Breast Cancer Control in Rural Settings

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THE University of Vermont CANCER CENTER

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Disclosures

- I have no disclosures to report.

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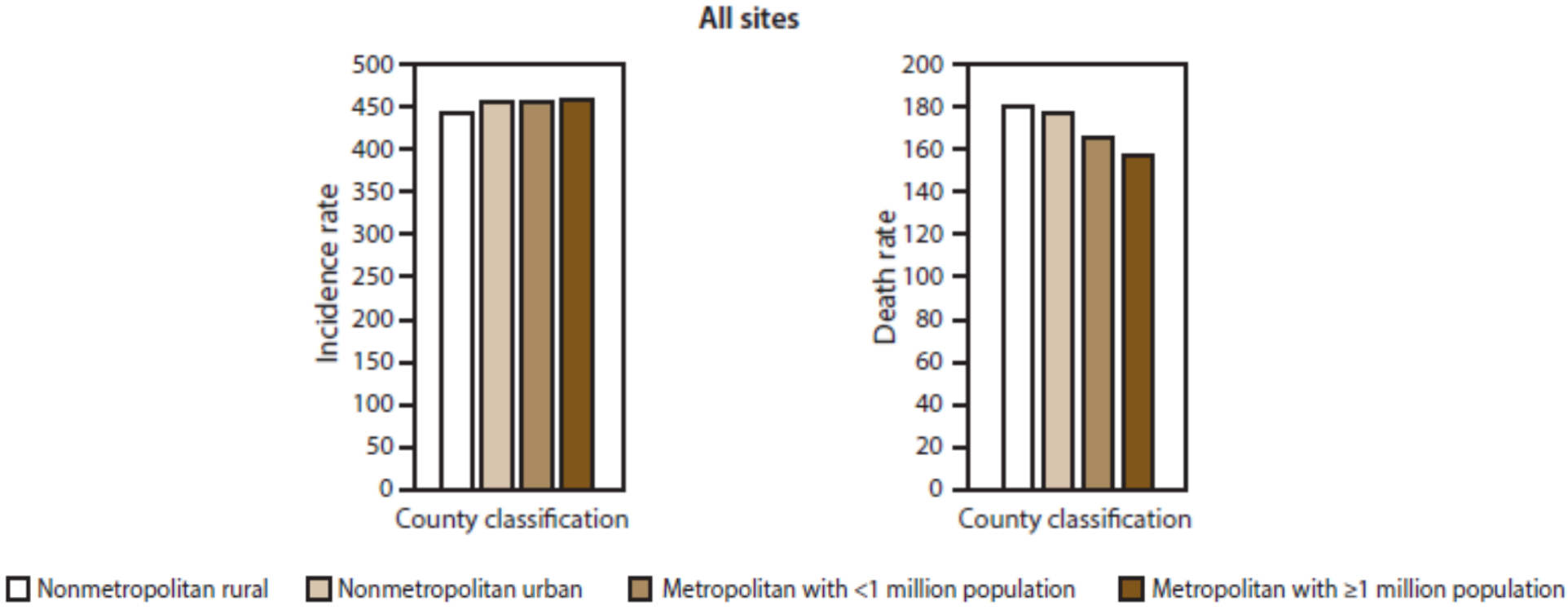
Urban-Rural Disparities in Cancer



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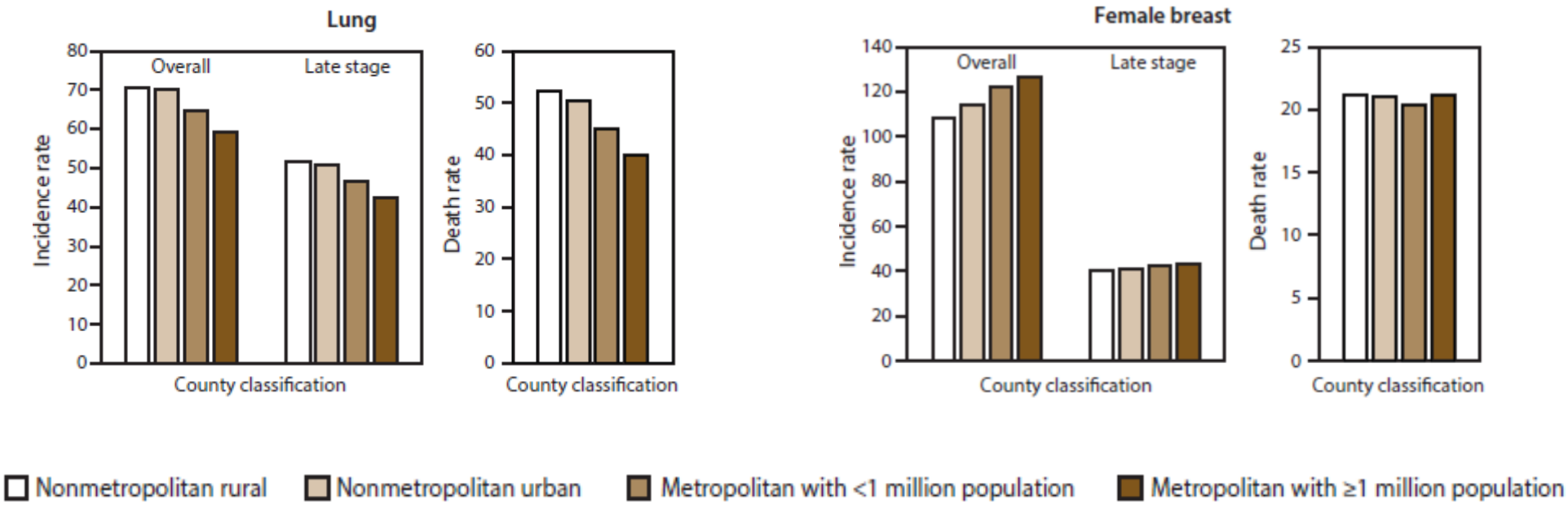
Henley et al., 2017 *MMWR Surveill Summ* 66:1-13

Urban-Rural Disparities in Cancer



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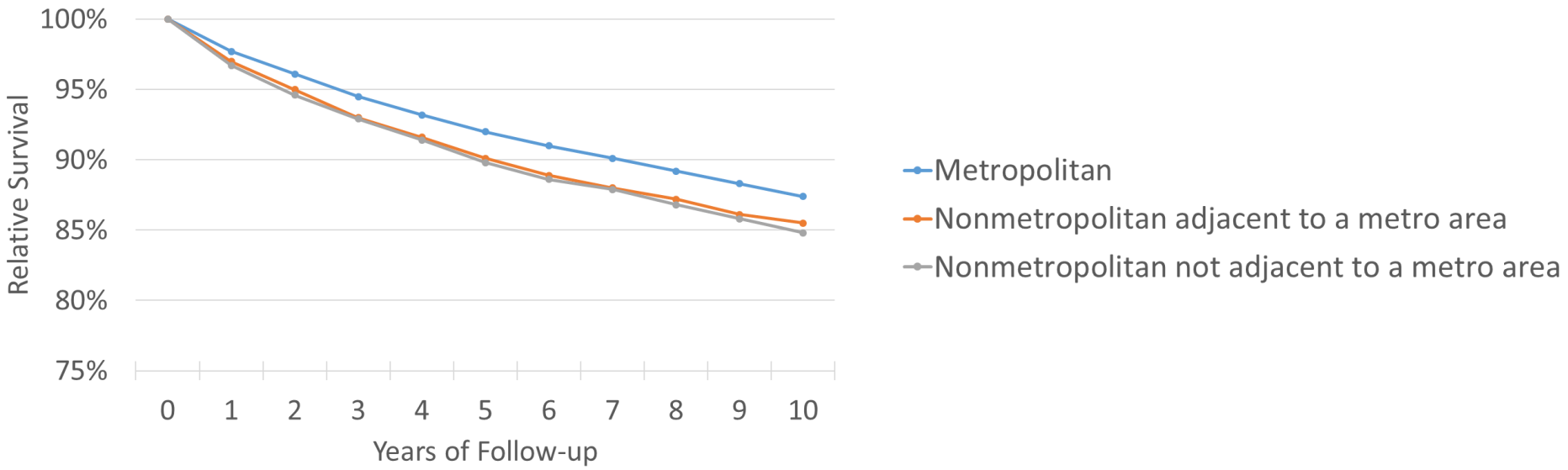
Henley et al., 2017 *MMWR Surveill Summ* 66:1-13

Breast Cancer Survival



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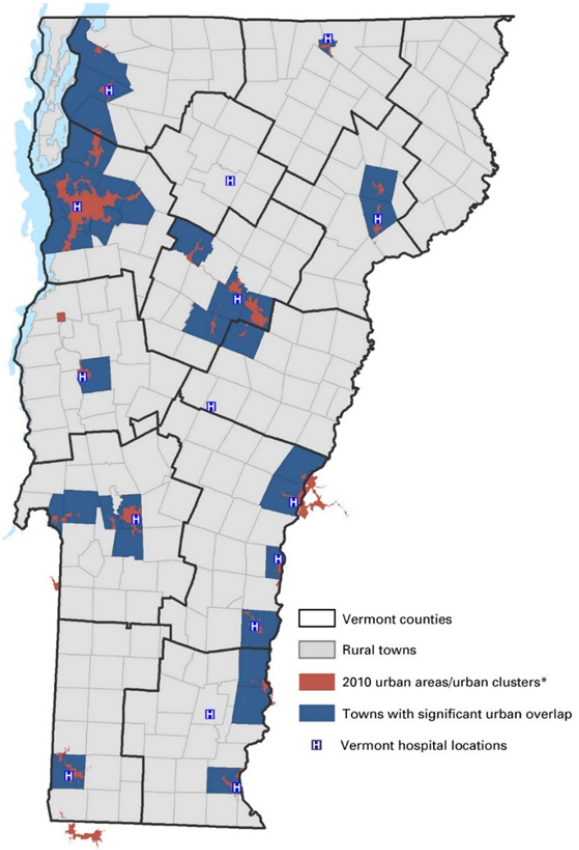
Source: SEER Cancer Registries

Studying Breast Cancer in Vermont

- 61% of Vermont's population lives in rural areas as defined by US Census
  - 2nd in US only to Maine
- Adult female population ~240,000
  - About 500 breast cancers diagnosed per year



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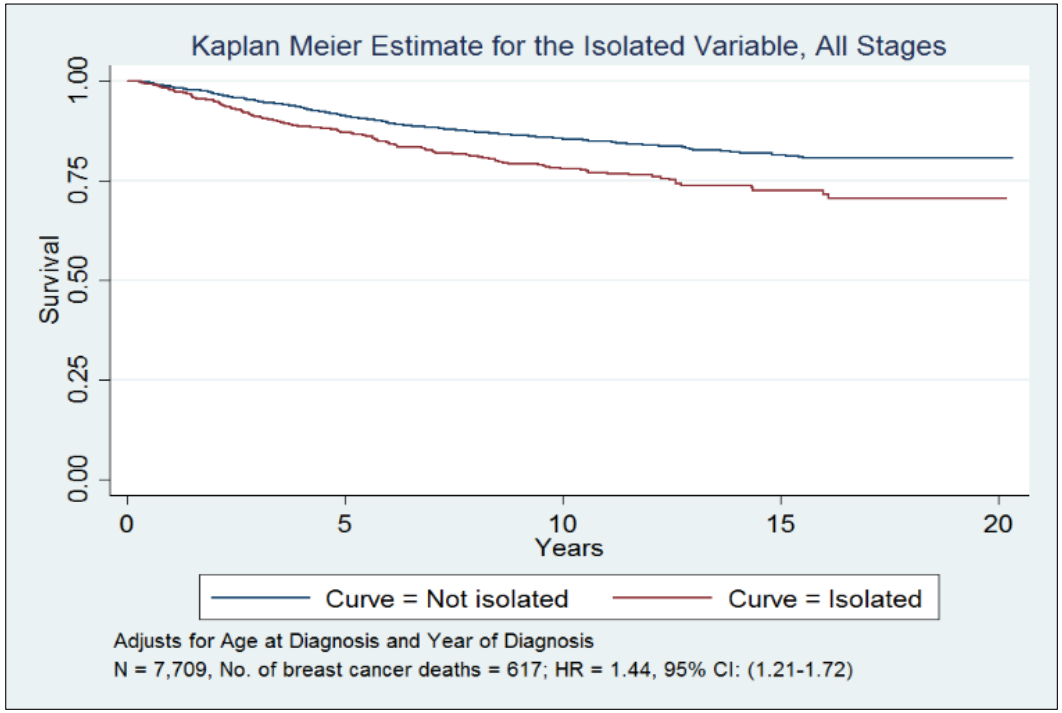
Breast Cancer Survival in Vermont

- Among women diagnosed with breast cancer in Vermont, those living in isolated rural areas of Vermont had 44% increased risk of breast cancer death compared to women living in urban areas.



KC Bolton, unpublished findings.

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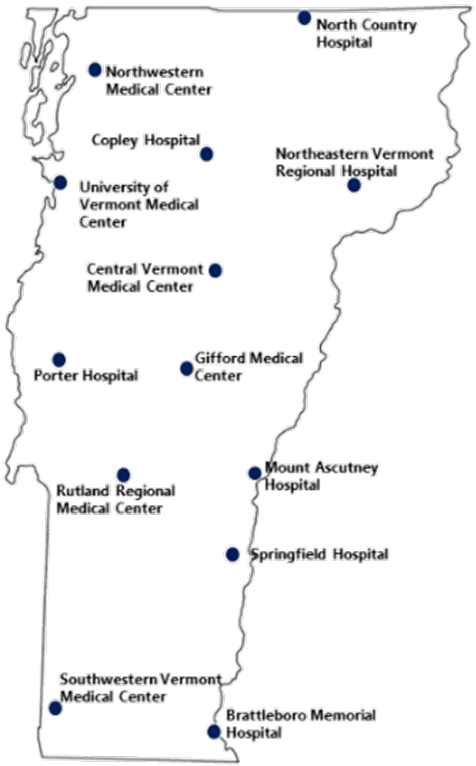
The Vermont Breast Cancer Surveillance System

- Statewide medical records registry for all women undergoing breast imaging at Radiology facilities in Vermont
  - Established in 1993
  - Funded by research grants from NCI, PCORI
- Data sources
  - 15 breast imaging facilities
  - 10 pathology facilities
    - Abstraction from path reports
  - Linkage to Vermont Cancer Registry and state vital records
  - Algorithms to ensure patient matching across data streams



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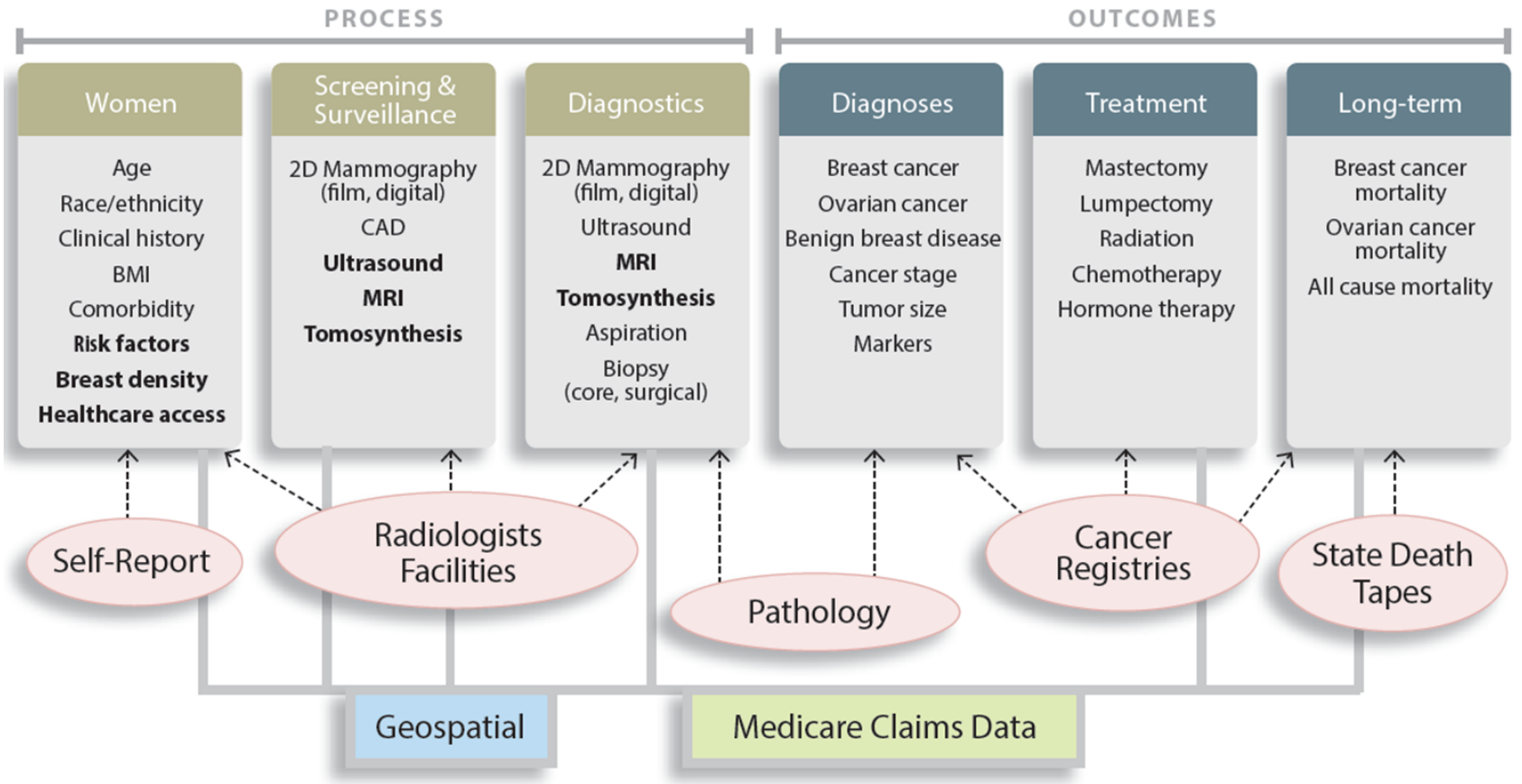
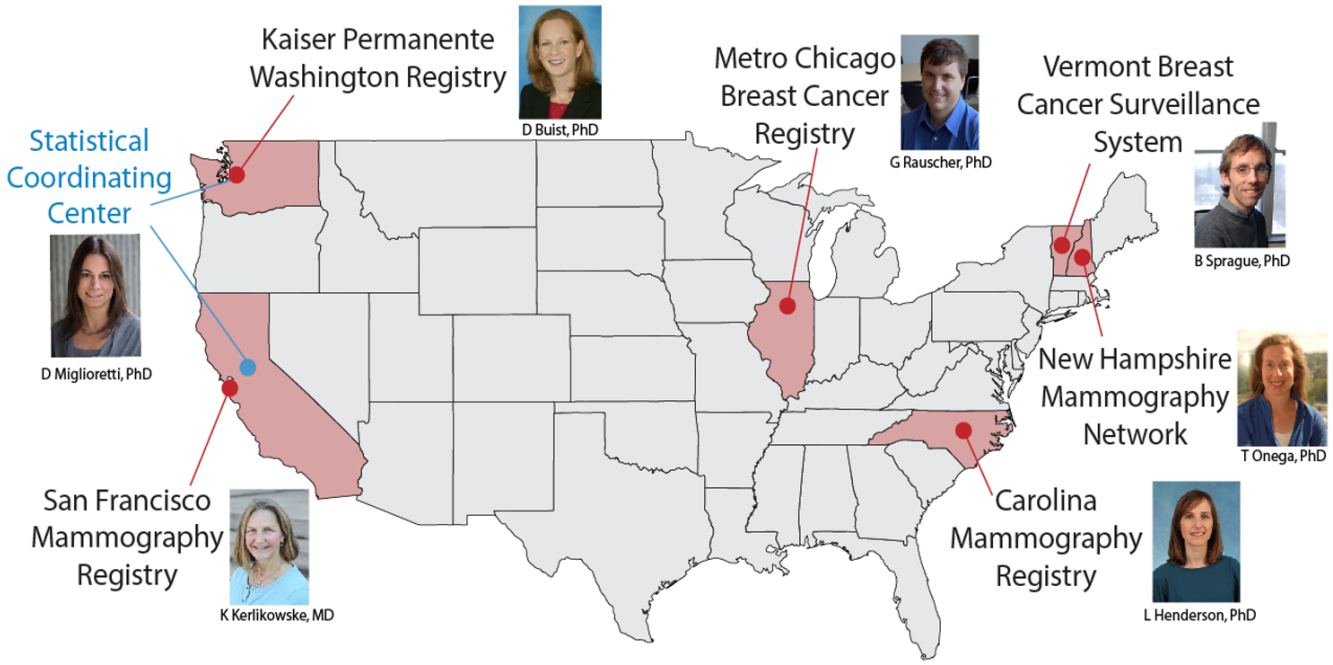
Data Collection



Ancillary Studies
Radiologic images
Tissue specimens
Patient surveys
Provider surveys

The Breast Cancer Surveillance Consortium (BCSC)

The nation's largest longitudinal collection of mammography data from breast cancer screening in community practice (13 million mammograms, 3 million women)



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Investigating Breast Cancer Control in Rural Populations

The Cancer Control Continuum

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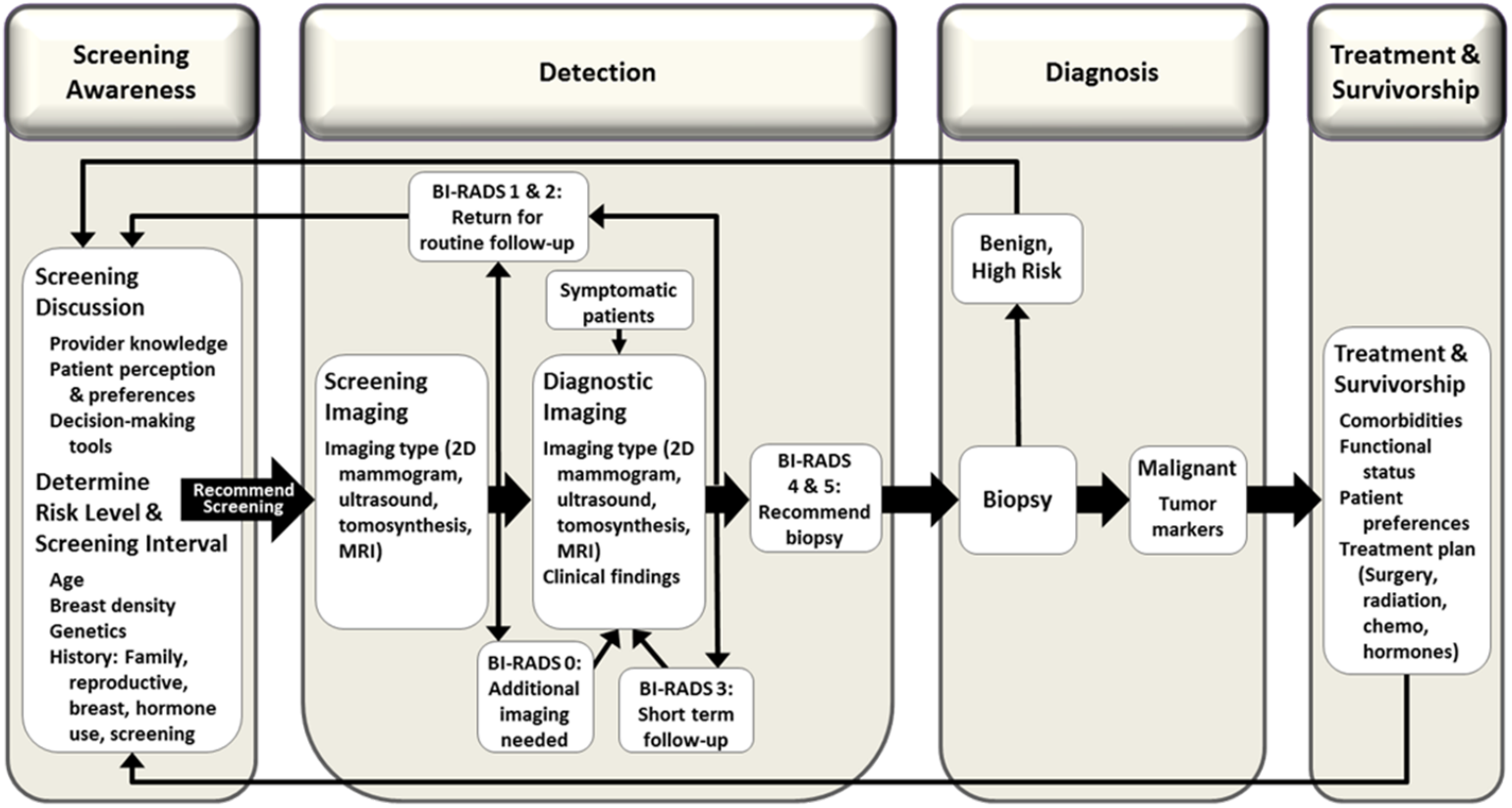


Onega et al., 2014
Cancer 120:2955-2964

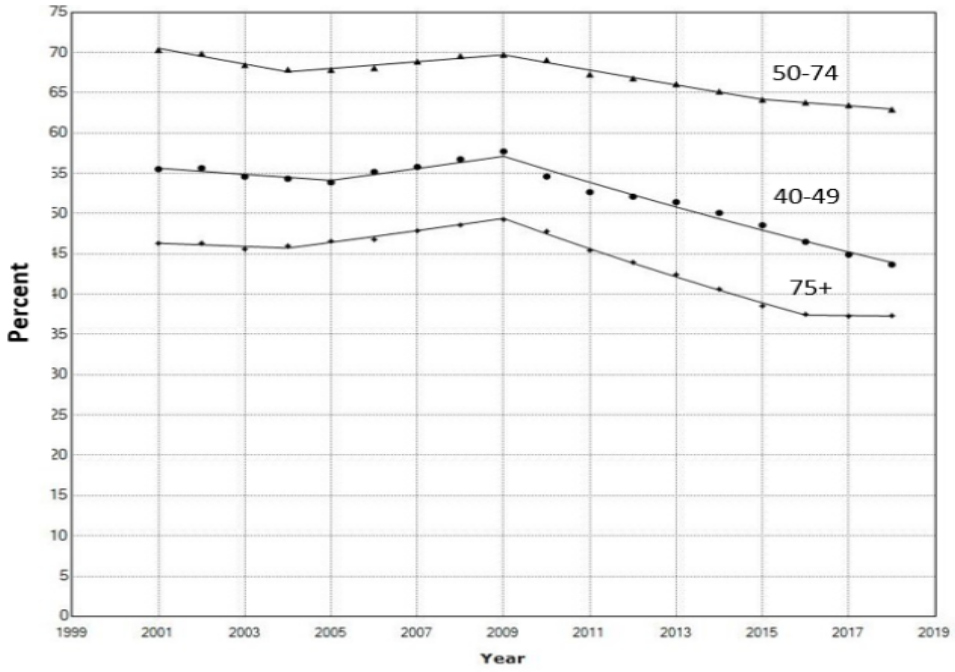
Investigating Breast Cancer Control in Rural Populations

- Prevention
- Detection
  - Access to screening & diagnostic imaging
  - Quality of imaging interpretation
- Diagnosis
  - Access to biopsy services
  - Timeliness of diagnosis
- Treatment
  - Access and adherence to treatment
- Survivorship

Screening Utilization in Vermont

- Persistent decline in Vermont women adhering to screening recommendations

Percent of Vermont Women Screened in the Past 2 Years



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Beaudet, manuscript in preparation

Screening

- National studies report that women living in rural areas have slightly lower utilization of breast cancer than women in urban areas

- Women living in counties with few or no mammography machines have lower screening rates
  - Need mobile vans, subsidies for purchase of machines, increased reimbursement, incentives for providers to practice in underserved areas

Tran & Tran, 2019 *Cancer Causes and Control* 30:1045-1055
Elkin et al., 2010 *Medical Care* 48:349-356

Detection: Mammography Interpretive Performance

- Mammography screening performance varies across providers in Vermont
  - 15 Vermont facilities
    - sensitivity 75-93%
    - specificity 79-95%
  - 51 Vermont radiologists
    - sensitivity 71-98%
    - specificity 73-97%

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Detection: Mammography Interpretive Performance

- BCSC studies have shown that mammographic accuracy is lower among:
  - General radiologists vs. breast specialists
  - Low volume vs. high volume readers
  - Radiologists with less years of experience

- Many rural facilities are served by general radiologists who read low volume of mammograms
  - 70% of rural physicians interpret <1000 mammograms per year (vs. 55% urban)

- 23% of rural facilities performed <1000 mammograms per year

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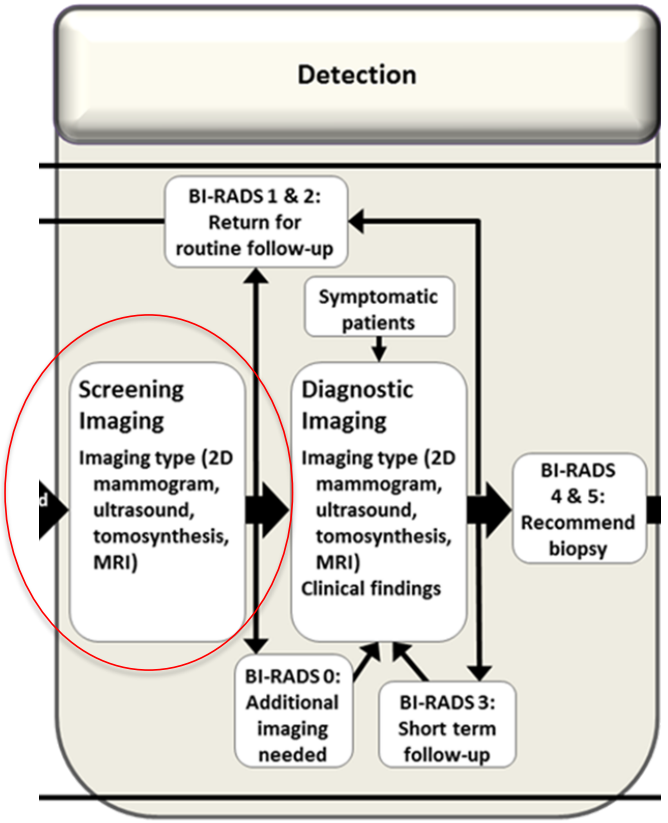
Smith-Bindman 2005 *Journal of the National Cancer Institute* 97:358-367
Smith-Bindman 2008 *American Journal of Roentgenology* 190:526-532

Mammography Interpretive Performance

- BCSC analyses of screening mammography performance at 151 facilities
  - No difference in sensitivity or specificity at rural vs. urban facilities after adjusting for patient-level factors (age, time since last mammogram, etc.)
  - Timeliness of follow-up with additional imaging after abnormal screen is comparable at rural vs. urban facilities.



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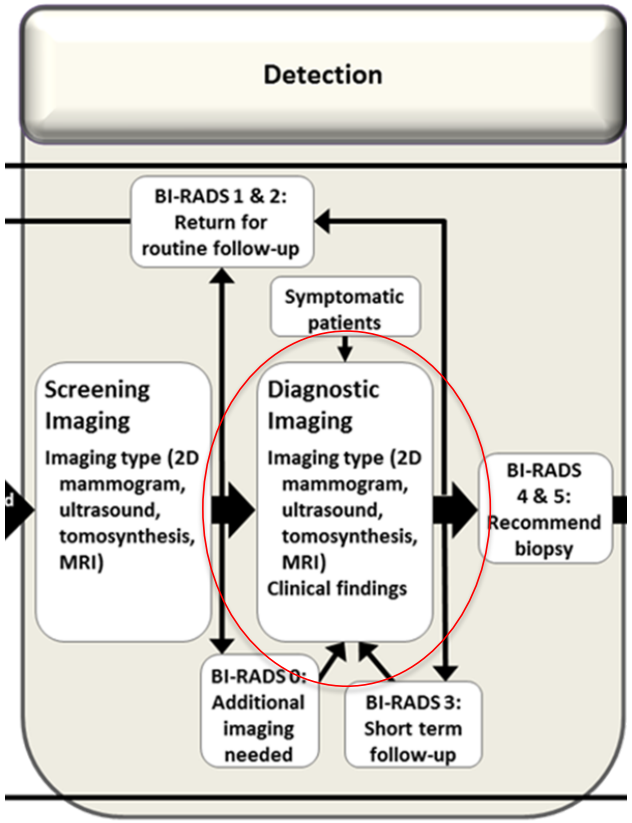
Goldman 2008 Medical Care 46:701-708
Rosenberg 2011 Radiology 261:404-413

Mammography Interpretive Performance

- BCSC analyses of diagnostic mammography
  - Comparable sensitivity at rural vs. urban facilities
  - Poorer specificity at rural facilities, corresponding to a **55%** higher false positive rate
  - Unnecessary additional imaging and biopsies



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Goldman 2013 *Medical Care* 51:307-314

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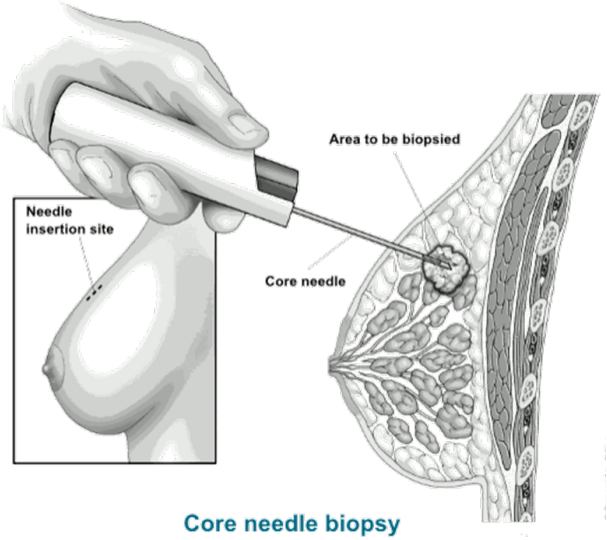
Diagnosis of Breast Cancer

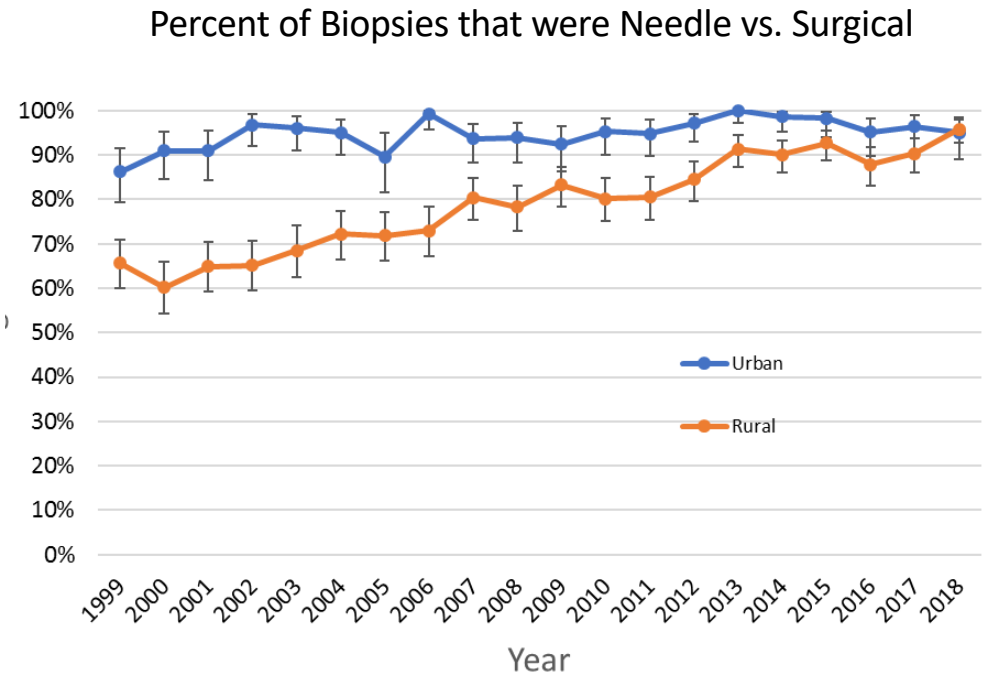
- Use of needle biopsy rather than surgical biopsy is a Quality of Care measure from the Commission on Cancer
  - Rate of needle biopsy should meet or exceed 90%
- Surgical biopsy
  - Increased patient discomfort, increased risk for wound complications
  - Prolonged recovery compared to MIBB
  - Disruption of tumor margins
- Needle biopsy
  - Less unlikely to have unnecessary surgery
  - More likely to have negative margins at time of first surgery
  - Allows for neo-adjuvant therapy



Core needle biopsy

Breast Biopsy in Vermont

- Open surgical excision was nearly one-third of the biopsies performed in Vermont in the year 1999
- Large disparity in biopsy type for rural vs. urban residents has essentially been erased.
- By 2013, the needle biopsy rate exceeded 90% for rural women in Vermont



James et al. 2012, *J Am Coll Surg*
Murphy et al., in preparation

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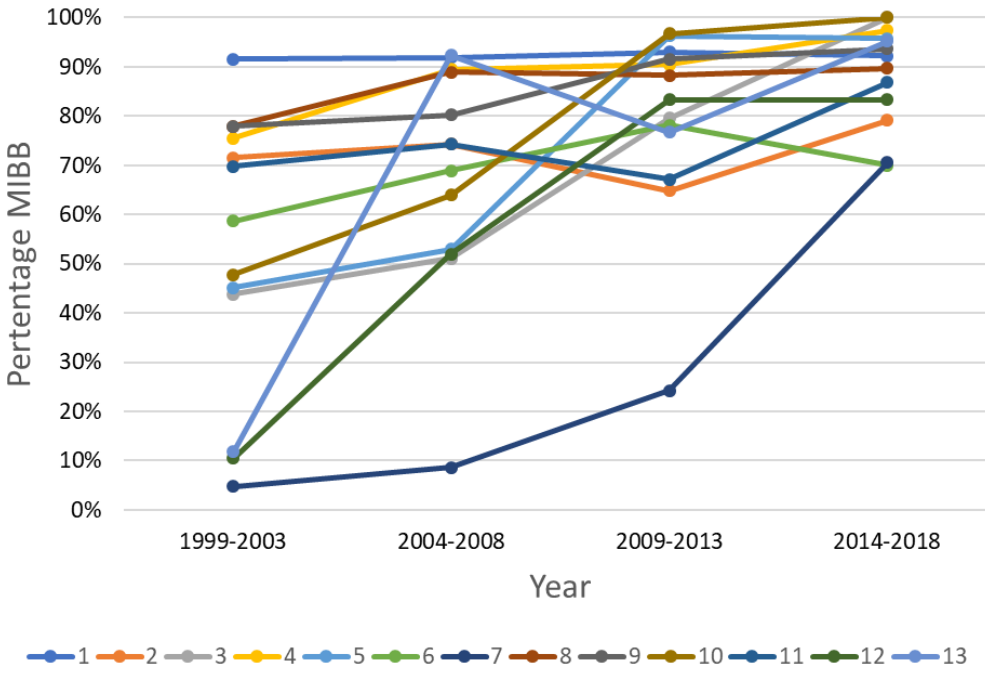
Breast Biopsy - results

- 3 of 13 hospitals in Vermont still have needle biopsy rate <90%
  - Some facilities can only perform ultrasound-guided needle biopsy.
  - Do not have equipment for stereotactic (mammography-guided) needle biopsy
    - If lesion is only seen on mammography (not ultrasound) then patient must choose whether to travel for stereotactic biopsy



Murphy et al., in preparation

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Diagnosis of Breast Cancer

- BCSC analysis of timeliness of diagnosis after positive diagnostic mammogram
  - Follow-up for biopsy/surgical consultation is slower in rural (38% in 15 days) vs. urban facilities (57% in 15 days).
    - And 5% less likely to follow through with biopsy.

Goldman 2013 *Medical Care* 51:307-314

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Access to Cancer Care

- Rural women in breast cancer treatment randomized trials have similar outcomes to urban women
  - When treatments are carefully managed/arranged, rural patients have comparable survival

- There are many fewer specialist physicians in rural vs. urban areas
  - Less than 50% of cancer patients living in small and isolated rural areas have a medical or radiation oncologist within 30 miles (compared to >98% for urban patients)

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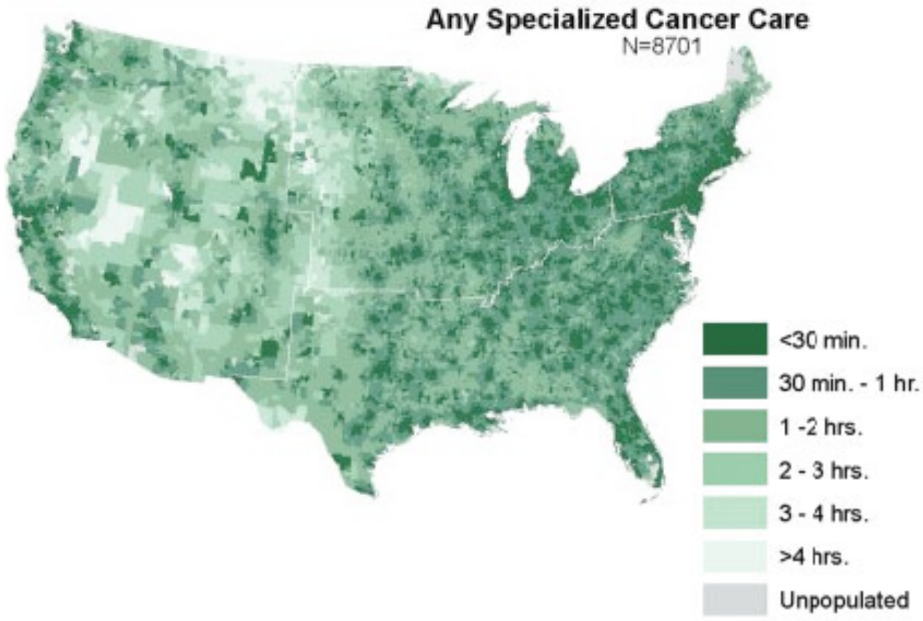
Unger et al., 2018 *JAMA Network Open* 1(4):e181235
Baldwin et al., 2008 *J Rural Health* 24:390-399

Access to Cancer Care

- Median drive times for small town and isolated rural areas:
  - 180 minute drive to the nearest NCI-designated cancer center
  - 105 minutes to academic medical center
  - 59 minutes to any specialized cancer care setting
- Travel time to a facility is associated with treatment choice
  - Choosing “low frequency” service (mastectomy rather than lumpectomy + radiation)



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Onega et al., 2008 *Cancer* 112:909-918
Onega et al., 2011 *BCRT* 129:269-275

Time to Chemotherapy

- In Vermont, drive time to the treatment facility is associated with delayed initiation of chemotherapy
  - 702 women diagnosed with stage I-III breast cancer in Vermont
  - Determined time between date of diagnosis and initiation of chemotherapy
  - Multivariable adjustment for stage, surgery type, age, hospital

Drive-Time Group	Mean (weeks)	25th Percentile (weeks) (95% CI)	50th Percentile (weeks) (95% CI)	75th Percentile (weeks) (95% CI)
<15 minutes	9.6	7.6 (7.0,8.0)	9.2 (8.7,9.8)	11.5 (11.0,12.1)
15-29 minutes	9.4	7.0 (5.8,7.1)	9.0 (8.1,9.7)	12.0 (10.4,13.0)
30-44 minutes	9.6	6.5 (6.0,7.4)	9.6 (8.1,10.7)	12.1 (11.0,13.4)
45-59 minutes	10.0	6.4 (5.4,7.8)	9.4 (8.4,10.5)	13.0 (11.8,14.5)
60+ minutes	11.7	8.2 (8.0,9.2)	11.0 (10.1,11.8)	14.2 (13.5,15.2)

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Johnson et al., 2016 J Oncol Pract 12(9):e848-57.

Summary

- Compared to women in urban areas, women in rural areas have:
  - Lower incidence of breast cancer
  - Comparable screening utilization, high quality screening mammography performance
  - Worse performance of diagnostic mammography (higher false positive rate)
  - Delays in biopsy and lower access to needle biopsy
  - Impaired access to treatments
  - Worse survival after diagnosis
- Themes
  - Access to high quality specialized care is a significant challenge
    - Especially care requiring multiple visits

Interventions

- Patient navigation programs
- Transportation assistance programs
- Guest housing near oncology practices
- Expanded services (mammography, chemotherapy, etc.) at local facilities
- Mobile services (mammography, chemotherapy)
- Remote interpretation of diagnostic mammography
- Need subsidies, reimbursement, incentives, etc., for all of the above

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