MOSAIC

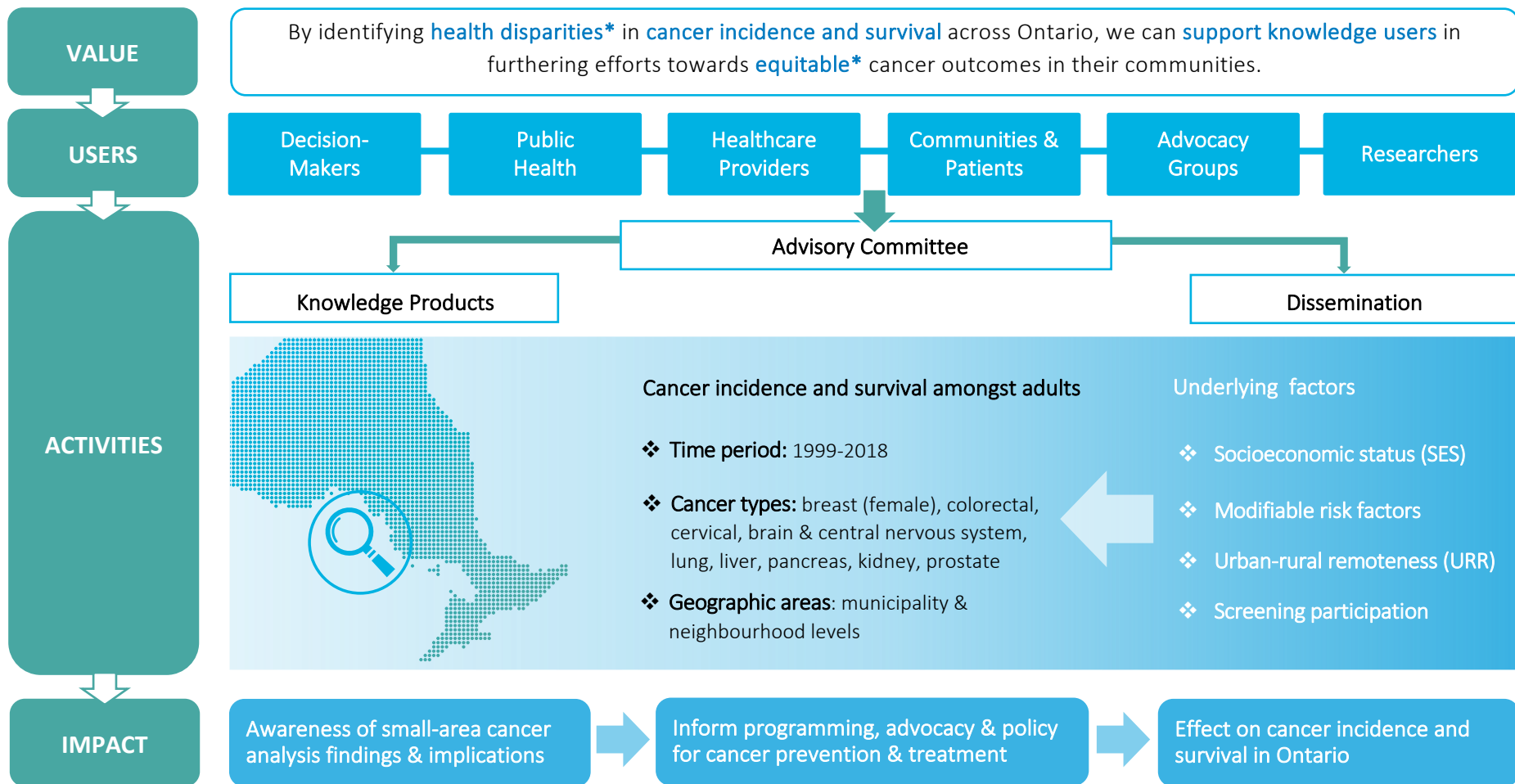## MEASURING ONTARIO'S SMALL-AREA INEQUALITIES IN CANCER

Cancer affects many Ontarians and there are large differences in cancer rates across the province.
We need to understand **where** these differences occur, **how** they have changed over time and possible **reasons** for these differences.

VALUE

By identifying **health disparities*** in **cancer incidence and survival** across Ontario, we can **support knowledge users** in furthering efforts towards **equitable*** cancer outcomes in their communities.

USERS

| Decision-Makers | Public Health | Healthcare Providers | Communities & Patients | Advocacy Groups | Researchers |

Advisory Committee

Knowledge Products

Dissemination

ACTIVITIES

Cancer incidence and survival amongst adults

❖ **Time period:** 1999-2018

❖ **Cancer types:** breast (female), colorectal, cervical, brain & central nervous system, lung, liver, pancreas, kidney, prostate

❖ **Geographic areas:** municipality & neighbourhood levels

Underlying factors

❖ Socioeconomic status (SES)

❖ Modifiable risk factors

❖ Urban-rural remoteness (URR)

❖ Screening participation

IMPACT

| Awareness of small-area cancer analysis findings & implications | → | Inform programming, advocacy & policy for cancer prevention & treatment | → | Effect on cancer incidence and survival in Ontario |

Ontario Health
Cancer Care Ontario

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MEASURING ONTARIO'S SMALL AREA INEQUALITIES IN CANCER

Background

- Ontario is Canada's most populous province (> 14 million people) with an increasing cancer burden and geographical disparities in cancer incidence and survival[1]

- Effective cancer control and equitable cancer outcomes require a better understanding of what is *influencing inequalities* in cancer burden *over time* (temporal) at the *small-area* (spatial) level

- Recent enhancements to statistical models exist to enable small-area disease mapping and spatial analysis, although these models have yet to be applied in Canada

- **Study aim:** to produce valid and robust small-area estimates of cancer incidence and survival among Ontario adults to identify and investigate inequalities

Objectives

1. **Identify spatio-temporal inequalities** in cancer incidence and relative survival among the cancers of interest

2. **Explore underlying factors** that may be driving spatio-temporal inequalities in cancer incidence and survival

3. **Engage knowledge users** in the research process to enhance utility and reach of study findings

Identify
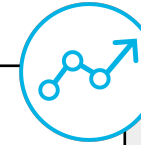
Population

- Ontario adults (ages 20-89) diagnosed with primary cancers* between 1999 and 2018

- Cancer types: Ontario screening programs (breast, colorectal, cervical), difficult to treat (brain & central nervous system, lung, liver, pancreas), emerging types (kidney, prostate)

Geography

- Census dissemination areas: 400-700 people (neighbourhoods)[2]

- "Uber" Census Tracts (CTs): newly created hybrid of Census Subdivisions (municipalities)[3] in rural areas (up to 110,000 people) & CTs in urbanized areas (2,500-8,000 people)[4]

Analysis

| Incidence	Survival
Cross-sectional design	Retrospective cohort design
Indirectly standardized incidence rate ratios	Excess mortality odds ratios
Dissemination areas	Uber CTs
Hierarchical Bayesian spatio-temporal modeling[5]	Hierarchical Bayesian spatio-temporal flexible parametic relative survival modeling[6]

*Primary cancer: refers to the first diagnosis of a specific cancer, as it is possible to have more than one primary cancer

Explore

- Up to six modifiable cancer risk factors[7]
- Participation in three cancer screening programs[8]
- Select dimensions of marginalization (SES)[9]
- Six categories of URR, from large urban (>=500,000) to rural-very remote (<10,000)

All underlying factors explored for incidence. *Select* factors (SES & URR) will be examined for survival

Engage
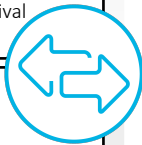
- Involve knowledge users in assessing study outputs (data visualizations), advising on knowledge products and informing dissemination planning

- Invite stakeholders from knowledge user groups to participate in an Advisory Committee

- Key activity: a user engagement workshop with the Committee to facilitate feedback and discussion

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5. Lee D, Rushworth A, Napier G. CARBayesST: An R Package for Spatio-temporal Areal Unit Modelling with Conditional Autoregressive Priors. *R Package Version 2*. 2015.
6. Cramb SM, Mengersen KL, Lambert PC, Ryan LM, Baade PD. A flexible parametric approach to examining spatial variation in relative survival. *Stat Med*. 2016;35(29):5448-5463. doi:10.1002/sim.7071
7. Cancer Care Ontario. Cancer Risk Factors Atlas of Ontario. https://www.cancercareontario.ca/en/statistical-reports/cancer-risk-factors-atlas-ontario. Published 2017. Accessed March 15, 2021.
8. Cancer Care Ontario. Screening Programs – Cancer Care Ontario. https://www.cancercareontario.ca/en/cancer-care-ontario/programs/screening-programs. Accessed March 15, 2021.
9. Ontario Community Health Profiles Partnership. Ontario Marginalization Index (ON-Marg). http://www.ontariohealthprofiles.ca/onmargON.php. Accessed March 15, 2021.

What kind of knowledge products would help you use this information to inform your practice or policy decisions?

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