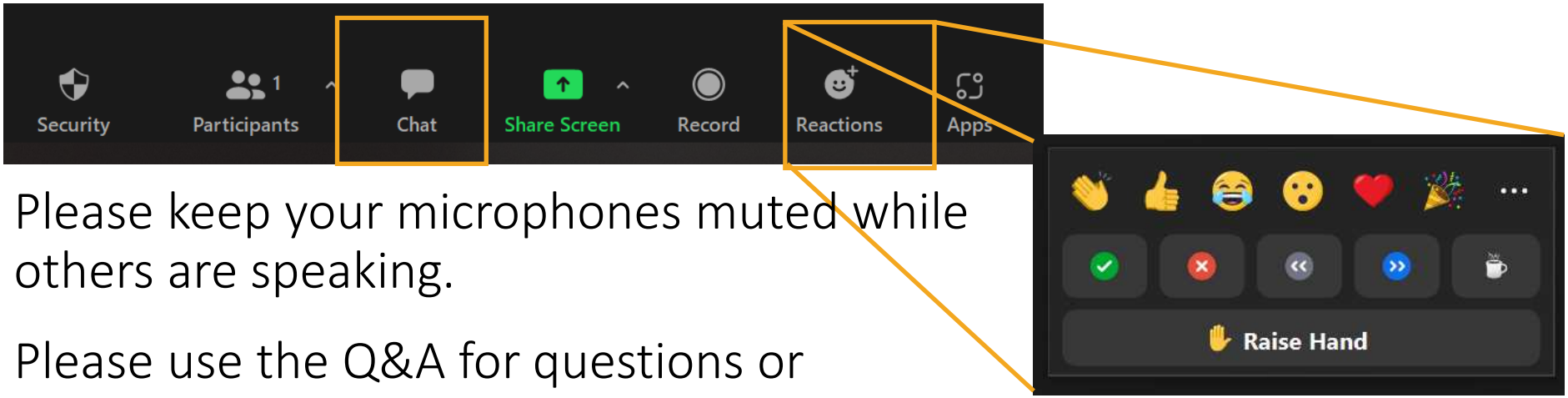
*Lunch 'n' Learn Webinar*

# Finding Meaning in a Universe of Data:
## Exploring Opportunities for Learning Machines to Advance Health Care Planning and Delivery

Dr. Jaky Kueper, PhD, Western University

October 7, 2022

# Housekeeping




- Please keep your microphones muted while others are speaking.
- Please use the Q&A for questions or comments and the chat for technical assistance.
- Open the “reaction” button to access “raise hand” and other tools.

# Acknowledgement of Traditional Indigenous Territories

We recognize that the work of the Alliance for Healthier Communities, our members, and the POPLAR Network takes place across what is now called Ontario, on traditional territories of Indigenous people. They have lived here since time immemorial and have deep connections to these lands. We further acknowledge that Ontario is covered by 46 treaties, agreements and land purchases, as well as unceded territories. We are grateful for the opportunity to live, meet and work on this territory.

Ontario continues to be home to vibrant, diverse Indigenous communities who have distinct and specific histories, needs, and assets as well as constitutionally protected and treaty rights. We honour this diversity and respect the knowledge, leadership and governance frameworks within Indigenous communities. In recognition of this, we commit to building allyship relationships with First Nation, Inuit and Métis peoples in order to enhance our knowledge and appreciation of the many histories and voices within Ontario. We also commit to sharing and upholding our responsibilities to all who now live on these lands, the land itself, and the resources that make our lives possible.

# Welcome & Introduction

**Dr. Jaky Kueper, PhD**
**Postdoctoral Fellow, Western University**

# Finding Meaning in a Universe of Data: Exploring Opportunities for Learning Machines to Advance Health Care Planning and Delivery

## Alliance Lunch 'n' Learn Webinar

Jaky Kueper, PhD

Postdoctoral Associate, Department of Computer Science, Western University

October 7, 2022

# Getting to Know You

**Poll Question**

What organizational setting do you primarily work in?

**Poll Question**

What is your role?

**Poll Question**

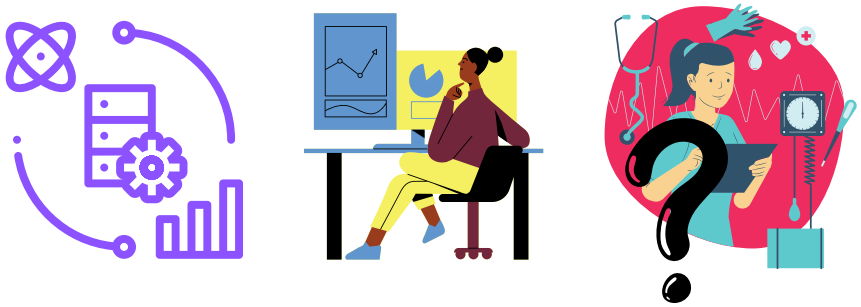
What are you most excited about learning today?

# Motivation

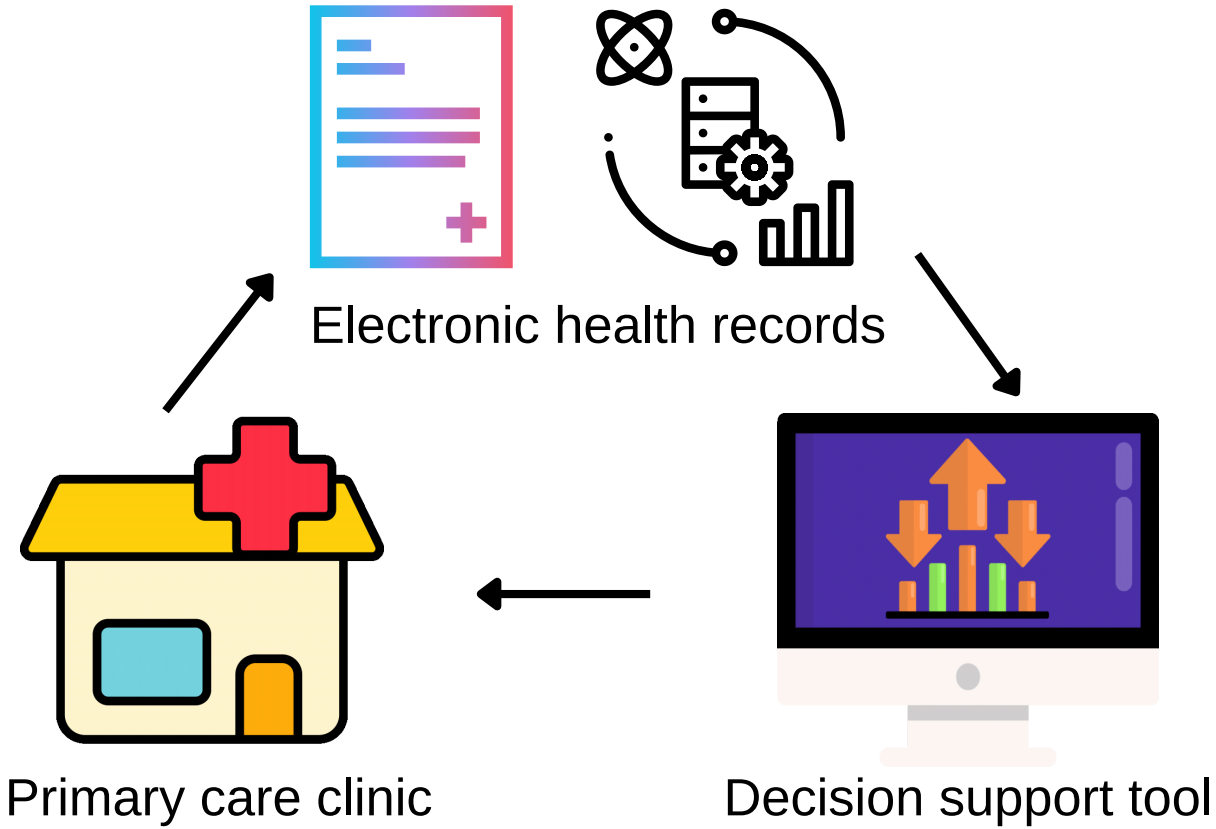
- Primary health care is the foundation of the healthcare system
  - Broad scope of practice
  - Team-based care across the lifespan
- **Challenge**: How to provide the best care possible, especially for clients experiencing complex clinical and/or social situations
  - Not well represented in research literature or clinical guidelines
  - Burden of treatment may be high
  - Need for whole-person, client-centred care
- **Potential support**: deriving insights and value through careful analysis of electronic health records
  - Learn from what was done in the past to inform the future

# Opportunity: Data to Support Care Delivery

- Increases in "everyday" data and computing resources
  - Electronic health records from healthcare delivery
- Potential to analyze these data to increase knowledge and improve care, e.g., personalized decision support tools
  - Artificial intelligence (AI) and machine learning are powerful tools to help us accomplish this
- Many opportunities to ask questions, learn, and work together towards innovations



# Decision Support Tool Development



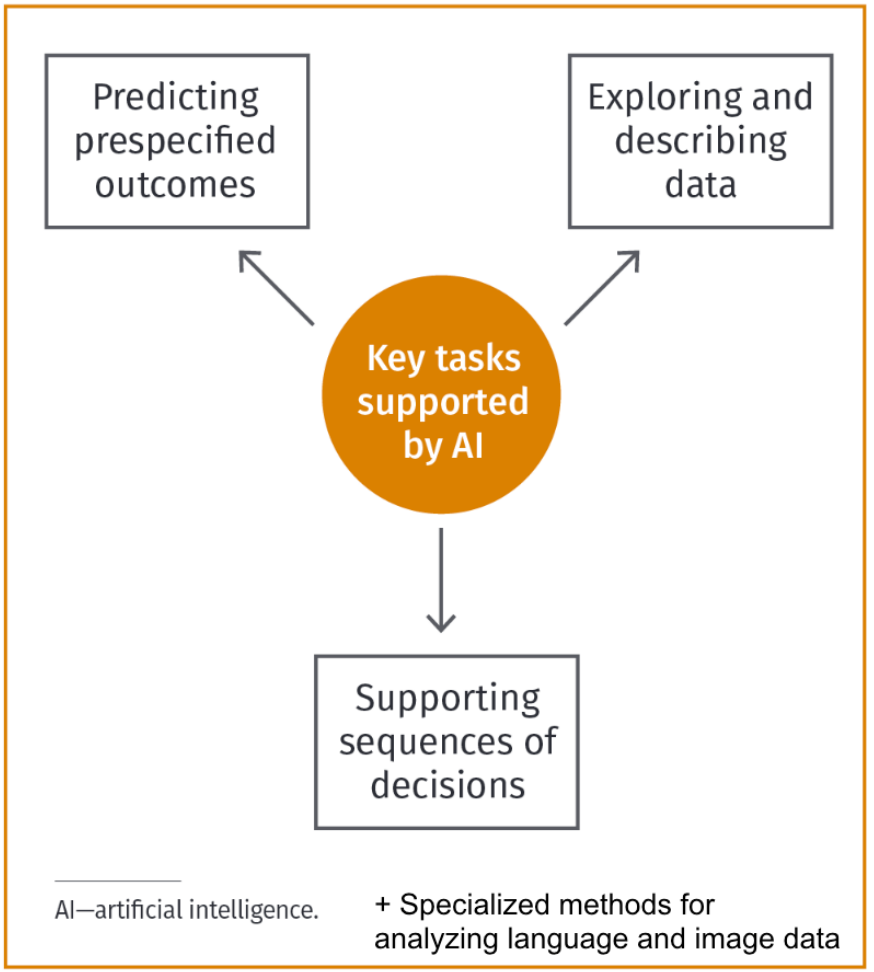

*Example Learning Health System (LHS) paradigm*

- Decision support tools may or may not rely on AI to function.

# Artificial Intelligence (AI)

- One part of a larger digital transformation
- Interdisciplinary field focused on computers performing humanlike "intelligent" tasks
- Machine learning subfield: Math based on data and *human decisions*

**Figure 1.** Key tasks supported by AI




Kueper JK. Primer for artificial intelligence in primary care. *Canadian Family Physician*. 2021;67:889-893.

# Example AI Applications in Healthcare

AI has the potential to *support* existing relationships and functions in primary health care

# Example AI Applications in Healthcare

AI has the potential to *support* existing relationships and functions in primary health care

- Risk prediction tool running in the background of an EHR system
  - Generate alerts when someone is at high risk of a negative outcome

# Example AI Applications in Healthcare

AI has the potential to *support* existing relationships and functions in primary health care

- Risk prediction tool running in the background of an EHR system
  - Generate alerts when someone is at high risk of a negative outcome
- Tools to perform clerical tasks, e.g., note-taking
  - Mitigate burnout and free up time for client interactions

# Example AI Applications in Healthcare

AI has the potential to *support* existing relationships and functions in primary health care

- Risk prediction tool running in the background of an EHR system
  - Generate alerts when someone is at high risk of a negative outcome
- Tools to perform clerical tasks, e.g., note-taking
  - Mitigate burnout and free up time for client interactions
- Personalized care decision support tool, e.g., synthesize relevant research literature, clinical guidelines, and EHR data
  - Provides recommendations for care providers and clients to discuss

# Example AI Applications in Healthcare

AI has the potential to *support* existing relationships and functions in primary health care

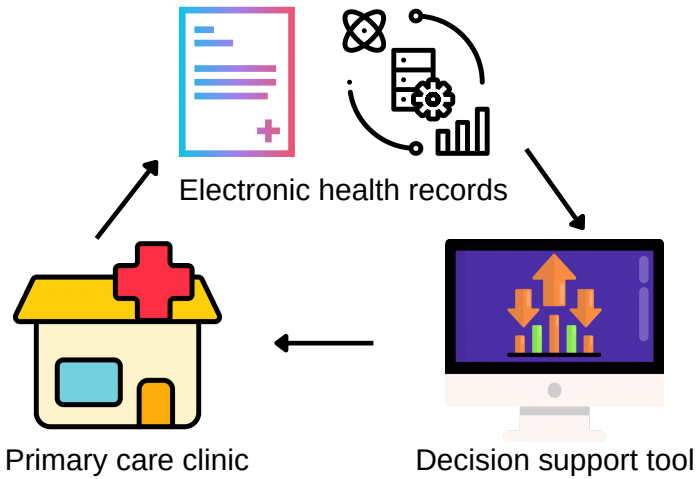
- Risk prediction tool running in the background of an EHR system
  - Generate alerts when someone is at high risk of a negative outcome
- Tools to perform clerical tasks, e.g., note-taking
  - Mitigate burnout and free up time for client interactions
- Personalized care decision support tool, e.g., synthesize relevant research literature, clinical guidelines, and EHR data
  - Provides recommendations for care providers and clients to discuss

**Poll Question**

What is your level of familiarity with AI?

# Decision Support Tool Development Context

- Want to start with real challenges and end up with impactful solutions - many possibilities!
- AI for health and LHS guidelines emphasize
  - Organization culture and capacity
  - Stakeholder engagement and leadership
  - Data availability, provenance, quality

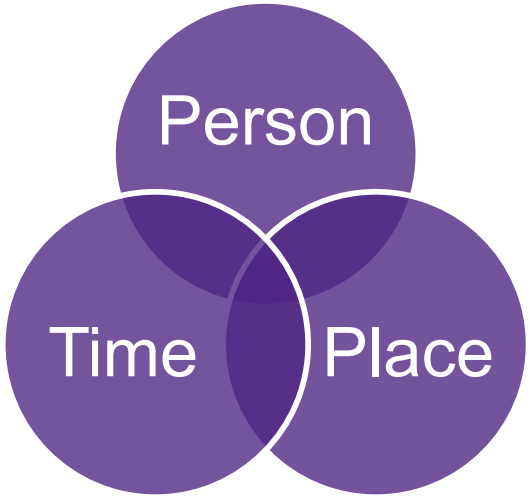



*Example Learning Health System (LHS) paradigm*

Can we use **descriptive epidemiology** to help guide early stages of decision support tool development?

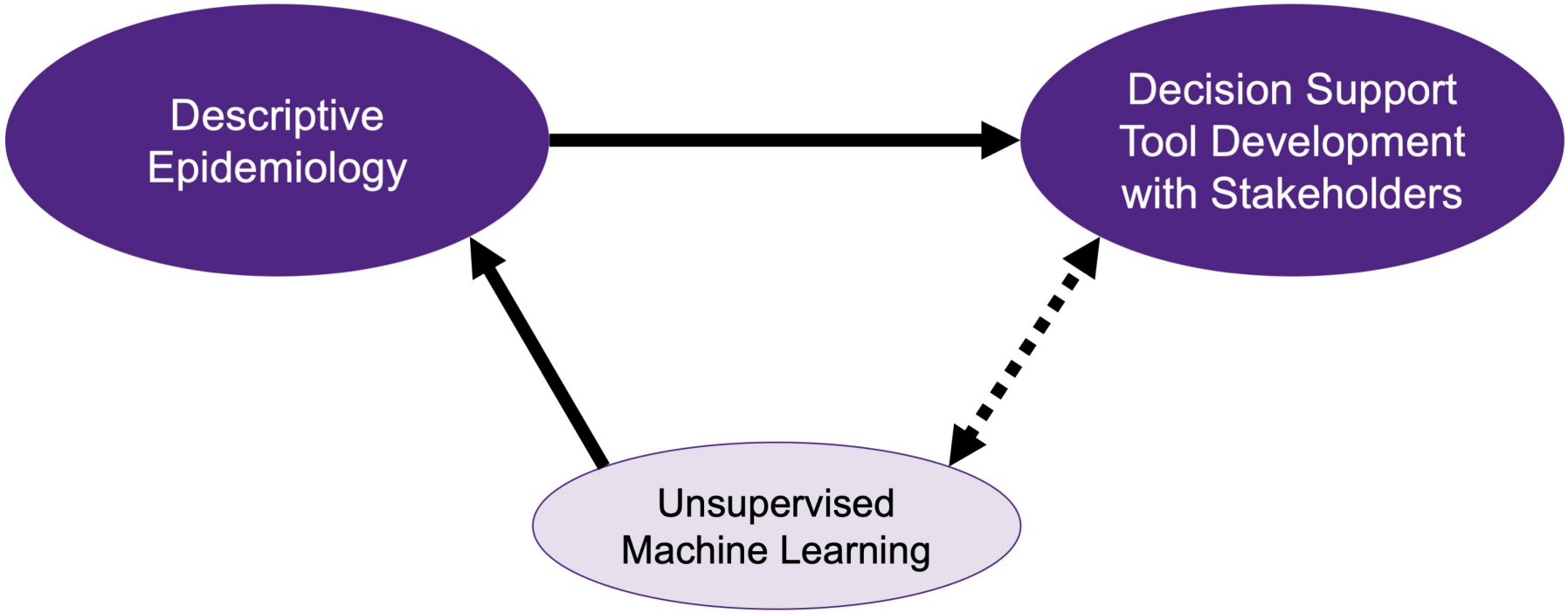
# Descriptive Epidemiology

- Understand health-related states and needs of a population
  - Who? What? When? Where? How?
- Valuable tool in public health practice and system planning
- Population-level descriptions may complement stakeholder expertise
  - Problem refinement and selection
  - Understanding of data availability and quality
  - Identify methodological considerations
  - Evaluation of long-term progress



# Proposed Role for Descriptive Epidemiology

# Proposed Role for Descriptive Epidemiology

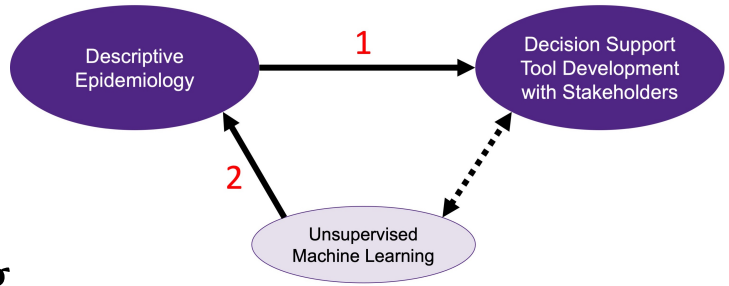



- To properly understand complex populations, both simple statistical techniques and techniques that can capture more complex patterns may be useful.

# Study Goals

1. To **describe an ongoing primary care population** for the purpose of supporting future initiatives, including the development of decision support tools.

2. To demonstrate **how simple statistical and unsupervised learning techniques**, applied with an epidemiological lens, can be used to describe complex populations.

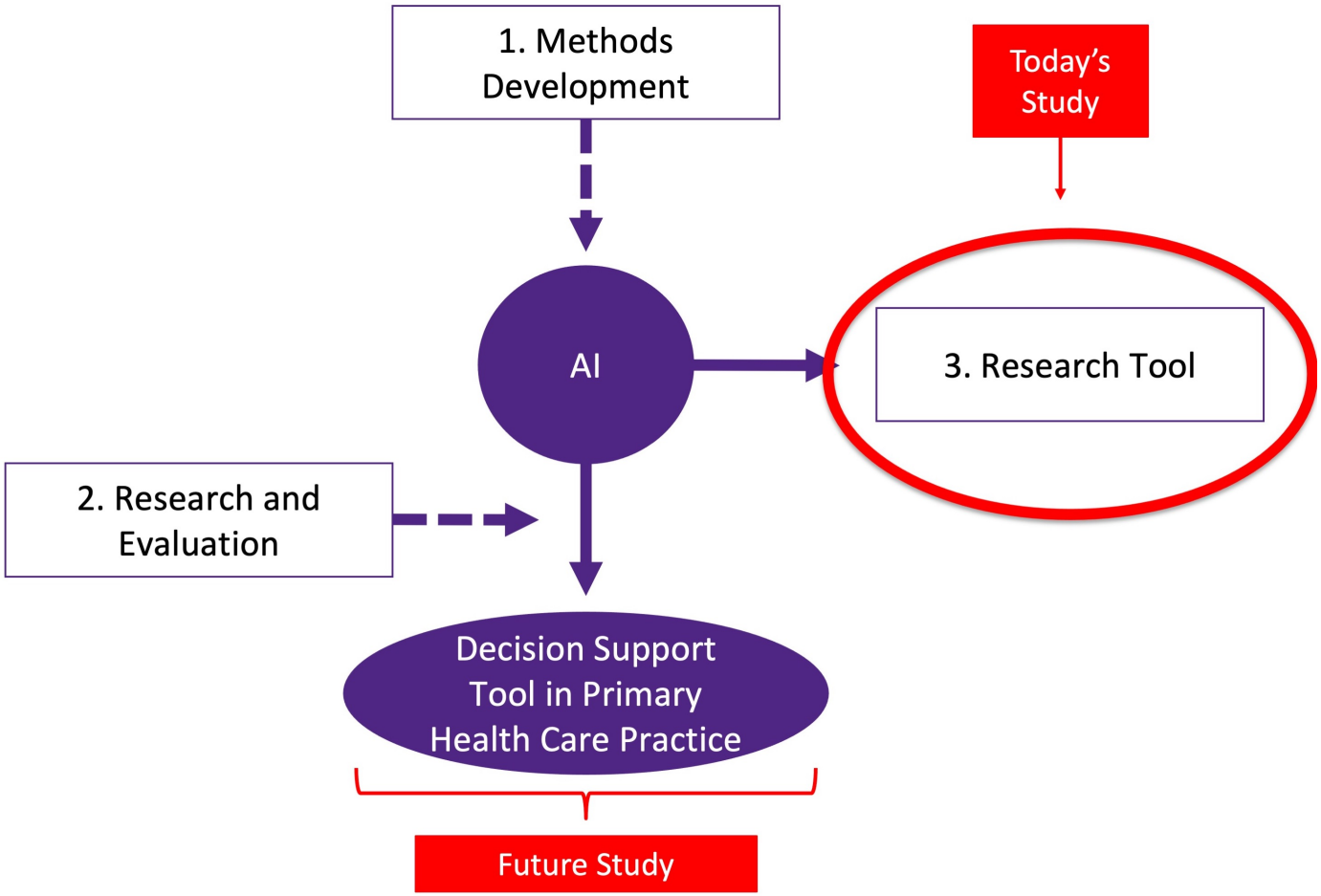


# Cohort Overview

- Clinical, Health Care Use, and Sociodemographic characteristics
- Electronic health record data
- Base cohort eligibility (n=221,047)
  - Ongoing primary care clients
  - 1+ encounter at a Community Health Centre (CHC) in 2009-2019
  - At least 18 years old

# Aside: AI as a Tool to Capture Complexity

- AI is a tool that can help to explore and describe more complex patterns in data than is possible with simple statistics



# Warning: Lots of Information Coming!

## General Strategy

- Take it one slide at a time.
- Polls embedded throughout.
- Put ideas and questions in the chat!

## Reflection Questions

1. Does each population-level description match your expectations?
2. What other questions about the data do you have?
3. Can you imagine any areas to develop decision support tools?

# Clinical Characteristics

# 11-Year Period Prevalence

## Poll Question

Are these prevalence estimates surprising to you?

1. Some are higher than expected
2. Some are lower than expected
3. Both 1 & 2
4. About what I expected
5. I don't have prior expectations

| Variable | All CHCs | Urban At Risk CHCs |
|---|---|---|
| Number of clients | 165125 | 27256 |
| Multimorbidity 2+ | 133704 (80.97) | 24129 (88.53) |
| Multimorbidity 3+ | 103172 (62.48) | 19237 (70.58) |
| Hypertension | 68177 (41.29) | 12304 (45.14) |
| Depression or Anxiety | 23828 (14.43) | 5533 (20.3) |
| Chronic Musculoskleletal | 104304 (63.17) | 18842 (69.13) |
| Arthritis | 37201 (22.53) | 6906 (25.34) |
| Osteoporosis | 11462 (6.94) | 1950 (7.15) |
| Asthma, COPD, or Chronic Bronchitis | 43837 (26.55) | 9190 (33.72) |
| Cardiovascular Disease | 23311 (14.12) | 4673 (17.14) |
| Heart Failure | 7994 (4.84) | 1564 (5.74) |
| Stroke or TIA | 2967 (1.8) | 585 (2.15) |
| Stomach Problem | 36175 (21.91) | 7620 (27.96) |
| Colon Problem | 24949 (15.11) | 4974 (18.25) |
| Chronic Hepatitis | 13288 (8.05) | 2954 (10.84) |
| Diabetes | 35704 (21.62) | 6912 (25.36) |
| Thyroid Disorder | 24793 (15.01) | 4217 (15.47) |
| Any Cancer | 14024 (8.49) | 2636 (9.67) |
| Kidney Disease or Failure | 8290 (5.02) | 1555 (5.71) |
| Chronic Urinary Problem | 59677 (36.14) | 11131 (40.84) |
| Dementia or AD | 4776 (2.89) | 898 (3.29) |
| Hyperlipidemia | 67175 (40.68) | 11659 (42.78) |
| Obesity | 38408 (23.26) | 6455 (23.68) |
| Hepatitis C | 2436 (1.48) | 1173 (4.3) |
| Smoking or Tobacco Use | 37355 (22.62) | 9597 (35.21) |
| Substance Use | 20853 (12.63) | 7508 (27.55) |
| Social Isolation or Loneliness | 17947 (10.87) | 5149 (18.89) |

*Notes:* Denominator was the approximated average population size across all years (2009-2019).

# Clinical Characteristics: Different Perspectives

**11-year period prevalence**: Burden of conditions from system planning perspective

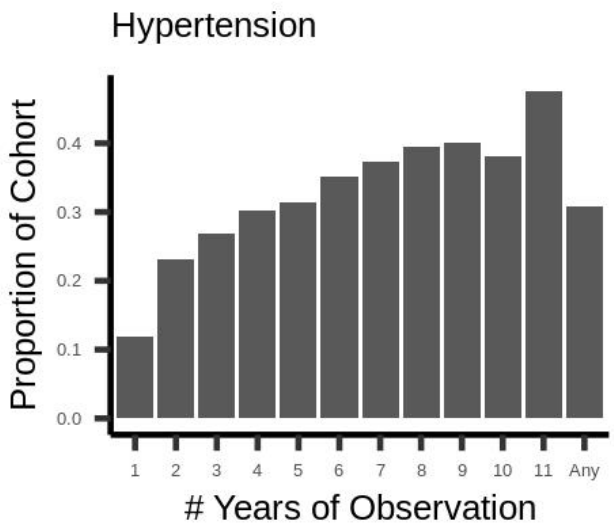
Estimates ranged from 2% (Hepatitis C) to 63% (Chronic musculoskeletal problem)

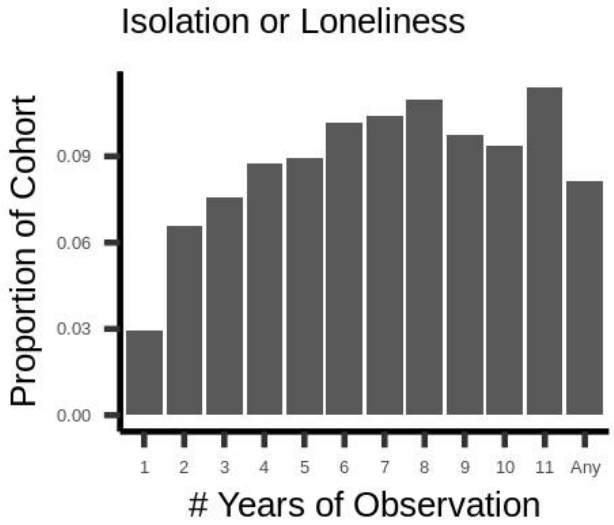
# Clinical Characteristics: Different Perspectives

**Observation-based period prevalence:** Burden from client perspective

**11-year period prevalence**: Burden of conditions from system planning perspective

Estimates range from 2% (Hepatitis C) to 63% (Chronic musculoskeletal problem)



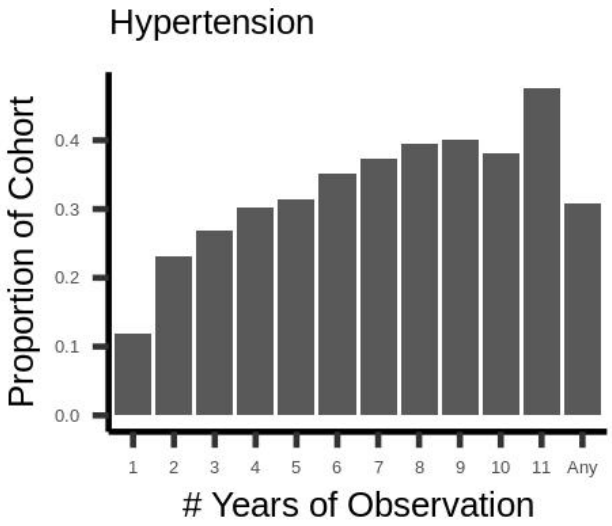
# Clinical Characteristics: Different Perspectives

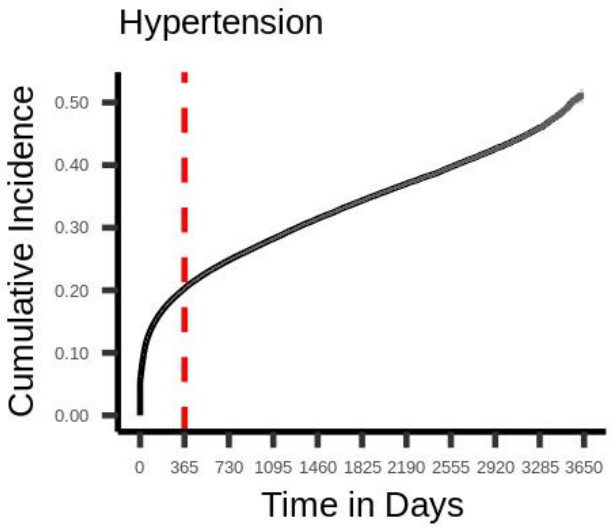
**11-year period prevalence**: Burden of conditions from system planning perspective

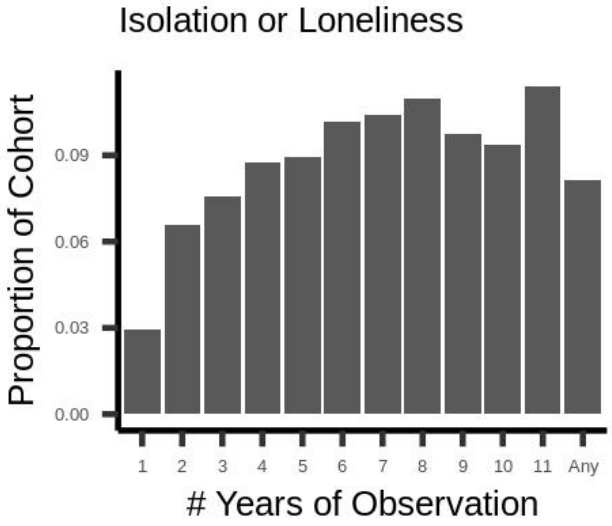
Estimates range from 2% (Hepatitis C) to 63% (Chronic musculoskeletal problem)

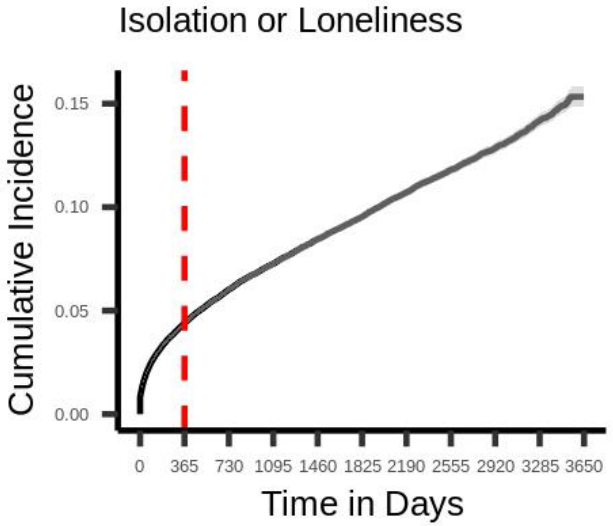
**Observation-based period prevalence:** Burden from client perspective

**Cumulative incidence:** Rate of condition indications by observation days



# Condition Co-occurence Patterns

**11-year period prevalence of 2+ multimorbidity**

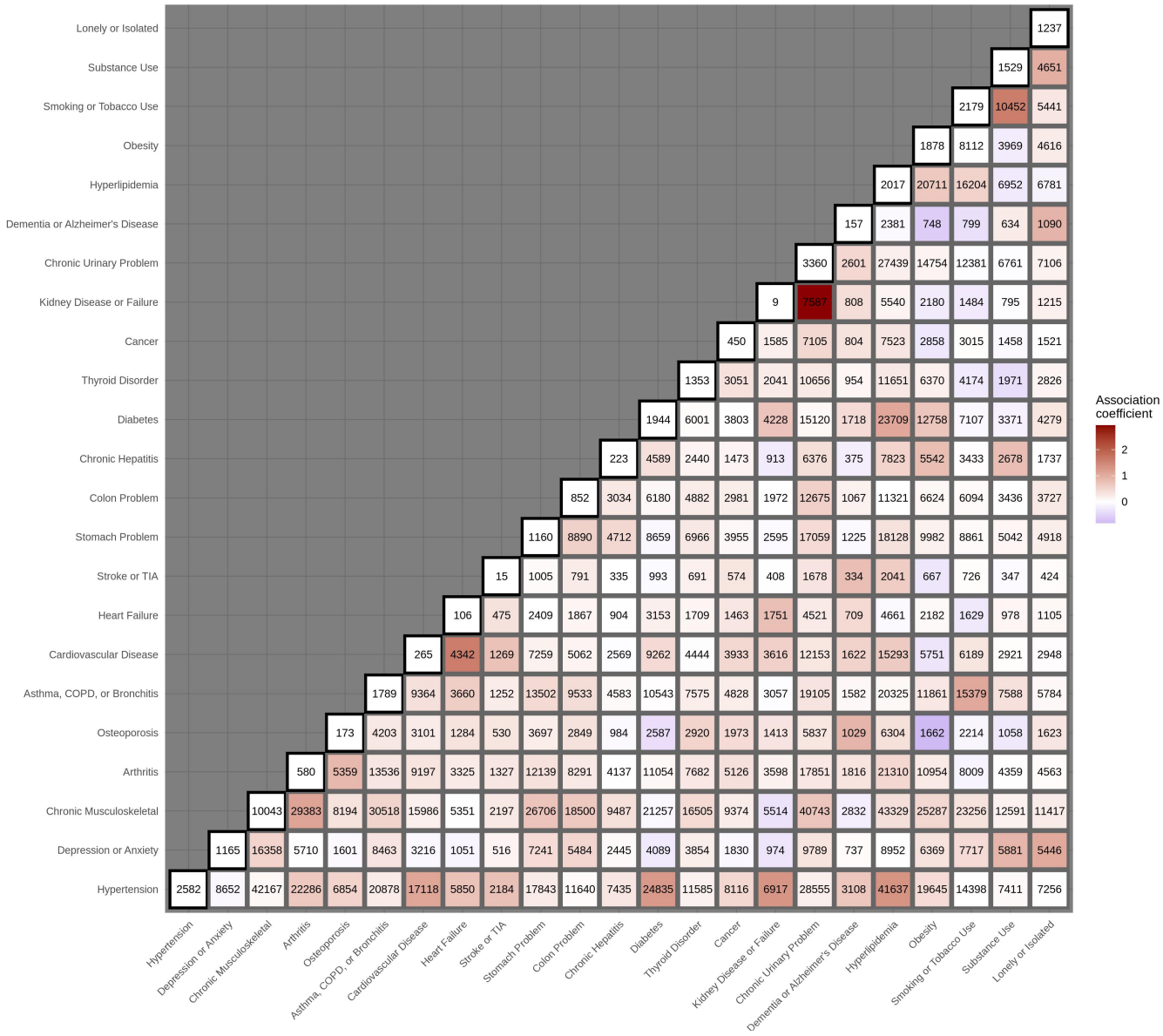
133,704 (81%) clients with 25,346 unique compositions ranging from 1 (<0.1%) to 2840 (2%)

# Condition Co-occurence Patterns

**Ising model:** Tendency for conditions to co-occur

**11-year period prevalence of 2+ multimorbidity**

133,704 (81%) clients with 25,346 unique compositions ranging from 1 (<0.1%) to 2840 (2%)

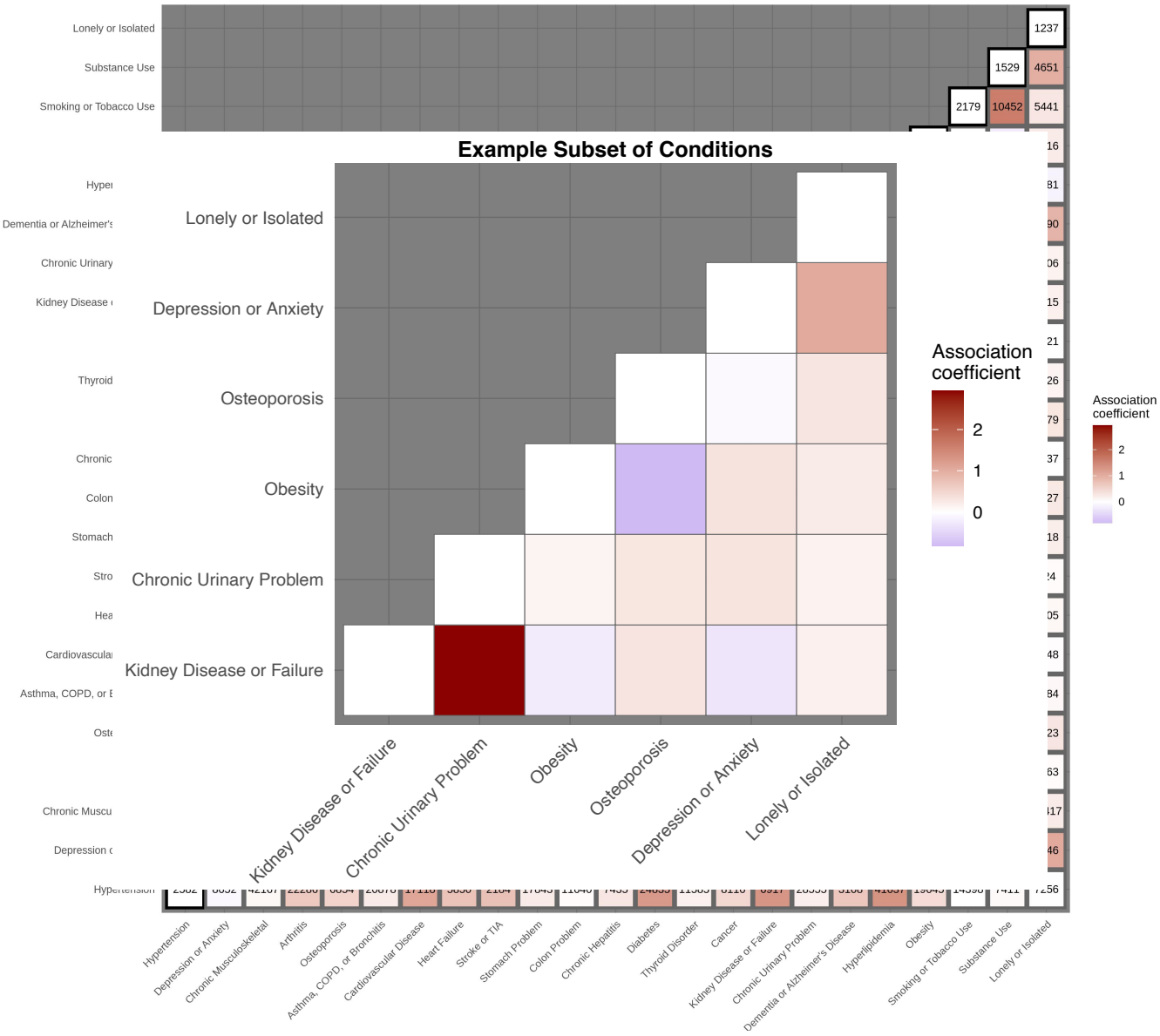


# Condition Co-occurence Patterns

**Ising model:** Tendency for conditions to co-occur

**11-year period prevalence of 2+ multimorbidity**

133,704 (81%) clients with 25,346 unique compositions ranging from 1 (<0.1%) to 2840 (2%)



# Common Comorbidities: Different Perspectives

## Most frequent co-occurring conditions (Simple counts)

1. Hyperlipidemia—Chronic Musculoskeletal
2. Hypertension—Chronic Musculoskeletal
3. Hyperlipidemia—Hypertension
4. Chronic Urinary Problem—Chronic Musculoskeletal
5. Asthma or COPD or Chronic Bronchitis—Chronic Musculoskeletal

## Largest positive pairwise associations (Ising model)

1. Kidney Disease or Failure—Chronic Urinary Problem
2. Smoking or Tobacco Use—Substance Use
3. Cardiovascular Disease—Heart Failure
4. Hypertension—Hyperlipidemia
5. Hypertension—Kidney Disease

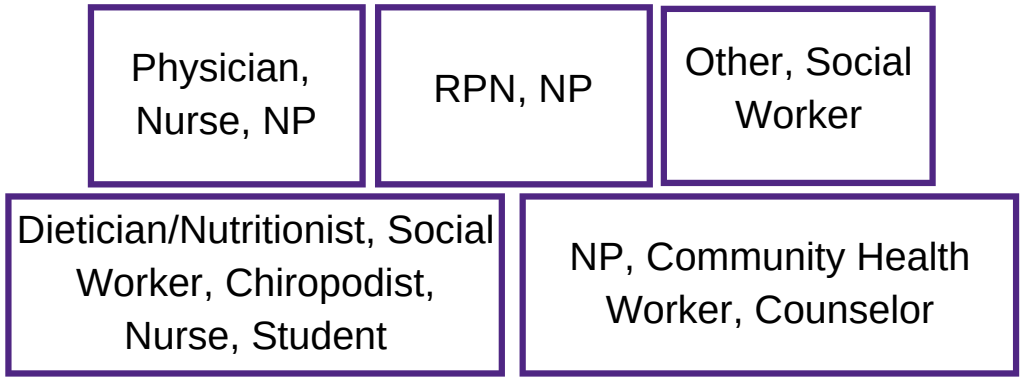
**Poll Question**

Which type of measure do you think is more important to guide focus areas for decision support tools?

# Health Care Use Characteristics

# Provider Teams

- 19,394 unique combinations of 68 provider types
- We used topic modelling to identify common “ever-seen” and “relative amount seen” teams
- Care amount is typically led by physician or nurse practitioners with heterogeneous combinations of other provider types
  - End-users for a given decision support tool may differ by client




Example: 5 topic "ever-seen" analysis.

# Provider Type Teams: Ever-Seen

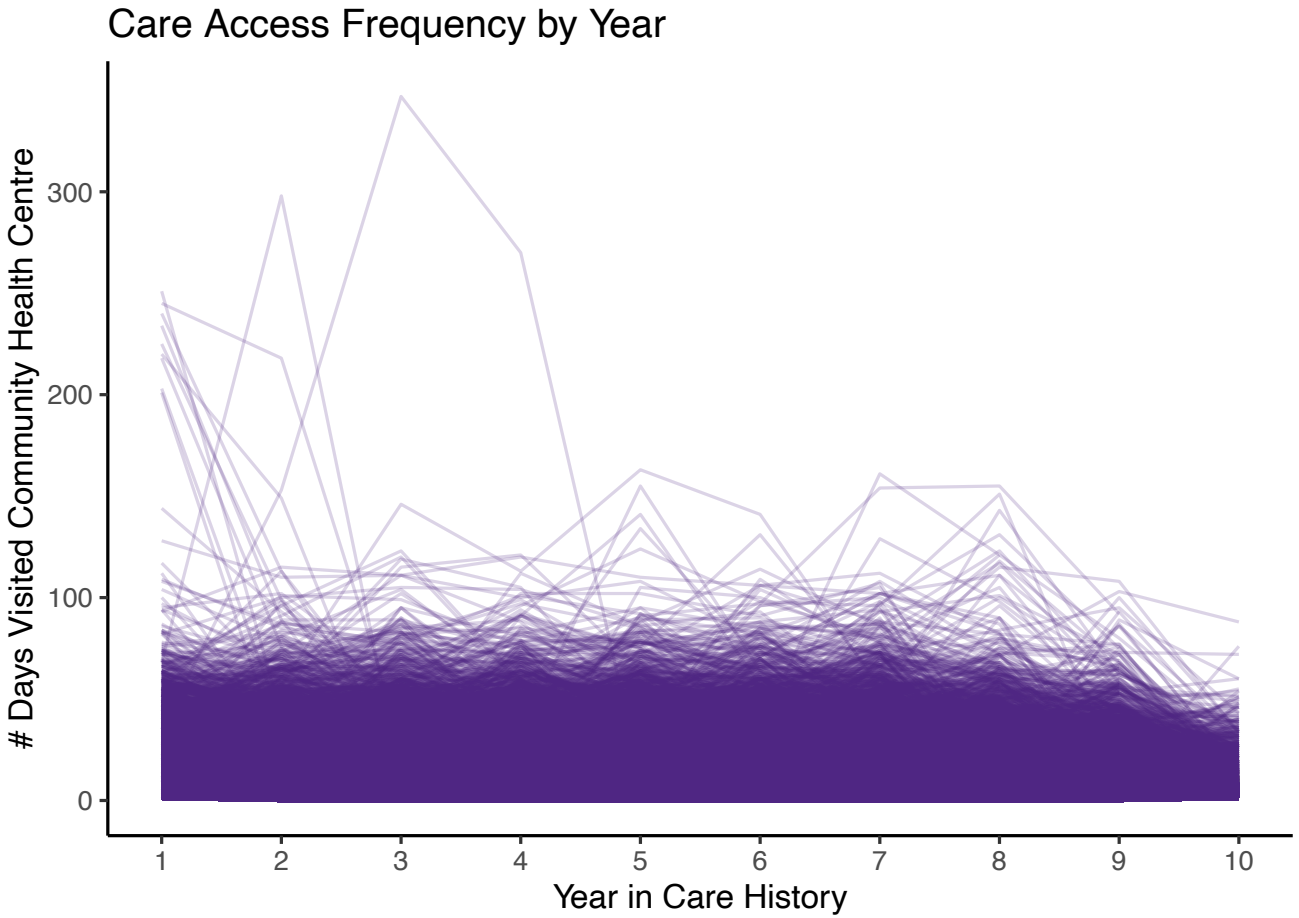
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **2 Topics** | Physician, Nurse, NP, Other, Dietician | RPN, NP | | | | | |
| **3 Topics** | Physician, Nurse, NP, Dietician | RPN, NP | Other, Dietician, Social Worker, Chiropodist | | | | |
| **5 Topics** | Physician, Nurse, NP | RPN, NP | Other, Social Worker | Dietician, Social Worker, Chiropodist, Nurse, Student/Trainee | NP, Community Health Worker, Counselor | | |
| **10 Topics** | Nurse, Physician | RPN, RN | Other | Dietitian | NP | | |
| | Physician | Counselor, Community Health Worker | Student/Trainee | Chiropodist, Physiotherapist | Social Worker | | |
| **15 Topics** | Nurse, Physician | RPN, NP | Other | Dietitian | NP | Social Worker | Medical Technician |
| | Physician | Counselor | Student/Trainee | Chiropodist | Community Health Worker | Physiotherapist, Service Access Coordinator | Outreach Worker |
| | | | | | | | Health Promoter/Educator, Respirologist |

## Poll Question

Do any of the common provider type combinations surprise you?
1) Some combinations are unexpected 2) Some expected combinations are missing 3) 1 & 2 4) Looks about right 5) Not sure!

# Care Access Frequency

- Number of days that clients received care by year and by quarter-year
- We did not identify distinct groups of people or "frequent visitor" cut-offs



# Care Complexity

- **CHC-perspective**
  - 80% of client-visits had a single issue addressed (low complexity)
  - $<$ 1% client-visits had over 5 issues addressed (high complexity)
- **Client-perspective**
  - 17% only ever experienced one issue per visit
  - 11% had at least one visit with over 5 issues addressed
    - Did not tend to also have high care frequency
- Reminder that these analyses only capture what is recorded in EHRs, but these are the data that EHR-based decision support tools would have access to

# Sociodemographic Characteristics

# Sociodemographic Characteristics (Last Poll!)

| Variable | Values | All (n=221047) | UAR (n=35998) | MM (n=103172) |
|---|---|---|---|---|
| Age in 2015 | 25-44 | 101151 (45.76) | 15516 (43.10) | 24888 (24.12) |
| | 45-64 | 82501 (37.32) | 14976 (41.60) | 49560 (48.03) |
| | 65+ | 37395 (16.92) | 5506 (15.30) | 28724 (27.84) |
| Rural Geography | Rural | 49275 (22.29) | 6131 (17.03) | 26818 (25.99) |
| | Urban | 167728 (75.88) | 28538 (79.28) | 75011 (72.7) |
| | Missing | 4044 (1.83) | 1329 (3.69) | 1343 (1.3) |
| Sex | Female | 127070 (57.49) | 18699 (51.94) | 59946 (58.1) |
| | Male | 93294 (42.21) | 17151 (47.64) | 43124 (41.8) |
| | Other | 331 (0.15) | 43 (0.12) | 19 (0.02) |
| | Missing | 352 (0.16) | 105 (0.29) | 83 (0.08) |
| Primary Language | English | 167163 (75.62) | 31658 (87.94) | 79599 (77.15) |
| | French | 22547 (10.2) | 944 (2.62) | 11091 (10.75) |
| | Other | 26847 (12.15) | 2948 (8.19) | 10710 (10.38) |
| | Missing | 4490 (2.03) | 448 (1.24) | 1772 (1.72) |
| Highest Level of Education | Post-secondary or equivalent | 84888 (38.4) | 12056 (33.49) | 35763 (34.66) |
| | Secondary or equivalent | 61831 (27.97) | 11783 (32.73) | 32617 (31.61) |
| | Less than high school | 18941 (8.57) | 3266 (9.07) | 10618 (10.29) |
| | Other | 8507 (3.85) | 719 (2) | 4078 (3.95) |
| | Do not know | 4860 (2.2) | 1318 (3.66) | 2350 (2.28) |
| | Prefer not to answer | 2950 (1.33) | 422 (1.17) | 1585 (1.54) |
| | Missing | 39070 (17.67) | 6434 (17.87) | 16161 (15.66) |
| Household Income | $0 to $14,999 | 40519 (18.33) | 8729 (24.25) | 17757 (17.21) |
| | $15,000 to $24,999 | 21102 (9.55) | 3555 (9.88) | 11081 (10.74) |
| | $25,000 to $39,999 | 20877 (9.44) | 2988 (8.3) | 10736 (10.41) |
| | $40,000 to $59,999 | 17245 (7.8) | 2421 (6.73) | 8671 (8.4) |
| | $60,000 or more | 28494 (12.89) | 3862 (10.73) | 12868 (12.47) |
| | Do not know | 15408 (6.97) | 2658 (7.38) | 6264 (6.07) |
| | Prefer not to answer | 27621 (12.5) | 4130 (11.47) | 14890 (14.43) |
| | Missing | 49781 (22.52) | 7655 (21.27) | 20905 (20.26) |
| Stable Residence | True | 199349 (90.18) | 28227 (78.41) | 90479 (87.7) |
| Food Insecurity | True | 10985 (4.97) | 2947 (8.19) | 7323 (7.1) |

*Note:* Over 60 percent missing: Gender, Sexual Orientation, Race & Ethnicity

# Conclusions

- Community Health Centres serve a complex population in terms of sociodemographic, clinical, and healthcare use characteristics
  - Multimorbidity is common but specific profiles are diverse
  - Ongoing primary care is typically led by a physician or nurse practitioner with heterogeneous combinations of other provider types
  - No major separation in care use frequency patterns
- AI techniques were useful to explore comorbidity patterns and care provider teams

## Reflection Questions

1. Does each population-level description match your expectations?
2. What other questions about the data do you have?
3. Can you imagine any areas to develop decision support tools?

# Acknowledgements

**Research Team Collaborators**:

- Dr. Dan Lizotte
- Dr. Jennifer Rayner
- Dr. Merrick Zwarenstein

Alliance for Healthier Communities
Alliance pour des communautés en santé

CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada

# EXTRA SLIDES

# Sociodemographic Characteristics: A

| Variable | Values | All | UAR | MM |
|---|---|---|---|---|
| Number of clients | | 221047 | 35998 | 103172 |
| Age in 2015 | 25-34 | 55505 (25.11) | 7976 (22.16) | 9346 (9.06) |
| | 35-44 | 45646 (20.65) | 7540 (20.95) | 15542 (15.06) |
| | 45-54 | 44653 (20.20) | 8186 (22.74) | 23982 (23.24) |
| | 55-64 | 37848 (17.12) | 6790 (18.86) | 25578 (24.79) |
| | 65-74 | 23162 (10.48) | 3644 (10.12) | 17780 (17.23) |
| | 75+ | 14233 (6.44) | 1862 (5.17) | 10944 (10.61) |
| Rural Geography Residence | Rural | 49275 (22.29) | 6131 (17.03) | 26818 (25.99) |
| | Urban | 167728 (75.88) | 28538 (79.28) | 75011 (72.70) |
| | Missing | 4044 (1.83) | 1329 (3.69) | 1343 (1.30) |
| Sex | Female | 127070 (57.49) | 18699 (51.94) | 59946 (58.1) |
| | Male | 93294 (42.21) | 17151 (47.64) | 43124 (41.80) |
| | Other | 331 (0.15) | 43 (0.12) | 19 (0.02) |
| | Missing | 352 (0.16) | 105 (0.29) | 83 (0.08) |
| Gender | Female | 41352 (18.71) | 5509 (15.30) | 21831 (21.16) |
| | Gender Diverse | 340 (0.15) | 112 (0.31) | 144 (0.14) |
| | Male | 29366 (13.28) | 4585 (12.74) | 14733 (14.28) |
| | Prefer not to answer | 1001 (0.45) | 51 (0.14) | 376 (0.36) |
| | Missing | 148988 (67.40) | 25741 (71.51) | 66088 (64.06) |
| Sexual Orientation | Bisexual | 1578 (0.71) | 285 (0.79) | 690 (0.67) |
| | Gay | 708 (0.32) | 192 (0.53) | 306 (0.30) |
| | Heterosexual | 57065 (25.82) | 8447 (23.47) | 29105 (28.21) |
| | Lesbian | 485 (0.22) | 70 (0.19) | 244 (0.24) |
| | Queer | 323 (0.15) | 34 (0.09) | 91 (0.09) |
| | Two-Spirit | 128 (0.06) | 80 (0.22) | 61 (0.06) |
| | Other | 246 (0.11) | 34 (0.09) | 143 (0.14) |
| | Do not know | 924 (0.42) | 201 (0.56) | 485 (0.47) |
| | Prefer not to answer | 7561 (3.42) | 877 (2.44) | 4078 (3.95) |
| | Missing | 152029 (68.78) | 25778 (71.61) | 67969 (65.88) |

*Legend:* MM = Multimorbidity; UAR = Urban At Risk CHC

# Sociodemographic Characteristics: B

| Variable | Values | All | UAR | MM |
|---|---|---|---|---|
| Number of clients | | 221047 | 35998 | 103172 |
| Highest Level of Education | Post-secondary or equivalent | 84888 (38.40) | 12056 (33.49) | 35763 (34.66) |
| | Secondary or equivalent | 61831 (27.97) | 11783 (32.73) | 32617 (31.61) |
| | Less than high school | 18941 (8.57) | 3266 (9.07) | 10618 (10.29) |
| | Other | 8507 (3.85) | 719 (2.00) | 4078 (3.95) |
| | Do not know | 4860 (2.20) | 1318 (3.66) | 2350 (2.28) |
| | Prefer not to answer | 2950 (1.33) | 422 (1.17) | 1585 (1.54) |
| | Missing | 39070 (17.67) | 6434 (17.87) | 16161 (15.66) |
| Primary Language | English | 167163 (75.62) | 31658 (87.94) | 79599 (77.15) |
| | French | 22547 (10.20) | 944 (2.62) | 11091 (10.75) |
| | Other | 26847 (12.15) | 2948 (8.19) | 10710 (10.38) |
| | Missing | 4490 (2.03) | 448 (1.24) | 1772 (1.72) |
| Race and Ethnicity | Black | 8861 (4.01) | 725 (2.01) | 3757 (3.64) |
| | East/SouthEast Asian | 3739 (1.69) | 484 (1.34) | 1545 (1.50) |
| | Indigenous | 2944 (1.33) | 1577 (4.38) | 1641 (1.59) |
| | Latino | 4350 (1.97) | 206 (0.57) | 1708 (1.66) |
| | Middle Eastern | 2046 (0.93) | 344 (0.96) | 838 (0.81) |
| | Other | 567 (0.26) | 148 (0.41) | 306 (0.3) |
| | South Asian | 3597 (1.63) | 323 (0.90) | 1852 (1.80) |
| | White | 38464 (17.40) | 4531 (12.59) | 21504 (20.84) |
| | Do not know | 838 (0.38) | 151 (0.42) | 487 (0.47) |
| | Prefer not to answer | 2649 (1.20) | 261 (0.73) | 1513 (1.47) |
| | Missing | 152992 (69.21) | 27248 (75.69) | 68021 (65.93) |

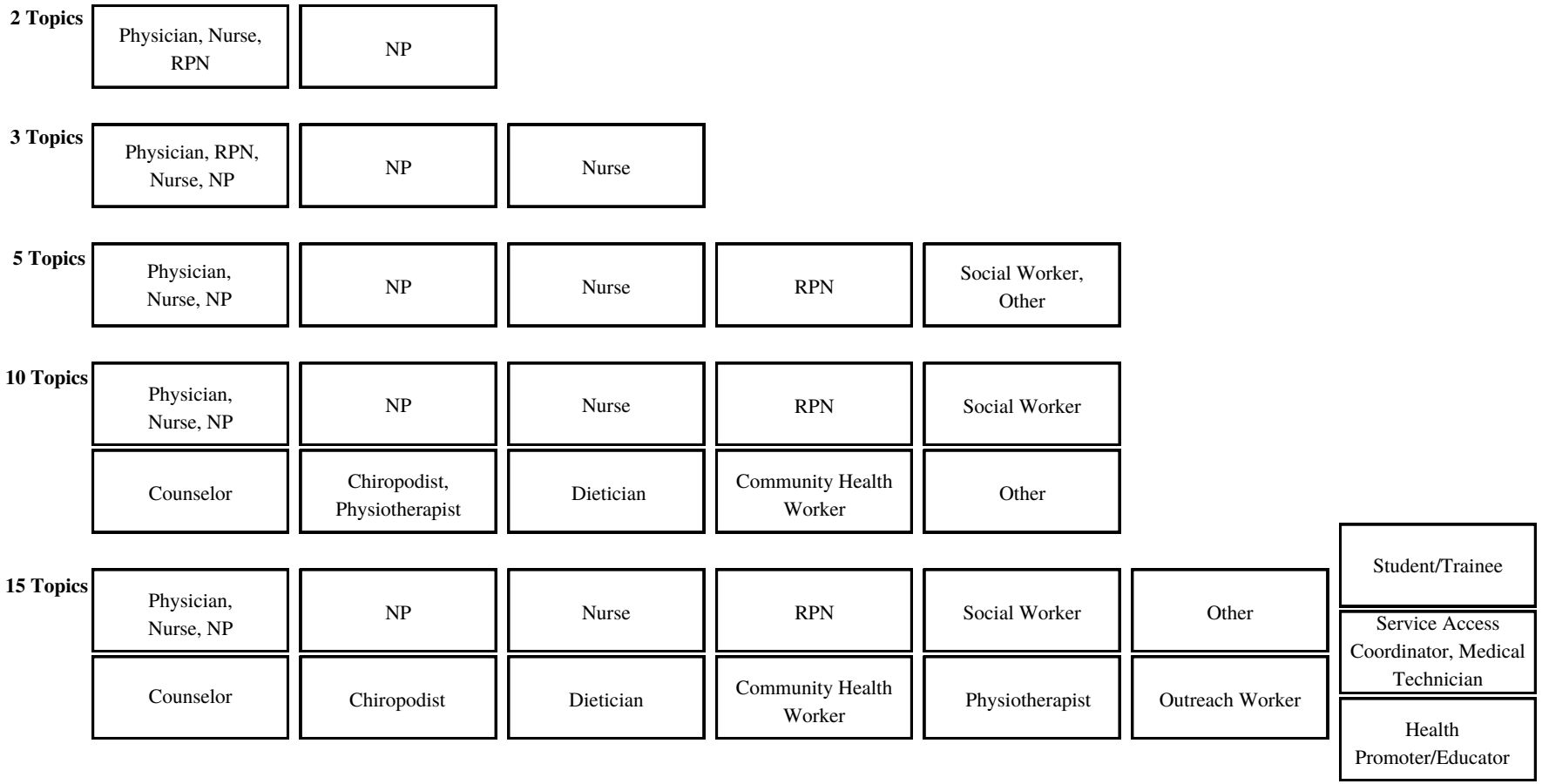
*Legend:* MM = Multimorbidity; UAR = Urban At Risk CHC

# Sociodemographic Characteristics: C

| Variable | Values | All | UAR | MM |
|---|---|---|---|---|
| Number of clients | | 221047 | 35998 | 103172 |
| Years since Arrival in Canada | 0-5 years | 13654 (6.18) | 1191 (3.31) | 3047 (2.95) |
| | 6+ years | 51815 (23.44) | 4940 (13.72) | 22722 (22.02) |
| | None recorded | 155578 (70.38) | 29867 (82.97) | 77403 (75.02) |
| Household Income | $0 to $14,999 | 40519 (18.33) | 8729 (24.25) | 17757 (17.21) |
| | $15,000 to $24,999 | 21102 (9.55) | 3555 (9.88) | 11081 (10.74) |
| | $25,000 to $39,999 | 20877 (9.44) | 2988 (8.3) | 10736 (10.41) |
| | $40,000 to $59,999 | 17245 (7.80) | 2421 (6.73) | 8671 (8.40) |
| | $60,000 or more | 28494 (12.89) | 3862 (10.73) | 12868 (12.47) |
| | Do not know | 15408 (6.97) | 2658 (7.38) | 6264 (6.07) |
| | Prefer not to answer | 27621 (12.50) | 4130 (11.47) | 14890 (14.43) |
| | Missing | 49781 (22.52) | 7655 (21.27) | 20905 (20.26) |
| Household Composition | Couple with children | 53398 (24.16) | 6759 (18.78) | 20713 (20.08) |
| | Couple without child | 39664 (17.94) | 5945 (16.51) | 22950 (22.24) |
| | Extended Family | 7632 (3.45) | 1123 (3.12) | 3581 (3.47) |
| | Grandparents with Grandchild(ren) | 1746 (0.79) | 247 (0.69) | 1183 (1.15) |
| | Siblings | 1622 (0.73) | 250 (0.69) | 669 (0.65) |
| | Single Parent | 14445 (6.53) | 2527 (7.02) | 6348 (6.15) |
| | Sole Member | 32782 (14.83) | 7445 (20.68) | 18597 (18.03) |
| | Unrelated housemates | 8622 (3.90) | 1567 (4.35) | 2849 (2.76) |
| | Other | 8913 (4.03) | 1476 (4.10) | 4202 (4.07) |
| | Do not know | 2475 (1.12) | 643 (1.79) | 1279 (1.24) |
| | Prefer not to answer | 3727 (1.69) | 491 (1.36) | 1927 (1.87) |
| | Missing | 46021 (20.82) | 7525 (20.90) | 18874 (18.29) |
| Stable Residence | True | 199349 (90.18) | 28227 (78.41) | 90479 (87.70) |
| Food Insecurity | True | 10985 (4.97) | 2947 (8.19) | 7323 (7.10) |

*Legend:* MM = Multimorbidity; UAR = Urban At Risk CHC

# Provider Type Teams: Relative Amount-Seen



# Questions/Discussion

Please raise your hand and we'll call on you to ask your question aloud.

If you prefer, you may type questions into the Q&A panel and we will moderate them.

# Want more? Let's take a deeper dive together!

## Brainstorming Session: How can we use health care data to create decision-support tools?

Friday, October 21, 2022
12:00-1:00 pm
Info: Sara.Bhatti@AllianceON.org

Alliance for Healthier Communities
Alliance pour des communautés en santé

EPIC

# Thank you!

For follow-up questions:

jkueper@uwo.ca
LHS@AllianceON.org