

ESTIMATING POPULATION BENEFITS USING A RISK TOOL:

AN EXAMPLE OF HIGH RESOURCE USERS IN
ONTARIO

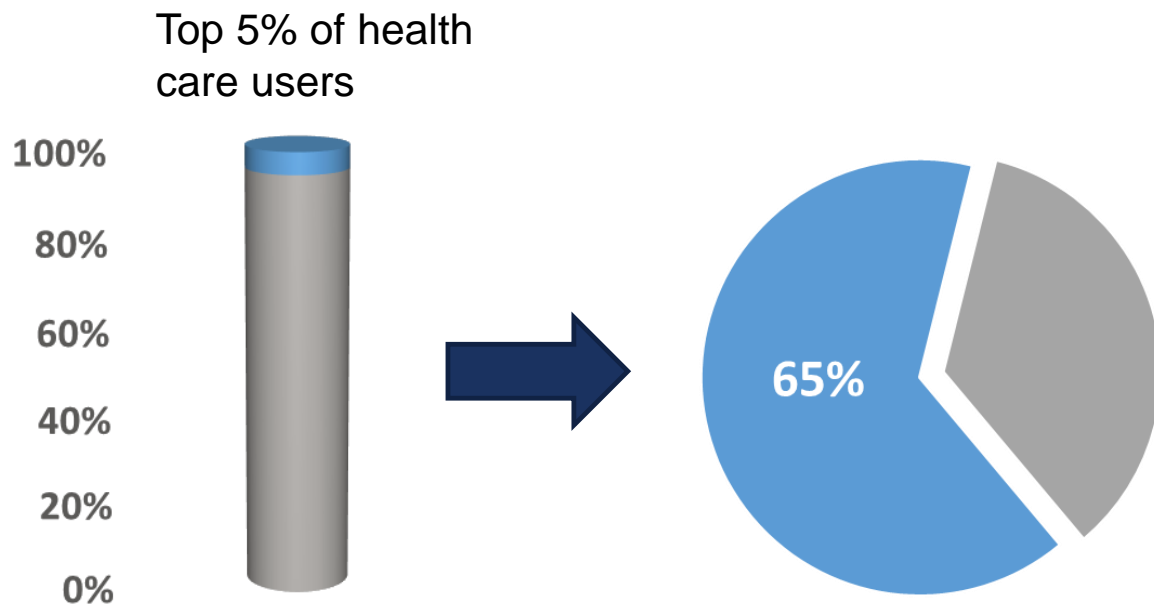
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APHEO November 27, 2018

HIGH RESOURCE USERS OF HEALTH CARE SERVICES

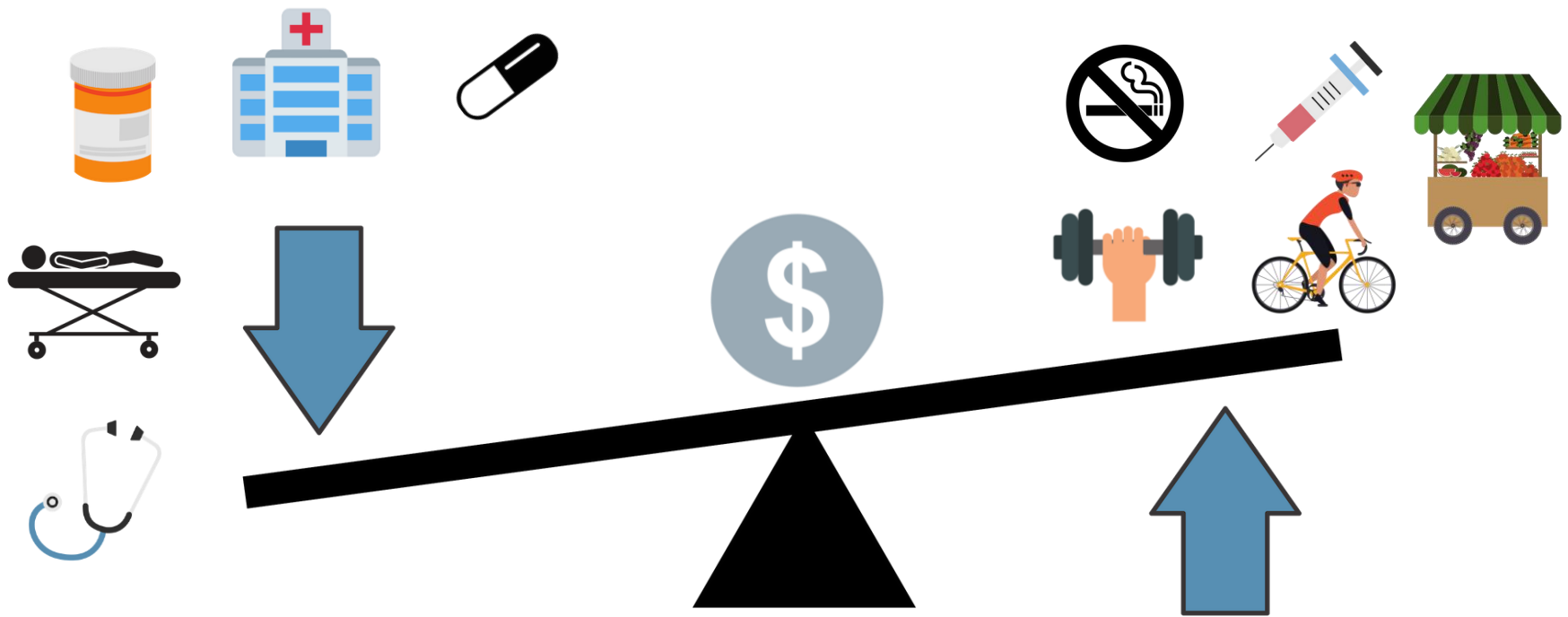
- The majority of health care spending is concentrated among a small proportion of the population¹



Accounted for **65%** of total health care costs in Ontario in 2009 to 2011

PREDICTING HIGH RESOURCE USERS

- Tools that can predict who will become a high resource user (HRU) in the future are important for informing intervention strategies
- Existing predictive models of HRUs traditionally:
 - ▶ Are for applications at the individual patient-level
 - ▶ Are for use in a specific health sector
 - ▶ Require data inputs that are not widely accessible
 - ▶ Do not consider upstream determinants of health

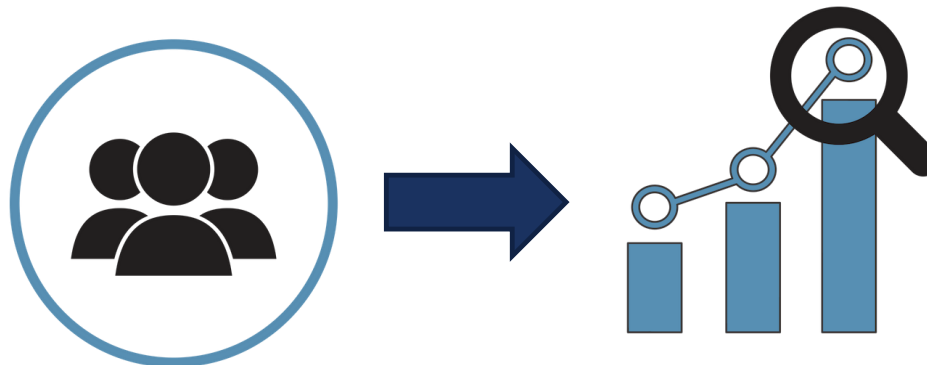


ROLE OF PUBLIC HEALTH IN PREVENTING HIGH RESOURCE USERS

HIGH RESOURCE USER POPULATION RISK TOOL (HRUPoRT)

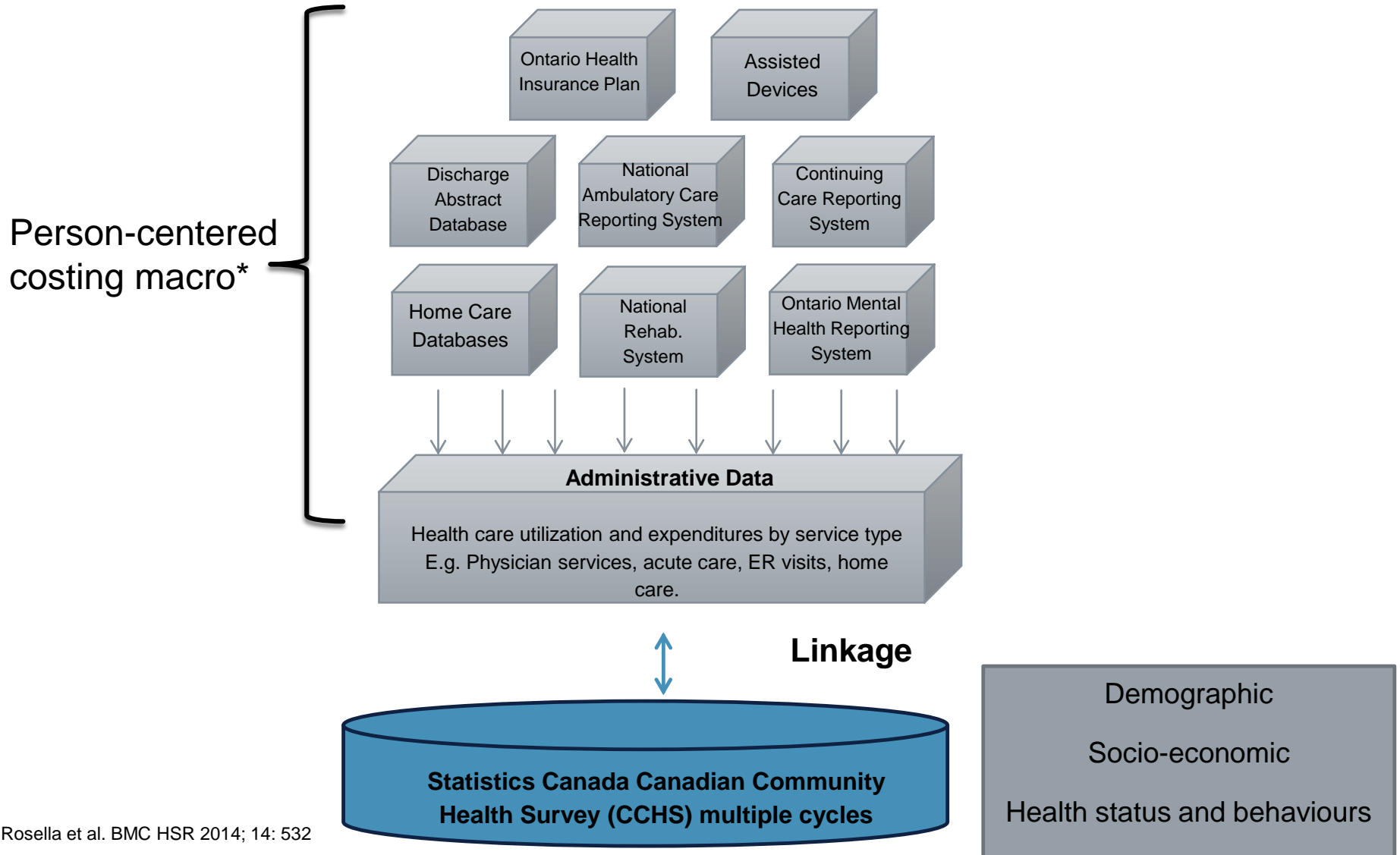
A population-based predictive model of adults who will become **the top 5% of health care users over 5-years**, based on self reported clinical, sociodemographic, and health behaviour information in population survey data for the purpose of:

- ▶ Understanding how future HRUs will be distributed in a population
- ▶ Identifying population targets for prevention strategies
- ▶ Informing health resource planning



Data Linkage

Health Care Utilization Data



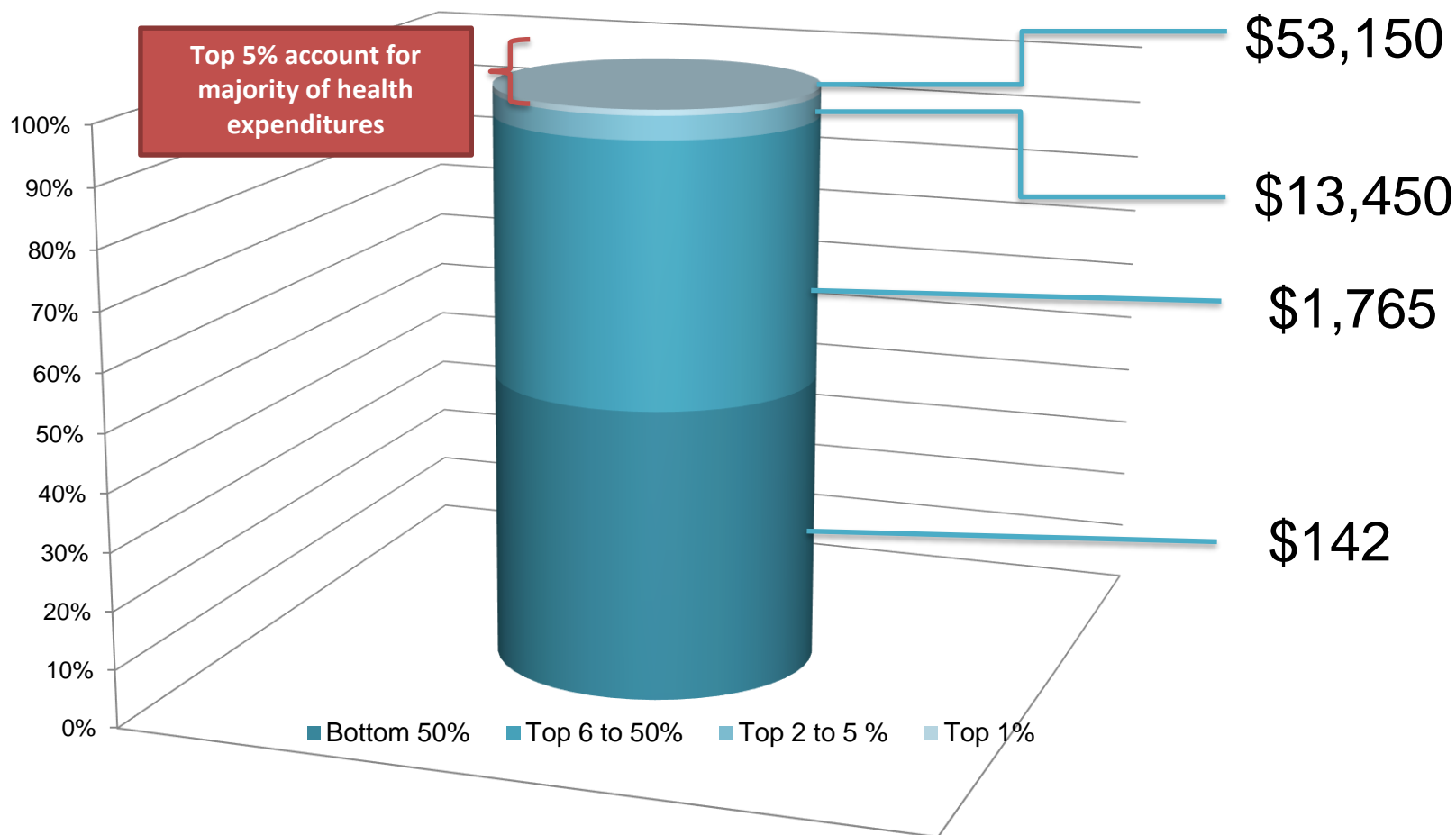
Rosella et al. BMC HSR 2014; 14: 532

*Wodchis et al. A 3-year study of high-cost users of health care. CMAJ, 2015

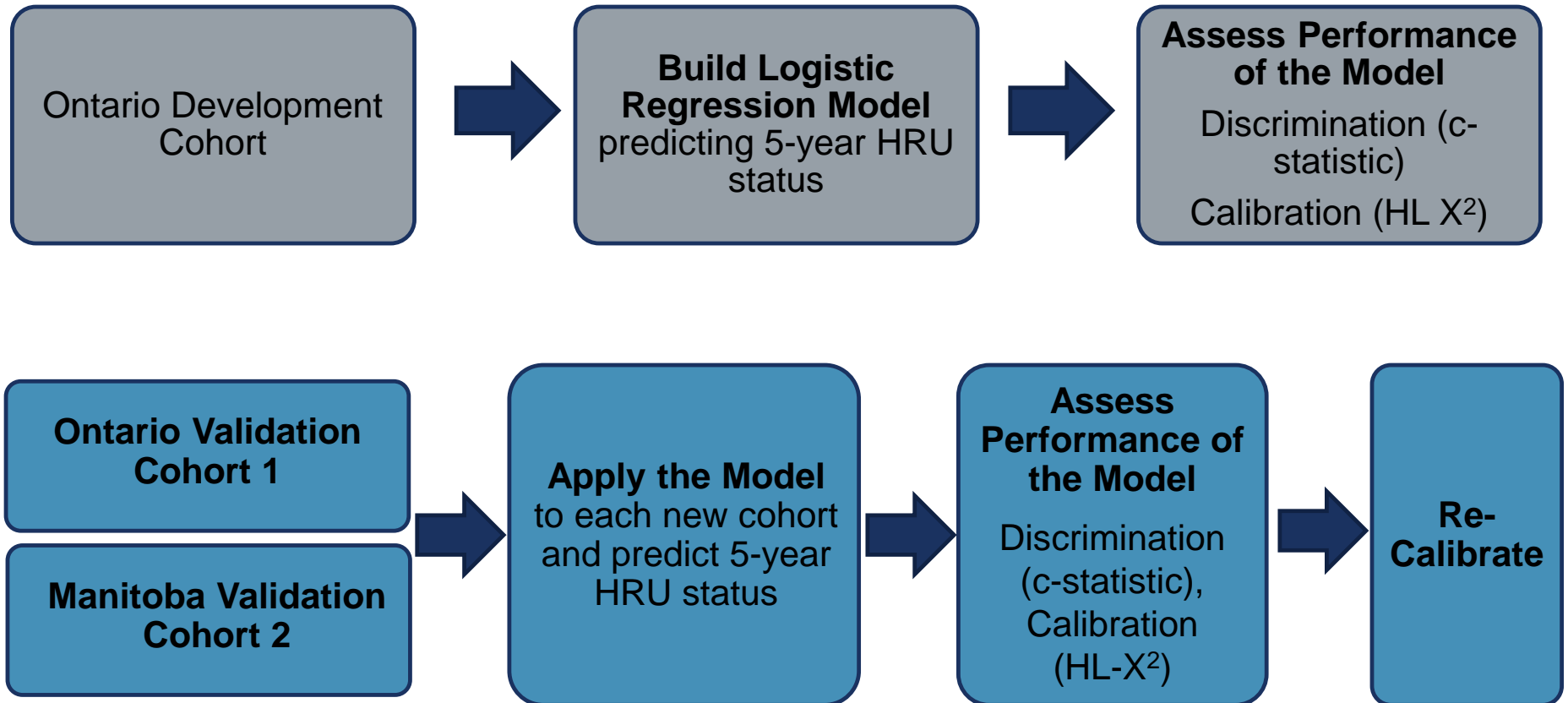
HEALTH CARE RESOURCE UTILIZATION IN ONTARIO

Distribution of health care expenditures in an Ontario cohort for one year

Avg annual per person expenditure



HRUPoRT MODEL DEVELOPMENT & VALIDATION PROCESS



HRUPoRT PREDICTOR VARIABLES

Health Status

- Perceived health
- Chronic condition

Socio-demographic

- Age group
- Sex
- Ethnicity
- Immigrant status
- Household income
- Food security

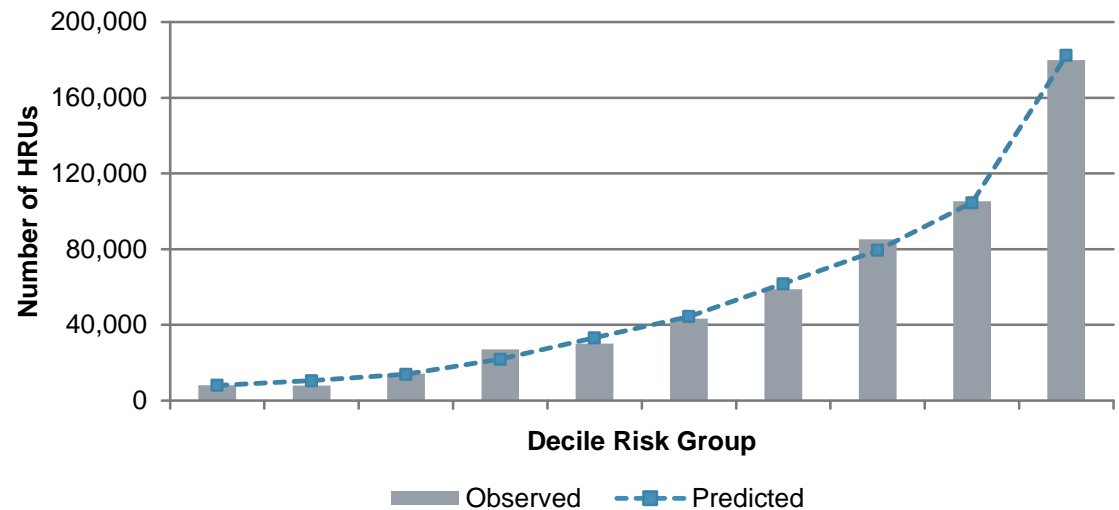
Behavioural

- Body Mass Index
- Smoking status
- Physical activity quartile
- Alcohol consumption

HRUP_oRT MODEL PERFORMANCE

Ontario **development** cohort (CCHS 2005-08)³

C statistic = 0.82



Ontario **validation** cohort (CCHS 2009-2010)³

C statistic = 0.81

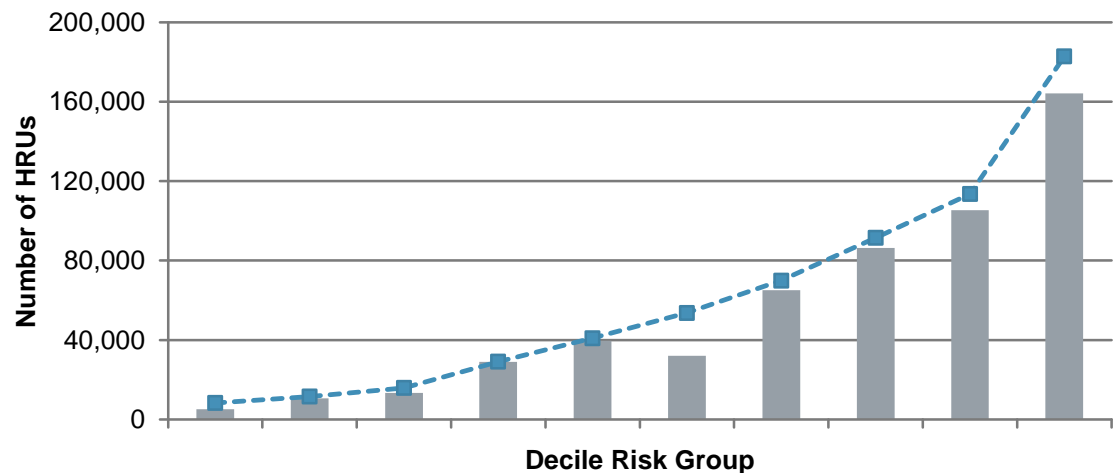
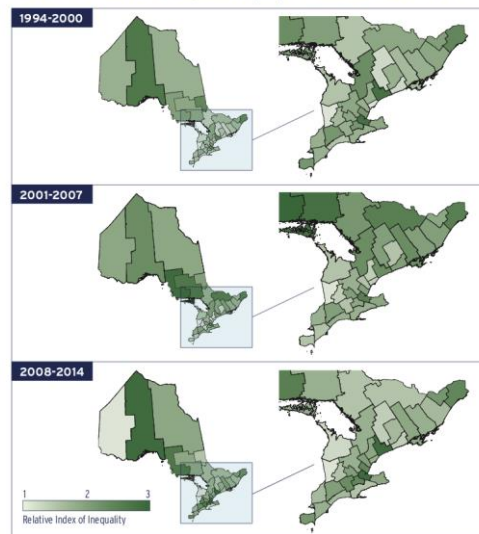


FIGURE 4.
RELATIVE INDEX OF INEQUALITY (RII) BY PUBLIC HEALTH UNIT



Dr. Laura Rosella provided the data in figure 4. Dr. Rosella is supported by a Canadian Institutes of Health Research Foundation Scheme Grant (FDN148456) and by a Canada Research Chair in Population Health Analytics.

The RII tool provides a more nuanced look at the causes of premature mortality. For example, the maps on page 16 that looked only at mortality trends seemed to show that the entire north faced larger disparities, while the RII maps displayed on page 18 indicate that certain northern regions, such as Northwestern and Timiskaming, have seen a decrease in their RII. There is a smaller gap between the most and least disadvantaged in those and other regions. It appears that some measures of equity in those regions are improving.

High Resource User Population Risk Tool

Health inequities are devastating for the people who experience them. Over a lifetime, they reduce opportunities for health, increase health problems such as chronic diseases and shorten lives. In fact, almost one in four premature deaths among people who are most disadvantaged (high RII) could be avoided if we could reduce or eliminate inequities, which would also eliminate about one in six premature deaths among people who are the least disadvantaged.

The impact of health inequities is not limited to the individuals and their families who face them. There are ripple effects throughout society, including lower productivity, more use of health services, and higher health care and other social costs. People who experience high rates of health inequities and poorer health outcomes are more likely to become high users of health services. The top five per cent of service users account for 55 per cent of health care spending.⁹ If we don't invest in upstream policies, programs and services to improve health equity for everyone, we will pay more downstream for preventable emergency, hospital and other health services.

To help identify populations at high risk of poor health outcomes over the next five years, Ontario researchers have developed the High Resource User Population Risk Tool (HRUPoRT), which takes into account both the clinical and social determinants that contribute to people developing the kind of health problems that make them high users of health services.



Improving
the Odds
Championing
Health Equity
in Ontario

HRUPoRT IN ACTION: 2016 CMOH REPORT

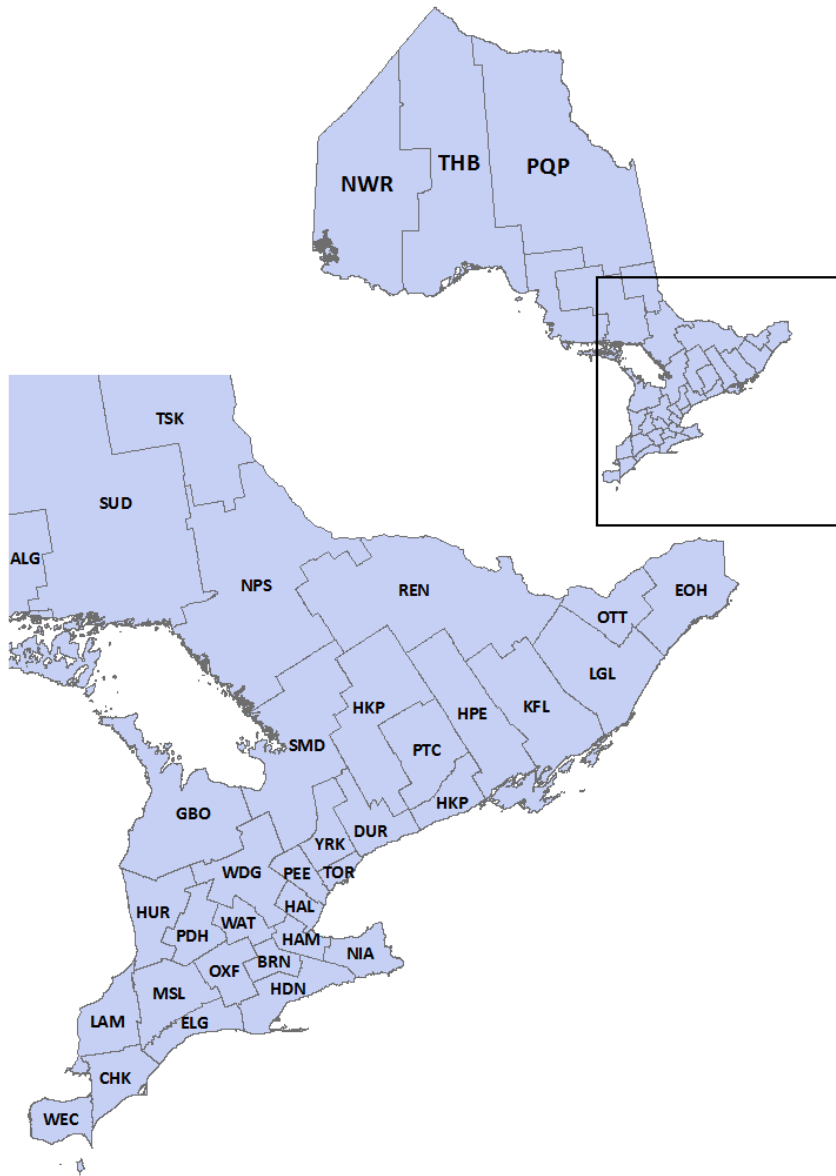
APPLICATION TO ONTARIO PUBLIC HEALTH UNITS (PHU)

Data sources

- HRUPoRT was applied to data from the Ontario portion of the 2013/14 CCHS to predict:
 - The total number of high resource users
 - The rate of high resource use

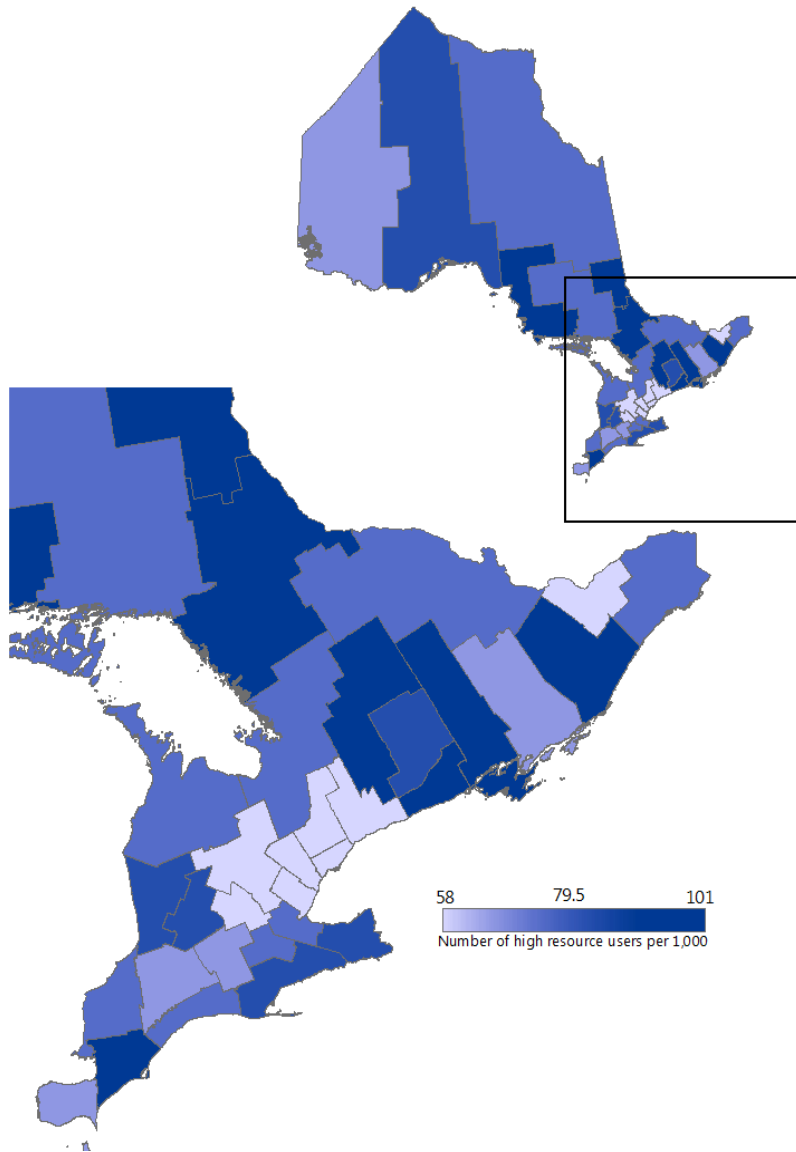
Interpretation

- The results may be interpreted as the total number of predicted adults per 1,000 that will become the top 5% of health care users in a given PHU over a 5-year period



PUBLIC HEALTH UNIT BOUNDARIES

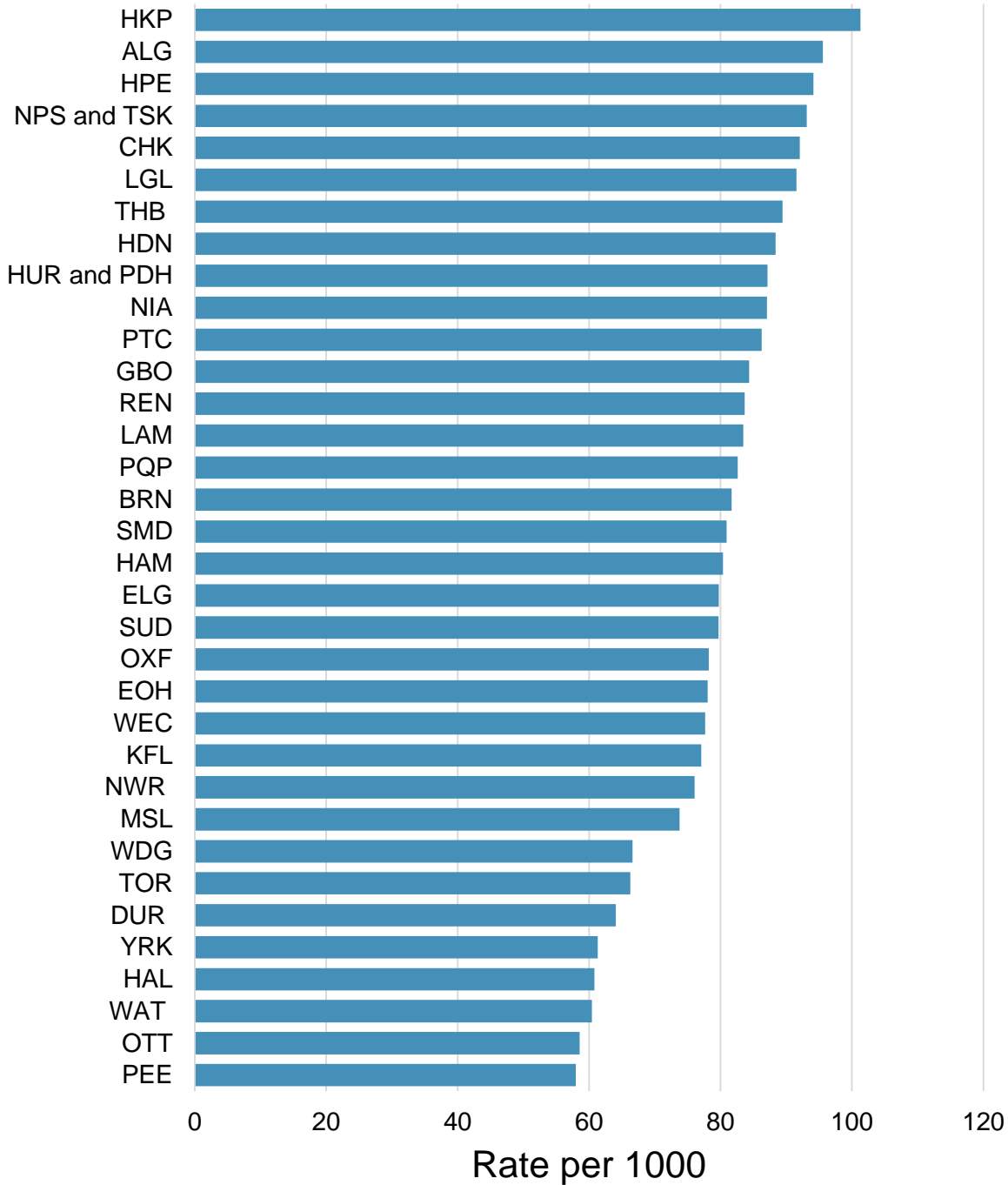
- In Ontario there are 36 Public Health Units
- They are organized primarily based on municipal boundaries



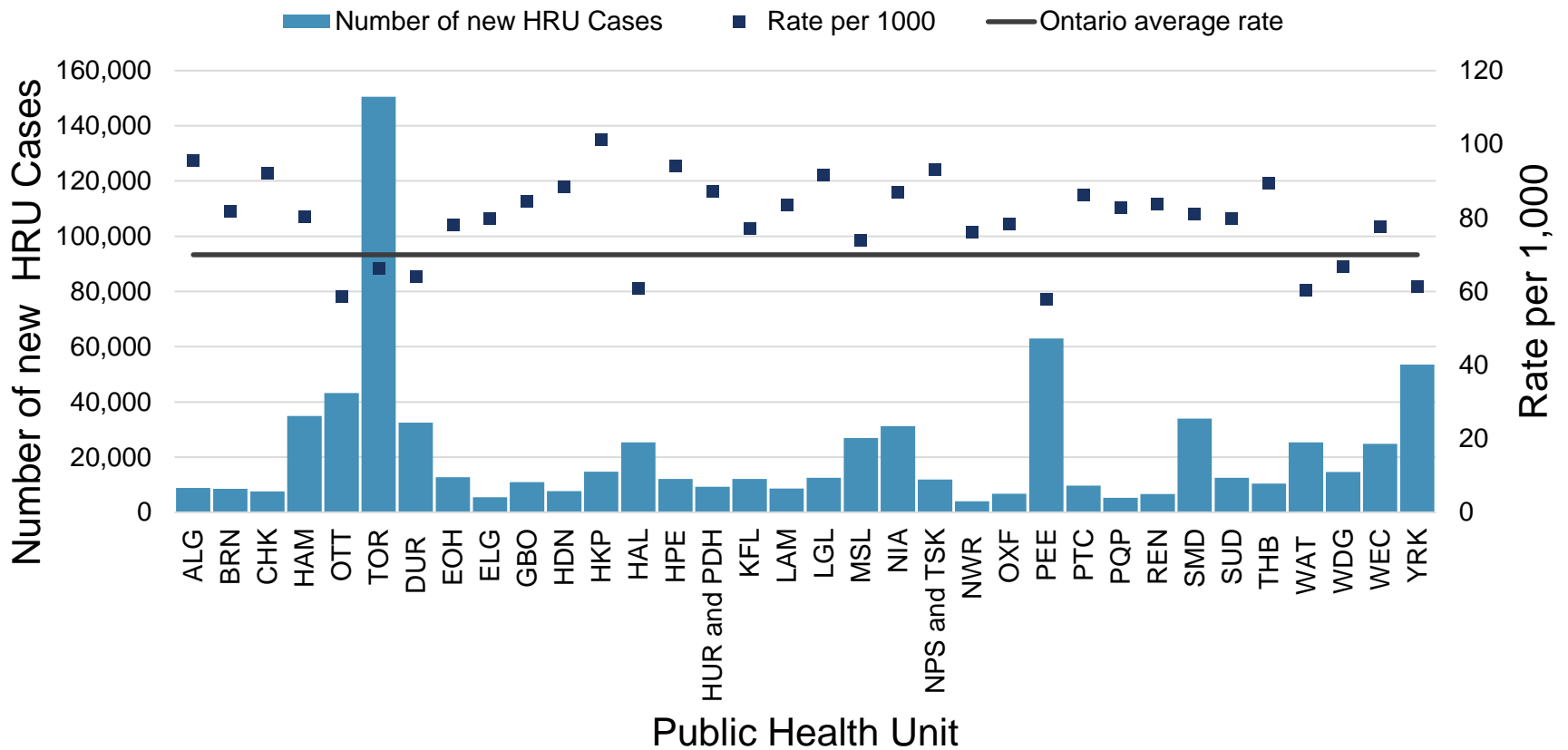
RATE OF HIGH RESOURCE USE BY PUBLIC HEALTH UNIT

- **758,190** total high resource users in Ontario by 2018/19
- Slightly higher rates in northern Ontario
- Equates to **\$16.22 billion** in health care costs

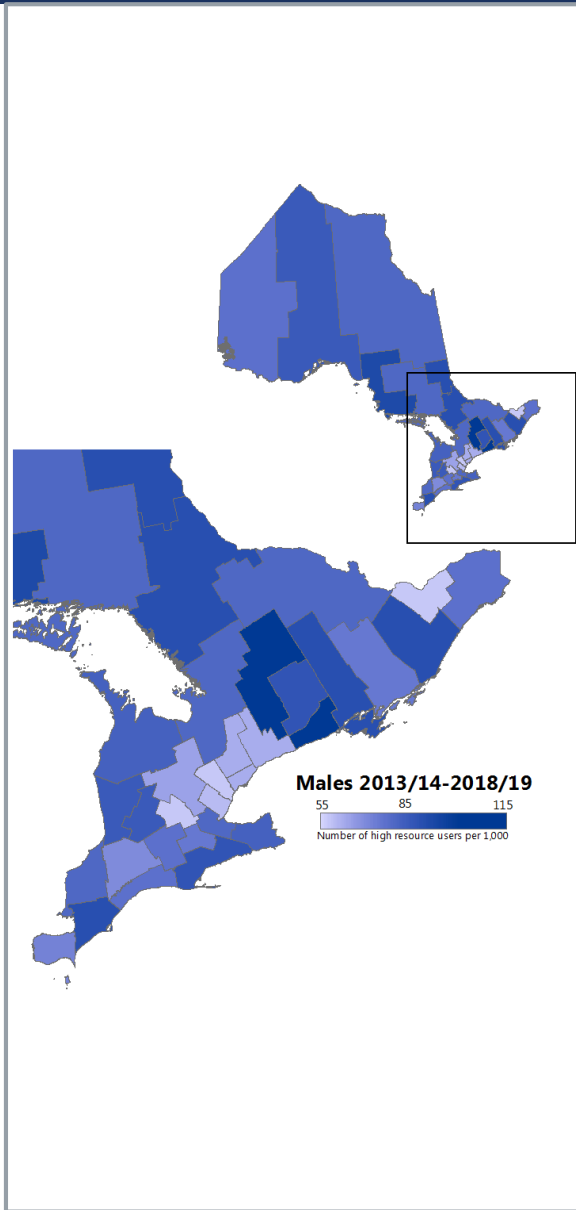
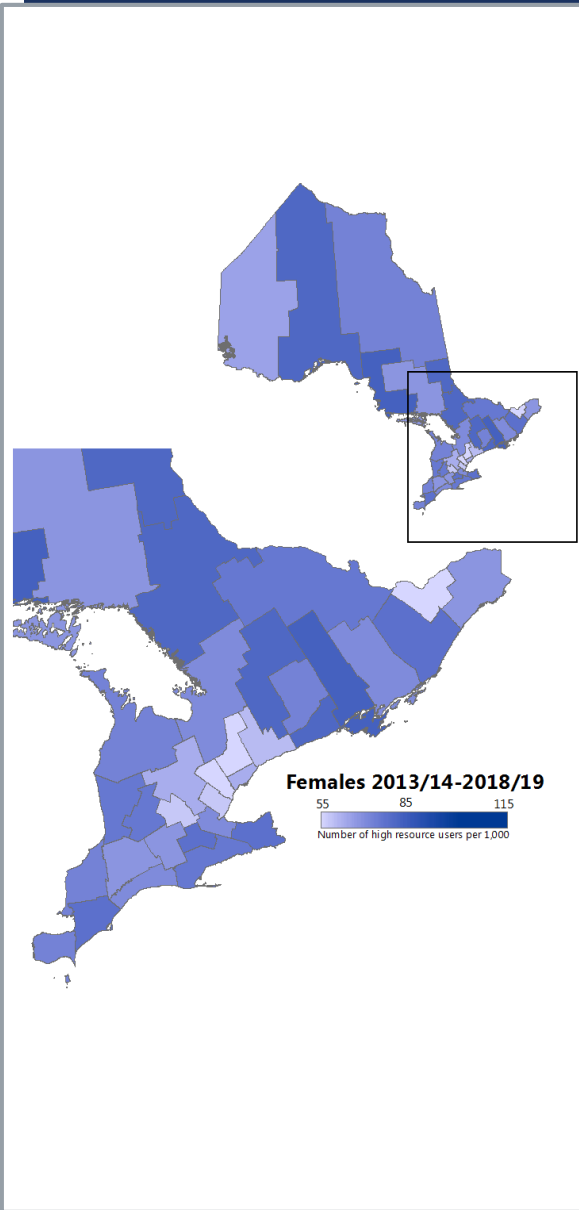
Public Health Unit



RATE OF
HIGH
RESOURCE
USERS IN
ONTARIO
BY PUBLIC
HEALTH
UNIT
(2013/14-
2018/19)



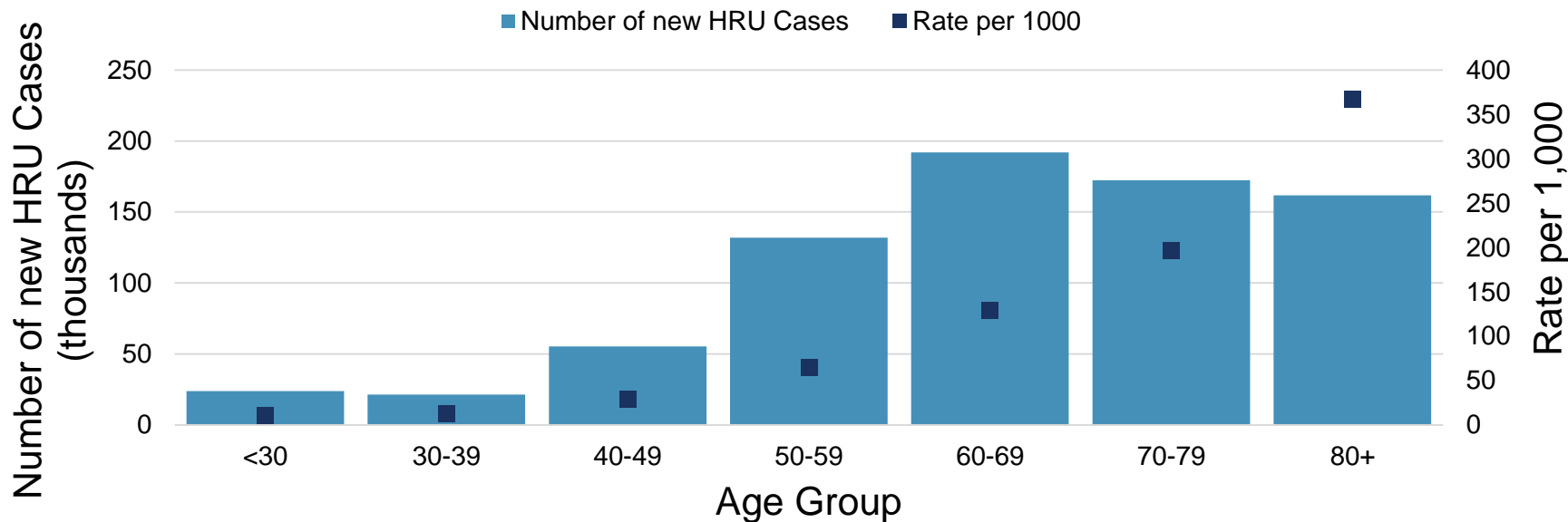
HRUP_oRT NUMBER AND RATE OF HIGH RESOURCE USERS IN ONTARIO BY PUBLIC HEALTH UNIT (2013/14-2018/19)



HIGH RESOURCE USER CHARACTERIZATIONS: SEX

- Generally, men have a higher rate of becoming a HRU
- Largest sex differences observed in two neighbouring PHUs

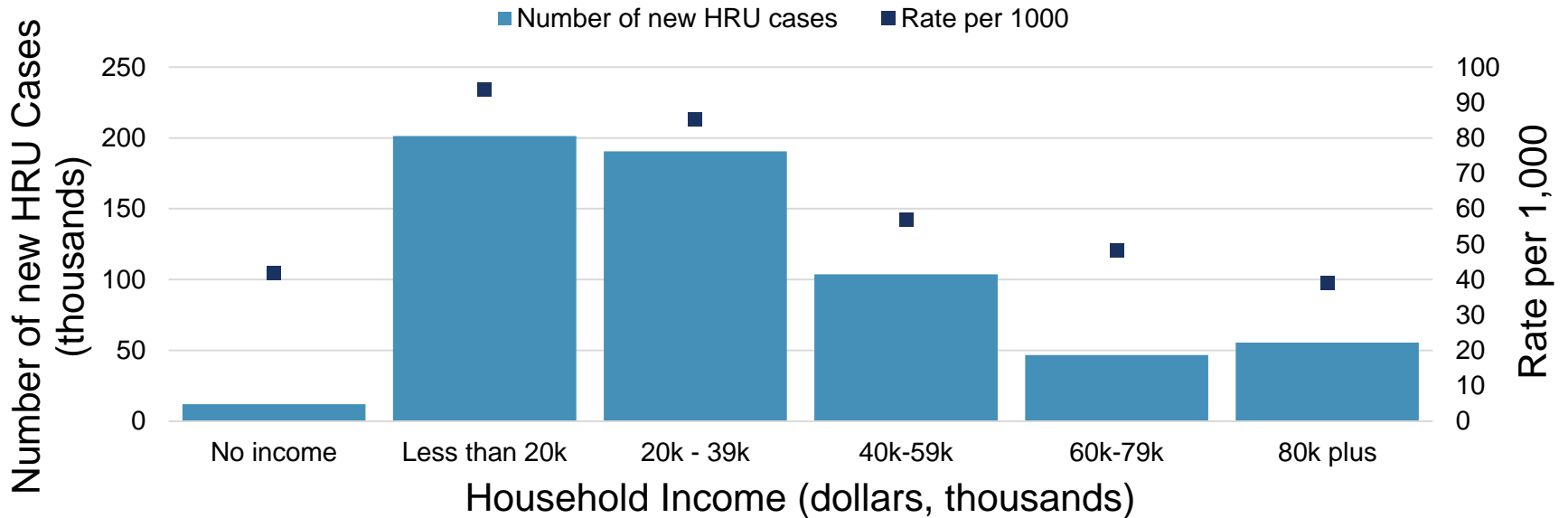
Expected number and rate of high resource users in Ontario by age group
(2013/14- 2018/19)¹



¹Note: number of new HRU cases do not sum to 758,184 due to missing information on key stratification variables for some individuals.

HIGH RESOURCE USER CHARACTERIZATIONS: AGE GROUP

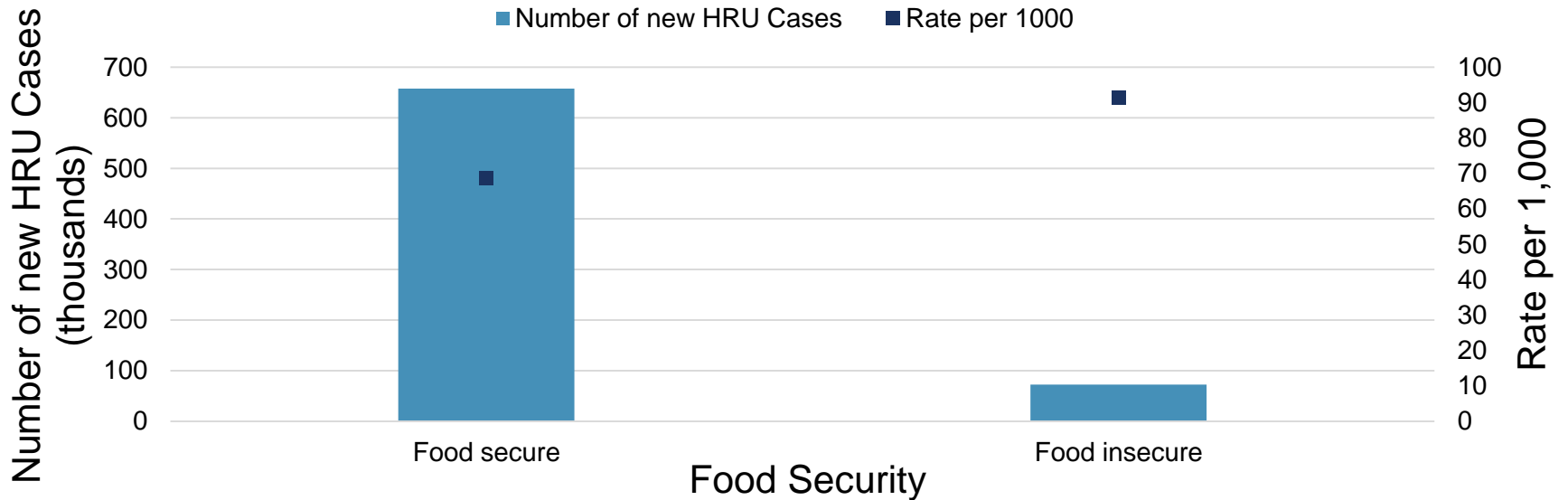
Expected number and rate of high resource users in Ontario by income range (2013/14- 2018/19)¹



¹Note: number of new HRU cases do not sum to 758,184 due to missing information on key stratification variables for some individuals.

HIGH RESOURCE USER CHARACTERIZATIONS: INCOME

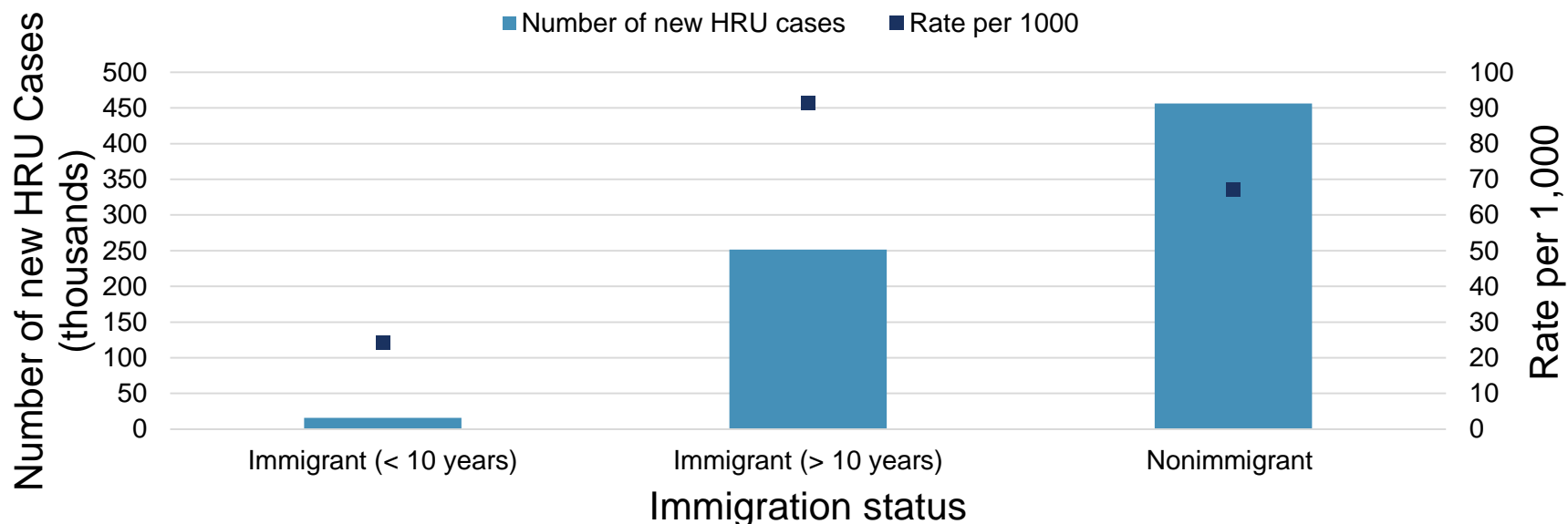
Expected number and rate of high resource users in Ontario by food security (2013/14- 2018/19)¹



¹Note: number of new HRU cases do not sum to 758,184 due to missing information on key stratification variables for some individuals.

HIGH RESOURCE USER CHARACTERIZATIONS: FOOD SECURITY

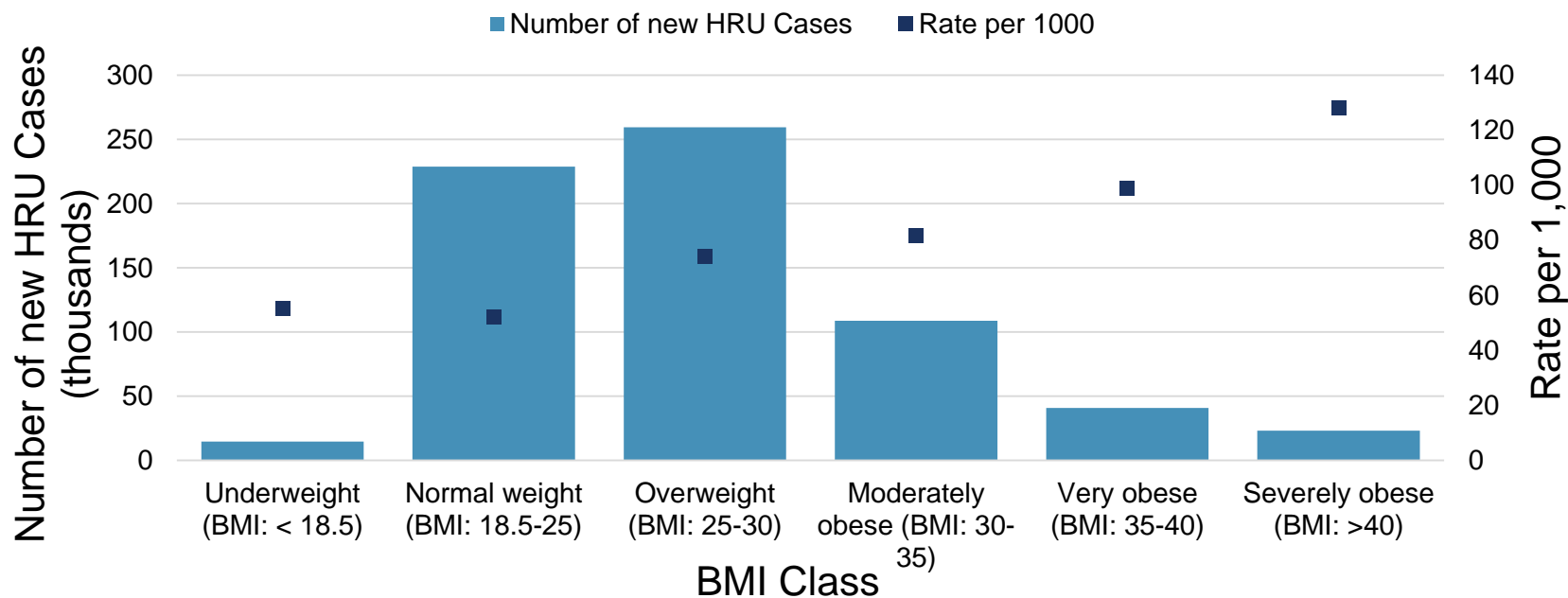
Expected number and rate of high resource users in Ontario by immigration status (2013/14- 2018/19)¹



¹Note: number of new HRU cases do not sum to 758,184 due to missing information on key stratification variables for some individuals.

HIGH RESOURCE USER CHARACTERIZATIONS: IMMIGRATION STATUS

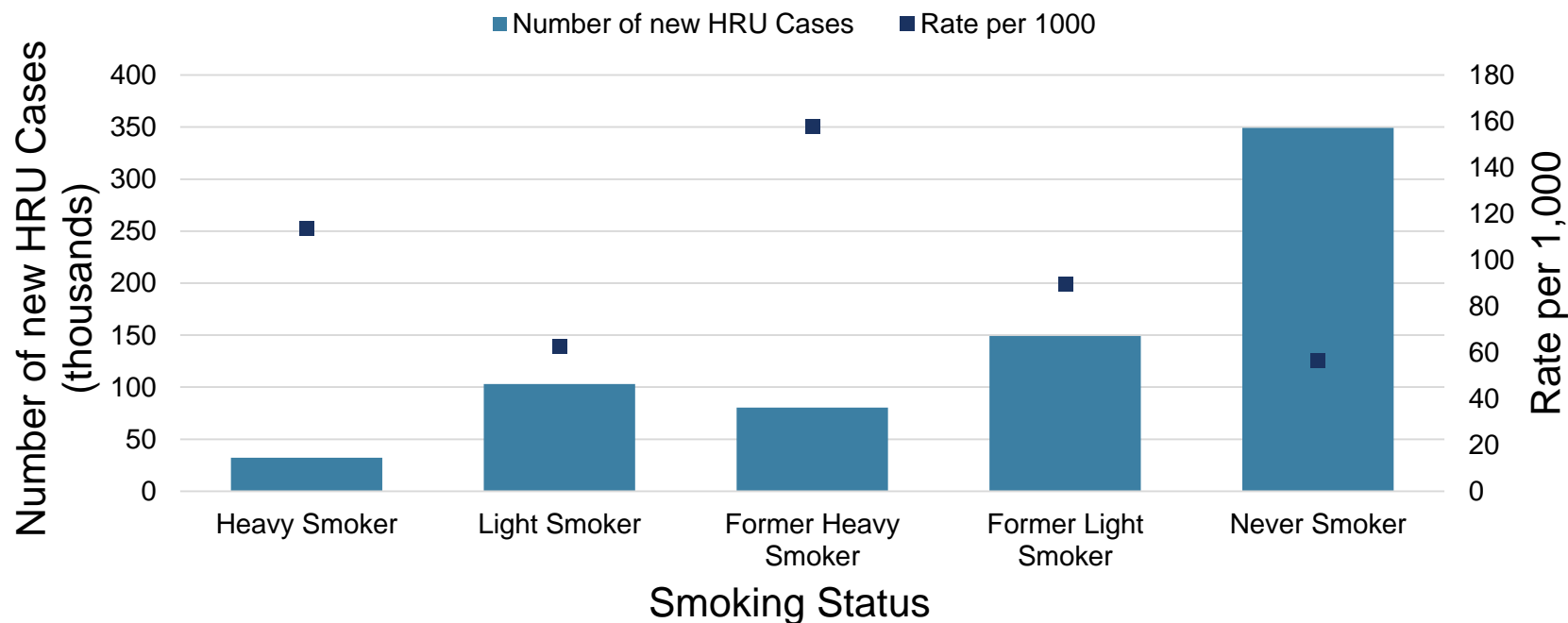
Expected number and rate of high resource users in Ontario by body mass index (2013/14- 2018/19)¹



¹Note: number of new HRU cases do not sum to 758,184 due to missing information on key stratification variables for some individuals.

HIGH RESOURCE USER CHARACTERIZATIONS: BMI

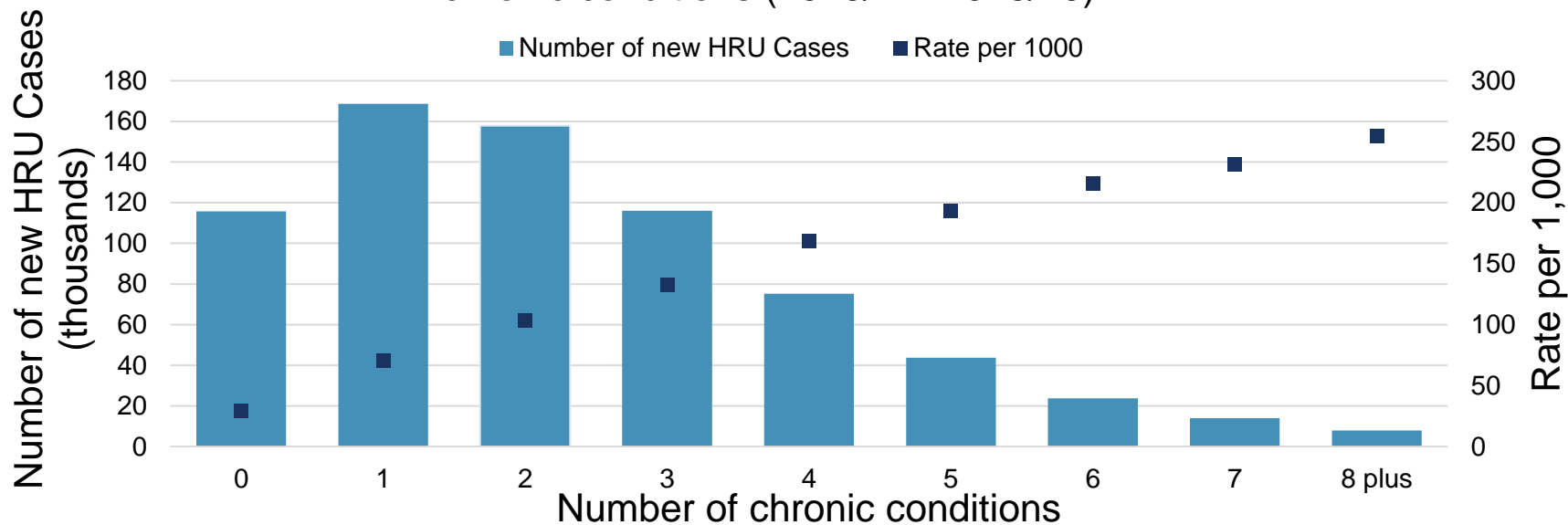
Expected number and rate of high resource users in Ontario by smoking status (2013/14- 2018/19)¹



¹Note: number of new HRU cases do not sum to 758,184 due to missing information on key stratification variables for some individuals.

HIGH RESOURCE USER CHARACTERIZATIONS: SMOKING STATUS

Expected number and rate of high resource users in Ontario by number of chronic conditions (2013/14- 2018/19)^{1,2}



¹Note: number of new HRU cases do not sum to 758,184 due to missing information on key stratification variables for some individuals.

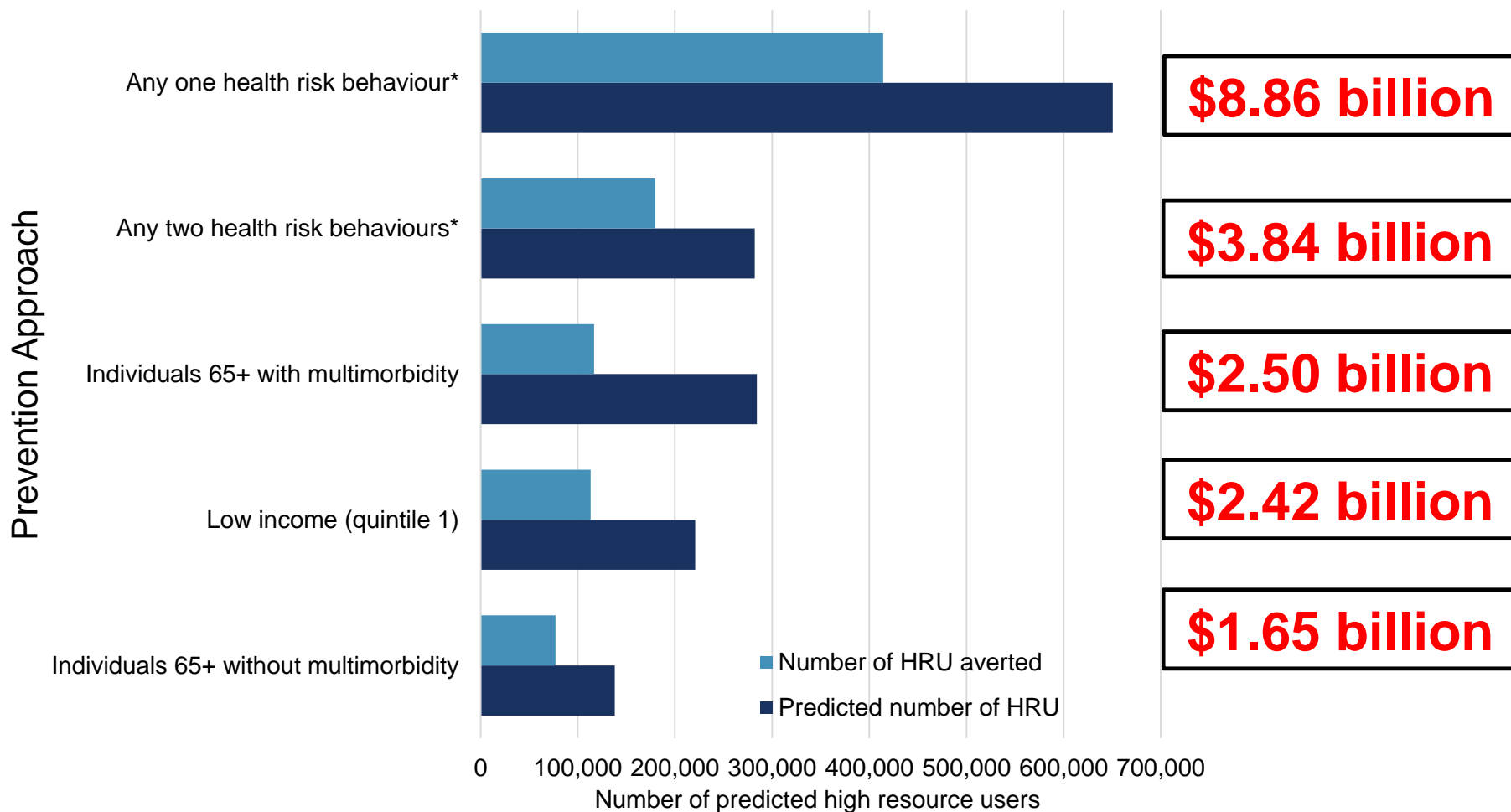
²Chronic conditions include self-reported asthma, arthritis, back problems, migraine headaches, chronic obstructive pulmonary disease, diabetes, hypertension, heart disease, cancer, stomach ulcers, stroke, urinary incontinence, bowel disorder, mood disorder, and anxiety disorders.

HIGH RESOURCE USER CHARACTERIZATIONS: NUMBER OF CHRONIC CONDITIONS

HRUPoRT PREVENTION SCENARIOS

- The HRUPoRT algorithm includes socioeconomic and modifiable health behavioural risk factors, of which the baseline distributions can be manipulated, offering opportunities to test policy and intervention scenarios
 - **Prevention Scenario 1:** seniors 65+ with multimorbidity
 - **Prevention Scenario 2:** seniors 65+ without multimorbidity
 - **Prevention Scenario 3:** low income group (quintile 1)
 - **Prevention Scenario 4:** any 1 or any 2 health risk behaviours (including heavy alcohol consumption, overweight/obesity, former/current tobacco use, and physical inactivity)

Prevention scenarios for high resource users in Ontario (2013/14 - 2018/19)



*Health risk behaviours include heavy alcohol consumption, overweight/obesity, former/current tobacco use, and physical inactivity

TOOL LIMITATIONS

- Does not account for how long a person remains a high cost user
- Does not capture HRUs among those <18, institutionalized, or living on-reserve
- Baseline estimate for an individual based on what we know today
 - Does not account for changes in population structure or emigration/immigration
- Based on self-reported information



IMPLICATIONS

- Can be applied to inform health resource planning and prevention
 - Currently in use by some Public Health Units
 - SAS and STATA code are available upon request
- Substantial applicability and is created to be accessible and transparent for use within applied settings
- Aids in shifting thinking from a primarily treatment focused mindset to a more preventative approach

THANK YOU! QUESTIONS?



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