CPCRN
Cancer Prevention and Control Research Network

Modeling Evidence-Based Interventions (EBI) Impact Workgroup Update

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PRC Prevention Research Centers

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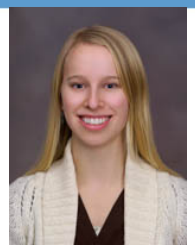
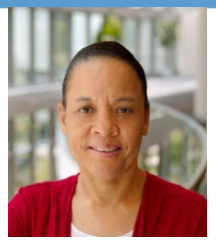

Melinda Davis, OHSU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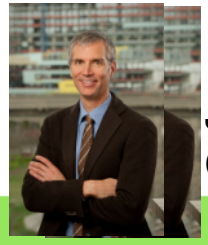
John McConnell, OHSU


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CPCRN Cancer Prevention and Control Research Network

Modeling EBI Impact Workgroup Objectives

- Inform cancer screening-focused EBI implementation planning, practice-level change, and policies at the state and national levels
- Use models to simulate and compare the impact of alternate "what if" scenarios on:
  - Cancer screening rates in a given year and over time
  - The percent of subpopulations up-to-date with routine screening, cancer incidence, cancer stage at diagnosis, cancer deaths and/or life-years lost due to cancer
  - Costs and cost-effectiveness of CRC screening-focused interventions
- Integrate best available evidence into decision support models to increase cancer screening overall and address observed disparities

Research Questions Examined Since May 2016

- Claims data only analyses:

1) What is the regional variation in CRC screening within publically and commercially insured populations in **OR**?

2) What is the regional variation in CRC screening modalities used across CCOs in **OR**?

- Simulation analyses:

3) What is the projected impact of Medicaid expansion on CRC screening and outcomes among African American males in **NC**?

4) *What is the impact of the ACA private insurance expansion on CRC screening and outcomes in **NC**?**

5) *What is the impact of the ACA private insurance expansion and Medicaid expansion on CRC screening and outcomes in **OR**?**

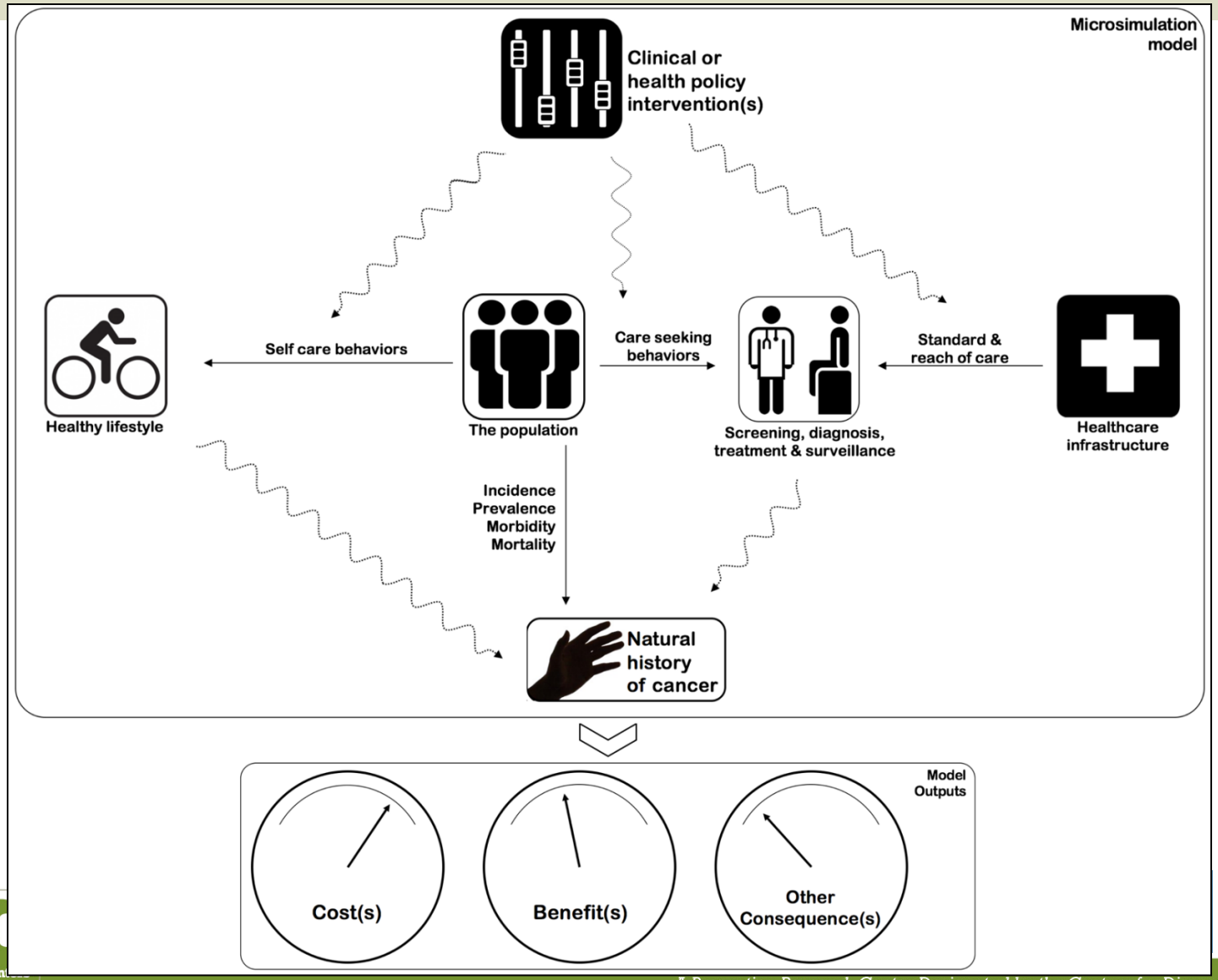
6) *What interventions are recommended to increase CRC screening in publically insured populations in **OR**?**

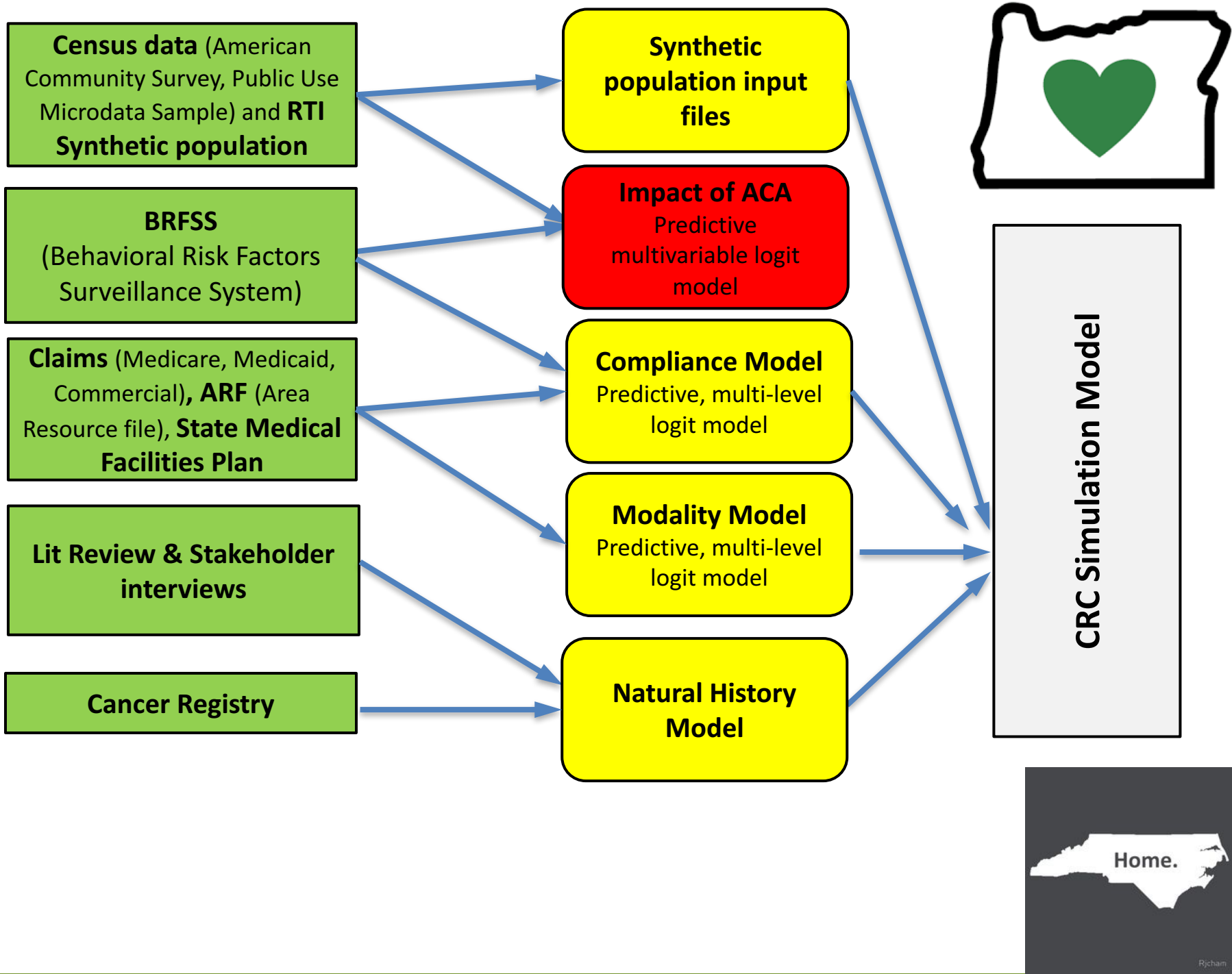
** in progress*

What's Next for the Modeling EBI Workgroup

- What would it take to get to 80% by 2018 in NC? In OR?
- How can we best integrate decision support modeling with implementation science for CRC screening?
  - To inform implementation of specific CRC screening EBIs in geographically distinct areas and populations, e.g.:
    - Urban, publicly insured populations
    - FQHCs
    - CCOs in OR
    - Eastern NC
  - To develop best practices for using simulation in stakeholder implementation decision support

Model schematic




Census data (American Community Survey, Public Use Microdata Sample) and RTI Synthetic population
BRFSS (Behavioral Risk Factors Surveillance System)
Claims (Medicare, Medicaid, Commercial), ARF (Area Resource file), State Medical Facilities Plan
Lit Review & Stakeholder interviews
Cancer Registry
Synthetic population input files
Impact of ACA Predictive multivariable logit model
Compliance Model Predictive, multi-level logit model
Modality Model Predictive, multi-level logit model
Natural History Model
CRC Simulation Model
Home.

Illustrative Model Outputs

Modules	Examples of Simulation outputs
 Clinical or health policy Intervention scenarios	Costs, cost-effectiveness and other consequences of interventions or policies
 Healthy lifestyle	Prevalence of tobacco and alcohol use Percentage up-to-date with screening
 The population	Prevalence of benign tumors (e.g. adenomas) Average life expectancy Cancer mortality rates by race and ethnicity
 Healthcare infrastructure	Service volume by facility
 Cancer screening, diagnosis, treatment & surveillance	Percent up-to-date with screening Number of false positives Adherence rate of diagnostic testing
 Natural history of cancer	Cancer incidence Stage of cancer diagnoses Cancer mortality Cancer cases averted Life years gained.

Progress

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Aim 1 Progress (CRC Screening Variation in Oregon - County)

Preventive Medicine
Available online 13 May 2017
In Press, Accepted Manuscript — Note to users

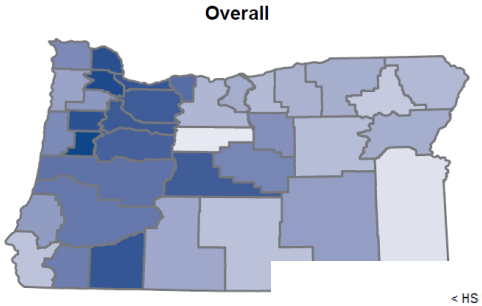
Geographic and population-level disparities in colorectal cancer testing: A multilevel analysis of Medicaid and commercial claims data

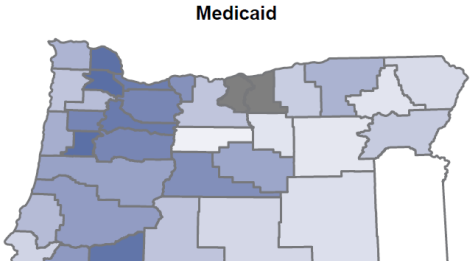
Melinda M. Davis[a, b], Stephanie Renfro[c], Robyn Pham[b], Kristen Hassmiller Lich[d], Jackilen Shannon[e], Gloria D. Coronado[f], Stephanie B. Wheeler[d, g, h]
Show more

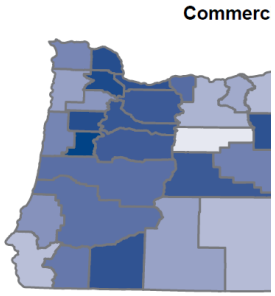
https://doi.org/10.1016/j.ypmed.2017.05.001 Get rights and content

Highlights

- Despite insurance, 58% had not received colorectal cancer (CRC) testing.
- CRC testing varied from 22.4% to 46.8% across Oregon's 36 counties.
- Individual, community, and health system-level factors impacted CRC testing.
- Counties with higher socioeconomic deprivation displayed lower CRC testing.
- Work to increase CRC testing in targeted counties and populations is needed.







	< HS Educ	< FPL	Unemployed	Uninsured	Fam Med MDs	Specialists
Jefferson - 22.4	16.3	21	10.7	25.1	4.1	0.9
Malheur - 23.4	20.2	25.8	8.7	22	1.3	3.3
Union - 26.6	10.7	19	8.2	17.2	1.9	7
Curry - 27.6	9.2	17.9	10.6	18.7	4.5	1.8
Lake - 27.9	13.6	19.8	11.1	20.2	5.1	0
Grant - 28.5	11.2	18.8	11.8	20.7	9.6	0
Gilliam - 28.9	10.4	11.6	6.9	15.2	0	0
Wallowa - 29.0	7.7	16.6	9.9	19.5	8.8	2.9
Wasco - 29.4	16.7	17	7.1	21.9	3.5	4.3
Morrow - 30.0	21.7	15.5	7.8	20.1	2.7	0.9
Baker - 30.5	11.9	19.3	9.2	17.4	6.9	1.9
Umatilla - 30.5	17.8	17.5	8.1	21	2	2
Sherman - 30.7	9.8	14.8	7.3	16.6	0	0
Klamath - 31.4	12.8	19.9	10.7	21.6	8.3	3.3
Tillamook - 32.1	11.5	15.4	7.2	22.7	5.5	2
Harney - 32.8	10.6	18.5	12.3	21.9	8.3	0
Coos - 33.2	12.2	20.6	9.9	18.6	3.2	6.4
Yamhill - 33.8	12.8	16.9	7.4	17.4	3.3	4.7
Wheeler - 34.9	12.8	21.8	7.1	22	0	0
Clatsop - 35.7	8.2	17.1	6.8	17.6	4	3.5
Lincoln - 35.8	10.7	18.5	8.2	21.7	2.2	2.8
Crook - 36.4	14.6	18.9	12.3	18.6	3.9	0
Josephine - 37.6	11.8	22.2	10.9	19.4	3.4	3.7
Douglas - 38.6	13.2	21.3	10.8	18.2	1.9	5
Lane - 39.3	9.4	22.1	7.6	17.7	4	7.3
Hood River - 40.2	17.7	14	6.1	21.6	13.3	7.1
Linn - 42.2	11.3	17.6	9.7	16.6	4.5	2.4
Deschutes - 42.8	7	15.8	9.5	18.2	3.9	8.3
Clackamas - 43.0	7.6	9.3	6.8	13.7	2.6	8.1
Marion - 43.3	16.9	20.2	8.4	20.6	4.2	4.7
Jackson - 43.9	10.6	18.1	9.5	19.2	4.1	8.1
Multnomah - 44.1	10.5	18.3	6.9	16.7	4.5	19.4
Polk - 44.7	10.1	16.2	7.6	15.6	2.4	2.6
Columbia - 45.0	11.1	15.8	8.2	15.2	1.4	1.4
Washington - 45.9	9.3	12.1	6.3	14.1	2.6	10.4
Benton - 46.8	6	19.7	5.8	13.7	3.8	13.2

- Controlling for age, beneficiaries had greater odds c
  if they were female (OR 1.04, 95% CI 1.01-1.08), c
  urban residents (OR 1.14, 95% CI 1.07-1.21).
- Accessing primary care (OR 2.47, 95% CI 2.37-2.5
  endoscopy (OR 0.98, 95% CI 0.92-1.03) was associ

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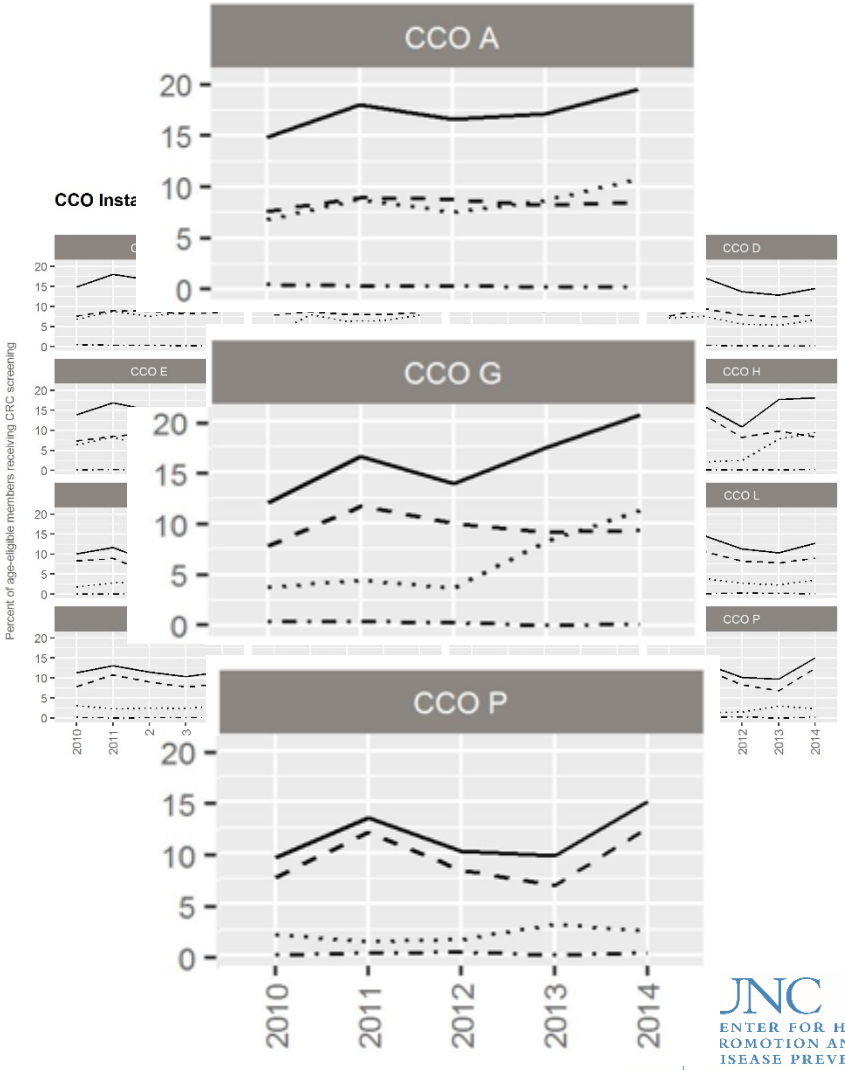
Aim 1 Progress (CRC Screening Variation in Oregon – Coordinated Care Organizations)

- RQ: How might Medicaid ACOs affect patterns of CRC screening and testing modalities used over time and across geographic regions?
  - **Participants:** Oregon Medicaid members between January 2010 and December 2014 who were age-eligible for CRC screening and met study inclusion criteria.
  - **Measures:** We examined incident (first evidence of) CRC screening and corresponding testing modality (i.e., colonoscopy, sigmoidoscopy, fecal testing) at the person level.



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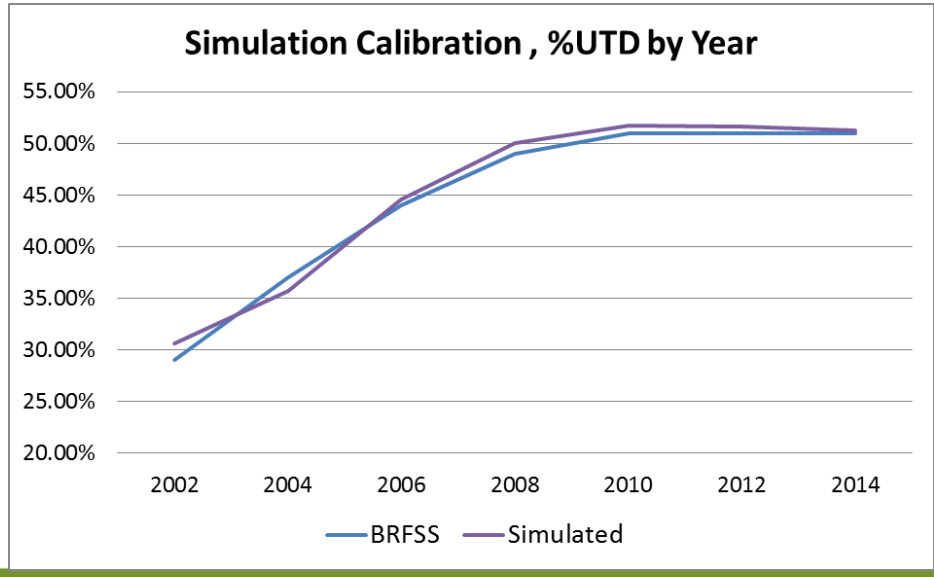
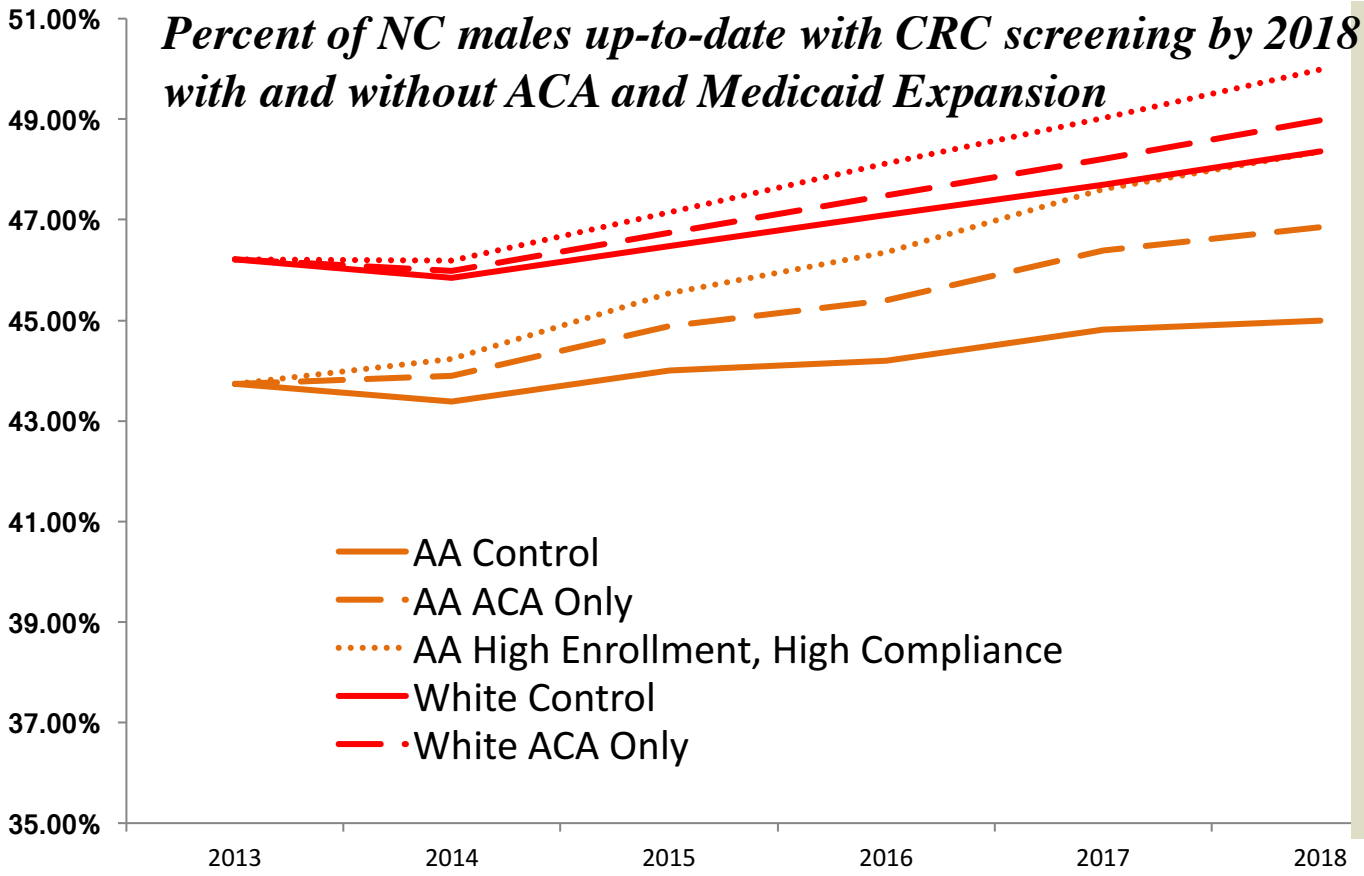
Simulation Model Updates since May 2016

- Added racial specificity in underlying natural history of CRC
- Updated input parameters (compliance with surveillance etc.) based on evidence
- Included more realistic trajectories of colonoscopy screening
- Updated underlying synthetic population to 2010 Census
- Estimated impact of ACA on insurance coverage using BRFSS and Medicaid eligibility criteria, both NC and OR: initial effect in 2014 & Secondary effect 2014-2015

- Surveyed the evidence regarding costs of post-screening follow-up care
- Replacing NC with OR data and statistical models
- Recalibrated secular trend and self report adjustment (for NC) to match updated BRFSS

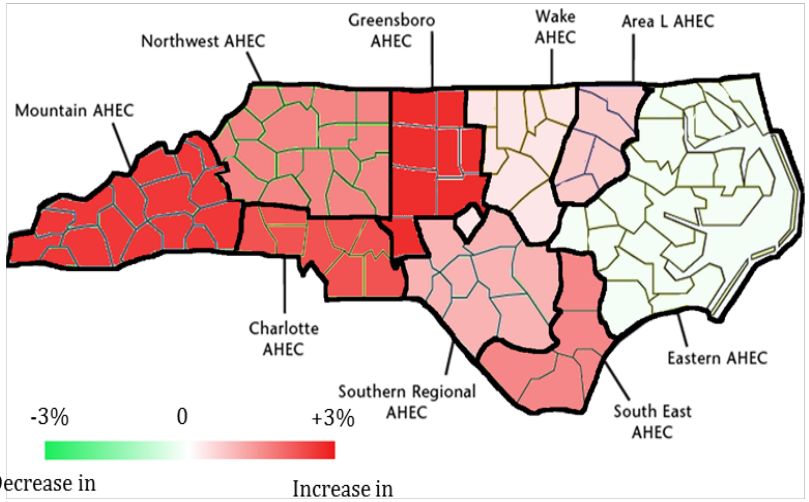




- **ACA and Medicaid Expansion begins to close disparity gap between African American and White males**
- **Without ACA, the disparity gap continues to widen**

Change in disparity gap between White and African American males in the percent up-to-date with colorectal cancer screening from baseline to 2023 by NC geographic regions

Control

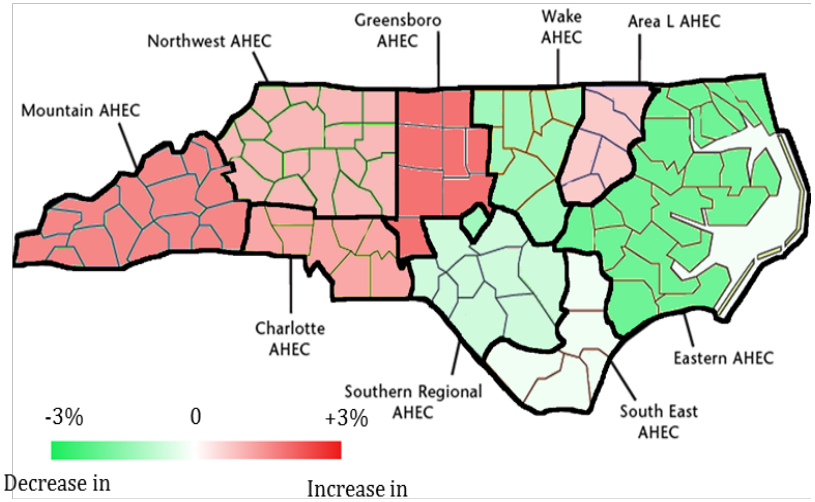


Decrease in percentage points

Increase in Percentage points

Change in Disparity Gap from 2014 to 2023

Medicaid Expansion (High Enrollment and Compliance)

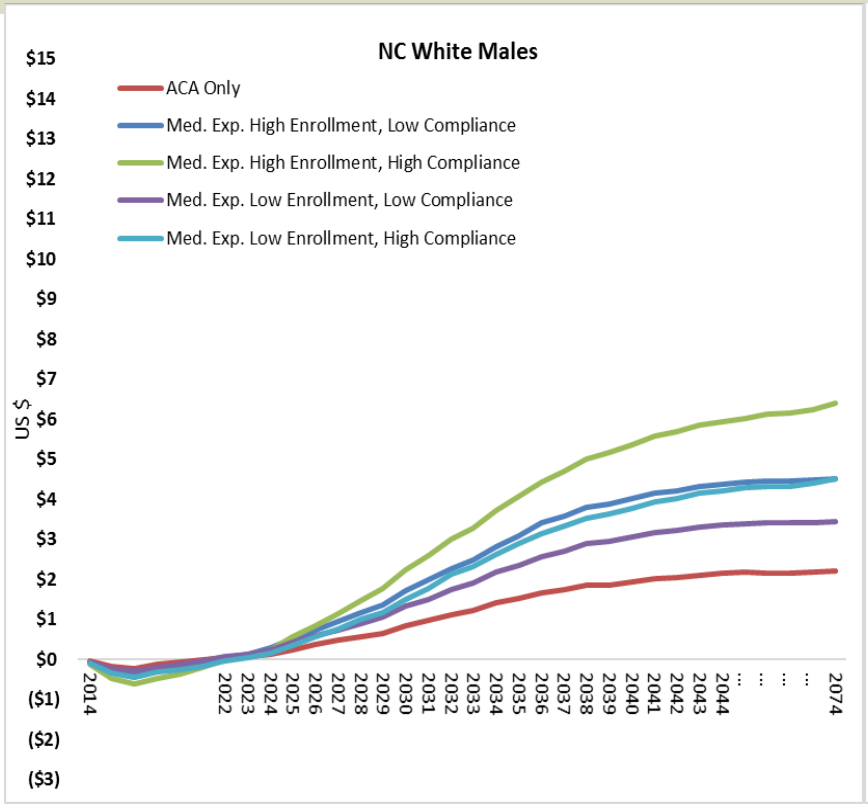


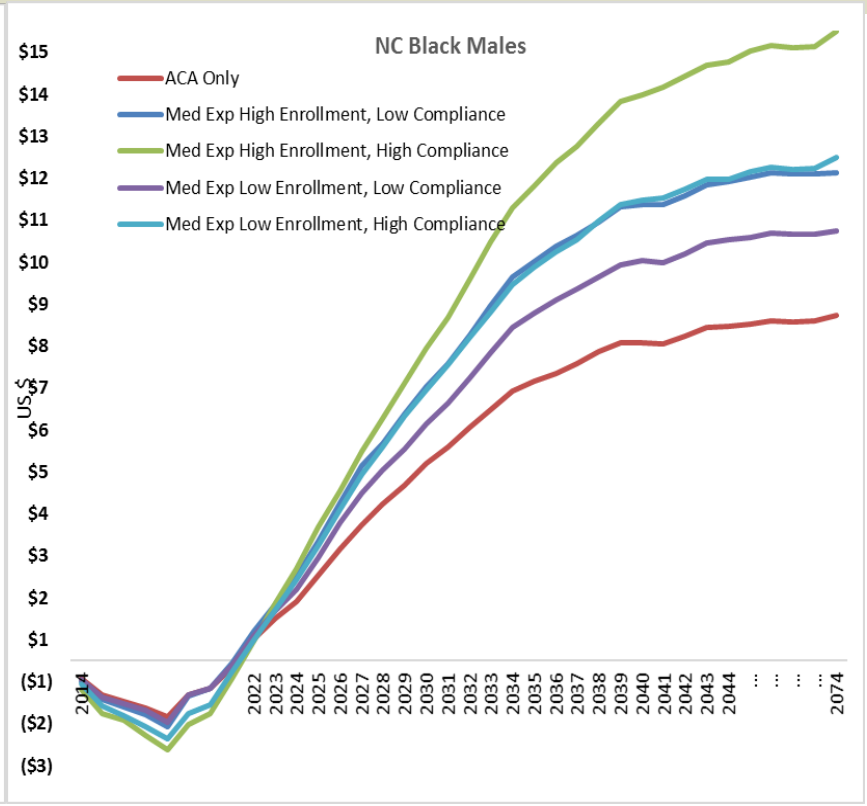
Decrease in percentage points

Increase in Percentage points

Change in Disparity Gap from 2014 to 2023

Differences in ***cumulative CRC screening and treatment cost savings per person*** between policy scenarios and the control scenario





ACA and Medicaid Expansion result in substantial long-term cost savings, especially for African American males

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Expanding Coverage is Not Enough: Estimating the Impact of ACA/Medicaid Expansion

- Insurance uptake mechanisms
  - Medicaid
    - Newly eligible
    - "Woodwork" enrollees
  - Insurance Exchanges/Marketplace
    - Newly enrolled through self-pay
    - Previously eligible for employer-sponsored coverage but unenrolled
  - Predicted uptake modeled using 2013-2015 BRFSS by age group, gender, race/ethnicity, income, and marital status

Simulating the impact of insurance expansion on CRC outcomes in NC & OR

	North Carolina	Oregon
Status Quo	ACA w/o Medicaid expansion	ACA w/ Medicaid expansion
Pre-exchange insurance	No ACA No Medicaid expansion	No ACA No Medicaid expansion
Complete Repeal of ACA	Includes loss of insurance from the exchanges	Includes loss of insurance from the exchanges and Medicaid
AHCA	Based on CBO estimates of insurance loss	Based on CBO estimates of insurance loss
ACA + Medicaid expansion (on January 2018)	As operationalized in other states since 2014	———
Universal insurance	Medicare for all	Medicare for all

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EBI Screening Intervention Scenarios for OR

- Existing (Simulated in NC)
  - Mailed reminders (no FIT kit)
  - Mass media campaigns
  - Vouchers for uninsured
  - Endoscopy expansion
- Novel (Planned for OR)
  - Direct Mail of FIT (potential variations, see Table)
  - Outreach (navigators, panel managers)
  - Practice Improvement?

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 14, E18 FEBRUARY 2017

ORIGINAL RESEARCH

Cost-Effectiveness Analysis of Four Simulated Colorectal Cancer Screening Interventions, North Carolina

Kristen Hassmiller Lich, PhD[1]; David A. Cornejo[2]; Maria E. Mayorga, PhD[2]; Michael Pignone, MD, MPH[3,4,5,6]; Florence K.L. Tangka, PhD[7]; Lisa C. Richardson, MD, MPH[7]; Tzy-Mey Kuo, PhD, MPH[3]; Anne-Marie Meyer, PhD[3,8]; Ingrid J. Hall, PhD, MPH[7]; Judith Lee Smith, PhD[7]; Todd A. Durham, MS[1]; Steven A. Chall, MS[9]; Trisha M. Crutchfield, MHA, MSIS[4,6]; Stephanie B. Wheeler, PhD, MPH[1,3,4]

Table. Mailed stool test variations – assumes that return postage is included

Source	Test Characteristics	Patient Characteristics	Follow-up Intensity (and who delivered)	Patient Incentive(s)
Clinic	Type/sensitivity (FIT vs FOBT)	Screening history (yes, no)	None	None
Health Plan	Samples required (one, two, three)	Ethnicity (Hispanic, Non-Hispanic)	Reminders: Auto, live, text	$25
Combo		Insurance Type (Medicaid, Commercial)	Reminders + Navigator follow-up	$50
		Geographic location		

What’s Next?

What's Next for the Modeling EBI Workgroup

- What would it take to get to 80% by 2018 in NC? In OR?
- How can we best integrate decision support modeling with implementation science with a focus on CRC screening?
  - To inform implementation of specific CRC screening EBIs in geographically distinct areas and populations, e.g.:
    - Urban, publicly insured populations
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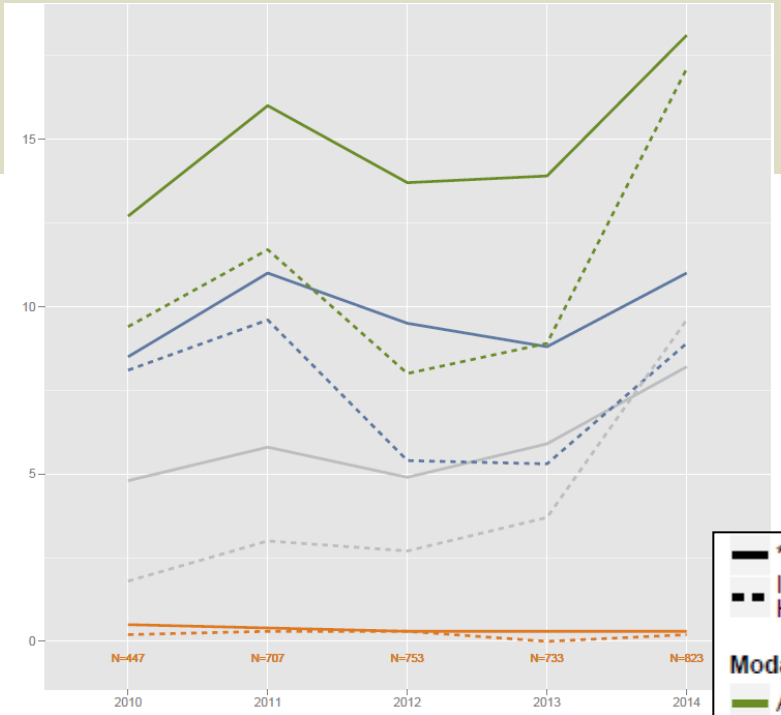
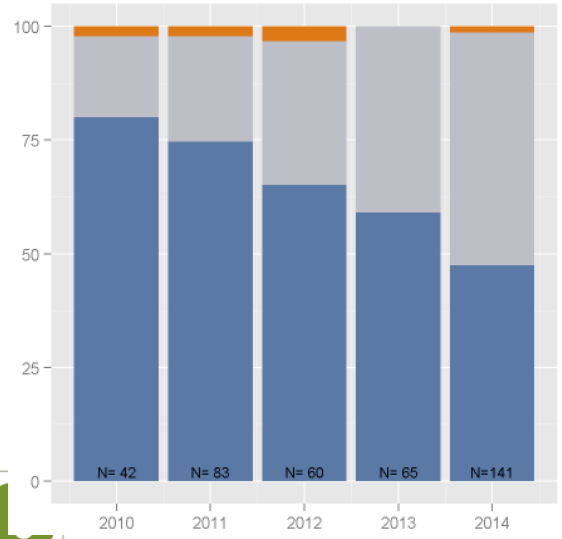
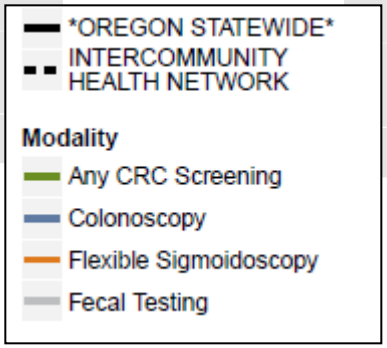
  - To develop best practices for using simulation in stakeholder decision support

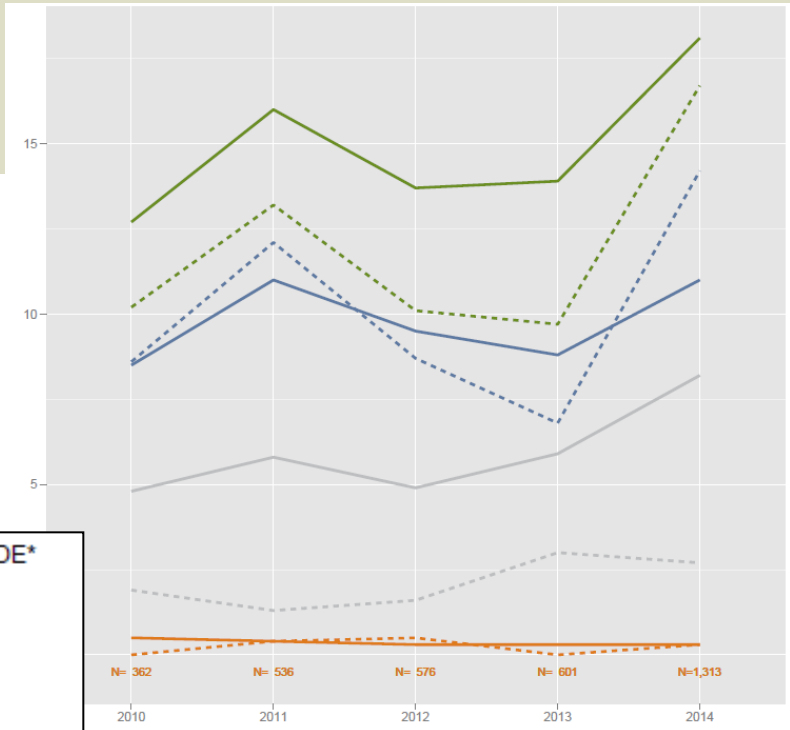
OR CCO A

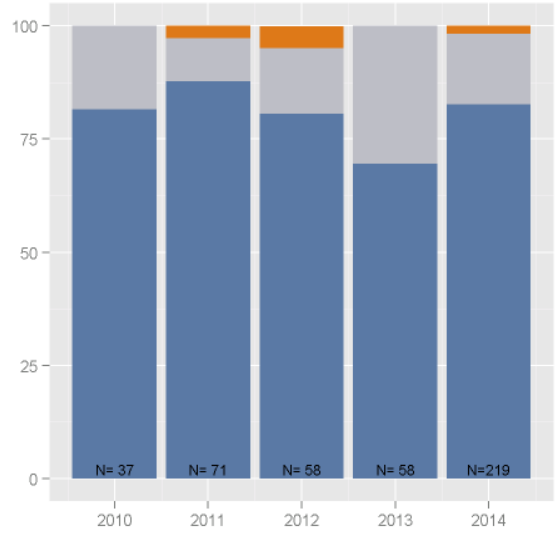


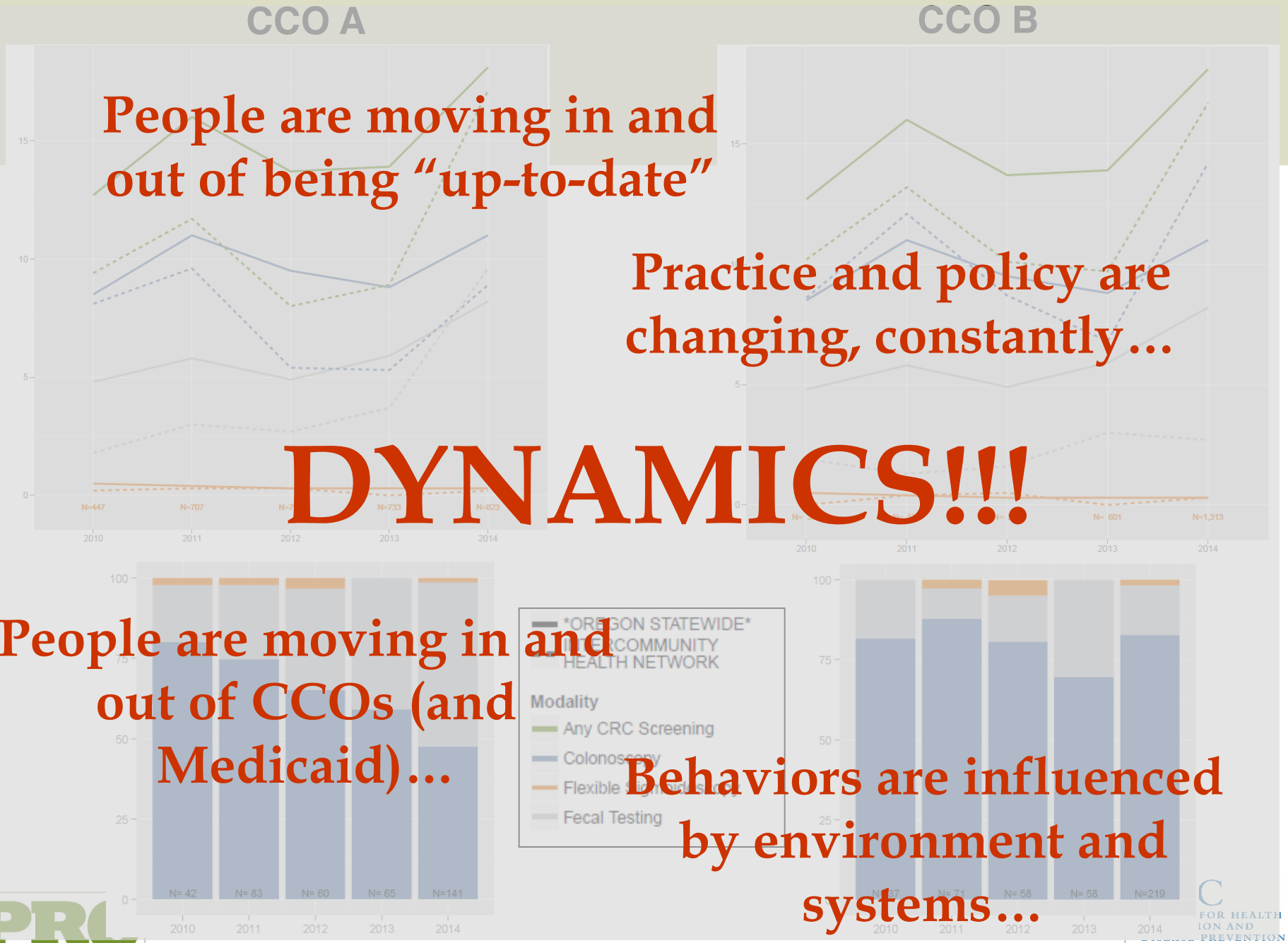


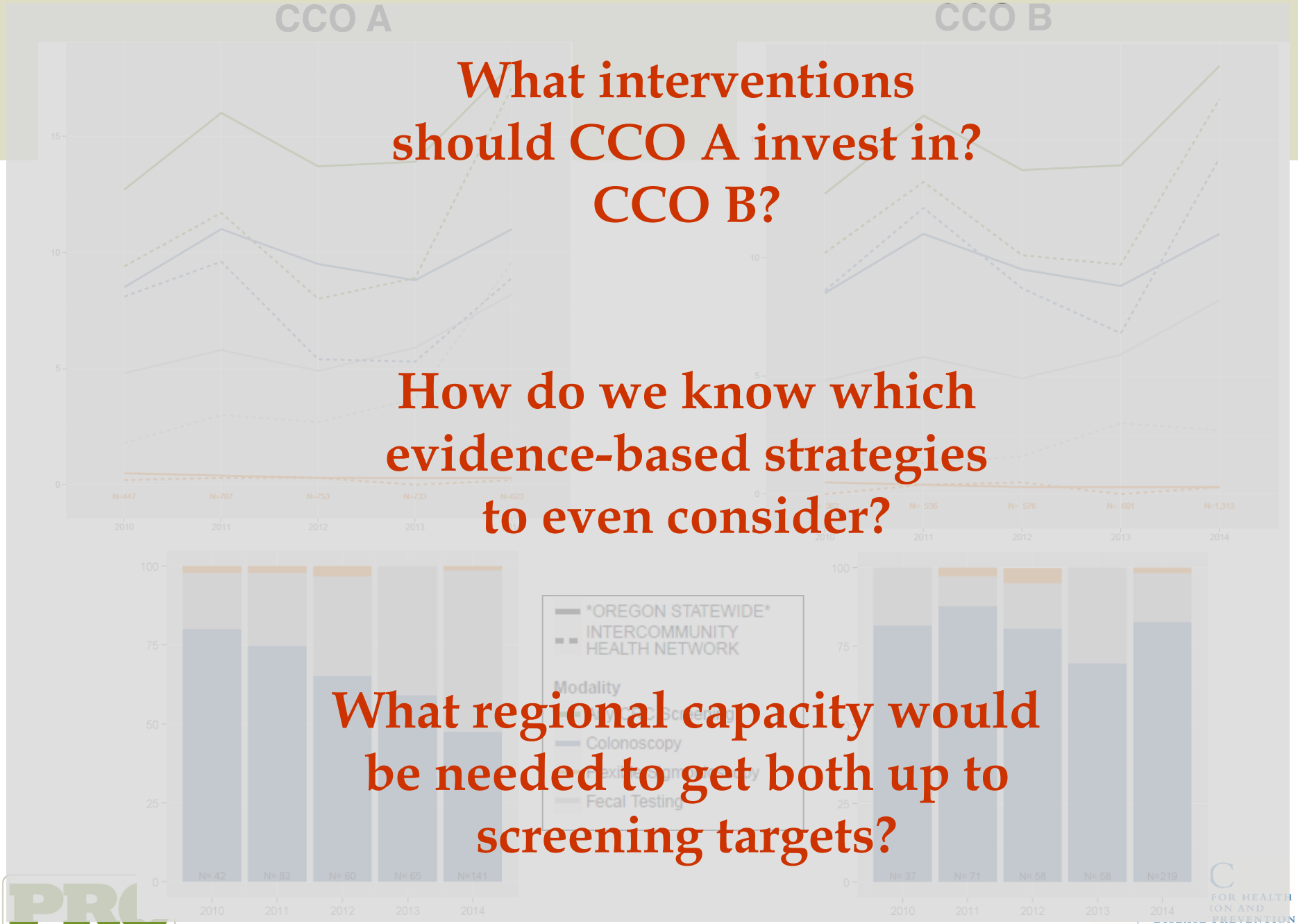


OR CCO B






CCO A
CCO B
People are moving in and out of being "up-to-date"
Practice and policy are changing, constantly…
DYNAMICS!!!
People are moving in and out of CCOs (and Medicaid)…
Behaviors are influenced by environment and systems…
OREGON STATEWIDE
COMMUNITY HEALTH NETWORK
Modality
Any CRC Screening
Colonoscopy
Flexible Sigmoidoscopy
Fecal Testing



What interventions should CCO A invest in? CCO B?

How do we know which evidence-based strategies to even consider?

What regional capacity would be needed to get both up to screening targets?

Finalizing intervention plans in the face of uncertainty

Reccommendation based on most Cost Effective Life Years UTD

Mass Media Cost	3,000,000
Mailed Reminder Cost	1,679,578
WTP	10

Mailed Reminder

Max Total Cos Yrs UTD		Effect	Max Total Cos	Yrs UTD	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3
			$218,150	21,815																											
			$325,920	32,592																											
			$434,080	43,408																											
			$541,350	54,135																											
			$647,600	64,760																											
			$756,590	75,659																											
			$862,070	86,207																											
			$968,280	96,828																											
			$1,072,940	107,294																											
			$1,180,930	118,093																											
			$1,285,770	128,577																											
			$1,394,040	139,404																											
			$1,500,980	150,098																											
			$1,601,910	160,191																											
			$1,708,530	170,853																											
			$1,810,920	181,092																											
			$1,917,090	191,709																											
			$2,016,130	201,613																											
			$2,116,370	211,637																											
			$2,210,260	221,026																											
			$2,306,400	230,640																											
			$2,399,190	239,919																											
			$2,491,250	249,125																											
			$2,586,020	258,602																											
			$2,682,070	268,207																											
			$2,771,200	277,120																											
			$2,858,850	285,885																											
			$2,946,020	294,602																											
			$3,034,230	303,423																											
$54,350	5,435	0.2			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$125,050	12,505	0.3			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$221,050	22,105	0.4			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$350,370	35,037	0.5			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$507,620	50,762	0.6			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$689,530	68,953	0.7			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$901,850	90,185	0.8			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$1,136,140	113,614	0.9			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$1,398,600	139,860	1			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$1,694,950	169,495	1.1			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$2,024,030	202,403	1.2			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$2,331,030	233,103	1.3			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$2,606,950	260,695	1.4			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$2,899,460	289,946	1.5			N	N	N	N	N	N	N	N	N	N	N	N	N	N	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$3,210,460	321,046	1.6			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$3,513,470	351,347	1.7			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR	MR
$3,848,570	384,857	1.8			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MR	MM	MR	MR	MR	MR	MR	MR	MR	MR
$4,200,280	420,028	1.9			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MR	MR	MR	MR	MR	MR	MR
$4,554,260	455,426	2			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MR	MR	MR	MR	MR
$4,931,800	493,180	2.1			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MR	MR	MR	MR
$5,324,040	532,404	2.2			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MR
$5,733,080	573,308	2.3			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
$6,155,260	615,526	2.4			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
$6,581,640	658,164	2.5			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
$6,842,500	684,250	2.6			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
$7,094,760	709,476	2.7			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
$7,348,660	734,866	2.8			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
$7,599,340	759,934	2.9			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
$7,842,640	784,264	3			MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM

Mass Media

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Oregon vs. North Carolina

	Oregon	North Carolina
Population, 2014	3,970,239	9,943,964
Persons 65 years and over, 2013	15.5%	14.3%
Females	50.5%	51.3%
Race/Ethnicity (selected), 2013		
White alone	88.1%	71.7%
Black or African American alone	2.0%	22.0%
Hispanic or Latino	12.3%	8.9%
Persons below poverty level, 2009-2013	16.2%	17.5%
Land area in square miles, 2010	95,988	48,618
Persons per square mile, 2010	39.9	196.1

Source: http://quickfacts.census.gov/qfd/index.html