Travel

Travel that is replaced by telehealth is averted travel.

Averted travel represents actual dollar and time savings to people, organizations and agencies.

One way to estimate averted travel is to look at all of the telehealth sessions that were used for consultation/ counselling and to determine the percent of these telehealth sessions that would have required travel in the past.

For instance, if 90% of the telehealth sessions would have required travel, then this suggests that only 10% of telehealth is new.

The percent of new telehealth is expected to be low for clinical uses and moderate to high for education, training and meetings.

The percent of new telehealth for demonstrations and tests of the telehealth service is close to 100% because these sessions are needed to run the telehealth service.

The potential savings that can be attributed to new usage is adjusted to reflect the fact that people did not travel for these sessions in the past.

The estimates of averted travel, "new" telehealth and the value of "new" telehealth (Valuation Factor) are discussed in the travel savings worksheet.

Reason for Referral

Source: PHCTF application (May 23, 2003) page 11

Reason for Referral	count	%	Includes
Consultation/ Counselling	11,750	59.0%	C&C, Follow-up, mental health, alcohol and drug abuse counselling, post-op follow-up
Medevac	3,097	15.5%	
Diagnostic Imaging	2,592	13.0%	Ultrasound (other), x-rays, prenatal ultrasound, scans, mammograms, MRI, scope
Surgery	858	4.3%	
Diagnostic Tests	578	2.9%	other; lab work, biopsy
Pre-Natal Confinement	362	1.8%	
Other	687	3.4%	dental
	19,924	100.0%	

annual growth rate (suggested range 0-10%, default 5%) **5%**
 percent of travel that is replaced by telehealth (suggested range 15-40%, default 20%) Averted tr **20%** replacement telehealth
 percent of all telehealth that is new (suggested range 0-40%, default 10%) "New" telehealth **10%** new telehealth

Consultation/ Counselling Modality	Actual	Extrapolated -->					
	FY02-03	FY03-04	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Travel	9,400	9,870	10,364	10,882	11,426	11,997	12,597
Telehealth replaces travel (averted travel)	2,350	2,468	2,591	2,721	2,857	3,000	3,150
sub-total: travel + averted travel	11,750	12,338	12,955	13,603	14,283	14,997	15,747
Telehealth in addition to travel ("new" telehealth)	261	274	288	302	317	333	350
total TH	2,611	2,742	2,879	3,023	3,174	3,333	3,500
Grand total	12,011	12,612	13,243	13,905	14,600	15,330	16,097

Reason for Referral	Actual	Extrapolated -->					
	FY02-03	FY03-04	FY04-05	FY05-06	FY06-07	FY07-08	FY08-09
Consultation/ Counselling (= sub-total: travel + averted travel)	11,750	12,338	12,955	13,603	14,283	14,997	15,747
Medevac	3,097	3,252	3,415	3,586	3,765	3,953	4,151
Diagnostic Imaging	2,592	2,722	2,858	3,001	3,151	3,309	3,474
Surgery	858	901	946	993	1,043	1,095	1,150
Diagnostic Tests	578	607	637	669	702	737	774
Pre-Natal Confinement	362	380	399	419	440	462	485
Other	687	721	757	795	835	877	921
Total Travel (Trips)	19,924	20,920	21,966	23,064	24,217	25,428	26,699

KO TELEHEALTH ACTIVITY

month-year	Clinical Consults: Mean = 51/month	Education: Mean = 21/month	Training: Mean = 24/month	Meetings: Mean = 16/month	System Tests: Mean = 4/month	Demos: Mean = 4/month	Family Visits: Mean = 2/month	TOTAL: Mean = 122/month	Cancellations (not included): Mean = 22/month
Sep-03	45	20	8	12	1	0	0	86	19
Oct-03	35	12	5	9	6	4	1	72	14
Nov-03	36	12	13	2	4	0	4	71	11
Dec-03	26	13	16	8	0	2	1	66	11
Jan-04	25	12	24	13	1	4	2	81	11
Feb-04	40	10	33	9	1	4	0	97	25
Mar-04	42	22	19	10	0	0	2	95	29
Apr-04	61	15	22	12	1	0	1	112	17
May-04	63	17	15	10	2	2	2	111	23
Jun-04	65	13	28	16	6	10	4	142	16
Jul-04	50	1	15	10	7	1	0	84	23
Aug-04	33	1	21	12	3	2	1	73	20
Sep-04	62	16	38	18	3	2	1	140	29
Oct-04	43	36	27	18	6	2	1	133	21
Nov-04	40	33	14	11	2	6	1	107	13
Dec-04	37	10	10	6	1	5	2	71	18
Jan-05	46	30	27	24	5	10	2	144	20
Feb-05	56	41	19	31	1	1	2	151	29
Mar-05	51	45	31	16	6	8	2	159	31
Apr-05	100	42	31	36	10	3	2	224	33
May-05	71	31	33	19	8	10	3	175	27
Jun-05	72	38	44	33	4	11	4	206	27
Jul-05	67	14	41	21	15	6	5	169	27
Aug-05	69	19	34	27	7	1	0	157	33
Sep-05									
Oct-05									
Nov-05									
Dec-05									
Jan-06									
Feb-06									
Mar-06									

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

month-year	Clinical Consults: Mean = 51/month	Education: Mean = 21/month	Training: Mean = 24/month	Meetings: Mean = 16/month	System Tests: Mean = 4/mont h	Demos: Mean = 4/mont h	Family Visits: Mean = 2/mont h	TOTAL: Mean = 122/mont h	Cancellations (not included): Mean = 22/month
<i>Pilot Project Total</i>	1235	503	568	383	100	94	43	2926	527
<i>number of months</i>	24	24	24	24	24	24	24	24	24
<i>percent of total</i>	42.2%	17.2%	19.4%	13.1%	3.4%	3.2%	1.5%	100.0%	18.0%

of 2926

<i>annual use-prorated</i>	618	252	284	192	50	47	22	1463	264
<i>percent check</i>	42.2%	17.2%	19.4%	13.1%	3.4%	3.2%	1.5%	100.0%	18.0%

of 1463

<i>Mean</i>	51	21	24	16	4	4	2	122	22
<i>Median</i>	48	16.5	23	12.5	3.5	2.5	2	111.5	22
<i>Minimum</i>	25	1	5	2	0	0	0	66	11
<i>Maximum</i>	100	45	44	36	15	11	5	224	33

Comparison of % based on total time to % based on frequency of use

April 2003 to May 2005 (24 months)

Session Type	Sessions (#)	Sessions (%)	Sessions (%) based on Sep-03 to Jun-05	Session Duration (minutes)	Session Duration (%)	Average Session Duration (minutes)	Number % - Time % (percentage points)
Clinical	1,055	41.1%	42.2%	35,571	25.1%	33.7	15.92
Education	485	18.9%	17.2%	48,465	34.2%	99.9	(15.37)
Training	494	19.2%	19.4%	18,794	13.3%	38.0	5.95
Meetings	320	12.5%	13.1%	30,773	21.7%	96.2	(9.29)
Other	216	8.4%	8.1%	7,955	5.6%	36.8	2.79
All Types	2,570	100.0%	100.0%	141,558	100.0%	55.1	↑

24 months, 2926 sessions

compare % from same source

Count of of Records and Sessions	24 months	12 months
	2,887	2,887 records
	-445	-445 cancelled sessions
	-33	-33 missing start or stop time or both
	0	-956 outside of time period
	<u>2,409</u>	1,453 sub-total
	161	69 additional sessions (due to records with multiple sessions)
	<u>2,570</u>	1,522 total

June 2004 to May 2005 (last 12 months)

Session Type	Sessions (#)	Sessions (%)	Sessions (%) based on Sep-03 to Jun-05	Session Duration (minutes)	Session Duration (%)	Average Session Duration (minutes)	Number % - Time % (percentage points)
Clinical	578	38.0%	42.2%	17,862	21.7%	30.9	16.23
Education	300	19.7%	17.2%	30,910	37.6%	103.0	(17.91)
Training	294	19.3%	19.4%	10,632	12.9%	36.2	6.37
Meetings	214	14.1%	13.1%	18,463	22.5%	86.3	(8.41)
Other	136	8.9%	8.1%	4,286	5.2%	31.5	3.72
All Types	1,522	100.0%	100.0%	82,153	100.0%	54.0	↑

24 months, 2926 sessions

compare % from same source

KO TELEHEALTH ACTIVITY

First Nations Communities

Month-Year	BL	BT	CL	DL	EB	FS	KF	KS	KW	LS	MD	MI	NB	NC	NK	NS	PH	PK	SC
Sep-03				9		11	1		11							3	6		
Oct-03				8		6	0		4							8	7		
Nov-03				15		13	7		11							5	9		
Dec-03				14		7	0		6							4	3		
Jan-04				14		10	2		9							10	15		
Feb-04				20		9	4		21							5	11		
Mar-04				16		11	3		11							6	18		
Apr-04				22		8	8		15							3	12		
May-04				21		6	3		7							5	11		
Jun-04				22		10	17		7							4	10		
Jul-04		4		8		3	4		10					2		4	2		
Aug-04		3		7		0	5		3					6		2	5		
Sep-04		3		11		7	23		7					5		8	10		
Oct-04		8		9		9	14	10	8					9		11	14		
Nov-04		9		11		14	13	5	4					8		12	8		
Dec-04		4		9		11	8	4	11					7		2	5		
Jan-05		11	2	17		13	14	9	13			15		7		9	16		
Feb-05		9	7	26		22	17	22	12			21		19		23	17		
Mar-05		14	17	28		14	28	25	21			17		6		20	15		
Apr-05		11	15	26		23	26	15	19			20		23	1	13	18		
May-05		15	17	27		21	24	2	12			23		25	27	24	21		
Jun-05	1	12	21	25		22	21	15	1		2	27		19	24	21	22	9	
Jul-05	11	6	13	14		17	25	18	3		13	17		24	20	21	12	8	7
Aug-05	6	9	7	25	3	23	14	15	10		15	23		15	10	17	21	15	19
Sep-05																			
Oct-05																			
Nov-05																			
Dec-05																			
Jan-06																			
Feb-06																			
Mar-06																			

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

KO TELEHE

Month-Year	First Nations Communities						Other Communities/ Users							Grand Total	# of Communities	Mean Use/Community/ Month
	SF	SL	WB	WP	WN	FN Total	BM	NO	RL	SH	SLKT	K-net	Other Total			
Sep-03		1		1	7	50	14		2	3	40		59	109	9	5.6
Oct-03		2		1	2	38	16		0	0	35		51	89	9	4.2
Nov-03		8		7	2	77	19		0	1	22		42	119	9	8.6
Dec-03		8		0	0	42	17		0	0	34		51	93	9	4.7
Jan-04		16		1	3	80	31		0	0	26		57	137	9	8.9
Feb-04		8		3	5	86	34		2	2	35		73	159	9	9.6
Mar-04		12		5	6	88	22		0	1	39		62	150	9	9.8
Apr-04		12		1	0	81	22		0	0	40		62	143	9	9
May-04		8		5	3	69	21		1	0	46		68	137	9	7.7
Jun-04		11		11	11	103	36		5	1	57		99	202	9	11.4
Jul-04		11		10	5	63	18		0	0	33		51	114	11	5.7
Aug-04		5		1	6	43	25		0	0	26		51	94	11	3.9
Sep-04		16		11	1	102	52		2	0	49		103	205	11	9.3
Oct-04		18		11	10	131	44		1	1	61		107	238	12	10.9
Nov-04		12		17	11	124	33		0	1	57	2	93	217	12	10.3
Dec-04		9		6	4	80	20		0	0	19	6	45	125	12	6.7
Jan-05		18		12	10	166	46		1	4	52	44	147	313	14	11.9
Feb-05		17		18	23	253	41	2	1	4	74	43	165	418	14	18.1
Mar-05		17	1	20	13	256	65	2	0	0	48	24	139	395	15	17.1
Apr-05		26	0	21	12	269	73	2	0	1	88	43	207	476	16	16.8
May-05		28	0	19	32	317	57	1	2	0	41	34	135	452	16	19.8
Jun-05	8	22	0	20	24	316	57	1	1	1	62	45	167	483	20	15.8
Jul-05	11	17	0	19	25	301	61	0	2	2	31	36	132	433	21	14.3
Aug-05	9	18	13	16	16	319	49	1	1	3	37	51	142	461	22	14.5
Sep-05																
Oct-05																
Nov-05																
Dec-05																
Jan-06																
Feb-06																
Mar-06																

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Total	18	118	99	404	3	290	281	140	236	0	30	163	0	175	82	240	288	32	26
% Grand total	0.3%	2.0%	1.7%	7.0%	0.1%	5.0%	4.9%	2.4%	4.1%		0.5%	2.8%		3.0%	1.4%	4.2%	5.0%	0.6%	0.5%
# months	3	14	8	24	1	24	24	11	24		3	8		14	5	24	24	3	2
annual usage	72	101	149	202	36	145	141	153	118		120	245		150	197	120	144	128	156

Population Estimate	BL	BT	CL	DL	EB	FS	KF	KS	KW	LS	MD	MI	NB	NC	NK	NS	PH	PK	SC
1996 census	428	n/a	275	628	801	362	302	520	237	697	n/a	n/a	n/a	475	235	157	390	n/a	n/a
2001 census	363	n/a	428	756	1001	401	368	740	265	708	n/a	n/a	n/a	697	270	231	375	n/a	n/a
band's numbers	462	820	571	828	813	449	450	810	n/a	n/a	297	899	340	923	246	n/a	n/a	1716	428
<i>year</i>	<i>1999</i>	<i>1999</i>	<i>2002</i>	<i>2002</i>	<i>1991</i>		<i>1999</i>	<i>1999</i>	<i>n/a</i>	<i>n/a</i>	<i>2002</i>	<i>1999</i>	<i>1999</i>	<i>2002</i>	<i>1999</i>	<i>n/a</i>	<i>n/a</i>	<i>1999</i>	<i>2002</i>
KOTH numbers	601	1127	621	1006	2199	594	495	875	631	n/a	372	1239	380	1141	283	406	407	1823	645
DIAND-registered Indians in band-2003	776	1222	572	1003	2084	584	422	861	637	2586	352	1392	383	871	352	410	408	1980	703
DIAND-reg Indians on reserve-2003	509	880	487	832	1152	475	393	778	444	799	200	973	319	744	274	391	389	1871	471
DIAND-reg Indians on reserve+crown land-2003	509	880	488	832	1154	475	393	782	444	820	200	984	332	744	277	391	389	1872	471
DIAND-reg Indians in band-2004	788	1234	568	1003	2089	591	436	873	629	2634	354	1448	383	881	354	421	410	2015	709
DIAND-reg Indians on reserve-2004	499	889	480	838	1157	477	414	734	438	807	197	952	3	700	274	398	396	1906	458
DIAND-reg Indians on reserve+crown land-2004	499	889	481	838	1159	477	414	737	439	824	197	959	327	702	277	398	396	1907	459

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Total	28	320	14	236	231	3454	873	9	21	25	1052	328	2308	5762
% Grand total	0.5%	5.6%	0.2%	4.1%	4.0%	59.9%	15.2%	0.2%	0.4%	0.4%	18.3%	5.7%	40.1%	100.0%
# months	3	24	6	24	24	of 5762	24	7	24	24	24	10	of 5762	
annual usage	112	160	28	118	116	2911	437	15	11	13	526	394	1396	4307

Population Estimate	SF	SL	WB	WP	WN	FN Total	BM	NO	RL	SH	SLKT	K-net		# of Communities	Mean Use/Community/ Month
1996 census	n/a	1611	443	209	n/a								mean	12.4	10.6
2001 census	n/a	1704	600	329	n/a								median	11	9.7
band's numbers	152	2057	599	n/a	459								min	9	3.9
<i>year</i>	1999	n/a	1999	n/a	1999								max	22	19.8
KOTH numbers	192	2444	643	363	494		<i>"KOTH Community Engagement tracking Form.xls"</i>								
DIAND-registered Indians in band-2003	208	2197	671	352	538		<i>Includes those living off-reserve</i>								
DIAND-reg Indians on reserve-2003	49	1902	262	315	488		<i>number in community</i>								
DIAND-reg Indians on reserve+crown land-2003	164	1902	618	315	488		<i>number in community plus surrounding area. For most communities (except WB) this is very close to on-reserve</i>								
DIAND-reg Indians in band-2004	212	2280	678	362	546										
DIAND-reg Indians on reserve-2004	1	1961	266	359	483		<i>values for NB & SF are correct</i>								
DIAND-reg Indians on reserve+crown land-2004	153	1961	622	359	483		Use this estimate								

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Population used for rate	BL	BT	CL	DL	EB	FS	KF	KS	KW	LS	MD	MI	NB	NC	NK	NS	PH	PK	SC
DIAND-reg Indians on reserve+crown land-2004	499	889	481	838	1159	477	414	737	439	824	197	959	327	702	277	398	396	1907	459

Annual Per capita use	BL	BT	CL	DL	EB	FS	KF	KS	KW	LS	MD	MI	NB	NC	NK	NS	PH	PK	SC
rate (adjusted to 12 months)	0.144	0.114	0.310	0.241	0.031	0.304	0.341	0.208	0.269	no TH	0.609	0.255	no TH	0.214	0.711	0.302	0.364	0.067	0.340
number of months	3	14	8	24	1	24	24	11	24	no TH	3	8	no TH	14	5	24	24	3	2

Annual Per Capita Telehealth Utilization Rates based on: (a) longest running communities; & (b) all communities					
(a) long running			(b) all communities		
	rate	months		rate	months
avg. of rates	0.274	24	avg. of rates	0.284	13.5
median	0.302	24	median	0.262	13
low	0.082	24	low	0.031	1
high	0.364	24	high	0.732	24
sample size	9	9	sample size	22	22
total use	1264	annual, adjusted use	total use	2911	annual, adjusted use
total pop	5765		total pop	15957	
total use/total pop	0.2193		total use/total pop	0.182	

First Nation community with long running telehealth service

- BL-Bearskin Lake
- BT-Big Trout Lake-Kitchenuhmaykoosib Inninuwug
- CL-Cat lake
- DL-Deer Lake
- EB-Eabametoong-Fort Hope
- FS-Fort Severn
- KF-Kingfisher
- KS-Kasabonika
- KW-Keewaywin
- LS-Lac Seul
- MD-Muskrat Dam

First Nation community with fewer months of telehealth service

- MI-Mishkeegogamang-New Osaburgh
- NB-Nibinamik-Summer Beaver
- NC-North Caribou-Weagamow Lake
- NK-Neskantaga-Lansdowne House
- NS-North Spirit
- PH-Poplar Hill
- PK-Pikangikum
- SC-Sachigo
- SF-Slate Falls
- SL-Sandy Lake
- WB-Webequie

- WN-Wunnumin
- WP-Wapekeka-Angling Lake

not a FN community

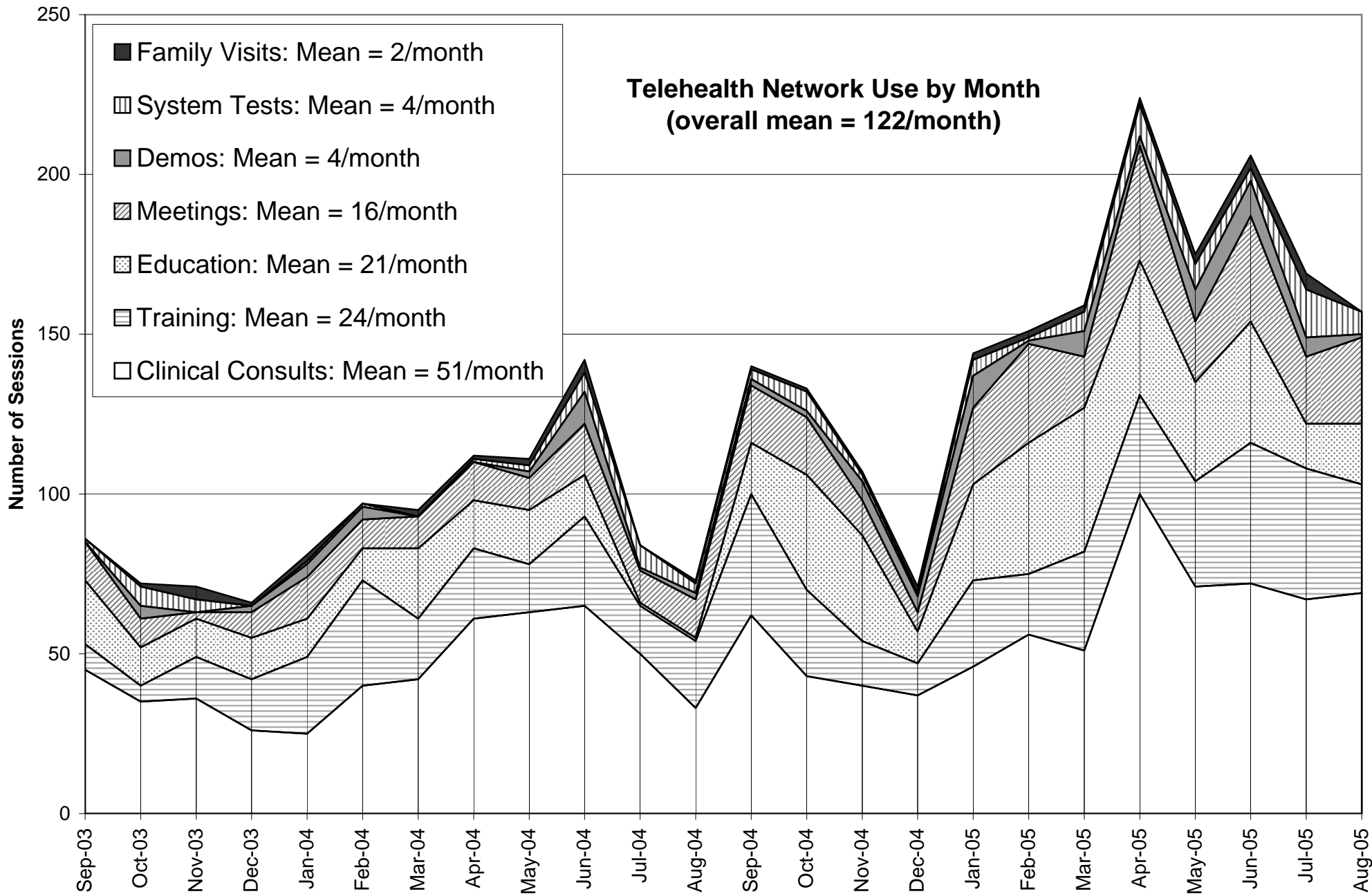
- BM-Balmertown
- NO-NODIN
- RL-Red Lake Hospital
- SH-Shibogama FN council
- SLKT-Sioux Lookout
- Knet-non medical

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

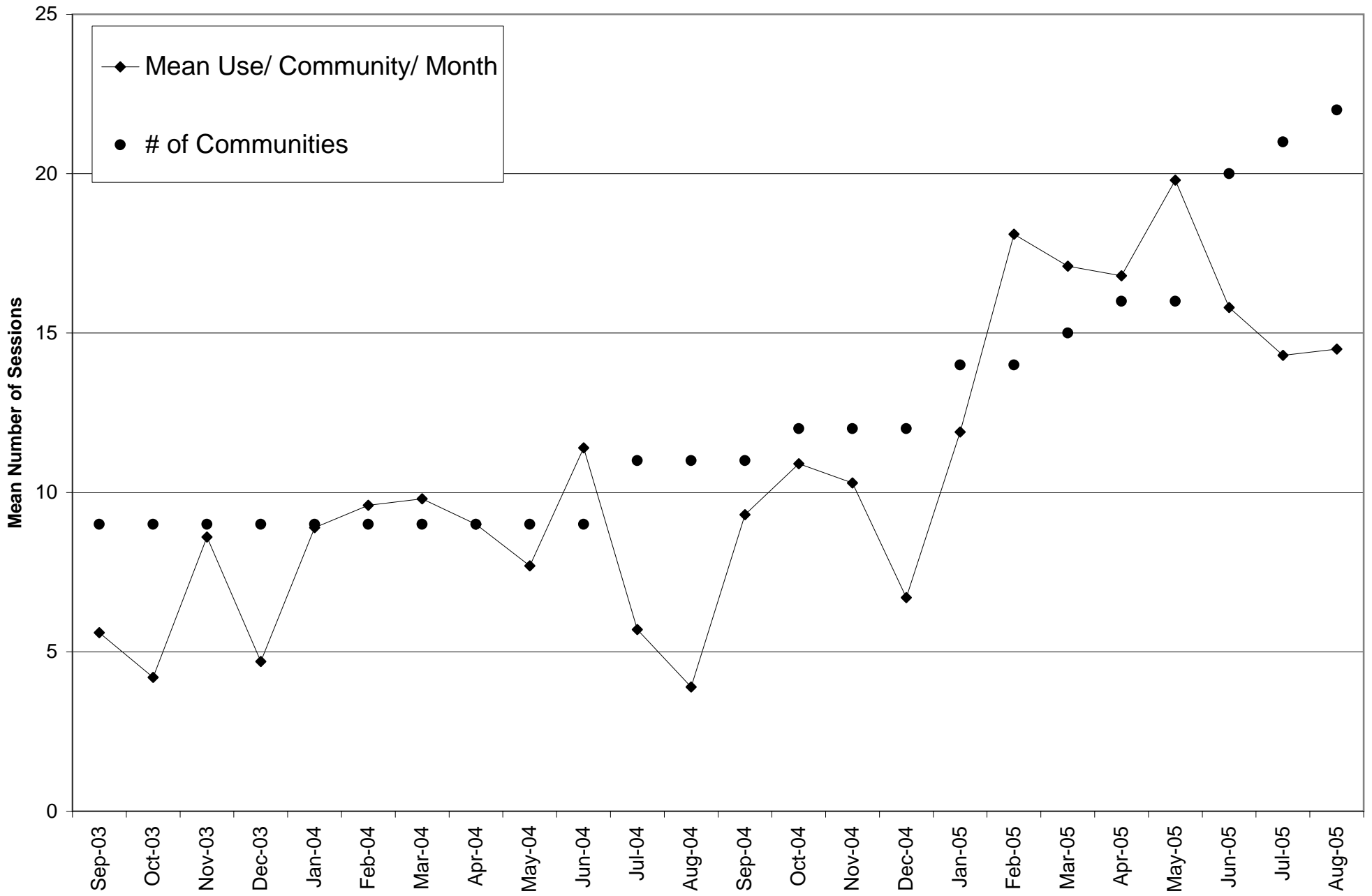
Population used for rate	SF	SL	WB	WP	WN	FN Total	BM	NO	RL	SH	SLKT	K-net	
DIAND-reg Indians on reserve+crown land-2004	153	1961	622	359	483	15,957							
						n= 24							
Annual Per capita use	SF	SL	WB	WP	WN		BM	NO	RL	SH	SLKT	K-net	
rate (adjusted to 12 months)	0.732	0.082	0.045	0.329	0.240								
number of months	3	24	6	24	24								

population of all 24 communities	15,957
estimated use based on FN communities with longest running TH service	
avg. of rates	4379
median rate	4811
low rate	1302
high rate	5803
number of communities	9
total use/total pop	3499 per year

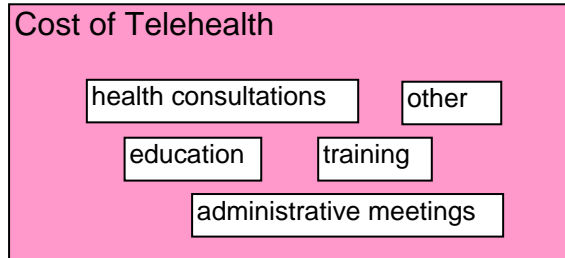
Number of sessions/month in FN communities	
Mean	11.6
Median	11
Min	0
Max	32
Std Dev	7.412
count	297 community-months
(max count would be 31 months x 24 communities =744)	



Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project



Telehealth Module-Costs



Costs

* Cost of the Expansion Project -- Money from the funders (Primary Health Care Transition Fund (Health Canada), FedNor (Industry Canada), Northern Ontario Heritage Fund)

SOURCE: total funds obtained from funders minus expenses unrelated to service provision (e.g., evaluation cost)

* Cost of a Sustainable Program -- actual cost of communications, personnel, minor equipment upgrades or purchase, etc. Excludes major capital start-up costs

SOURCE: service providers (KOTH, K-net); telecom companies; equipment vendors; etc.

The following worksheet captured the costs associated with these two scenarios: (1) cost of the expansion project; and (2) cost of a sustainable network serving 24 First Nations communities.

Cost worksheet for the Telehealth Network

Pilot project
Sustainable Program

Sep 2003 to March 2006 (31 months)
3 years (36 months)

Model Assumptions

ID	Cost Item	Specifics	Unit Price				
Cost-03a		Amortization (interest) rate	0.01%	change this value	.0001 to .05 (0.01 to 5%)		
Cost-03b	Pilot Project	Amortization period (months)	31		<table border="1"> <tr> <td>Annuity factor</td> <td>0.38717</td> </tr> </table>	Annuity factor	0.38717
Annuity factor	0.38717						
				Standard formula for annuitization of capital expenditures.	See, for example, page 70 in Drummond, et al. 1990.		
	Sustainable Program	Amortization period (months)	36	change this value	<table border="1"> <tr> <td>Annuity factor</td> <td>0.33340</td> </tr> </table> based on rate and number of years	Annuity factor	0.33340
Annuity factor	0.33340						
	Cost Sensitivity Factor	default=1.00	1.00	change this value	0.8=20% lower costs 1.2=20% higher costs		

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Costs = FUNDED (monies from government agencies)					Pilot	Sustainable
	Cost Item	Specifics	Funded Amount	Adjustments	Net Amount	
PHCTF	Health Canada: PHCTF	minus evaluation costs	\$3,441,495	-\$192,700	\$3,248,795	These funded costs are not applicable to the Sustainable Program
	FedNor-Telehealth Equip	\$50,000 hold-back, \$25,102 surplus repayable	\$500,000	-\$75,102	\$424,898	
	Health Canada: ICB	network cabling for nursing stations and connectivity	\$630,000		\$630,000	
	Sioux Lookout First Nations		\$488,852		\$488,852	
	NORTH Network	in-kind	\$410,852		\$410,852	
	K-NET	in-kind	\$150,000		\$150,000	
	NOHFC	iDoc carts under budget	\$1,093,928	-\$528,148	\$565,780	
	PHCTF total		\$6,715,127	-\$795,950	\$5,919,177	
Other Funds	FedNor-Furn & Equip -Additional		\$415,207		\$415,207	
	Health Canada- Additional		\$382,200		\$382,200	
	TOTAL		\$7,512,534	-\$795,950	\$6,716,584	
source: KOTH administration						
					Pilot Project	
Annual Telehealth Network Costs - FUNDED					\$2,600,434	
rounded to nearest dollar					adjusted	\$2,600,434

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Costs = DESIGN (estimated purchases and expenses)						Pilot		Sustainable	
ID	Cost Item	Specifics	Unit Price	Quantity	Total Cost	Quantity	Total Cost	Quantity	Total Cost
Equipment Costs (Capital)									
Cost-01a	Telehealth platforms, Peripherals and medical devices, Computers, monitors, etc., Cables, Software, includes warranties	First Nations Communities	\$55,000	24	\$1,320,000	9	\$495,000		
Cost-01b		Red Lake, Sioux Lookout	\$55,000	2	\$110,000	0	\$0		
Cost-01c		Thunder Bay, Winnipeg	\$55,000	in-kind	\$0	0	\$0		
Cost-01e	Installation (or purchase) of land line (or microwave towers) and associated costs	network cabling for nursing stations and connectivity (HC: ICB grant)	\$630,000	1	\$630,000	0	\$0		
Cost-01f	Satellite earth stations and associated costs	satellite link	??		\$0		\$0		
Cost-02a	Shipping & handling, Installation	included above?	??		\$0		\$0		
Cost-05a	Construction/ renovation, Office furnishings	FedNor-Furn & Equip Additional	\$415,207	0.5	\$207,604	0	\$0		
	Other equipment	network routers (RL, SL) (TB, Win. In-kind)	\$35,000	2	\$70,000	3	\$105,000		
	Other equipment	community routers & switches	\$2,200	24	\$52,800	9	\$19,800		
	Other equipment	large screen video conference units	\$26,000	0	\$0	3	\$78,000		
Cost-02b	Warranty/ maintenance/ insurance	10% of "other" equipment costs/year			\$12,280		\$20,280		
Subtotal-Capital equipment costs					\$2,402,684		\$718,080		
<i>Data Source: KOTH sustainability & pilot project budgets</i>									
					27% of annual cost	Pilot Project	9% of annual cost	Sustainable Program	
Subtotal-Capital Equipment Costs-Annualized					\$930,238		\$239,408		

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

				Pilot		Sustainable	
ID	Cost Item	Specifics	Unit Price	Quantity	Total Cost	Quantity	Total Cost
Equipment Costs (Annual)							
Cost-04a	Access and line charges (hook-up included above with installation)	\$1200/month/site = \$14,400/year	\$14,400	24	\$345,600	24	\$345,600
Cost-04b	Other access charges	\$48,000/y SSHA network interface-ISDN/bridging	\$48,000	1	\$48,000	1	\$48,000
Cost-04b	Other access charges	\$90,000/y K-net	\$90,000	1	\$90,000	1	\$90,000
Cost-05b	Building operations, Room rental		??		\$0		\$0
Cost-08	Overhead		??		\$0		\$0
<i>Data Source: KOTH sustainability budget</i>				14% of annual cost	Pilot Project	17% of annual cost	Sustainable Program
Subtotal-Equipment costs (Annual)					\$483,600		\$483,600
Other Costs (Annual)							
Cost-09	Promotion/ marketing		\$36,667	1	\$36,667	1	\$36,667
Cost-07a	Training/ education	Staff development and special projects support	\$27,000	1	\$27,000	1	\$27,000
Cost-07b	Project travel		\$38,250	1	\$38,250	1	\$38,250
Cost-07c	Project management		\$35,000	1	\$35,000	1	\$35,000
<i>Data Source: KOTH sustainability budget</i>				4% of annual cost	Pilot Project	5% of annual cost	Sustainable Program
Subtotal-Other costs (Annual)					\$136,917		\$136,917

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

				Pilot		Sustainable		
ID	Cost Item	Specifics	Unit Price	Quantity	Total Cost	Quantity	Total Cost	
Personnel Costs (Annual)								
Cost-06a	Salary + 10% benefits & 10% administrative overhead	CTCs	\$36,000	24	\$864,000	24	\$864,000	
Cost-06b	Salary + 10% benefits & 10% administrative overhead	KOTH personnel K-net personnel	\$1,090,000	1	\$1,090,000	1	\$1,090,000	
	Other variable costs (specify)							
					56% of annual cost	Pilot Project	69% of annual cost	Sustainable Program
Subtotal-Personnel costs (Annual)					\$1,954,000	\$1,954,000	\$1,954,000	

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

			Pilot		Sustainable		
	Specifics	Unit Price	Quantity	Total Cost	Quantity	Total Cost	
Variable Costs-Personnel							
Cost-06c	fee-for-service	OHIP and TH session fee (average)	\$80	618	\$49,440	2030	\$162,400
	Not included in model.	NORTH Network pays while OHIP saves. Both are funded by the Ontario Government.		clinical sessions	=\$80 * 618	=4811 pro-rated TH use based on median of 9 longest running communities * 0.422 proportion clinical TH use	=\$80 * 2030 pro-rated TH clinical use
				0% of annual cost	Pilot Project	0% of annual cost	Sustainable Program
Subtotal-Variable Costs-Personnel (Annual)							
					Pilot Project		Sustainable Program
Grand Total Annual Telehealth Network Costs - DESIGNED					\$3,504,755		\$2,813,925
rounded to nearest dollar				adjusted	\$3,504,755		\$2,813,925

Annual Telehealth Network costs approporitioned by frequency of type of use

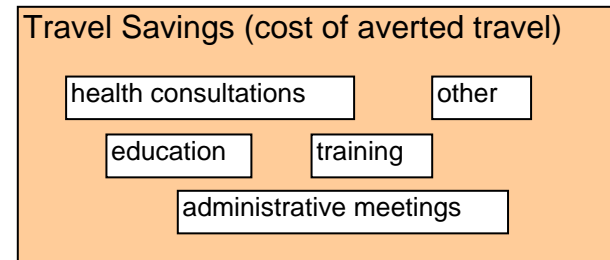
Pilot Project

Type of Use	Frequency of Use	Source of Cost Estimate	
	(%)	Funds	Design
Clinical	42%	\$1,097,383	\$1,479,007
Education	17%	\$447,275	\$602,818
Training	19%	\$504,484	\$679,922
Meetings	13%	\$340,657	\$459,123
Other	8%	\$210,635	\$283,885
Total	100%	\$2,600,434	\$3,504,755

Sustainable Program

Type of Use	Frequency of Use	Source of Cost Estimate	
	(%)	funded network costs not applicable here	Design
Clinical	42%		\$1,187,476
Education	17%		\$483,995
Training	19%		\$545,901
Meetings	13%		\$368,624
Other	8%		\$227,928
Total	100%		\$2,813,924

Travel Module-Averted Costs (Savings)



Averted Costs or Savings

Health Consultations Travel Sub-Module

* Cost of travel by patients and escorts (accompanying persons) to visit health care providers

**Schedevacs (scheduled medically necessary travel)

SOURCE: Health Canada, FNIHB, NIHB *need Band Council Resolutions to authorize release

**Medevacs (emergency/unscheduled medically necessary travel)

SOURCE: Ontario Ministry of Health and Long-Term Care *need BCRs to authorize release

Education/Training Travel Sub-Module

* Cost of travel for health education/training

SOURCE: KOTH, Regional Nursing Officer, Regional Medical Director, (Health Canada)

Administrative Meetings Travel Sub-Module

* Cost of travel for administrative meetings

SOURCE: KOTH, Regional Nursing Officer, Regional Medical Director, (Health Canada)

NOTES: (a) travel included transportation, accommodation, food and incidentals (registration, parking, supplies, etc.)
(b) travel costs may be estimated from (i) administrative/accounting values; (ii) commercial air fares, hotel charges or hospital per diem, food and incidental per diem, registration fees, etc.

Cost Estimates

\$8,000 medevac from Fort Severn (p 14 in CanadaConnects magazine, Spring 2004) OHIP

\$5,000 medevac cost mentioned in "Turning the corner" video; reiterated by Dr. Dermot McLoughlin in same video -OHIP

\$12,000 medevac cost mentioned in "Turning the corner" video -OHIP

Caveat: NIHB data are typically recorded for each passenger and for each leg of the trip. Multiple records may exist for a given trip to correspond to different reimbursement categories. Therefore averages may underestimate the actual cost of a patient (+/- escort) leaving the community for medical care.

\$1,200 schedevac from Fort Severn (p 14 in CanadaConnects magazine, Spring 2004) NIHB

\$1,250 average cost NIHB (John Rowlandson, personal communication, June 21, 2005, based on 7.25 trips/ site, 25 sites
\$2.72M/year)

\$628 average cost (per patient or per passenger?) (per leg?) NIHB (PHCTF application, John Rowlandson, based on \$12,504,561 for 19,924 trips in FY02/03)

Not all Travel Costs are Savings

Some telehealth sessions will replace travel and some will be in addition to what would have occurred in the past. Telehealth sessions will avert a trip for those situations that would have required a trip in the past (or in the absence of telehealth). For these averted trips it is valid to compare the full cost of telehealth to the full cost of travel (averted travel cost = savings).

However, not all telehealth sessions will avert a trip that would have occurred in the past. This is because telehealth may be more convenient in time and dollars to the patient and other users.

Thus some of these telehealth sessions are in addition to what would have occurred in the past and, from an economic point of view, have lower value--people, band councils, charitable organizations, government agencies, etc., did not place the same monetary value on these sessions in the past. For these additional or new sessions, the full cost of telehealth is compared against an adjusted cost of travel, to reflect the historically lower value placed on travel for this type of session.

The **Valuation Factor** is the % of the travel cost that is assumed to represent a real savings.

It is set at typically 100% for telehealth sessions that averted a trip. (See below for exceptions.)

It is set at some other % for telehealth sessions that are in addition to what would have required travel in the past. This factor is the value that stakeholders wish to place of these additional sessions and as such is expected to vary depending on the stakeholder's perspective.

(sensitivity analyses may be used to explore a range of values to determine the impact on the cost comparison, including calculation of a break-even point, if applicable.)

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Estimates by Type of Session

Averted Trips		Valuation Factor	
60%	of telehealth clinical sessions averted a trip: default 60%, range 30-90% (see below)	Valuation Factor for averted clinical trips assumed to be 100%	100%
40%	of telehealth clinical sessions are additional sessions (by subtraction)	There is real value to "new" clinical sessions. Consider a default Valuation Factor of 50%, range 25-100%.	50%
10%	of <i>educational</i> sessions averted a trip: default 10%	Valuation Factor for averted <i>educational</i> trips assumed to be 100%	100%
90%	of <i>educational</i> sessions are additional sessions (by subtraction)	There is real value to "new" <i>educational</i> sessions. Consider a default Valuation Factor of 30%, range 10-60%.	30%
1%	of <i>training</i> sessions averted a trip: default 1%. Set very low because these training sessions are not needed if there is no telehealth.	Valuation Factor for averted <i>training</i> trips assumed to be very low because <i>training</i> sessions are not needed if there is no telehealth but these TH sessions do provide some benefits beyond telehealth (5%)	5%
99%	of <i>training</i> sessions are additional sessions (by subtraction)	Valuation Factor for "new" telehealth assumed to be very low given that <i>training</i> sessions are not needed if there is no telehealth but these TH sessions serve an educational need. (5%)	5%
5%	of <u>meeting</u> sessions averted a trip: default 5%	Valuation Factor for averted <u>meeting</u> trips assumed to be 100%	100%
95%	of <u>meeting</u> sessions are additional sessions (by subtraction)	There is value to "new" telehealth if more people are able to attend meetings, but Valuation Factor is assumed to be low to reflect the choice and cost of staying versus travel. (5%)	5%
1%	of "other" sessions averted a trip (family visits, demos, tests): default 1%. Set very low because demos and tests are not needed if there is no telehealth.	Valuation Factor for averted "other" trips assumed to be low because demos and tests are not needed if there is no telehealth. There is real value to Family visits but these are infrequent (1%)	1%
99%	of "other" sessions are additional sessions (by subtraction)	A similar argument can be made for "new" telehealth for "other" sessions.	1%

↑
Estimates in red are best guesses.
Pairs of estimates must sum to 100%

↑
Estimates in red are best guesses.
Pairs of estimates are independent

Estimates Notes

	Valuation Factor
<p>Averted Trips</p> <p><i>Averted clinical</i> Examination of telehealth referral sheets for 4 First Nations communities (Apr-03 to June-05) suggests that on average 50% (median=49%) of all telehealth sessions were follow-up appointments and could be assumed to have averted a trip. Minimum and maximum values were 38% and 65%, respectively. Global average was 57% (149/263).</p> <p>A telehealth consultation could be categorized as "initial" n=114, "follow-up" n=149 or left blank n=64 ("unknown").</p> <p>The proportion of "initial" consultations done by telehealth that would have averted a trip is unknown.</p> <p>60% was used as a first estimate, with a suggested range of 30-90%.</p>	<p><i>There is no empirical basis for any estimate of the Valuation Factor.</i></p> <p>The default estimates for the Valuation Factor are educated guesses.</p> <p>It would be useful to explore the impact of other levels of the valuation factors on the final result. Suggested range would be 1/2 to 2x that of default value for Valuation Factor.</p>

Estimates Notes (continued)

Averted Trips

Data from 7 averted trip forms completed by specialists in July 2005 suggest that all 7 telehealth sessions would have required a trip in the past. There were 2 initial consultations and 5 follow-up consultations.

A sample size of 7 is unreliable because it is too small. A change in one response represents a change of 14% ($1/7=0.143$).

In addition, random fluctuation may play a large role in the estimate. One way to compensate would be to examine the estimate +/- error.

The best estimate of the error of a count is the square root of the count.

$SQRT(7)=2.646$, therefore $(7-2.646)/7= 62\%$ =lower estimate, upper estimate=100%

$SQRT(6)=2.449$, therefore $(6-2.449)/7= 51\%$ =lower estimate, upper estimate=100%

These lower estimates fall in the range of values suggested by the examination of telehealth referral sheets.

There is no empirical basis for any other averted travel estimate.

The averted travel estimates for education, training, meetings and other were based in part on conversations with KOTH personnel and the researcher's educated guess.

Valuation Factor

Travel Savings- Summary (clinical, educational, training, administrative and other)

Pilot Project

ID	Cost Item
Cost-10	Travel: transportation, accommodation & food, incidentals (parking, etc.)

Model Assumptions		Pilot Project										
Item		Clinical		Educational		Training		Administrative		Other		
Total number of telehealth sessions	annual use-prorated		618				284			192	119	
percent of telehealth sessions that averted travel	based on 1	60%		guess--> (previous sheet)	10%	guess--> (previous sheet)	1%	guess--> (previous sheet)	5%	guess--> (previous sheet)	1%	
averted number of trips (rounded to nearest integer)	$618 * 0.6 =$		371	$252 * 0.1 =$			3			10	1	
average number of people / trip (rounded to one decimal place)	guess--> patient + escort on 3 of 4 trips		1.75	guess-->		4	guess--> CTC + backup every 2nd session	1.5	guess-->	4	guess-->	2
Valuation Factor (% of travel cost)			100%			100%		5%		100%	1%	
New telehealth												
Number of new telehealth	$618 - 371 =$		247	$252 - 25 =$		227		281		182	118	
Valuation Factor (% of travel cost assumed to be savings) - NEW TH	guess--> (previous sheet)		50%			30%		5%		5%	1%	

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Agency Values			Pilot Project									
Cost Item	Unit cost	Note	Clinical		Educational		Training		Administrative		Other	
			#/trip	cost	#/trip	cost	#/trip	cost	#/trip	cost	#/trip	cost
Total travel cost / Trip (Inclusive)		agency values	PENDING	\$0		\$0		\$0		\$0		\$0
agency budgetary values are not yet available												
Total annual savings-AGENCY				\$0		\$0		\$0		\$0		\$0
"New" telehealth travel savings				\$0		\$0		\$0		\$0		\$0
Total annual savings-AGENCY-with "New" telehealth travel savings				\$0		\$0		\$0		\$0		\$0

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Estimate BUILT UP from invoices, literature, commercial values

Pilot Project

Cost Item	Unit cost	Note	Clinical	Educational	Training	Administrative	Other
Itemized Costs / Trip							
Transportation Costs				60% of NIHB	60% of NIHB	60% of NIHB	60% of NIHB
air fare (return-patient or 1st person)	\$430	NIHB da	0.98 \$421	1 \$258	1 \$258	1 \$258	1 \$258
air fare (medevac)	\$5,000	guess: v	0.02 \$100				
air fare (patient goes home after medevac)	\$258	60% of r	0.02 \$5				
air fare (return-escort or other people)	\$430	see abo	0.75 \$323	3 \$774	0.5 \$129	3 \$774	1 \$258
Transportation sub-total			\$849	\$1,032	\$387	\$1,032	\$516
Daily Costs							
accommodation-patient-SL hospital	\$799	2005 int	0.98 \$783				
accommodation-patient-SL hospice	\$90	assumes	0.02 \$2				
accommodation-escort or others-SL hotel	\$90	90% of a	0.75 \$68	4 \$360	1.5 \$135	4 \$360	2 \$180
food and misc.	\$50	per diem	0.75 \$38	4 \$200	1.5 \$75	4 \$200	2 \$100
total cost for each day (rounded)			\$890	\$560	\$210	\$560	\$280
Number of Days per trip		guess-->	2.5	guess--> 2.5	guess--> 1.5	guess--> 1.5	guess--> 1
Daily Costs sub-total (rounded)		\$890 * 2.5 =	\$2,225	\$1,400	\$315	\$840	\$280
Other Costs / Trip			\$1	\$1	\$1	\$1	\$1
Total average cost / trip-AGENCY estimate			\$3,075	\$2,433	\$703	\$1,873	\$797
Total annual savings-BUILT-UP							
"New" telehealth travel savings			\$1,140,847	\$60,825	\$105	\$18,730	\$8
Total annual savings-BUILT-UP-with "New" telehealth travel savings (rounded)			\$379,770	\$165,687	\$9,877	\$17,044	\$940
			\$1,520,617	\$226,512	\$9,983	\$35,774	\$948

Pilot Project

Type of Averted Travel	Annual Potential Travel Savings		Annual Potential Travel Savings with "New" telehealth	
	<i>Agency Values</i>	<i>Built-up estimate</i>	<i>Agency Values</i>	<i>Built-up estimate</i>
Clinical	\$0	\$1,140,847	\$0	\$1,520,617
Educational	\$0	\$60,825	\$0	\$226,512
Training	\$0	\$105	\$0	\$9,983
Meeting	\$0	\$18,730	\$0	\$35,774
Other	\$0	\$8	\$0	\$948
Total	\$0	\$1,220,516	\$0	\$1,793,834

Travel Savings- Summary (clinical, educational, training, administrative and other)

Sustainable Program

Model Assumptions		Sustainable Program								
Item		Clinical	Educational	Training	Administrative	Other				
Total number of telehealth sessions- Projected Utilization	Estimated	2030		827		933		630		390
percent of telehealth sessions that averted travel	based on 1	60%	guess--> (previous sheet)	10%	guess--> (previous sheet)	1%	guess--> (previous sheet)	5%	guess--> (previous sheet)	1%
averted number of trips (rounded to nearest integer)	$2030 * 0.6 =$	1218	$827 * 0.1 =$	83		9		32		4
average number of people / trip (rounded to one decimal place)	guess--> patient + escort on 3 of 4 trips	1.75	guess-->	4	guess--> CTC + backup every 2nd session	1.5	guess-->	4	guess-->	2
Valuation Factor (% of travel cost)		100%		100%		5%		100%		1%
New telehealth										
Number of new telehealth	$2030 - 1218 =$	812	$827 - 83 =$	744		924		598		386
Valuation Factor (% of travel cost assumed to be savings) - NEW TH	guess--> (previous sheet)	50%		30%		5%		5%		1%

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Agency Values			Sustainable Program									
Cost Item	Unit cost	Note	Clinical		Educational		Training		Administrative		Other	
			#/trip	cost	#/trip	cost	#/trip	cost	#/trip	cost	#/trip	cost
Total travel cost / Trip (Inclusive)		agency budgetary values		\$0		\$0		\$0		\$0		\$0
		agency budgetary values are not yet available				\$500		\$100		\$500		\$100
				try 2310 or 1350 alone or 2263 with other values								
Total annual savings-AGENCY				\$0		\$0		\$0		\$0		\$0
"New" telehealth travel savings				\$0		\$0		\$0		\$0		\$0
Total annual savings-AGENCY-with "New" telehealth travel savings				\$0		\$0		\$0		\$0		\$0

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

Estimate BUILT UP from invoices, literature, commercial values			Sustainable Program									
Cost Item	Unit cost	Note	Clinical	Educational	Training	Administrative	Other					
Itemized Costs / Trip			Values in this box are the same as for pilot project, but can be varied as needed.									
Transportation Costs			60% of NIHB		60% of NIHB		60% of NIHB					
air fare (return-patient or 1st person)	\$430	NIHB da	0.98	\$421	1	\$258	1	\$258	1	\$258		
air fare (medevac)	\$5,000	guess: v	0.02	\$100								
air fare (patient goes home after medevac)	\$258	60% of r	0.02	\$5								
air fare (return-escort or other people)	\$430	see abo	0.75	\$323	3	\$774	0.5	\$129	3	\$774	1	\$258
Transportation sub-total				\$849		\$1,032		\$387		\$1,032		\$516
Daily Costs												
accommodation-patient-SL hospital	\$799	2005 int	0.98	\$783								
accommodation-patient-SL hospice	\$90	assumed	0.02	\$2								
accommodation-escort or others-SL hotel	\$90	90% of a	0.75	\$68	4	\$360	1.5	\$135	4	\$360	2	\$180
food and misc.	\$50	per diem	1.75	\$88	4	\$200	1.5	\$75	4	\$200	2	\$100
total cost for each day (rounded)				\$940		\$560		\$210		\$560		\$280
Number of Days per trip			guess-->	2.5	guess-->	2.5	guess-->	1.5	guess-->	1.5	guess-->	1
Daily Costs sub-total (rounded)			\$940 * 2.5 =	\$2,350		\$1,400		\$315		\$840		\$280
Other Costs / Trip				\$1		\$1		\$1		\$1		\$1
Total average cost / trip-AGENCY estimate				\$3,200		\$2,433		\$703		\$1,873		\$797
Total annual savings-BUILT-UP				\$3,897,673		\$201,939		\$316		\$59,936		\$32
"New" telehealth travel savings				\$1,299,224		\$543,046		\$32,479		\$56,003		\$3,076
Total annual savings-BUILT-UP-with "New" telehealth travel savings (rounded)				\$5,196,897		\$744,985		\$32,795		\$115,939		\$3,108

Sustainable Program				
Type of Averted Travel	Annual Potential Travel Savings		Annual Potential Travel Savings Estimate with "New" telehealth	
	<i>Agency Values</i>	<i>Built-up estimate</i>	<i>Agency Values</i>	<i>Built-up estimate</i>
Clinical	\$0	\$3,897,673	\$0	\$5,196,897
Educational	\$0	\$201,939	\$0	\$744,985
Training	\$0	\$316	\$0	\$32,795
Meeting	\$0	\$59,936	\$0	\$115,939
Other	\$0	\$32	\$0	\$3,108
Total	\$0	\$4,159,896	\$0	\$6,093,724

Pilot Project -Averted travel savings only

Cost Comparison		Travel Savings = AGENCY estimate					
Network Costs = FUNDED		Agency estimates not yet available					
	Pilot Network Costs - FUNDED	<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
	Pilot Travel Savings - AGENCY	\$1,097,383	\$447,275	\$504,484	\$340,657	\$210,635	\$2,600,434
	Net Cost/Saving	\$0	\$0	\$0	\$0	\$0	\$0
	-\$1,097,383	-\$447,275	-\$504,484	-\$340,657	-\$210,635	-\$2,600,434	
	The Economic Model suggests that telehealth results in:						
	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	
Network Costs = DESIGN		Agency estimates not yet available					
	Pilot Network Costs - DESIGN	<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
	Pilot Travel Savings - AGENCY	\$1,479,007	\$602,818	\$679,922	\$459,123	\$283,885	\$3,504,755
	Net Cost/Saving	\$0	\$0	\$0	\$0	\$0	\$0
	-\$1,479,007	-\$602,818	-\$679,922	-\$459,123	-\$283,885	-\$3,504,755	
	The Economic Model suggests that telehealth results in:						
	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	

Pilot Project -Averted travel savings only

Cost Comparison		Travel Savings = BUILT-UP estimate					
Network Costs = FUNDED		<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
	Pilot Network Costs - FUNDED	\$1,097,383	\$447,275	\$504,484	\$340,657	\$210,635	\$2,600,434
	Pilot Travel Savings - BUILT-UP	\$1,140,847	\$60,825	\$105	\$18,730	\$8	\$1,220,516
	Net Cost/Saving	\$43,464	-\$386,450	-\$504,379	-\$321,927	-\$210,627	-\$1,379,918
The Economic Model suggests that telehealth results in:							
		Savings	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost
Network Costs = DESIGN		<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
	Pilot Network Costs - DESIGN	\$1,479,007	\$602,818	\$679,922	\$459,123	\$283,885	\$3,504,755
	Pilot Travel Savings - BUILT-UP	\$1,140,847	\$60,825	\$105	\$18,730	\$8	\$1,220,516
	Net Cost/Saving	-\$338,160	-\$541,993	-\$679,817	-\$440,393	-\$283,877	-\$2,284,239
The Economic Model suggests that telehealth results in:							
		Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost

Pilot Project -Averted travel savings + monetary value of new telehealth

Cost Comparison		Travel Savings = AGENCY estimate					
Network Costs = FUNDED		Agency estimates not yet available					
	Pilot Network Costs - FUNDED	<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
	Pilot Travel Savings+ new TH value - Agency	\$1,097,383	\$447,275	\$504,484	\$340,657	\$210,635	\$2,600,434
	Net Cost/Saving	\$0	\$0	\$0	\$0	\$0	\$0
	-\$1,097,383	-\$447,275	-\$504,484	-\$340,657	-\$210,635	-\$2,600,434	
	The Economic Model suggests that telehealth results in:						
	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	
Network Costs = DESIGN		Agency estimates not yet available					
	Pilot Network Costs - DESIGN	<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
	Pilot Travel Savings+ new TH value - Agency	\$1,479,007	\$602,818	\$679,922	\$459,123	\$283,885	\$3,504,755
	Net Cost/Saving	\$0	\$0	\$0	\$0	\$0	\$0
	-\$1,479,007	-\$602,818	-\$679,922	-\$459,123	-\$283,885	-\$3,504,755	
	The Economic Model suggests that telehealth results in:						
	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	

Pilot Project -Averted travel savings + monetary value of new telehealth

Cost Comparison		Travel Savings = BUILT-UP estimate					
Network Costs = FUNDED		<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
	Pilot Network Costs - FUNDED	\$1,097,383	\$447,275	\$504,484	\$340,657	\$210,635	\$2,600,434
	Pilot Travel Savings+ new TH value - BUILT-UP	\$1,520,617	\$226,512	\$9,983	\$35,774	\$948	\$1,793,834
	Net Cost/Saving	\$423,234	-\$220,763	-\$494,501	-\$304,883	-\$209,687	-\$806,600
The Economic Model suggests that telehealth results in:							
		Savings	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost
Network Costs = DESIGN		<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
	Pilot Network Costs - DESIGN	\$1,479,007	\$602,818	\$679,922	\$459,123	\$283,885	\$3,504,755
	Pilot Travel Savings+ new TH value - BUILT-UP	\$1,520,617	\$226,512	\$9,983	\$35,774	\$948	\$1,793,834
	Net Cost/Saving	\$41,610	-\$376,306	-\$669,939	-\$423,349	-\$282,937	-\$1,710,921
The Economic Model suggests that telehealth results in:							
		Savings	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost

Sustainable Program -Averted travel savings only

Cost Comparison		Travel Savings = AGENCY estimate					
Network Costs = FUNDED	Funded network costs are applicable only to pilot project						
Network Costs = DESIGN	Sustainable Network Costs - DESIGN	Agency estimates not yet available					
	Sustainable Travel Savings - AGENCY	<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
		\$1,187,476	\$483,995	\$545,901	\$368,624	\$227,928	\$2,813,924
		\$0	\$0	\$0	\$0	\$0	\$0
	Net Cost/Saving	-\$1,187,476	-\$483,995	-\$545,901	-\$368,624	-\$227,928	-\$2,813,924
		The Economic Model suggests that telehealth results in:					
		Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost

Sustainable Program -Averted travel savings only

Cost Comparison		Travel Savings = BUILT-UP estimate					
Network Costs = FUNDED	Funded network costs are applicable only to pilot project						
	Sustainable Network Costs - DESIGN	\$1,187,476	\$483,995	\$545,901	\$368,624	\$227,928	\$2,813,924
Network Costs = DESIGN	Sustainable Travel Savings - BUILT-UP	\$3,897,673	\$201,939	\$316	\$59,936	\$32	\$4,159,896
	Net Cost/Saving	\$2,710,197	-\$282,056	-\$545,585	-\$308,688	-\$227,896	\$1,345,972
		The Economic Model suggests that telehealth results in:					
	Savings	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Savings	

Sustainable Program -Averted travel savings + monetary value of new telehealth

Cost Comparison		Travel Savings = AGENCY estimate					
Network Costs = FUNDED	Funded network costs are applicable only to pilot project						
	Sustainable Network Costs - DESIGN	Agency estimates not yet available					
Network Costs = DESIGN	Sustainable Travel Savings+ new TH value - Agency	<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
		\$1,187,476	\$483,995	\$545,901	\$368,624	\$227,928	\$2,813,924
		\$0	\$0	\$0	\$0	\$0	\$0
	Net Cost/Saving	-\$1,187,476	-\$483,995	-\$545,901	-\$368,624	-\$227,928	-\$2,813,924
The Economic Model suggests that telehealth results in:							
		Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost	Extra Cost

Sustainable Program -Averted travel savings + monetary value of new telehealth

Cost Comparison		Travel Savings = BUILT-UP estimate					
Network Costs = FUNDED	Funded network costs are applicable only to pilot project						
Network Costs = DESIGN		<i>Clinical</i>	<i>Educational</i>	<i>Training</i>	<i>Meetings</i>	<i>Other</i>	<i>Total</i>
	Sustainable Network Costs - DESIGN	\$1,187,476	\$483,995	\$545,901	\$368,624	\$227,928	\$2,813,924
	Sustainable Travel Savings+ new TH value - BUILT-UP	\$5,196,897	\$744,985	\$32,795	\$115,939	\$3,108	\$6,093,724
	Net Cost/Saving	\$4,009,421	\$260,990	-\$513,106	-\$252,685	-\$224,820	\$3,279,800
	The Economic Model suggests that telehealth results in:						
	Savings	Savings	Extra Cost	Extra Cost	Extra Cost	Savings	

Summary of Model Assumptions

Major Assumptions

- 1 Telehealth network costs were derived from 2 sources:
 - a. amount of monies provided by funders
minus unspent funds or funds unrelated to telehealth expansion project
 - b. sustainability cost estimates obtained from KOTH.
(for equipment, connections, renovations/rental, personnel, etc.)

- 2 Telehealth network costs were amortized over the duration of:
 - a. pilot project (31 months) or
 - b. a sustainable 3-year program (36 months)

interest rate was: 0.01%

- 3 Telehealth network costs were apportioned by percent use, which was based on number of sessions for each type of use.

Type of Use	Frequency of Use	Pilot Project (actual annual use)	Sustainable Program (estimated annual use)
Clinical	42%	618	2030
Education	17%	252	827
Training	19%	284	933
Meetings	13%	192	630
Other	8%	119	390
Total	100%	1465	4810

NOTE: A second method would be to apportion by time (total hours of use by each type of use). This does not affect total cost, but just how the cost is allocated to the major types of use.

Economic Model - Keewaytinook Okimakanak Telehealth/NORTH Network Expansion Project

4 Travel is the main alternative to telehealth and averted travel is the main cost savings. Other alternatives would be telephone calls, postal/courier delivery and "do nothing".

5 Not all telehealth sessions would have required travel in the past, some telehealth sessions are in addition to what had been delivered in the past.

From an economist's viewpoint, telehealth that averts travel usually has a different monetary value than "new" telehealth.

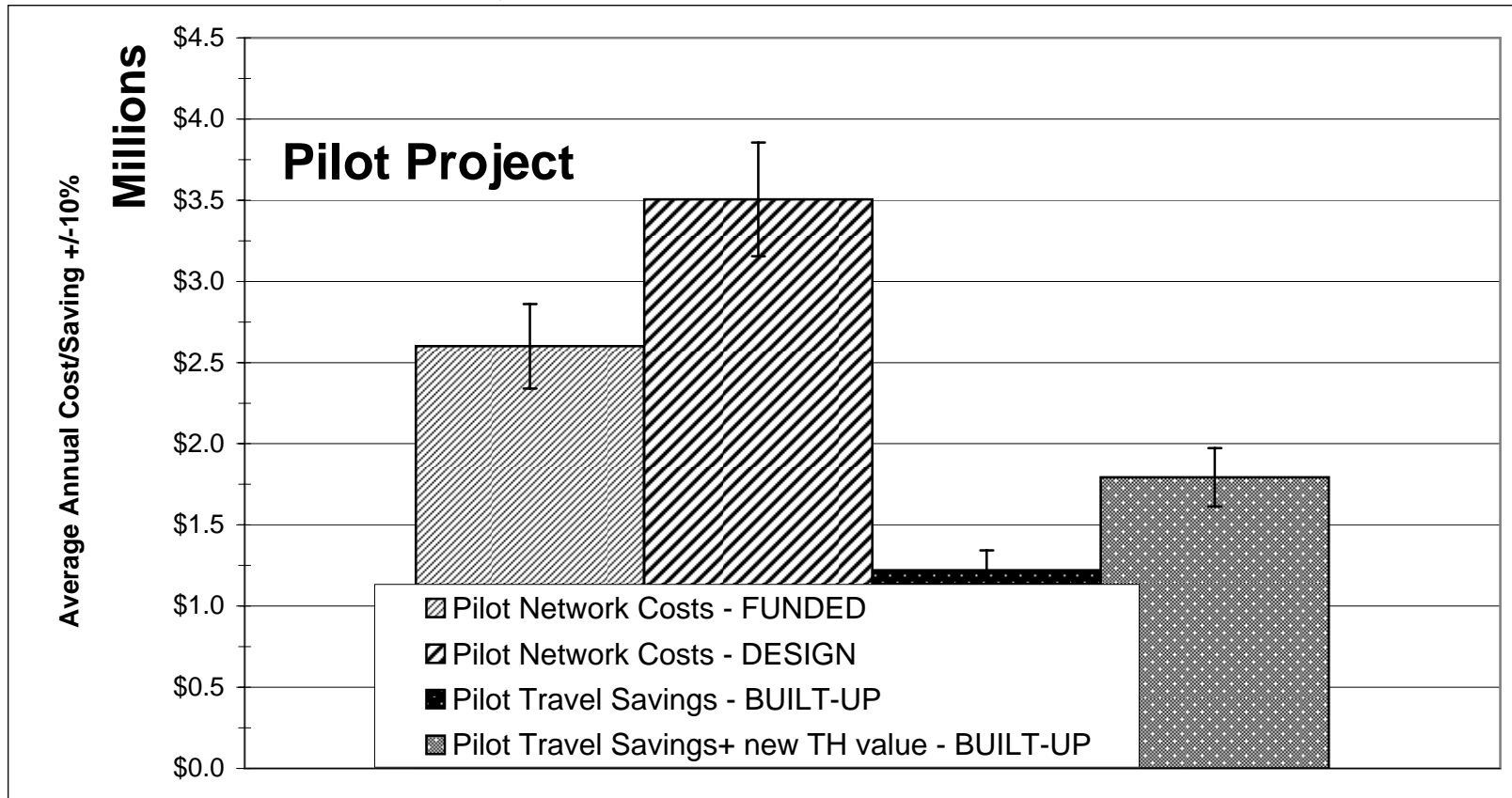
There were two estimates, each with 2 parts:

a. Percent of telehealth sessions that averted travel (the remaining telehealth sessions did not avert travel and were considered to be "new" telehealth). These estimates are linked and must sum to 100%.

b. Valuation Factor, expressed as a % of travel cost eligible as savings: (i) 100% for telehealth sessions that averted travel (training and other telehealth sessions were valued at only 1% because these sessions would not exist except for telehealth; and (ii) some other % for telehealth sessions that did not avert travel (so-called "new" telehealth). These estimates are separate and distinct--they can sum to any number.

Type of Use	Valuation Factor		
	% of TH that Averted Travel	TH that Averted Travel	"New" TH
Clinical	60%	100%	50%
Educational	10%	100%	30%
Training	1%	5%	5%
Meetings	5%	100%	5%
Other	1%	1%	1%

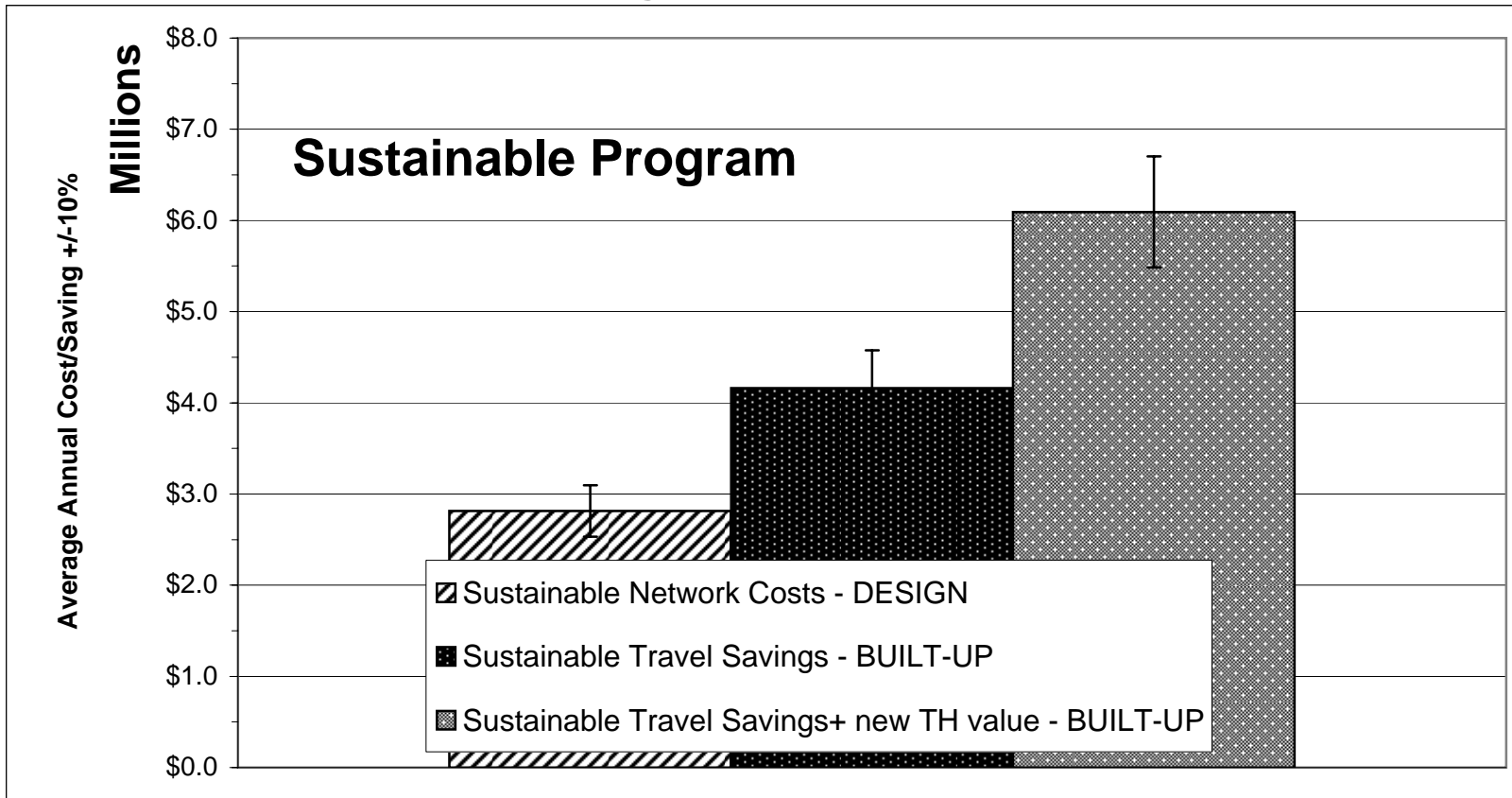
Model Output for Pilot Project



Actual utilization=

1463 telehealth sessions/year

Model Output for Sustainable Program



Estimated utilization (median)= 4811 telehealth sessions/year
 range= 1302 to 5803

Model/Theoretical Questions & Issues

How should telehealth network costs be apportioned? Is % use the most appropriate way to apportion the cost? Should we use % of total time instead? Are there differences in cost/minute among the major types?

Are all costs properly accounted for? Evidence?

Is total funding a fair accounting of the cost?

Are there 1-time costs that should be included? Should NOT be included?

Taxes included/excluded/rebated?

Empirical data for each type of use (e.g., clinical, educational, meetings, training and other) are needed for:

percent averted travel

number of people/trip (# patients and # escorts for clinical)

number of days per trip

agency budgetary cost value

Consensus is needed on the valuation factor that pertains to dollar value allocated to new telehealth. How much is new telehealth worth in terms of travel costs? (What % of travel costs can be considered as "savings"?).

Response

We are using percent based on frequency to apportion the costs. Biggest discrepancies in % allocation are for clinical frequency vs. time and for education frequency vs. time. Clinical sessions are more frequent but shorter compared to educational sessions.

Discussions and data requests are continuing on these issues.

