



Promoting Pharmacoepidemiology to Health Care Professionals and Institutions

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How do I Promote Pharmacoepidemiology?

- Start with a **KEY PROBLEM** that needs to be addressed - key to HCPs and/or Institution
- Obtain funding to do the work
- **SHOW PRAGMATIC BENEFIT**
- Now ask for their \$\$\$ for the next study

Michael Smith Foundation for Health Research - Research Unit



**Pharmaceutical Outcomes
& Policy Innovations**

POPi Researchers

Qualified Health Researchers (QHRs)

- Bruce Carleton - UBC, CFRI
- Stuart MacLeod - CFRI, PHSA, UBC
- Robert Peterson - ChildHealthBC, UBC (new in 2006)
- Charmaine Dean - SFU (new in 2006)
- Craig Mitton - UBC Okanagan (new in 2006)

Associated Health Researchers (AHRs)

- Robert Levy - UBC, St. Paul's Hospital
- Adrian Levy - UBC, St. Paul's Hospital
- Deborah Marshall - McMaster (new in 2006)
- Bob Prosser - UBC

POPi Mission

To foster pharmaceutical policy innovation through proactive policy research, training and knowledge translation concerning the effectiveness, safety and cost management of prescription drugs

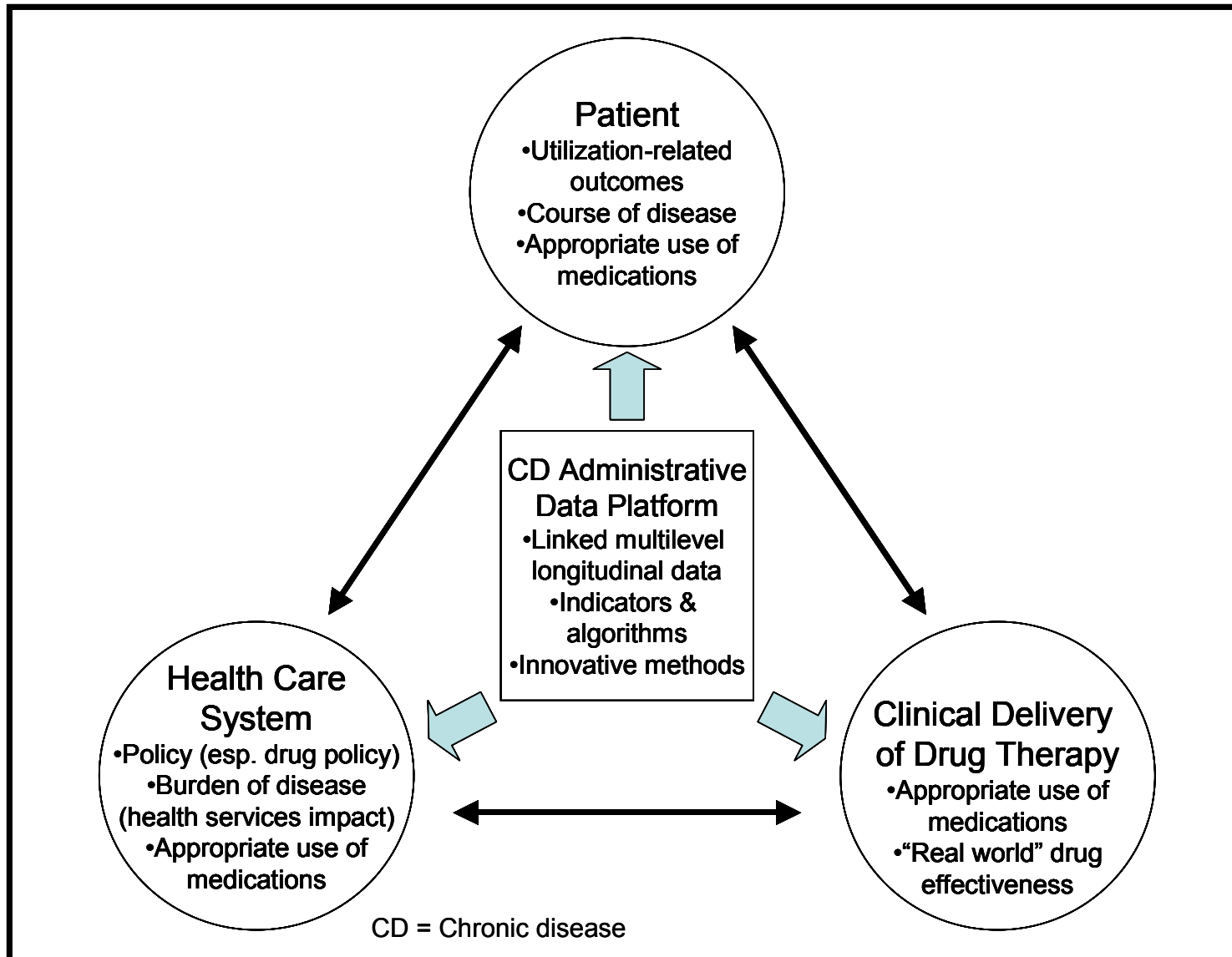
Pharmacoepidemiological Opportunities in British Columbia

- Large province - about 4x Texas
- 4.5 million residents
- Comprehensive health information: all hospitalizations, medical service visits, prescription drug use, mortality data and emergency services use

The Big Asthma Picture

- Global disease burden of asthma affects 300 million people, similar to diabetes and schizophrenia
- Affects 1:8 children and 1:16 adults in Canada
- Well accepted that heavy burden placed on health services delivery is due to preventable causes
- Respiratory disease burden is only going to get worse - climate change, increasing prevalence of forest fires, decreasing air quality: A particular issue for BC
- Current research describes for many Canadians, asthma therapy is suboptimal

POPi's Asthma Research Program Framework



Asthma Administrative Data Platform

Linked Multilevel Longitudinal Data

PATIENT

- ☐ Sex and Date of birth
- ☐ Date & Cause of death (if applicable)
- ☐ Income quintile
- ☐ Residential LHA & MSP enrollment status (each year)
- ☐ Annual ADG & ACG comorbidity variables

SERVICE DELIVERY

- ☐ Physician billing records
- ☐ Hospital discharge abstracts
- ☐ PharmaNet drug purchase records (from community pharmacies, covering all BC residents)
- ☐ Annual continuity of care measures (COC & UPC) for each patient

CONTEXTUAL

- ☐ Comprehensive LHA level health service utilization data (annual, for the general BC population)
- ☐ LHA level health status & other health measures
- ☐ Environmental data (Future)

Constructed Indicators & Algorithms (with validation & sensitivity testing)

Examples: Case definition for treated asthma (LCM), Drug regimen appropriateness criteria

Appropriate Application (& Development) of Innovative Methodologies

Examples: Multilevel spatial models, Spatial frailty models, Discrete Event Simulation

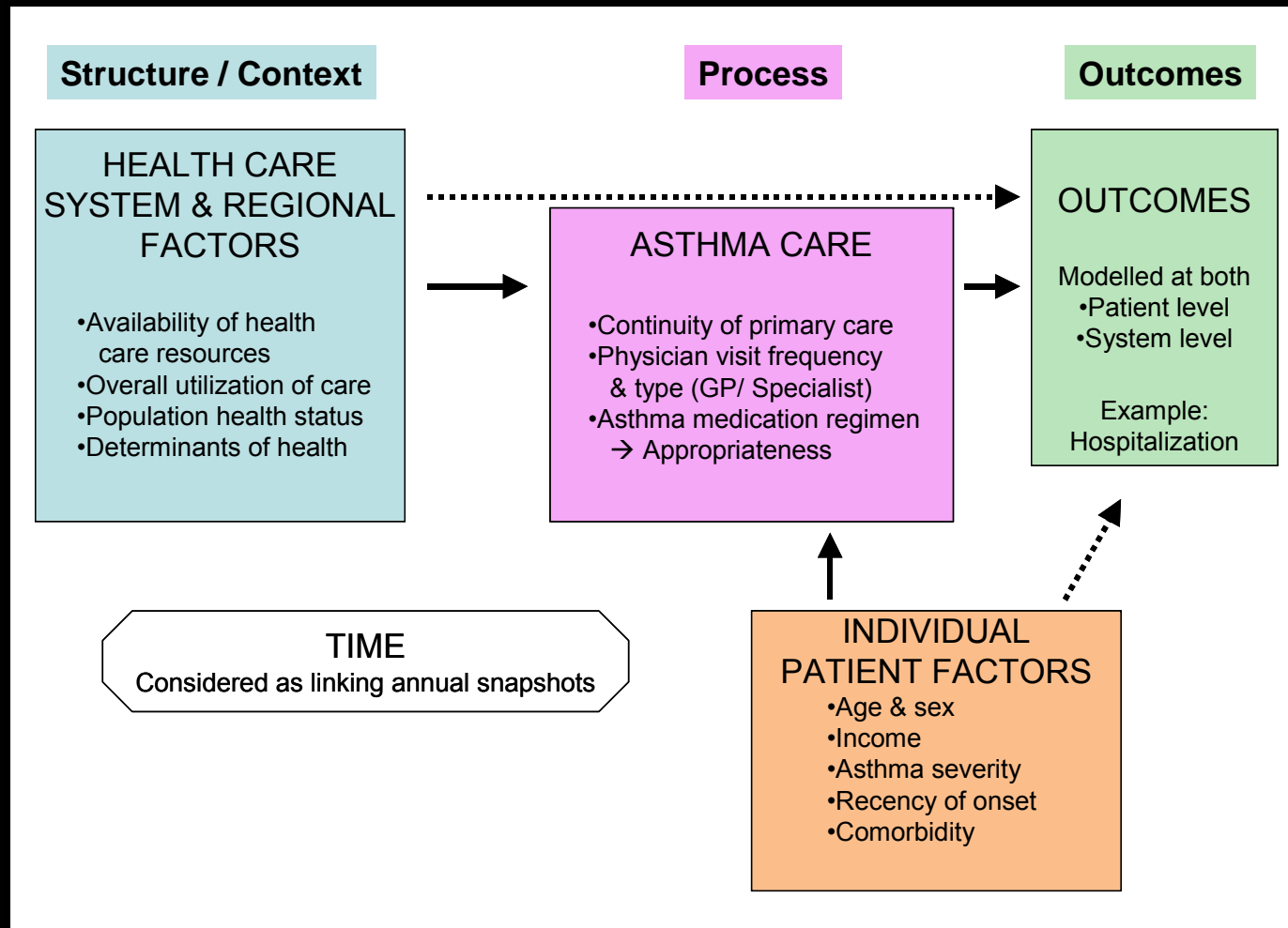
LHA = Local Health Area ADG = Aggregated Diagnosis Group ACG = Adjusted Clinical Group MSP = Medical Services Plan COC = Continuity of Care UPC = Usual Provider of Care LCM = Latent Class Models

Asthma Data Platform

Data Sources

Data Set	Dates	Content
Medical Services Plan (MSP) Billing Records	April 1, 1993 Š March 31, 2001	<ul style="list-style-type: none"> • Services provided to MSP-covered individuals (fee-for-service billings only)
Discharge Abstracts Database (DAD) of Hospital Separations	April 1, 1993 Š March 31, 2005	<ul style="list-style-type: none"> • A file of hospital separations (discharges, transfers, and deaths) of inpatients and day surgery patients from acute care hospitals in B.C.
Vital Statistics	March 31, 1993 -April 01, 2005	<ul style="list-style-type: none"> • Date of death (year, month, day) & cause of death
PharmaNet Drug	April 1, 1996 Š March 31, 2005	<ul style="list-style-type: none"> • Records of all medications purchased in BC community pharmacies, regardless of payer
Client Registry	1996 Š 2005	<ul style="list-style-type: none"> • Sex and date of birth • LHA, Census enumeration area and forward sortation area of patient's residence each year
Income Quintile	1996 Š 2005	<ul style="list-style-type: none"> • A categorical variable assigned annually to each patient based on his/ her residential postal code.
Comorbidity Measures	1996 Š 2005	<ul style="list-style-type: none"> • Annual sets of ACG and 34 ADG codes (binary indicators) for each patient based on annual application of Johns Hopkins ACG case mix algorithm to MSP and DAD records
Continuity of Physician Care Measures	1996 Š 2005	<ul style="list-style-type: none"> • COC and UPC

Graco Medical for Asthma Outcomes



Defining a Cohort to Study

- Data supplied - 2.5 Million BC patients (over 5 yrs) based on respiratory ICD 9 codes in the medical services and hospitalization database files
- “Treated Asthma” cohort - 190,000 patients
 - age 5-55 yrs
 - 1 hospital visit, OR
 - 2 physician visits OR
 - 3 prescriptions for asthma treatment
- Each patient’s data for up to 10 years

Selection of Treated Asthma Patients

Perform initial query to draw Source Population

- Age: 5 or over in the period 1993/4/1 to 2001/3/31 **AND**
- >1 MSP visit in this period with an ICD9 code from the set {466, 472, 490, 491, 492, 493, 494, 496} **OR**
- >1 hospital visit in the period with one of these ICD9 codes in any of the 16 diagnosis fields



Obtain all MSP, DAD & PharmaNet records from 1996/4/1 with respiratory ICD-9 codes / asthma-related DINs

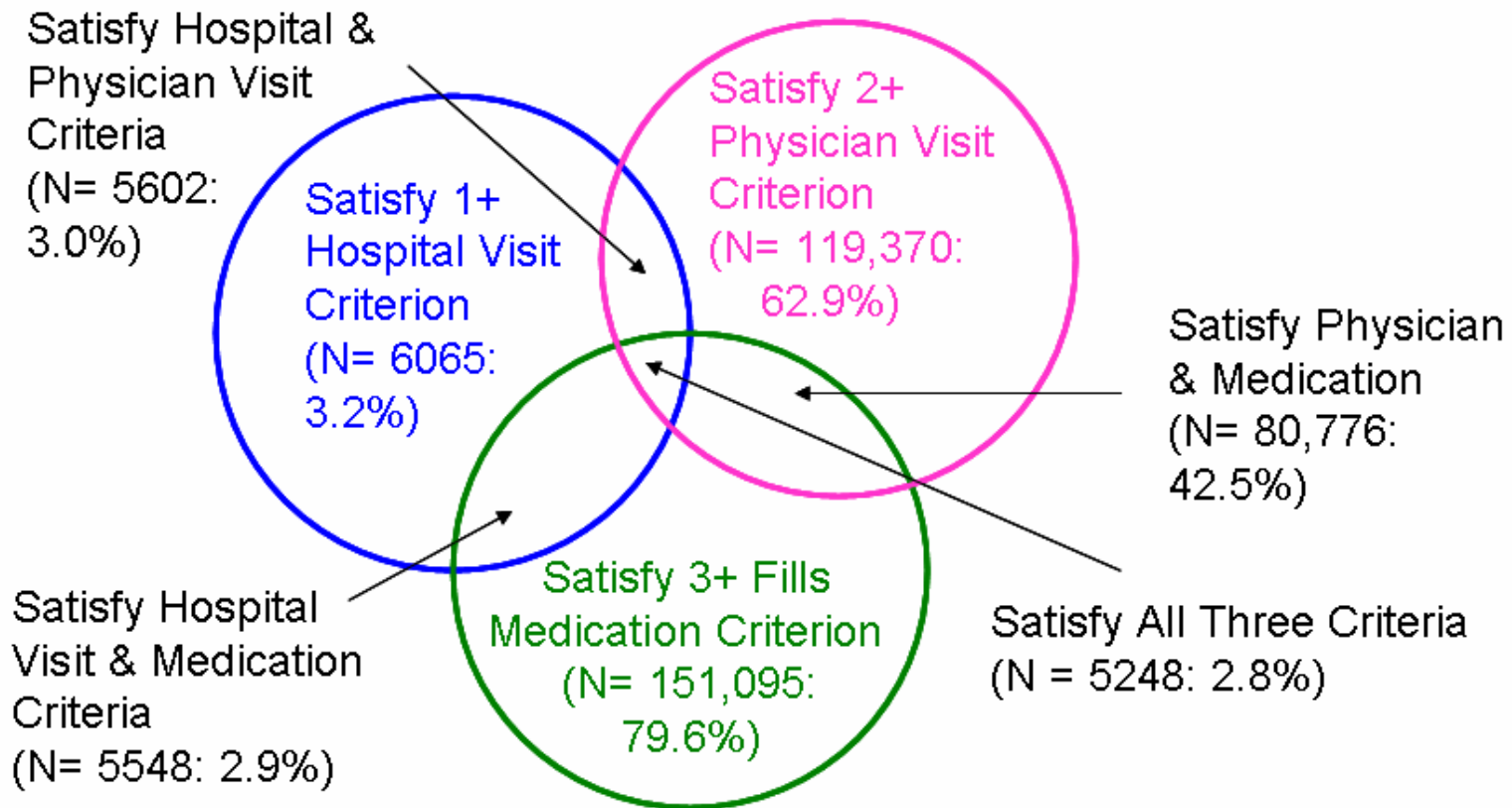


Apply validated selection criteria using a 12-month moving window to obtain Treated Asthma Population

- 2+ physician visits with ICD9 = 493 in 12 month interval (between 5th & 55th birthdays and between 1996/4/1 and 2001/3/31) **OR**
- 1+ hospital separations in the study interval (with admission between 5th and 55th birthdays) having a principal diagnosis of 493 **OR**
- 3+ asthma medication purchases within 12 months (between 5th and 55th birthdays and between 1996/4/1 and 2001/3/31)

Distribution of Treated Asthma Patients by Selection Criteria They Satisfy

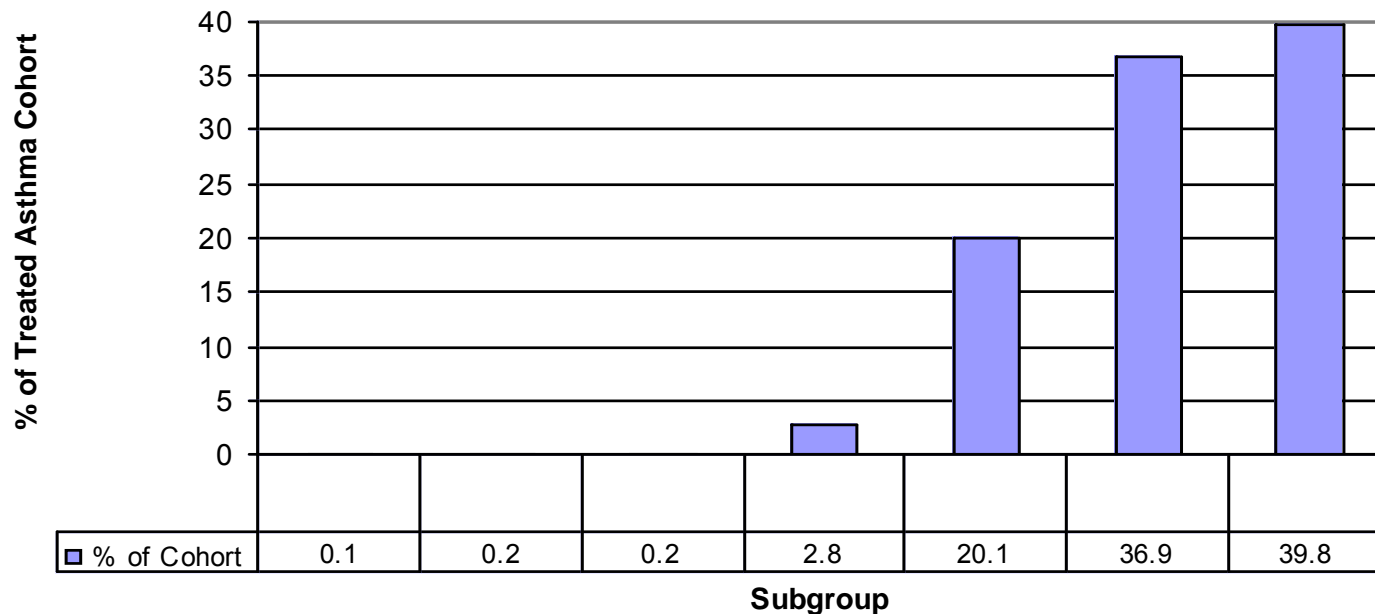
Satisfy At Least One of the Three Inclusion Criteria (N = 189,852: 100%)



Satisfy Initial Query (N = 1,889,877)

How Patients get into the “Treated Asthma” Cohort

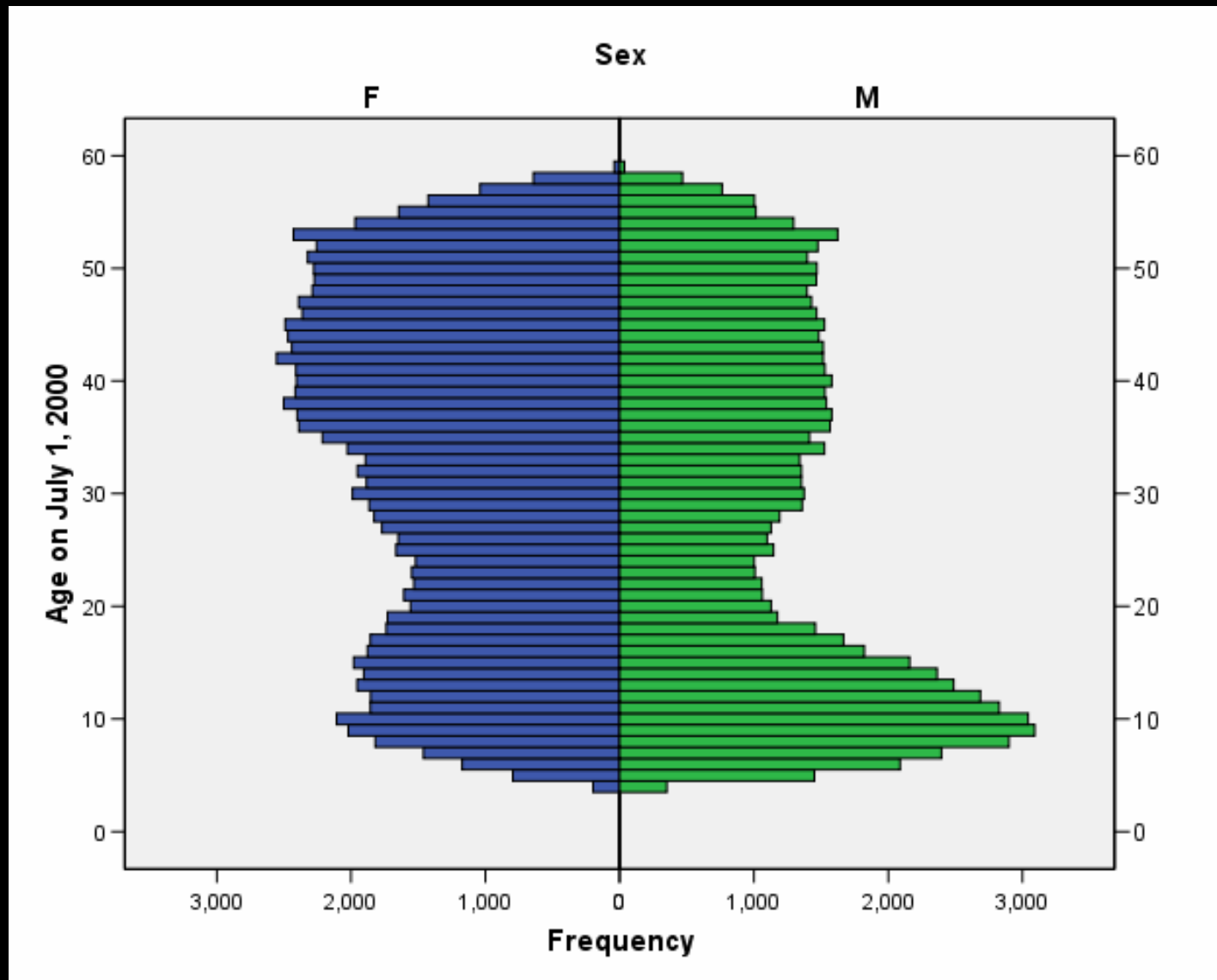
Proportions of Cases Meeting Criteria



Demographic Characteristics of the Cohort

- Age
- Gender
- Geographic region

Description of BC Treated Asthma Patients Age X Sex (2000/01)



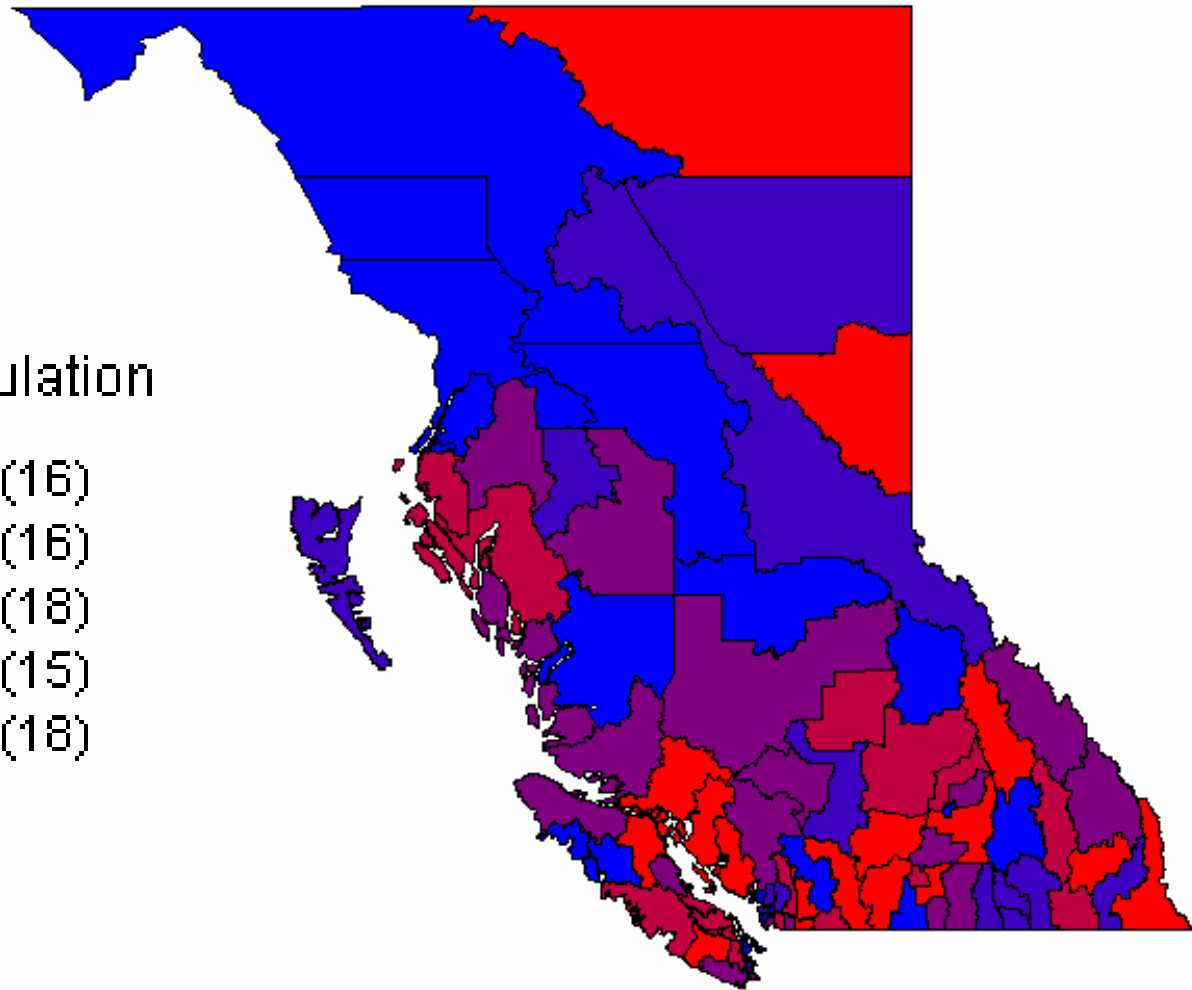
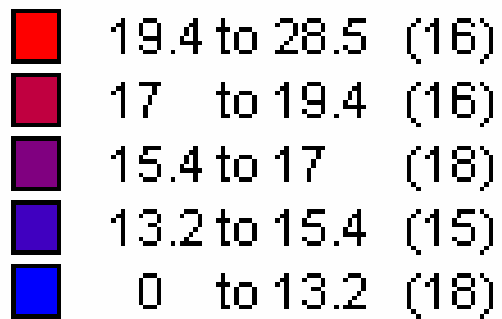
Three Key Findings: I

Prevalence of treated asthma differs significantly
among Local Health Areas (LHAs) in BC

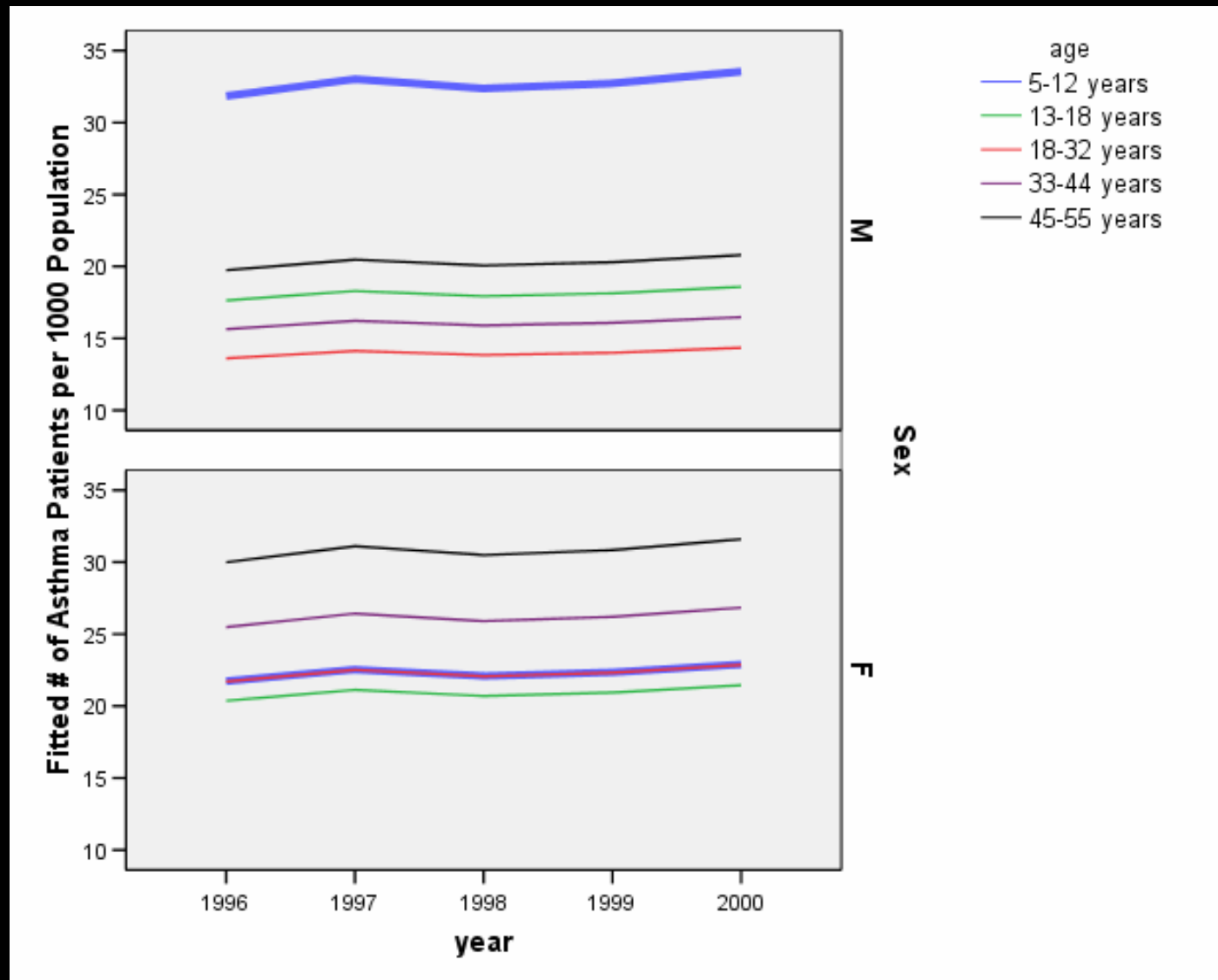
Asthma Prevalence by LHA

Males 19 to 44 (2000/01)

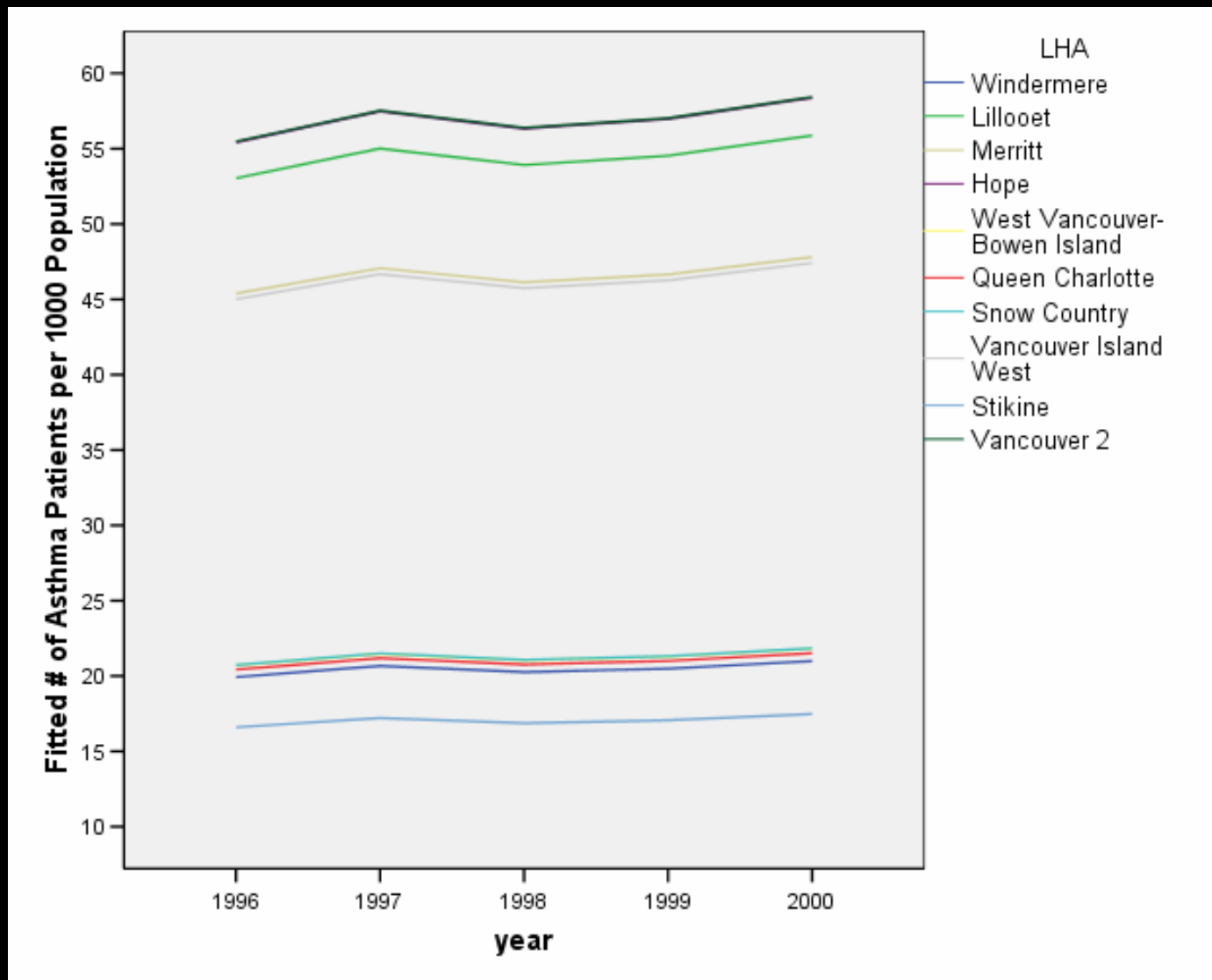
Cases / 1000 Population



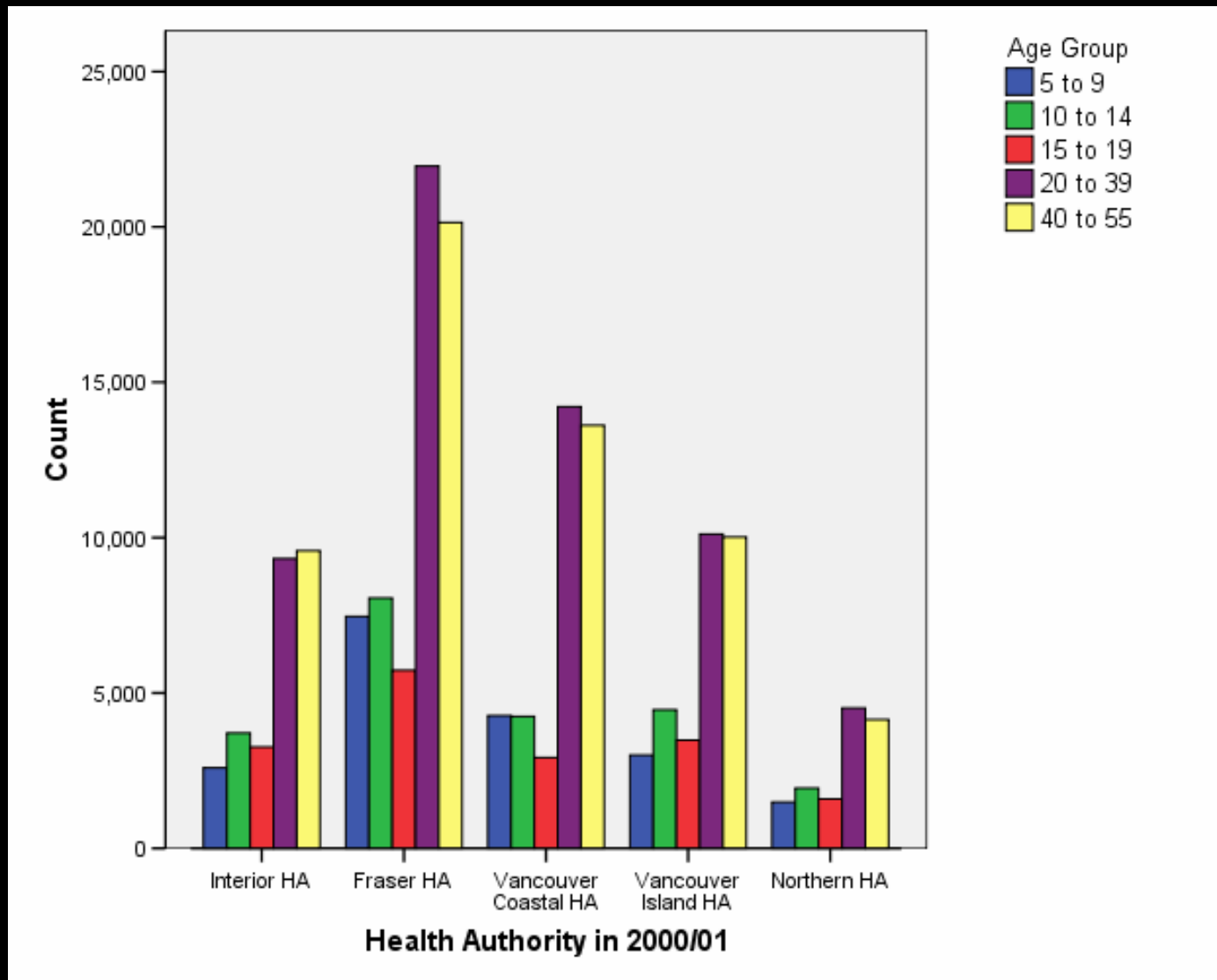
Estimated Treated Asthma Prevalence in BC by Age and Sex (1996/97–2000/01)



Trend in Estimated Treated Asthma Prevalence by LHA (Women, 45-55 Years)



Distribution of the Treated Asthma Population by Health Authority (2000/01)

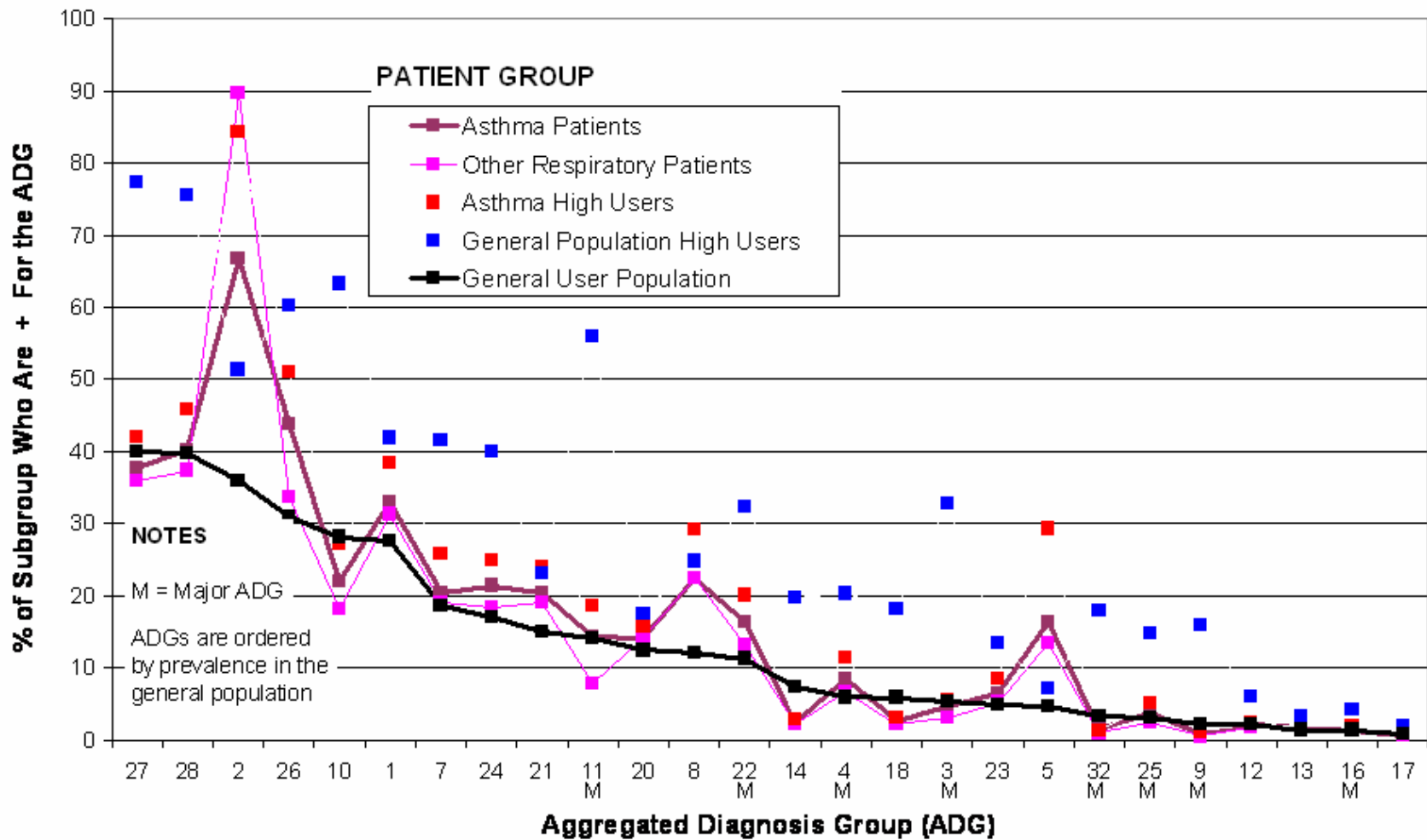


Three Key Findings: II

The probabilities of hospitalization and high use of physician services for asthma are highly dependent on specific age and comorbidities

which are amenable to specific improvements in intervention strategies to reduce hospitalization and physician services

Comorbidity Profiles of Asthma Patients and Other Patient Groups (1996/97)



Comorbidity and Health Services Utilization

Key Findings

- Time-limited minor infections (ADG 2) INCREASE THE ODDS OF HOSPITALIZATION by 95% for adults and 39% for children.
- Adults with allergies (ADG 5) are 21% LESS LIKELY TO BE HOSPITALIZED than those without.
- Children with allergies are 45% MORE LIKELY TO BE HOSPITALIZED than those without.
- Allergies or minor infections INCREASE THE ODDS OF HIGH USE OF PHYSICIAN SERVICES by > 4-fold

Unmet Need: Individualized 'asthma action plans' to prevent severe exacerbations at the onset of minor infection (URTI) or allergic symptoms.

Three Key Findings: III

There has been improvement in asthma drug regimen appropriateness, but it is inconsistent across age groups, genders and LHAs

Drug Optimality Matrix for Adult Asthma Drug Regimens

		Inhaled Corticosteroid (ICS) Use (Beclomethasone Equivalents)			
		0 mcg/ day	>0 & ≤ 500 mcg / day	> 500 & ≤ 1000 mcg / day	>1000 mcg / day
Inhaled Short-acting Beta Agonist (SABA) Use (Salbutamol Equivalents)	≤ 2 canisters / year	Appropriate regimen	Appropriate regimen	Unclassified regimen	Inappropriate regimen
	3 – 4 canisters / year	Appropriate regimen	Appropriate regimen	Unclassified regimen	Inappropriate regimen
	5 – 8 canisters / year	Unclassified regimen	Unclassified regimen	Unclassified regimen	Unclassified regimen
	> 8 canisters / year	Inappropriate regimen	Inappropriate regimen	Inappropriate regimen	Unclassified regimen



Appropriate regimen

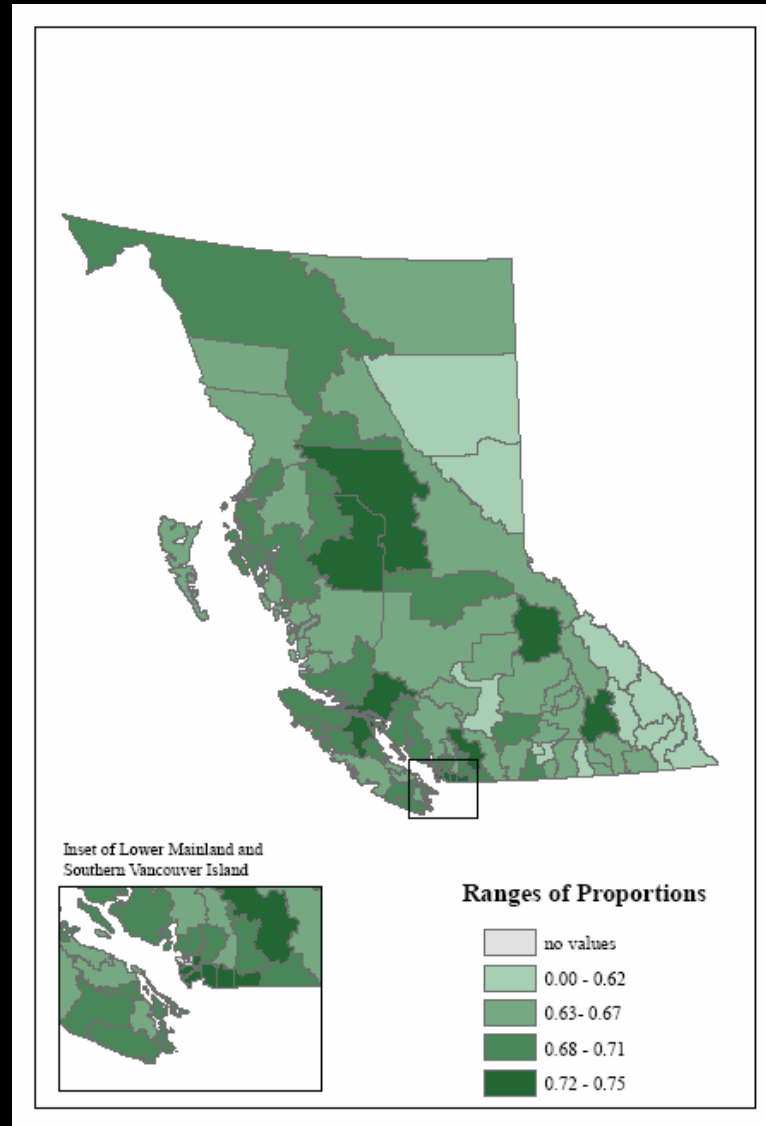


Unclassified regimen



Inappropriate regimen

Map of Fitted LHA Proportions of Users with Optimal Asthma Drug Regimens



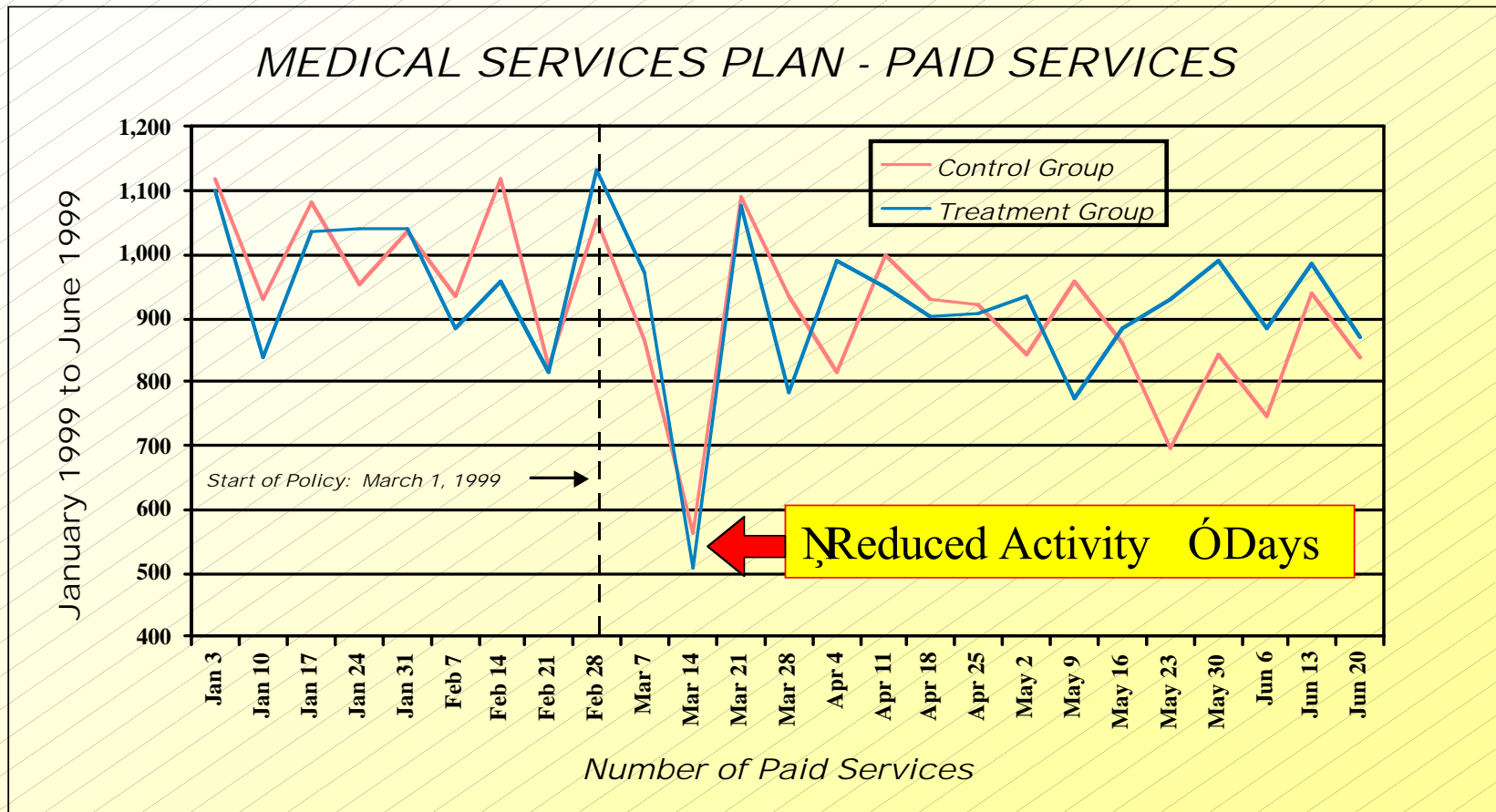
Next Steps in Asthma PE Research

- Burden of illness evaluation for paediatric asthma in British Columbia
- Pragmatic trial in Children's Hospital Emergency Department (ED) - oral steroids for NEXT exacerbating event
- Knowledge transfer to EDs across BC

Pharmacoepidemiology Can Strengthen or Refute Drug Effectiveness Evidence

- Effectiveness evidence is generally lacking when drugs are approved for market
- Bisphosphonate or teriparatide for osteoporosis?
 - No evidence to support effectiveness of teriparatide for patients who fail adequate standard therapy; effect occurs by different mechanism
 - Choice between \$160+ or \$10,000 per year [teriparatide: lifetime max. 18 months of therapy]

Need for controls: Coincidental events & trends.



Preparation of Students

- We train MSc, PhD students and Post-Doctoral Fellows in pharmacoepidemiology and related sciences
- Coursework is readily available in epidemiologic methods at the University of British Columbia which has 45,000 students

Canada/Mexico Collaboration

- Training of Mexican students in Canada is entirely possible
- Post-docs most needed
- PhD students also needed
- Would like to build companion exchange programs in pharmacoepidemiologic methods and analysis, conduct comparative population studies and improve the transfer of knowledge gained from PE research

Contact Information

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