Towards Best Practices in Rural Maternity Care Service Outcomes Reporting

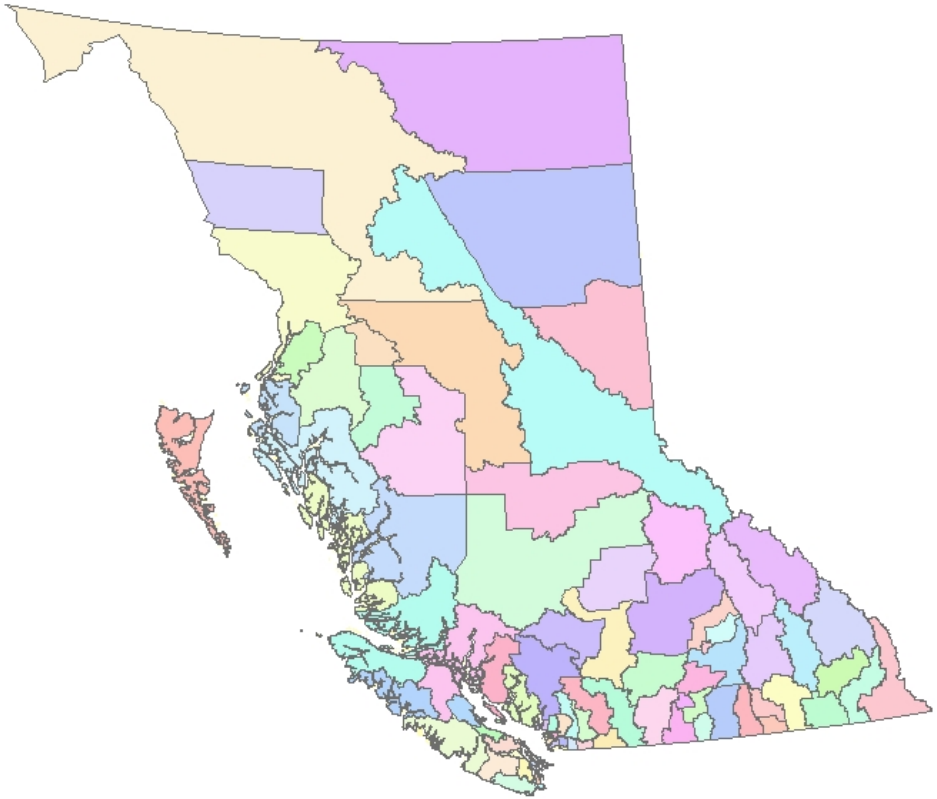
Canadian Perinatal Database Committee Meeting

June 22nd, 2008

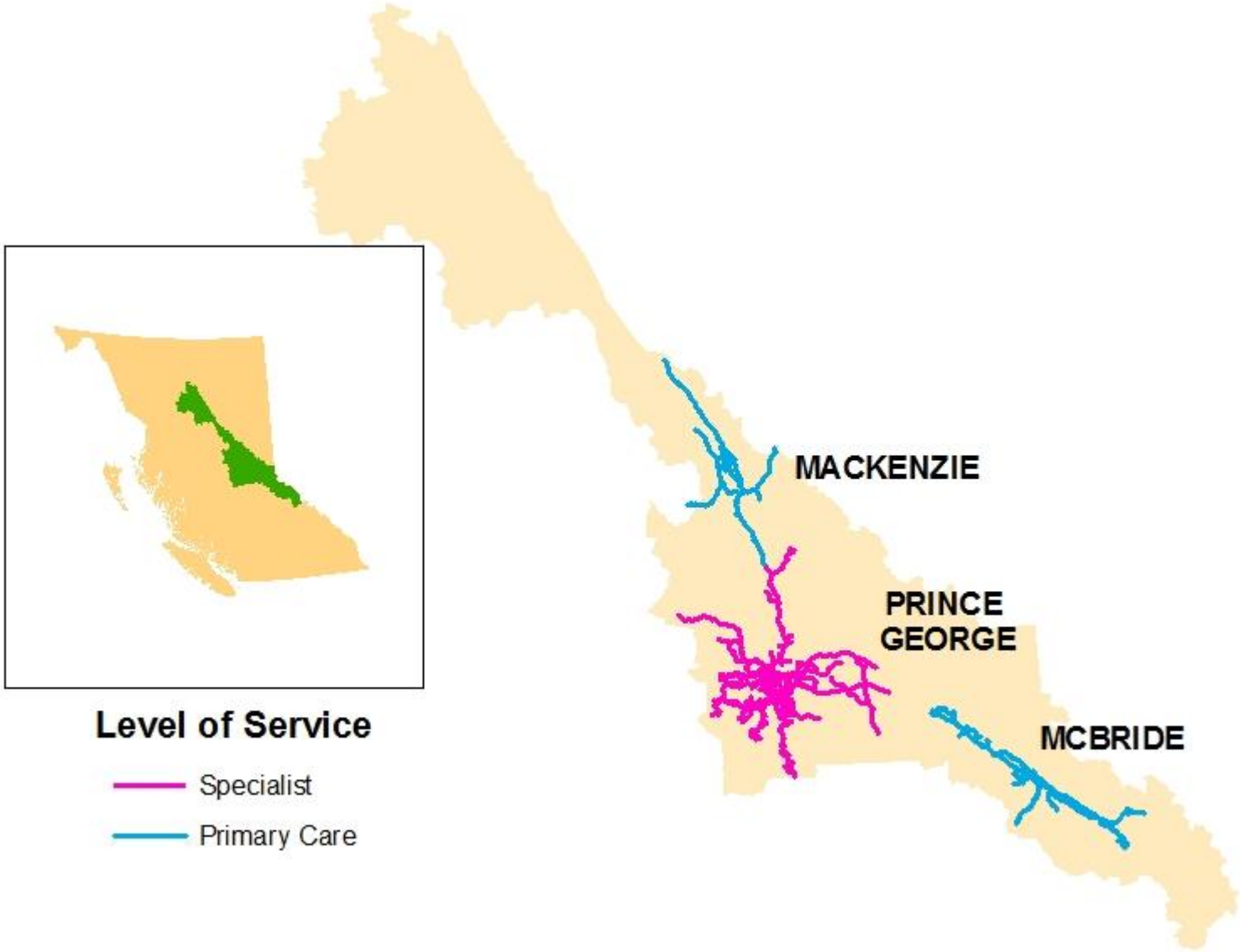
Rural Catchments and Service Classification

- Overview of the definition of rural maternity service catchments and rural service classification schemes in British Columbia.
- Demonstrate the potential strengths of reporting by maternity service Catchment population versus by traditional Local Health Area (LHA).
- Introduction of Rural Spreadsheets

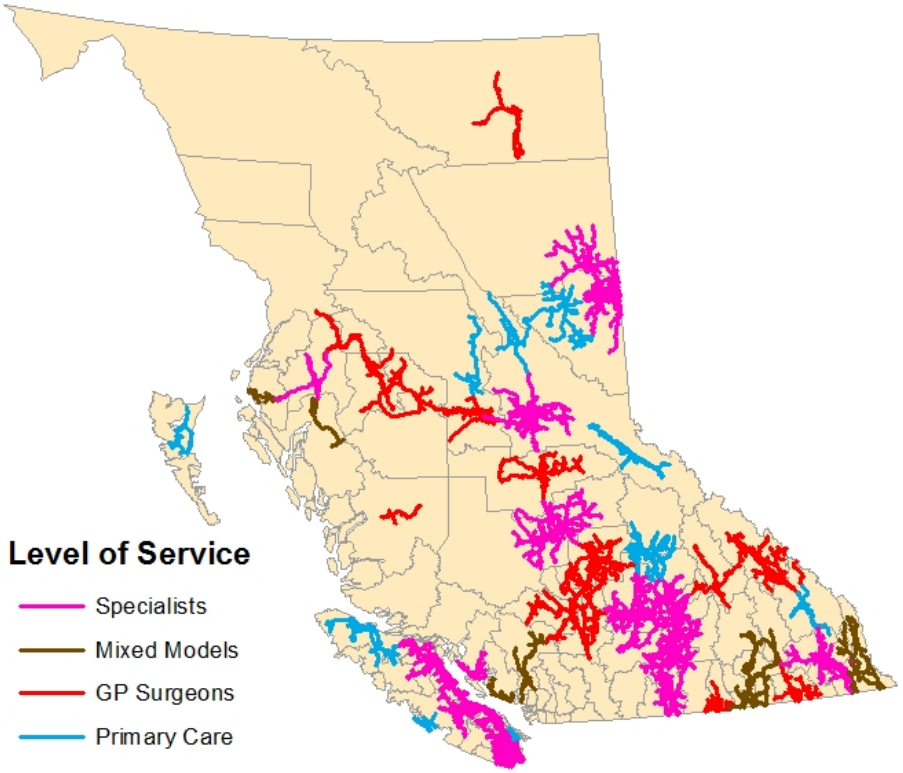
Local Health Areas

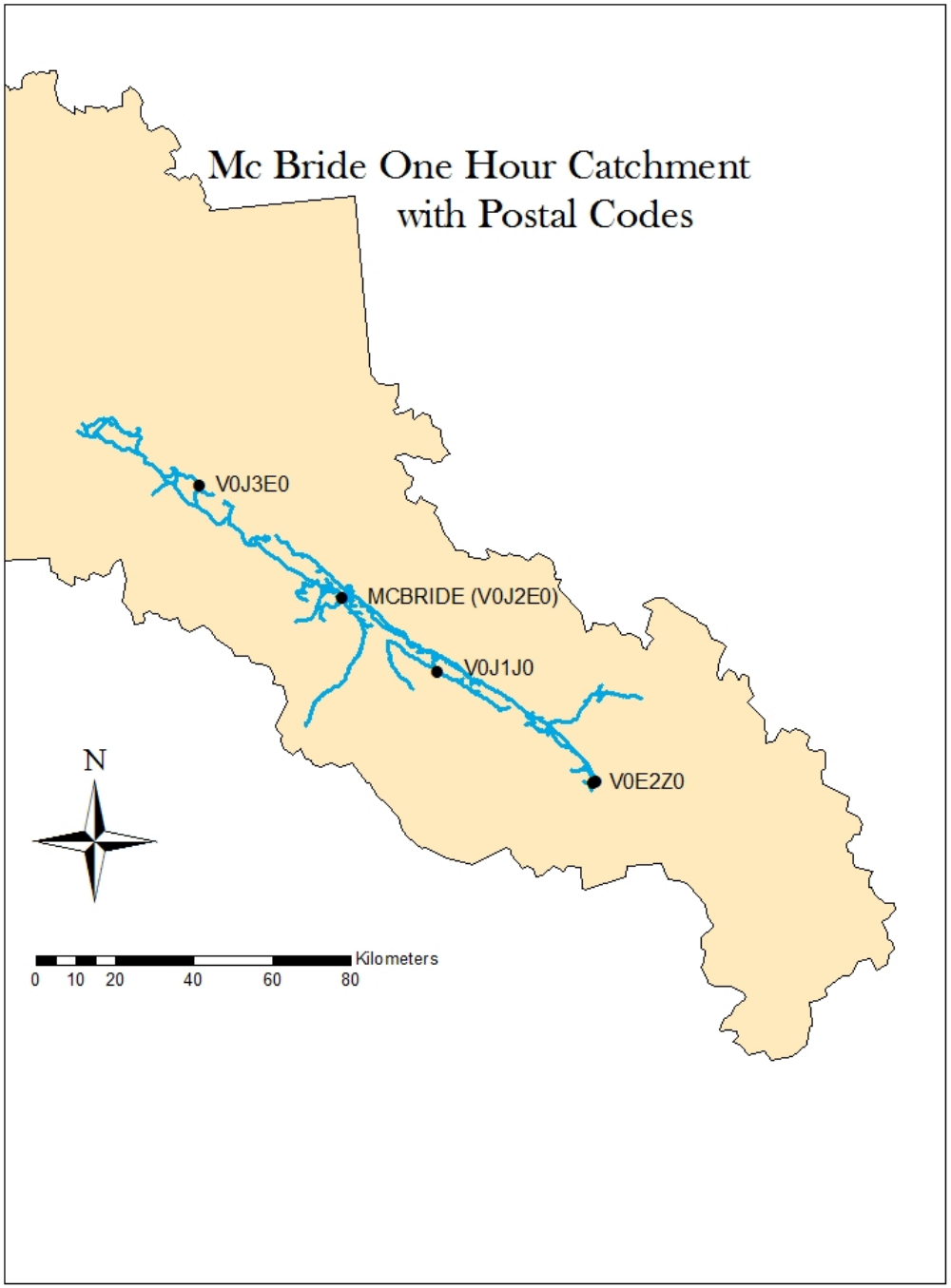


Local Health Area #57: Prince George

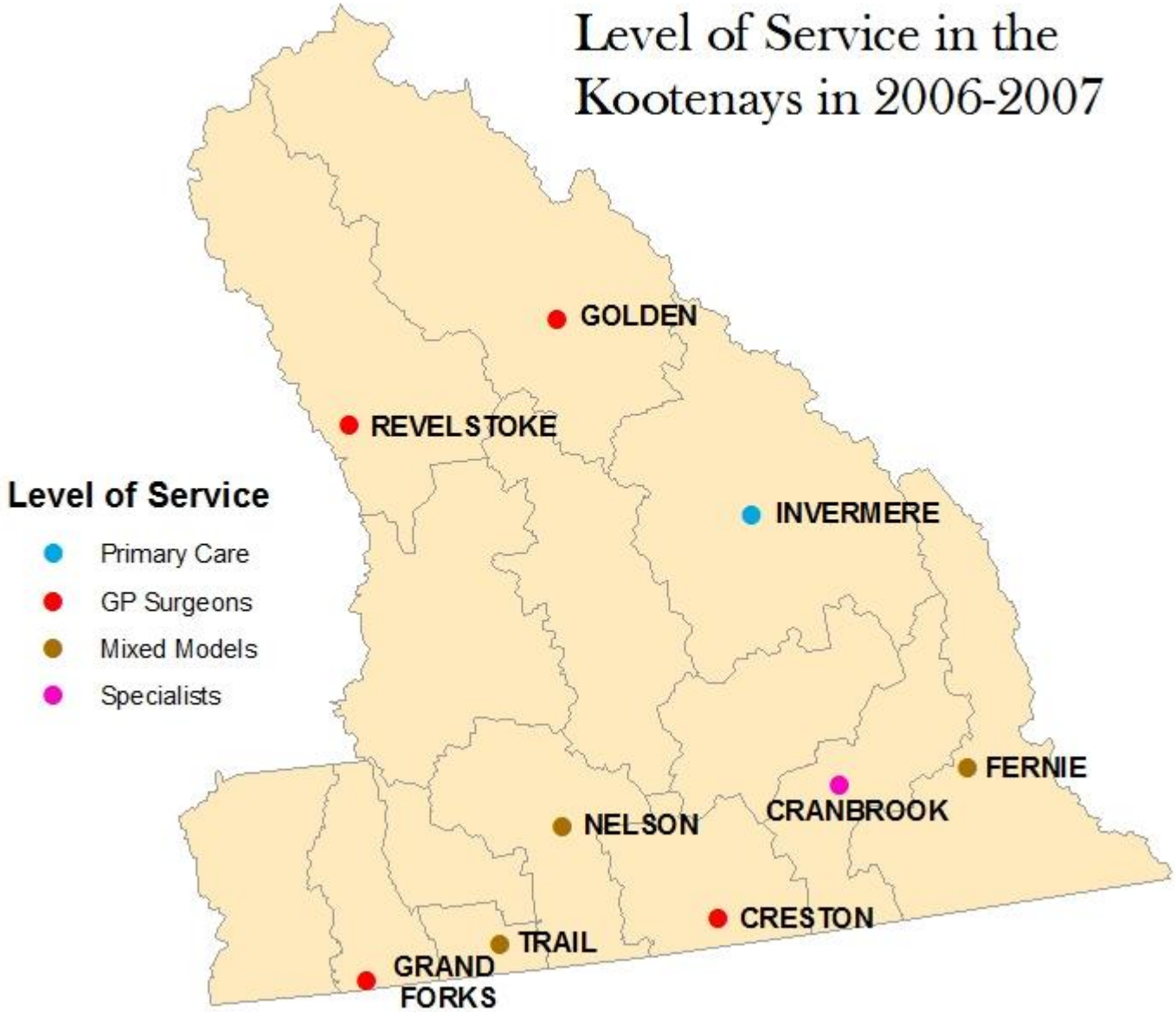


Local Health Areas Overlayed by 1 Hour Hospital Catchments

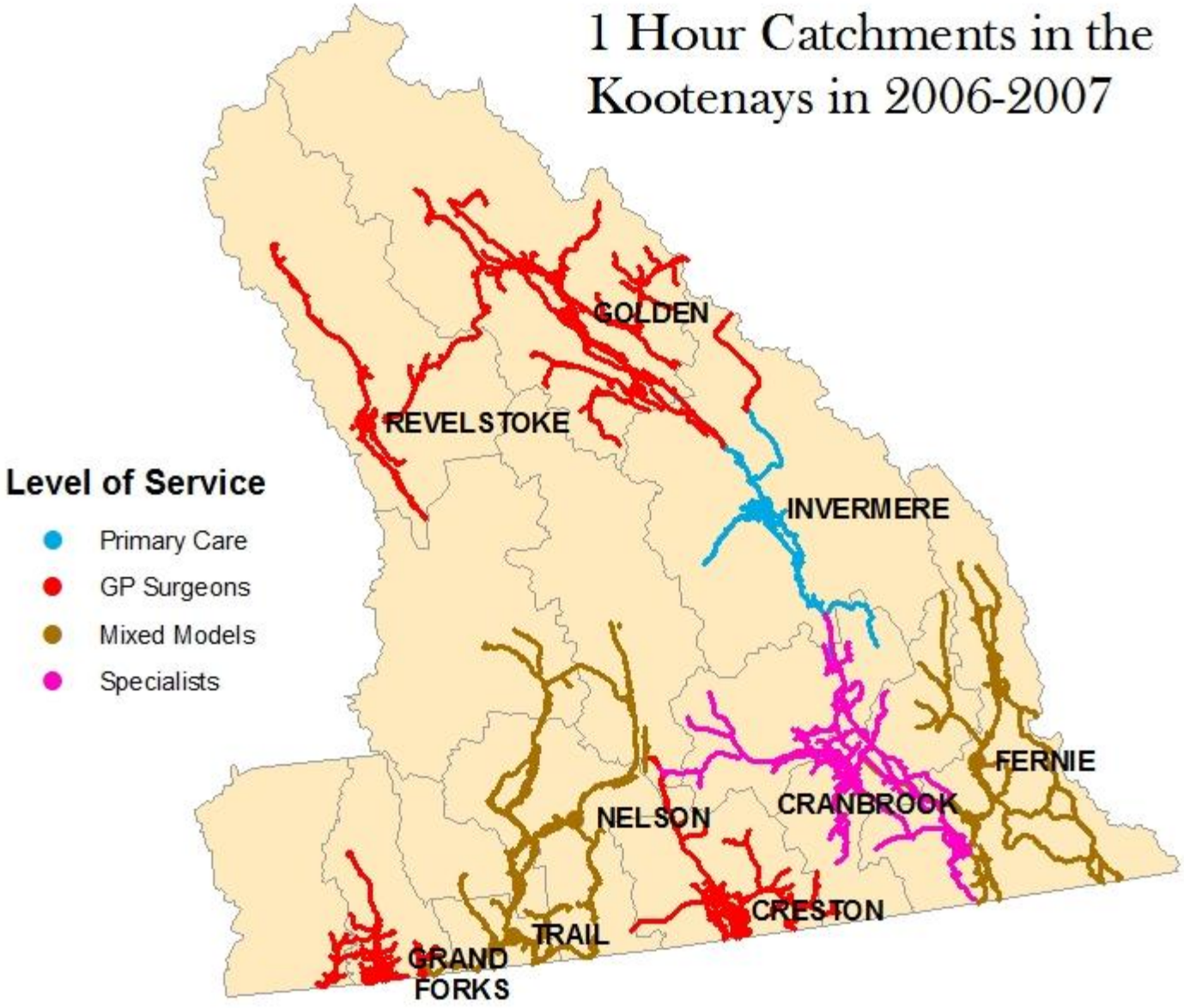



Mc Bride One Hour Catchment
with Postal Codes
V0J3E0
MCBRIDE (V0J2E0)
V0J1J0
V0E2Z0
N
Kilometers
0 10 20 40 60 80

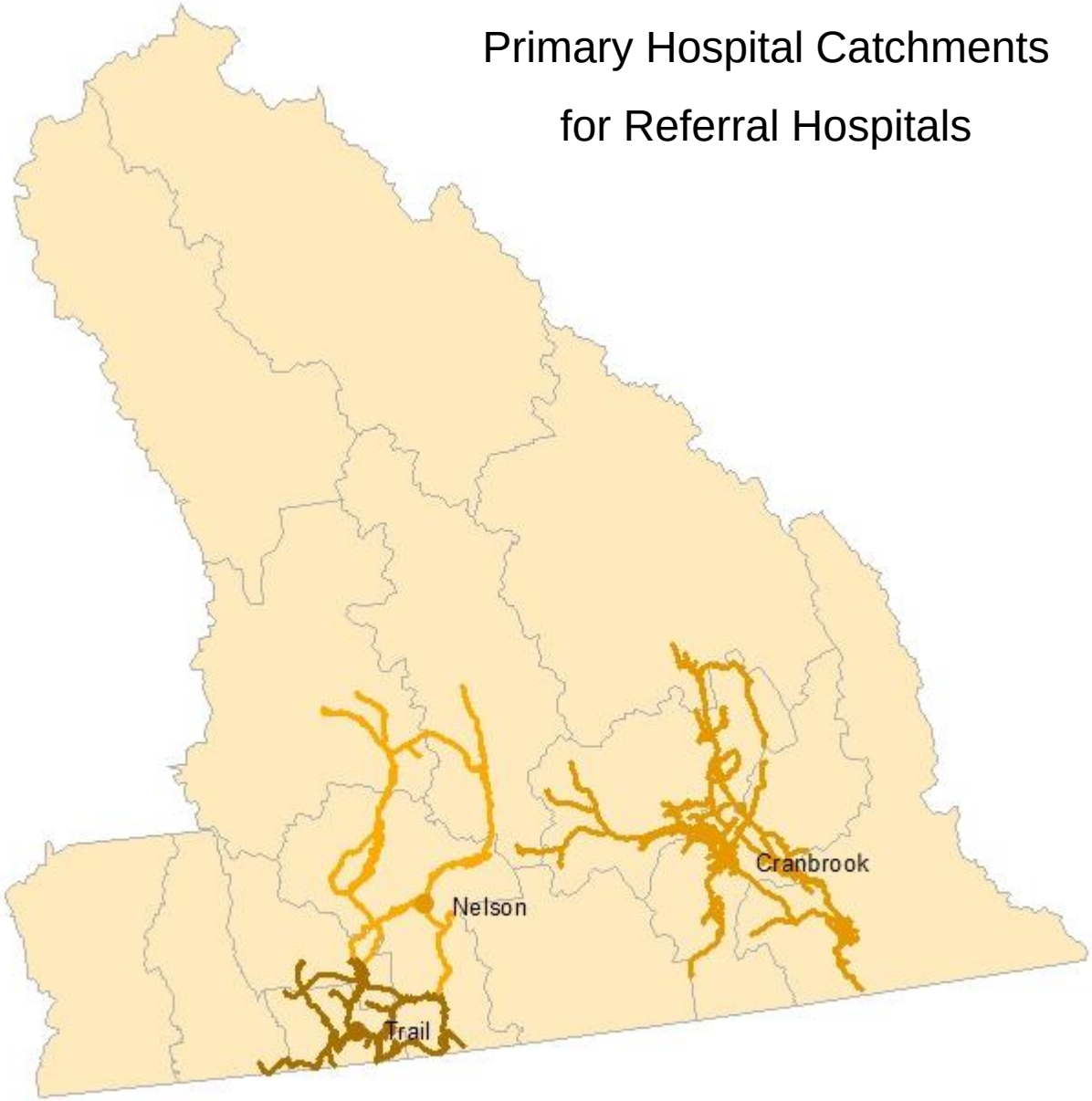
Level of Service in the Kootenays in 2006-2007

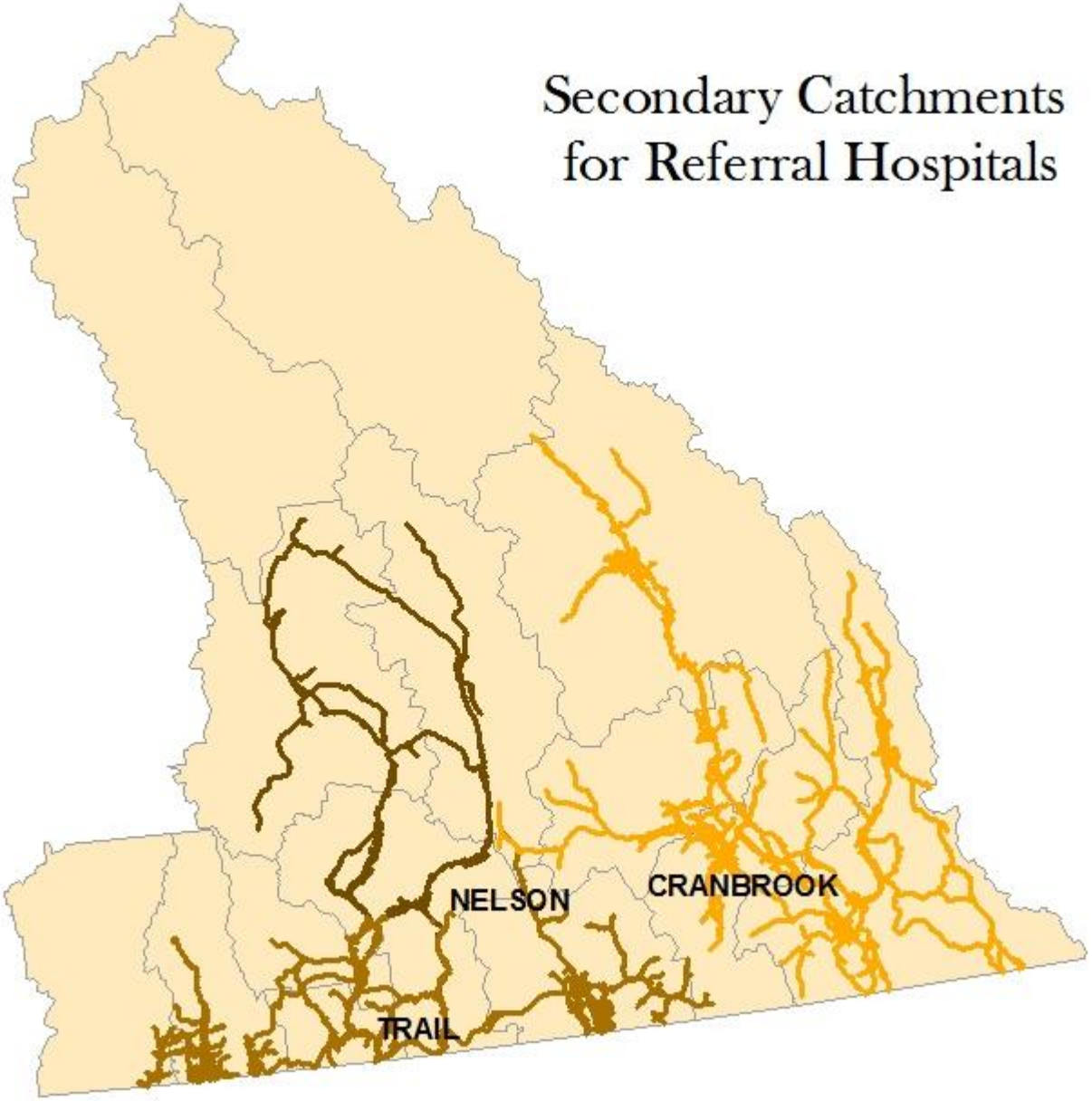


1 Hour Catchments in the Kootenays in 2006-2007



Primary Hospital Catchments for Referral Hospitals




Secondary Catchments
for Referral Hospitals
NELSON
CRANBROOK
TRAIL

Potential System Organization

Model A	Model B	Model C
No local elective intrapartum services	Local intrapartum services with no c/s	Local intrapartum services with c/s
(98% of women deliver away)	**(60% of women delivery away)**	**(15% of women delivery away)**

Interfacility relationships

- What are the effects of closing small facility services on the health system?
- Does centralization of services deliver the efficiencies of scale that it promises?
- What are the overall system effects?
- What is the cost effectiveness of providing rural maternity health services in small facilities?

The RBI Model

A health service delivery tool to determine the appropriate level of rural maternity service for a given rural community population.

Background

- Development of the Rural Birth Index (RBI) was informed by data gathering through 6 funded projects involving:
  - Repeat visits to 23 communities;
  - Interviews/focus groups with
    - 121 rural women;
    - 216 providers;
    - 49 administrators/key informants

Methodology

- Complex adaptive systems modeling recognizing that small rural maternity health services are at the edge of the complexity of health systems.
- Privileging the dominant nature of population need and degree of isolation in predicting level of service for small rural populations.
- Comparing service levels for rural BC hospitals to RBI scores to establish the phase transition points. (the derivation sample)

Component parts of the RBI

To project the appropriate service level for a given community, the RBI Model takes into account 3 factors.

- Birth rate;
- Social vulnerability,
- Proximity to nearest cesarean section service

Birth rate

The Birth rate is transformed into a Population Birth Score (PBS).

Population Birth Score (PBS):

Average # of births in catchment area of hospital over 5 years divided by 10.

Adjustment for Population Vulnerability (APV)

Social vulnerability is represented by a score derived from a BC stats composite score (range -1 to +1) of several social indicators* and is weighted in the RBI between:

0.8 (advantaged) to 1.4 (disadvantaged)

* Overall regional socio-economic index including levels of: human economic hardship, crime, health problems, education concerns, children and youth at risk. www.bcstats.gov.bc.ca/data/sep/i_lha/lha_main.asp

RBI Model: Proximity to nearest cesarean section service

Measured by an Isolation Factor (IF):

Surface travel time is weighted as follows:

< 30 minutes	=	-3
31-45 minutes	=	-2
46-60 minutes	=	-1
61-90 minutes	=	1
91-120 minutes	=	2
2-4 hours	=	3
> than 4 hours	=	4

** If Cesarean Section provided locally then distance to next service is calculated as if existing local service was closed.*

RBI Formula

RBI= (PBS x APV) + IF

RBI: Rural Birthing Index

PBS: Population Birthing Score

APV: Adjustment for Population Vulnerability

IF: Isolation Factor

What does the RBI Score mean?

The calculated score corresponds to the appropriate level of service for a given rural service catchment population:

0–6.5: No local intrapartum services

6.5–9: Local intrapartum services without operative delivery

9–14: Local GP Surgical Services

14–27: Mixed model of specialists and GPS

>27: Specialist service

RBI Model: Limitations

- Intended for application to rural populations of under 25,000 and has been developed within the context of British Columbia's geography and health policy structure.
- Population and Birth data is reported using adapted Local Health Area mapping rather than 1 hour surface travel time.
- The adjustment for population vulnerability is an average across the LHA and may underestimate the degree of vulnerability of the women who will make up the parturient population.

Three Examples of application of the RBI Model

- Summerland
- Queen Charlotte city
- Merritt

Summerland

Summerland

Data:

Average # of births (5 years): 71 → **RBI Factors:** **PBS: 7.1**

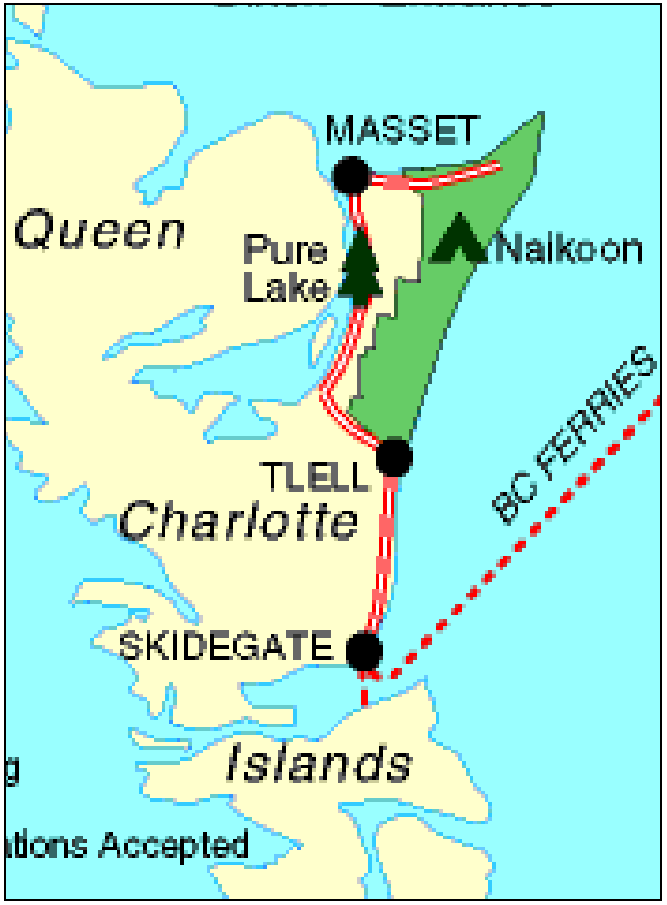
Socio-economic Status: -0.79 → **Adjustment for Population Vulnerability (APV): 0.84**

Travel Time to cxion: 17 minutes → **Isolation Factor (IF): -3**

RBI = (7.1 X 0.84) - 3 = 3.0

***Recommended level of service*: No Local Intrapartum Services**

Queen Charlotte city



Queen Charlotte City

Data:

Average # of births (5 years): 30 → **RBI Factors:**

PBS: 3.0

SIV: 0.29 → **Adjustment for Population Vulnerability (APV): 1.12**

Travel Time to cxion: 4 hours → **Isolation Factor (IF): 4**

RBI = (3.0 X 1.12) + 4 = 7.4

***Recommended level of service*: Intrapartum services with no c/s**

Merritt

Merritt

Data:

Average # of births (5 years): 105 → **RBI Factors:** **PBS: 10.5**

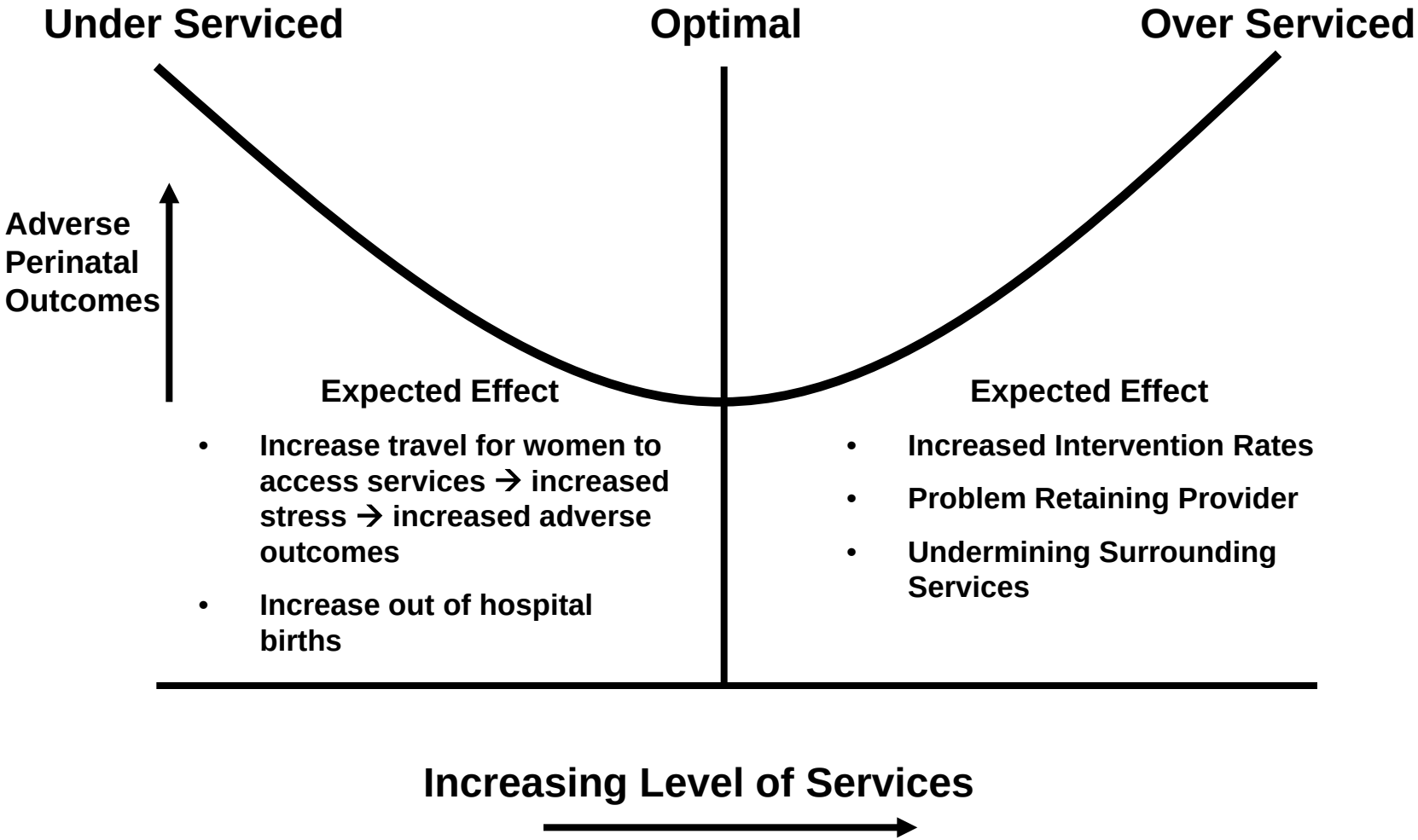
SIV: 0.87 → **Adjustment for Population Vulnerability (APV): 1.35**

Travel Time to cxion: 53 minutes → **Isolation Factor (IF): -1**

RBI = (10.5 x 1.35) - 1 = 13.2

***Recommended level of service*: Local intrapartum services with operative delivery**

Level of Maternity Services and Population Need



Three-stage planning process for Rural Maternity Care Services

1. Projecting the appropriate service level to meet the needs of a given community based on size of birthing population and degree of isolation using the Rural Birth Index (RBI);
2. Assessing the feasibility of implementing the proposed model of care based on community characteristics;
3. Considering potential implementation within the planning priorities of the Health Authority.

Stage 2: Measuring Feasibility

In Stage 2, the feasibility of implementing a certain level of service is evaluated.

Factors that might be considered:

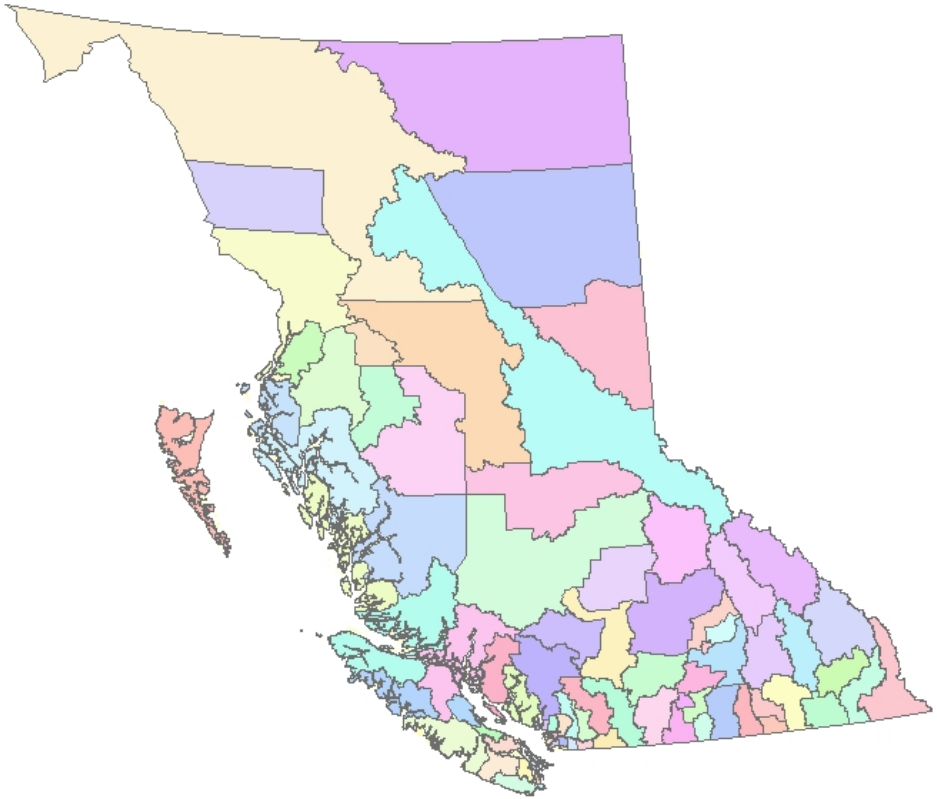
- Public transit access and schedules
- Local infrastructure (existing hospital services)
- Local caregiver Resources
- Community maternity service history
- Influence of other organizations (e.g. United Church Health Services)

Stage 3: Administrative Priorities

Making choices about service priorities:

- Addressing the greatest need (e.g. cancer care vs maternity care vs operative facilities)
- Political agenda

Local Health Areas

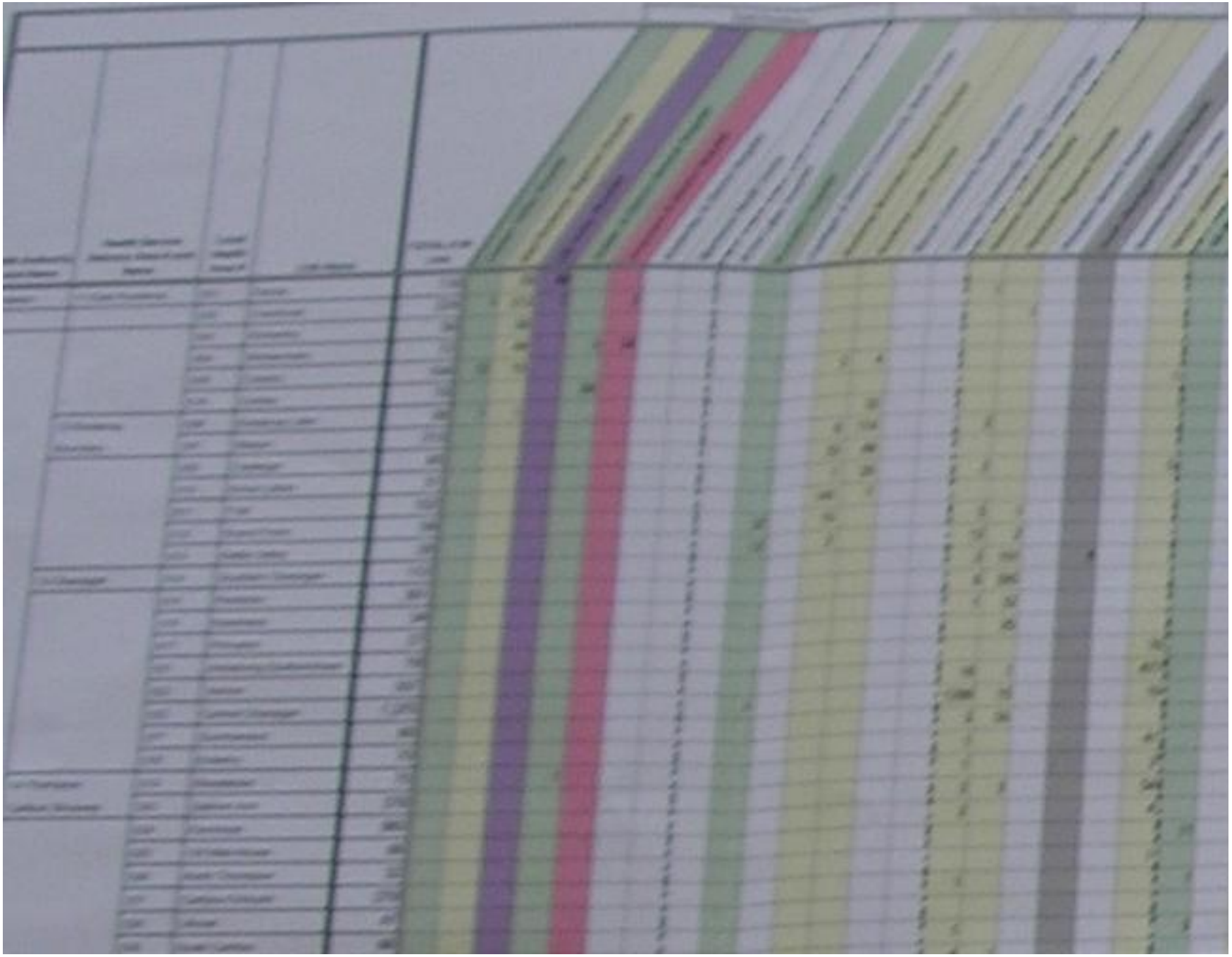


BRITISH COLUMBIA REPRODUCTIVE CARE PROGRAM - APRIL 1, 2005 TO MARCH 31, 2006

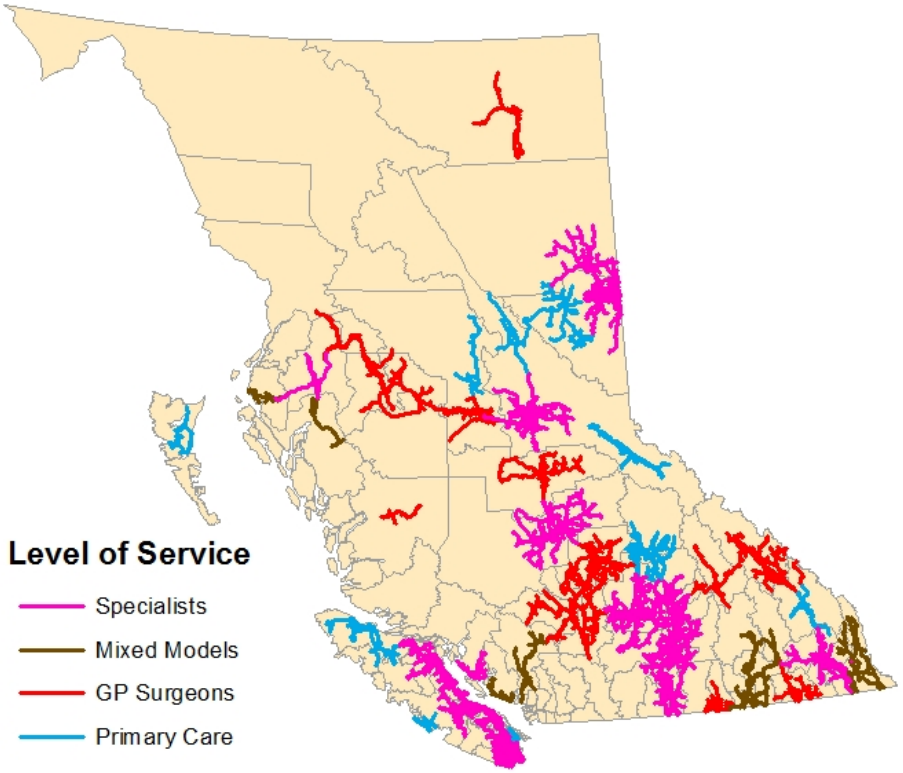
BRITISH COLUMBIA DELIVERIES* BY MATERNAL RESIDENCE AND DELIVERY HOSPITAL HIGHEST LEVEL OF SERVICE/CARE

2005/2006

					East Kootenay									Kootenay Boundary								
Health Authority # and Name	Health Service Delivery Area # and Name	Local Health Area #	LHA Name	TOTAL # IN LHA	Creston Valley Hospital	East Kootenay Regional Hospital	Elk Valley Hospital	Golden & District General Hospital	Invermere & District Hospital	Kimberley & District Hospital	Sparwood Health Centre	Arrow Lakes Hospital	Boundary Hospital	Castlegar & District Community Health Centre	Kootenay Boundary Regional Hospital	Kootenay Lake Hospital	Slocan Community Health Centre	Victorian Community Health Centre	Kelowna General Hospital	Penticton Regional Hospital	Princeton General Hospital	South Okanagan G
01-Interior	11-East Kootenay	001	Fernie	116		29	86															
		002	Cranbrook	224	1	213	1		2									1				
		003	Kimberley	58		56													1			
		004	Windermere	72		44		3	24													
		005	Creston	104	72	15								3	4							
		018	Golden	70				69														
	12-Kootenay	006	Kootenay Lake	39	1	1									32							
	Boundary	007	Nelson	213										8	174			2				
		009	Castlegar	85										33	49							
		010	Arrow Lakes	31										1	20			2				
		011	Trail	152										141	7							
		012	Grand Forks	59									37	15				5	1			
		013	Kettle Valley	28									12	2				12	2			
	13-Okanagan	014	Southern Okanagan	112														2	101		6	
		015	Penticton	301														6	285			
		016	Keremeos	34														1	32			
		017	Princeton	27															25			
		021	Armstrong-Spallumcheen	79																		
		022	Vernon	507														18	1			
		023	Central Okanagan	1,375									1					1299	10			
		077	Summerland	60														3	55			



Local Health Areas Overlayed by 1 Hour Hospital Catchments



BRITISH COLUM

B.C. DELIVERIES BY MATERNAL RESIDENT POSTAL CODE

SERVICE LEVEL STRATIFICATION** LEGEND: C/S By Obstetrician; C/S By Surgeon

INTERIOR

Health Authority # and Name	Health Service Delivery Area # and Name	Hospital Institution ID#	Hospital Name	Hospital City	Catchment Area (Travel time from residence to hospital)	TOTAL # IN DESIGNATED CATCHMENT	Creston Valley Hospital	East Kootenay Regional Hospital	Elk Valley Hospital	Golden & District Hospital	Invermere & District Hospital	Kimberley & District Hospital	Sparwood Health Centre	Arrow Lakes Hospital	Boundary Hospital	Castlegar & District Community Health Centre	Kootenay Boundary Regional Hospital	Kootenay Lake Hospital	Slocan Community Health Centre	Victorian Community Health Centre of Kaslo	Kelowna General Hospital	Penticton Regional Hospital	Princeton General Hospital	South Okanagan General Hospital	Summerland Health Centre	Vernon Jubilee Hospital	100 Mile District General Hospital	Ashcroft & District General Hospital	Cariboo Memorial Hospital	Dr. Helmcken Memorial Hospital	Lillooet Hospital & Health Centre	Nicola Valley H
							East Kootenay									Kootenay Boundary					Okanagan											
01-Interior	11-East Kootenay	753	Elk Valley	Fernie	0 - 60 minutes	126		23	102																							
		756	East Kootenay Regional	Cranbrook	0 - 60 minutes	261		256																					1			
		755	Invermere & District	Invermere	0 - 60 minutes	76		43		1	30						4	3			1											
		654	Creston Valley	Creston	0 - 60 minutes	114	63	30										4			1											
					61 - 120 minutes	7																										
		409	Golden & District General	Golden	0 - 60 minutes	60				60							2	206														
	12-Kootenay Boundary	651	Kootenay Lake District	Nelson	0 - 60 minutes	230											1	10														
					61 - 120 minutes	12												10			1				3							
					121 - 240 minutes	19				1				2																		
		801	Kootenay Boundary Regional	Trail	0 - 60 minutes	130		1							1		119	5														
		803	Boundary	Grand Forks	0 - 60 minutes	67									41		18				5	1			1							
		804	Castlegar & District Health Centre	Castlegar	0 - 60 minutes	98		1									50	42			1											
	13-Okanagan	309	South Okanagan General	Oliver	0 - 60 minutes	120									5						8	102		4								
		303	Penticton Regional	Penticton	0 - 60 minutes	377															10	345										
					61 - 120 minutes	29															1	24										
					121 - 240 minutes	1																1										
		301	Vernon Jubilee	Vernon	0 - 60 minutes	691									1						91				580	1						
					61 - 120 minutes	4												1							2								
		302	Kelowna General	Kelowna	0 - 60 minutes	1,259					1										1202	4			1				1			
					61 - 120 minutes	2															2											
	14-Thompson Cariboo Shuswap	402	Queen Victoria	Revelstoke	0 - 60 minutes	78																			2							
		404	Shuswap Lake General	Salmon Arm	0 - 60 minutes	269															7				58							
					61 - 120 minutes	0																										
		401	Royal Inland	Kamloops	0 - 60 minutes	870															3								1			
					61 - 120 minutes	27																										
		708	100 Mile House General District	100 Mile House	0 - 60 minutes	103																						76	13			
		419	Dr. Helmcken	Clearwater	0 - 60 minutes	72																								15		
					61 - 120 minutes	2																										
		406	Cariboo Memorial	Williams Lake	0 - 60 minutes	250																1							244			
					61 - 120 minutes	22																							21			
					121 - 240 minutes	9																							7			25
		417	Lillooet District	Lillooet	0 - 60 minutes	67																										
					61 - 120 minutes	2																										
		403	Nicola Valley General	Merritt	0 - 60 minutes	118																5					1					
02-Fraser	21-Fraser East	606	Fraser Canyon	Hope	0 - 60 minutes	152																										
03-Vancouver	32-Vancouver		No Assigned Hospital	Vancouver	241 + minutes	7																										

Outcomes reporting by service stratification

- Overserved
- Underserved
- Access challenges

BC PERINATAL HEALTH PROGRAM

Optimizing Neonatal, Maternal and Fetal Health

Data Reporting, Indicator Monitoring and Process Control Charting

Towards Best Practices in Rural Maternity Care Service Outcomes Reporting

June 22nd 2008

HEALTHCARE QUALITY IMPROVEMENT

‘A broad range of activities of varying degrees of complexity and methodological and statistical rigour through which health care providers develop, implement, and assess small-scale interventions and identify those that work well and implement them more broadly in order to improve clinical practice’

The Ethics of Improving Health Care Quality & Safety: A Hastings Center/AHRQ Project, Mary Ann Bailey, PhD, Associate for Ethics and Health Policy, The Hastings Center, Garrison, New York, July 2006.

BC FACILITY COMPARISON REPORTS – Data Tables

B.C. PERINATAL FACILITY COMPARISON REPORT - MOTHER DELIVERY - PART 1 (500+ Births)*
FISCAL YEAR - April 01, 2004 to March 31, 2005

FACILITY TABLE

Template

(2500+ Births Peer Group)			Labour			Vaginal Delivery				C/Section Delivery			
						Spontaneous		Assisted		Elective		Emergent	
Parity	Total Deliveries	%		#	%	#	%	#	%	#	%	#	%
Nullip	0	0.0%	Spontaneous	0	0.00%	0	0.00%	0	0.00%	N/A	N/A	0	0.00%
			Induced	0	0.00%	0	0.00%	0	0.00%	N/A	N/A	0	0.00%
			None	0	0.00%	N/A	N/A	N/A	N/A	0	0.00%	0	0.00%
>=1	0	0.0%	Spontaneous	0	0.00%	0	0.00%	0	0.00%	N/A	N/A	0	0.00%
			Induced	0	0.00%	0	0.00%	0	0.00%	N/A	N/A	0	0.00%
			None	0	0.00%	N/A	N/A	N/A	N/A	0	0.00%	0	0.00%
Total	0	100.00%		0	100.00%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

PEER GROUPS TABLE

500-999 Births (7 Sites)

			Labour			Vaginal Delivery				C/Section Delivery			
						Spontaneous		Assisted		Elective		Emergent	
Parity	Total Deliveries	%		#	%	#	%	#	%	#	%	#	%
Nullip	1,961	43.22%	Spontaneous	1,279	65.22%	727	37.07%	236	12.03%	N/A	N/A	316	16.11%
			Induced	553	28.20%	250	12.76%	104	5.30%	N/A	N/A	199	10.15%
			None	129	6.58%	N/A	N/A	N/A	N/A	93	4.7%	36	1.84%
>=1	2,576	56.78%	Spontaneous	1,551	60.21%	1,336	51.82%	80	3.11%	N/A	N/A	136	5.28%
			Induced	541	21.00%	463	17.97%	23	0.89%	N/A	N/A	55	2.14%
			None	484	18.79%	N/A	N/A	N/A	N/A	452	17.55%	32	1.24%
Total	4,537	100.00%		4,537	100.00%	2,775	61.16%	443	9.76%	545	12.01%	774	17.06%

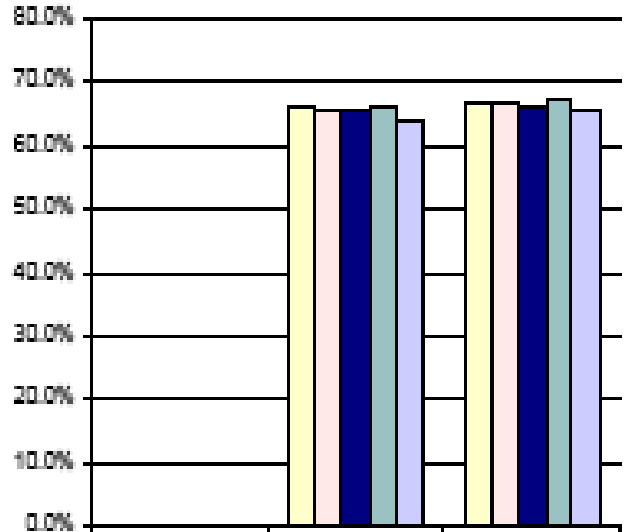
1000-2499 Births (10 Sites)

			Labour			Vaginal Delivery				C/Section Delivery			
						Spontaneous		Assisted		Elective		Emergent	
Parity	Total Deliveries	%		#	%	#	%	#	%	#	%	#	%
Nullip	6,294	46.72%	Spontaneous	4,314	68.54%	2,615	41.55%	795	12.63%	N/A	N/A	904	14.36%
			Induced	1,551	24.64%	710	11.28%	255	4.05%	N/A	N/A	586	9.31%
			None	429	6.82%	N/A	N/A	N/A	N/A	310	4.9%	119	1.89%
>=1	7,177	53.28%	Spontaneous	4,621	64.39%	3,976	55.40%	221	3.08%	N/A	N/A	424	5.91%
			Induced	1,150	16.02%	978	13.63%	72	1.00%	N/A	N/A	100	1.39%
			None	1,406	19.59%	N/A	N/A	N/A	N/A	1,260	17.55%	146	2.03%
Total	13,471	100.00%		13,471	100.00%	8,279	61.46%	1,343	9.97%	1,570	11.65%	2,279	16.92%

BC FACILITY COMPARISON REPORTS – Graphs

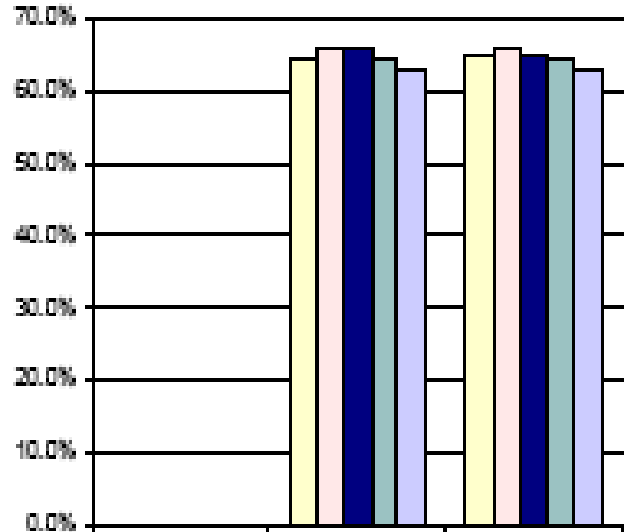
B.C. PERINATAL COMPARISON REPORT - MOTHER DELIVERY - PART 1

SPONTANEOUS LABOUR - NULLIP
(% OF TOTAL NULLIP DELIVERIES)
PEER GROUP 2500+



	Template	PEER 2500+	PROVINCIAL BC (Facility Births)
2001/02	0.00%	66.10%	66.83%
2002/03	0.00%	66.94%	66.88%
2003/04	0.00%	66.56%	66.28%
2004/05	0.00%	66.22%	67.46%
2005/06	0.00%	63.75%	65.59%

SPONTANEOUS LABOUR - PARITY >=1
(% OF TOTAL MULTIP DELIVERIES)
PEER GROUP 2500+

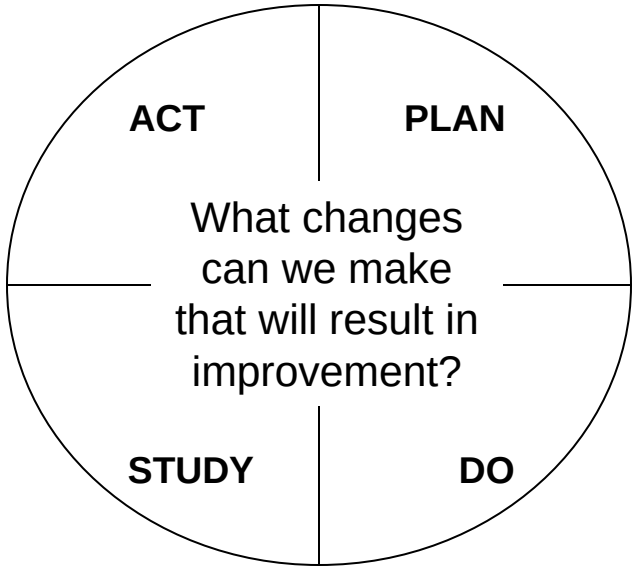


	Template	PEER 2500+	PROVINCIAL BC (Facility Births)
2001/02	0.00%	64.86%	65.11%
2002/03	0.00%	66.08%	65.95%
2003/04	0.00%	66.10%	65.14%
2004/05	0.00%	64.66%	64.52%
2005/06	0.00%	63.12%	63.01%

MODEL FOR RAPID-CYCLE IMPROVEMENT

What are we trying to accomplish? AIM

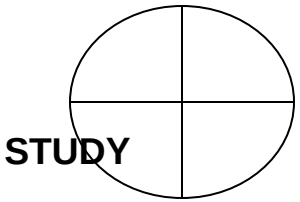
How will we know that a change is an improvement? CURRENT KNOWLEDGE



CYCLE FOR LEARNING AND IMPROVEMENT (PDSA CYCLE)

Quality Improvement Methods in Clinical Medicine. Plsek, Paul. Pediatrics 1999;103;203-214

FOCUS ON MEASUREMENT



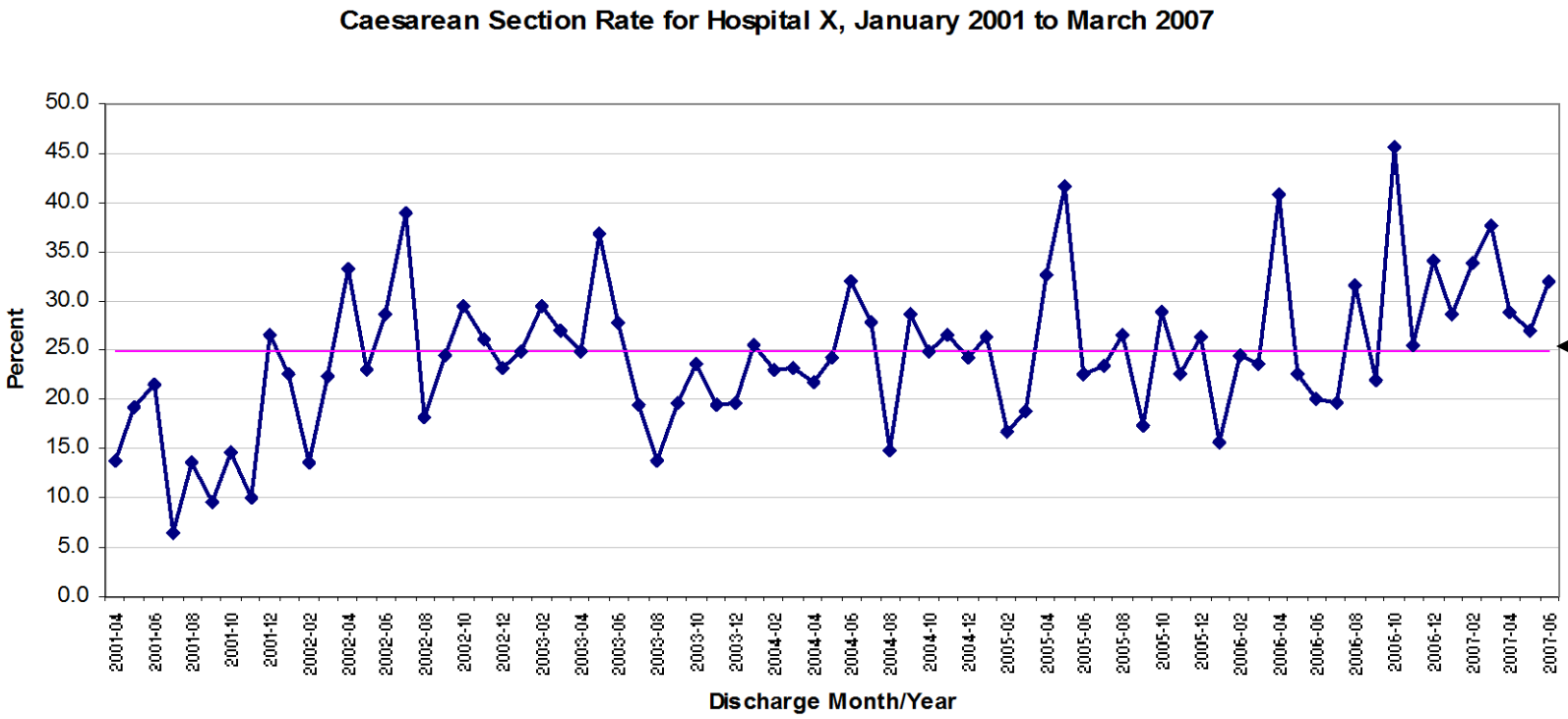
Measurement is:
- part of the 'Study' in the PDSA cycle
- provides feedback loop
- signals need for change or accomplishment of change (goal attainment)

Indicator monitoring examples:
- Run chart
- Control charts – trending one facility (or catchment area) over time
- Control charts – comparing facilities (or catchment area) to other 'like' facilities or catchment areas

Similar characteristics for each:
- Simple (relevant) aggregations – hospital, resident, catchment area – which is most useful?
- One indicator at a time
- Frequent data points

RUN CHART

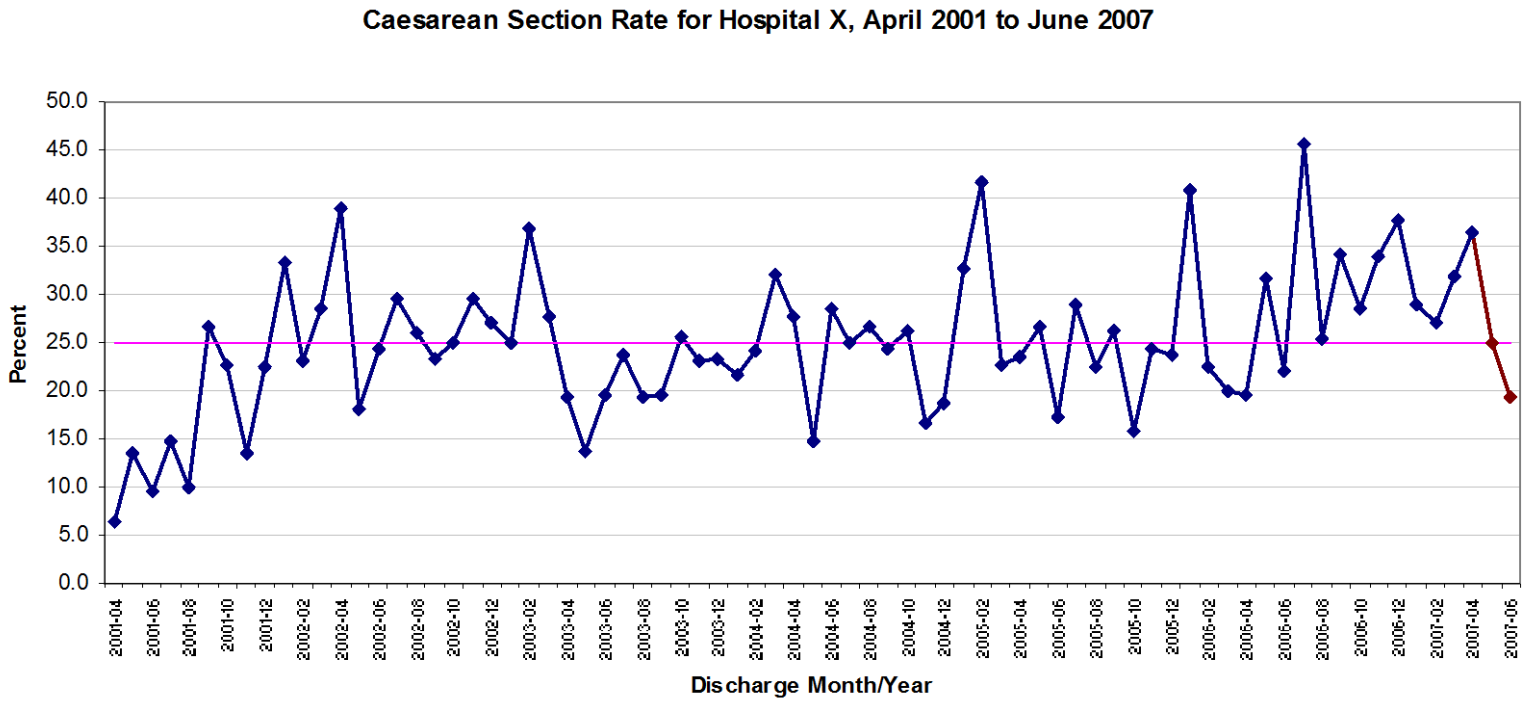
A run chart is a series of data points that can compare one group to itself over time and includes a mean or median value



Mean CS rate for Hospital X between January 2001 and March 2007 **(24.8%)**

RUN CHART – ADDING MORE DATA

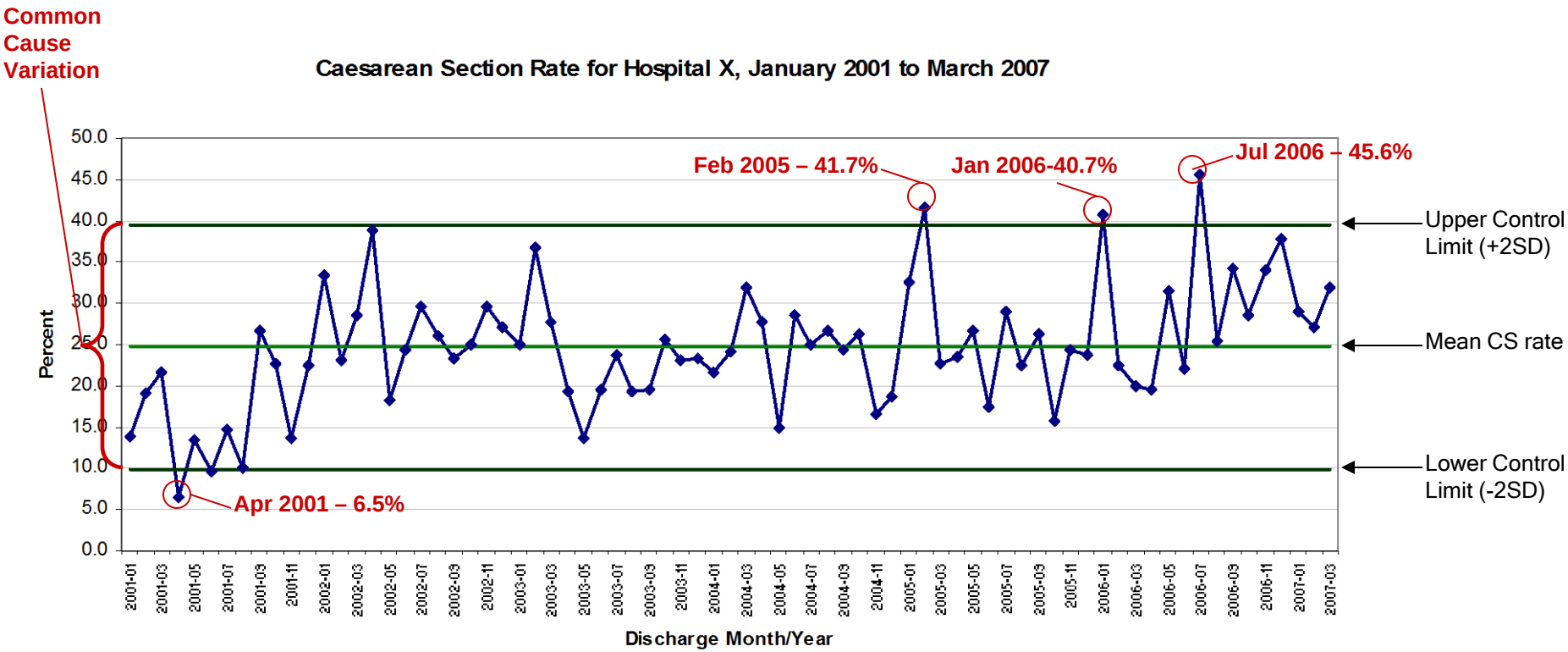
New values can be added to a run chart each reporting period (e.g. weekly, monthly, quarterly, annually, etc), depending on frequency of event and availability of data



Mean CS rate for Hospital X between January 2001 and June 2007 **(24.9%)**

CONTROL CHART

A process control chart is a series of data points (e.g., a run chart) with an overlay of statistical controls (e.g., mean, upper control limit, lower control limit)



CONTROL CHART – ADDING MORE DATA

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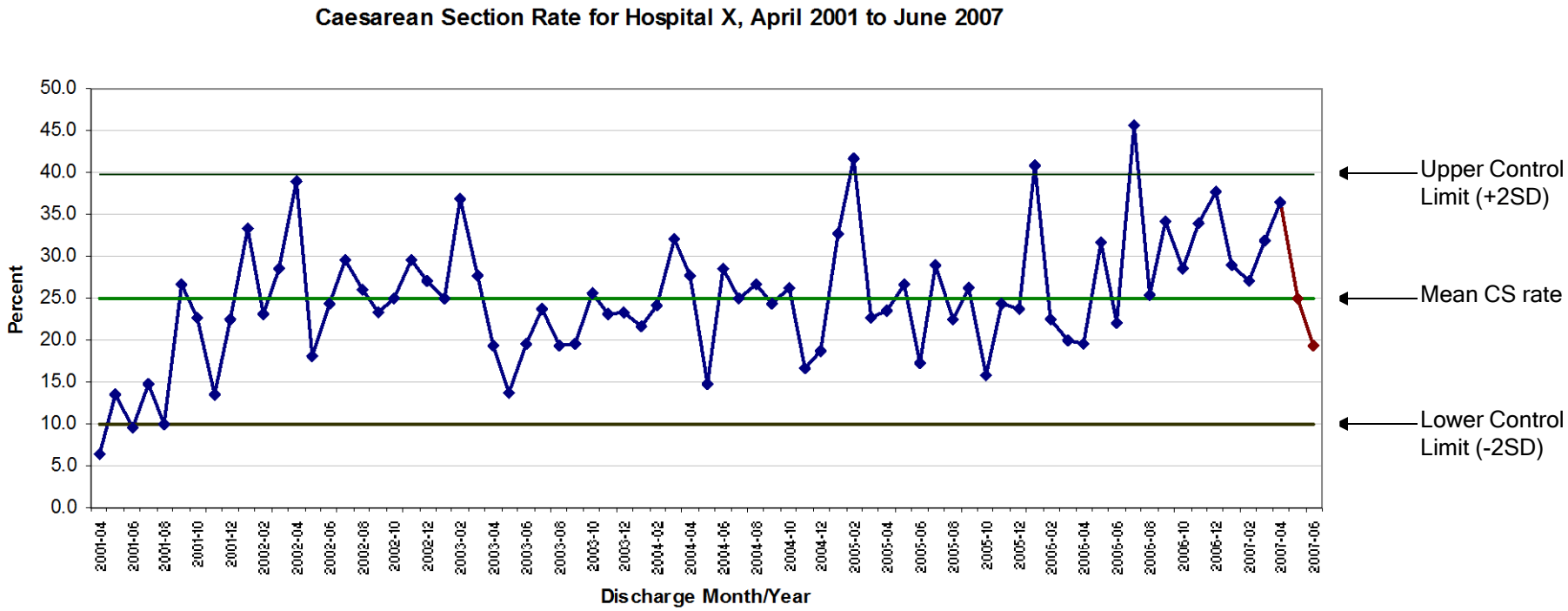
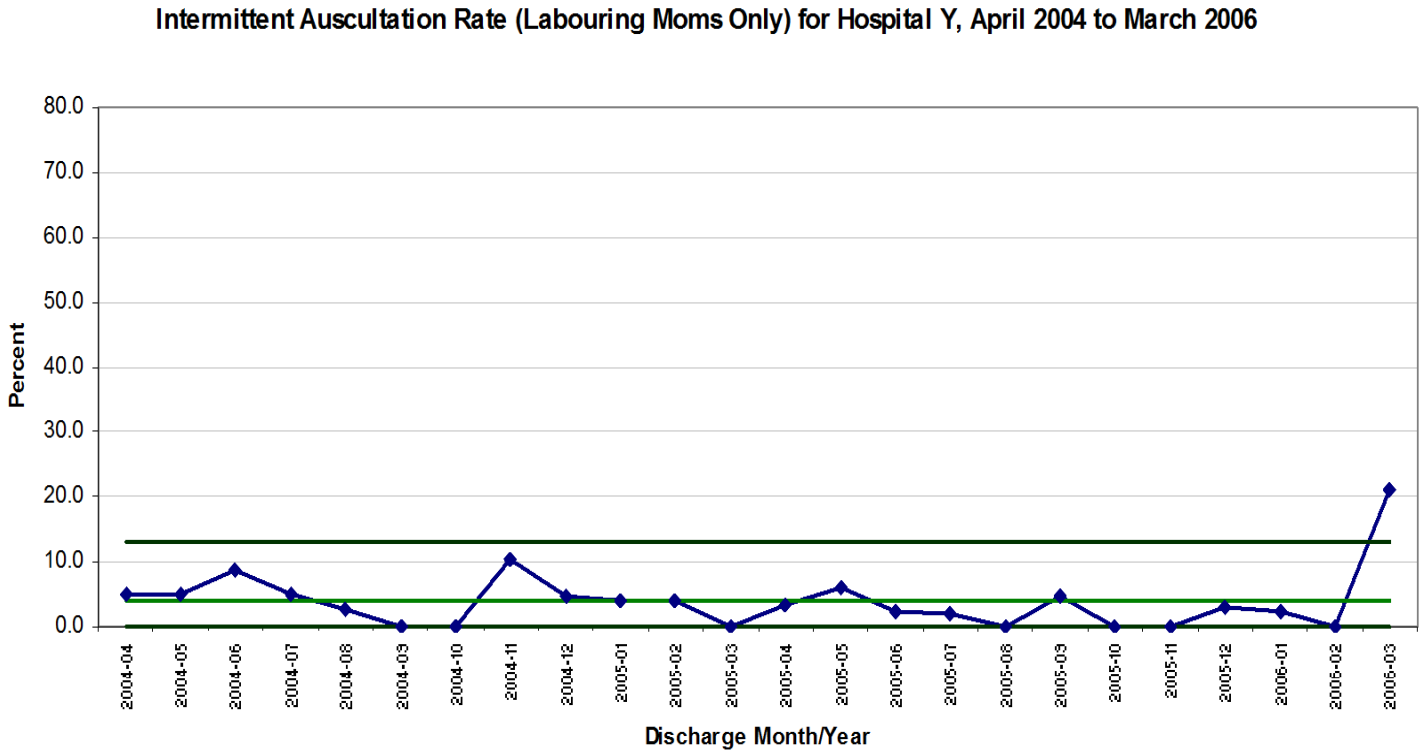


CONTROL CHART – INTERMITTENT AUSCULTATION

Intermittent auscultation (only) – change to an existing data field beginning in April/04



Upper Control Limit (13.2)

Mean (4.6)

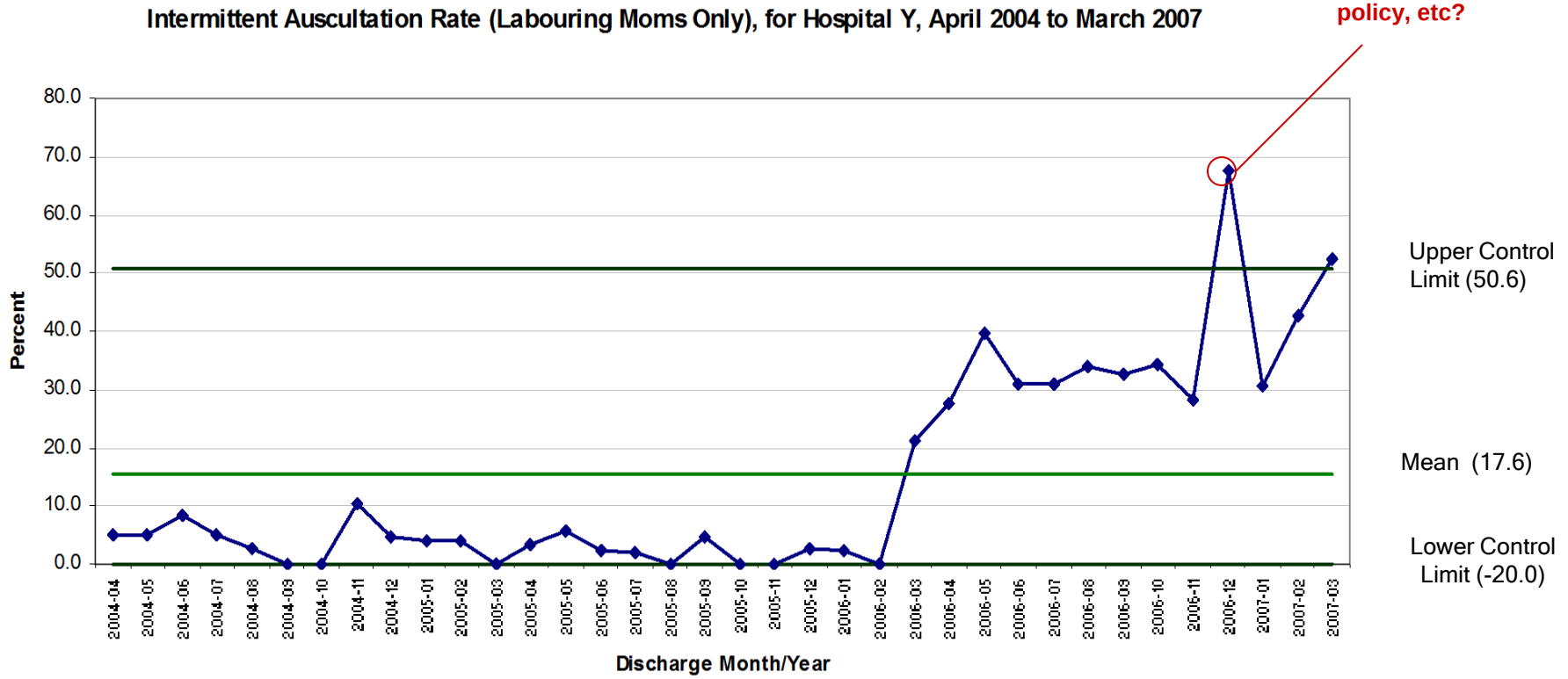
Lower Control Limit (-5.1)

CONTROL CHART - INTERMITTENT AUSCULATION

New values (one fiscal year) added

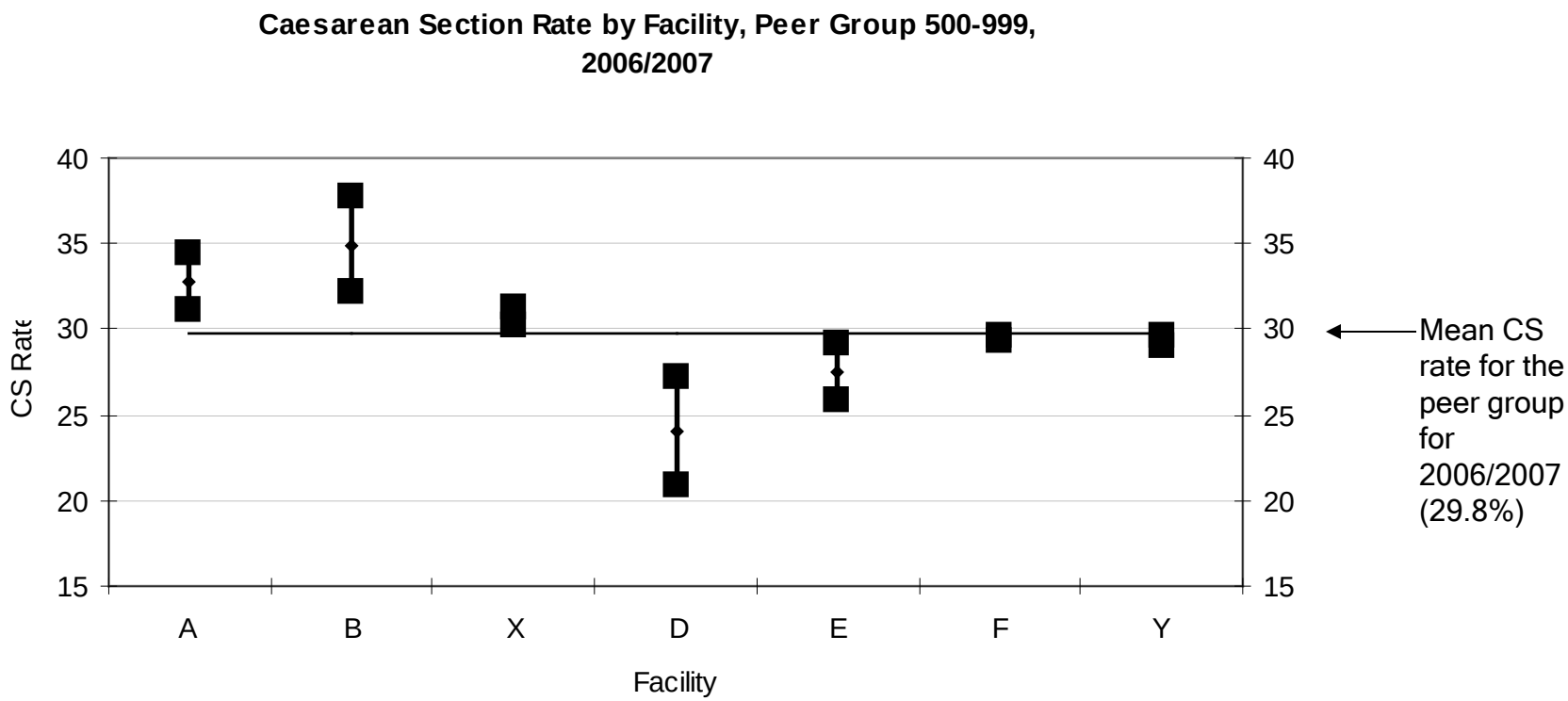
Outside of control limit, non-random cause:

New staff member, workshop, change in policy, etc?



COMPARING PEER GROUP FACILITIES AT ONE POINT IN TIME

Previous examples show how one facility performs over time; but, how do facilities compare to each other?



PUTTING IT TOGETHER

Determine:

- Indicators of interest to track
- Frequency of reporting (monthly, quarterly, etc) – can vary by indicator
- Population – e.g., report by hospital, resident LHA, catchment area, service level, etc.
- Comparison group

Can compile a score sheet or report card that identifies trends, flags, and comparisons

EXAMPLE: VARIATION FLAGGING SUMMARY REPORT

Detailed report for each hospital or catchment area with:

- Trend over time for each selected indicator
- Comparison to peer group or other similar population
- Identification of any flags
- Data detail as needed

VARIATION FLAGGING SUMMARY REPORT

DRAFT

HOSPITAL: Hospital Y - My Favourite Health Authority

DATE RANGE: January 1 - March 31, 2007

Indicator	Flag	Symbol	Target (Peer Group or Provincial or ?)
A. MATERNAL			
A1. Population			
INTERVENTIONS			
A2. Caesarean Section Deliveries	Red	▲	20%
A3. Assisted Vaginal Deliveries	Green	■	5%
A4. Spontaneous Vaginal Deliveries	Light Green	◊	75%
A5. Induction of Labour	Yellow	●	10%
A6. Attempted VBAC	Orange	♣	60%
ADMINISTRATIVE			
A7. Postpatum Average Length of Stay - Vaginal	Green	■	< 48 hours
A8. Postpatum Average Length of Stay - C/S	Yellow	●	< 72 hours
B. NEWBORN			
B1. Population			
B2. Low Birth Weight (<2500 grams)	Red	▲	5%
B3. Apgar <7 at 5 Minutes	Yellow	●	2%
B4. IPPV/ETT	Orange	♣	2%
B5. Stillbirth	Green	■	0%

EXAMPLE: VARIATION FLAGGING DETAILED REPORT

Hospital Y
My Favourite Health Authority

Current Quarter: Jan/Feb/Mar 2007
Previous Quarter: Oct/Nov/Dec 2006

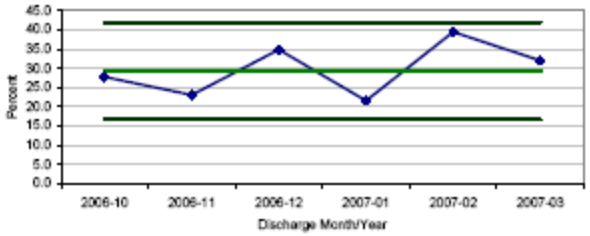
A1. Total maternal discharges:

	Hospital	Peer Group	BC
Previous Quarter	131	1,145	9,980
Current Quarter	139	1,139	9,780
Trend	INCREASING	DECREASING	DECREASING

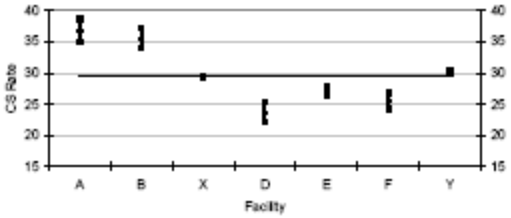
A2. Caesarean section rate

	Hospital	Peer Group	BC
Previous Quarter	28.2%	30.1%	31.3%
Current Quarter	30.2%	29.7%	30.7%
Trend	INCREASING	DECREASING	DECREASING

Caesarean Section Rate for Hospital Y, October 2006 to March 2007



Caesarean Section Rate by Facility, Peer Group 500-999,
January to March 2007



Conclusions:

- Caesarean section rates at hospital Y do not vary significantly in the last six months (e.g. they are within the control limits
- Hospital Y has a higher CS rate than the peer group rate for the current quarter (this difference is significant)