Economic Evaluation of the National Breast and Cervical Cancer Early Detection Program (NBCCEDP)

Donatus U (Don) Ekwueme, PhD, MS
Economist



NBCCEDP Business Meeting

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Project Team

CDC	RTI	Implenomics	Programs
Donatus (Don) Ekwueme	Benjamin (Ben) Allaire	**Sujha Subramanian**	Staff of all 9 programs selected for this project
Sun Hee (Sunny) Rim	Sydney Kirsch	**Sanjana Batabyal**	
Jacqueline (Jackie) Miller	Carolina Barbosa		
Stephanie Melillo	Zohra Tayebali		
David Siegel			
Djenaba Joseph			

Business Case for Economic Evaluation of the NBCCEDP

Why NBCCEDP Needs Rigorous and Continuing Economic Evaluation

- Illustrates cost-effectiveness according to established federal criteria
- Informs resource distribution considering the varied costs and circumstances of recipients
- Accounts for savings in downstream treatment expenses by enabling earlier diagnosis
- Advances the federal evidence agenda while enhancing program trustworthiness
- Measures the benefits derived from implementing interventions such as patient navigation
- Records NBCCEDP's distinct contribution to broadening access to screening and early detection

What to Measure and Report in NBCCEDP Economic Evaluations

- Cost per woman served and cost per completed screen
- Cost per cancer detected and stage-shift impact
- Cost-effectiveness
- Budget impact
- Implementation return on investment (ROI)

Five-Point Business Case for Awardees

Cost-Effectiveness Metrics	Early Detection Benefits	Pricing and Contract Planning	Optimizing Patient Navigation	Leveraging Evaluation for Impact
NBCCEDP demonstrates cost-effectiveness with an ICER of $81K per QALY, an indication of efficient use of resources	Earlier cancer detection reduces expensive treatments by shifting diagnoses to localized stages, improving patient outcomes	Use CPT-based benchmarks and bundled pricing to inform contract negotiations and reduce administrative costs	Efficient patient navigation improves adherence and cycle times through centralized scheduling and clear communication protocols	CDC evaluation evidence supports sustaining services, forging partnerships, and aligning funds with outcomes

QALY = quality adjusted life-years; ICERs = incremental cost-effectiveness ratio

Cost of Patient Support Activities

Patient Support in the NBCCEDP

- Patient support models vary across the NBCCEDP recipient and health systems
- Prior evaluation identified that these patient support models often involve education activities in the community setting and patient navigation in the clinic setting
- The objective of this study was to capture the activities and cost associated with different types of patient support models
- We compare the models implemented by three recipients and their partners such as regional organizations, health systems and health departments

Recipient 1

	Region A	Region B
Team	• 1 program coordinator • 2 health educators • 1 clinical nurse navigator	• 1 full-time health educator • 15 Community Health Workers (CHWs) • 2–6 masters level interns
Focus	• Low-income and uninsured individuals • Direct education and ongoing navigation calls • Follow-up for abnormal results	• Outreach to diverse communities • Uninsured and overdue patients • Follow-up for abnormal results
Approach	• Classes offered in English, Spanish and Vietnamese • Volunteers help at events and support team	• CHWs provide group and one-on-one education • Intern/CHW provide support for language-based outreach

Recipient 2

Category	Partner A	Partner B	Partner C
Team	• Program director • 1 part-time patient navigator	• Program coordinator • Community outreach member • 2 administrative assistants	• Program director • Patient navigator • Administrative assistant • Nurses at local health department assist
Focus	• Outreach to increase reach • Non-compliant patients	• Outreach to rural counties • Reaching patients who have never been screened	• Screening reminders to ensure high repeat screens • Community outreach and education to increase reach
Approach	• Screening status tracking via hospital records; built non-compliant list • Outreach via social media and targeted navigation	• Mobile unit visits counties annually • Working with 13 clinics	• Clinic referrals to PN • Pink envelope reminder system and tracking via Excel • Presentations at local organizations and providers

PN = Patient navigation

Recipient 3

Category	Health System 1	Health System 2
Team	• 3 types of navigators (community, health system and clinical) • Breast, cervical and WISEWOMAN navigators (roles overlap) • Separate staff who focuses on enrollment	• 3 types of navigators (community, health system and clinical) • Multiple teams (one for each health system) • Subcontracted health system navigators (data, billing, coordination)
Focus	• General outreach and education • Targeted efforts for justice-involved individuals	• Patient enrollment and retention • Coordination across clinical and community levels
Approach	• Attend community events (churches, health events etc.) to connect and enroll • Navigation coordinated across the system	• Navigator-led outreach events • Internal coordination for smooth patient flow • Data entry and billing managed centrally

Methods for Costing of Patient Support Activities

- Used activity-based costing approach
- All participating health systems reviewed and provided feedback on the activities
- Some teams included specific activities, but activities were categorized into three large groupings for comparison
- We collected detailed salaries as well as percent time spent on NBCCEDP activities
- We applied a 30% fringe rate across all personnel
- Costs are reported from the health system perspective

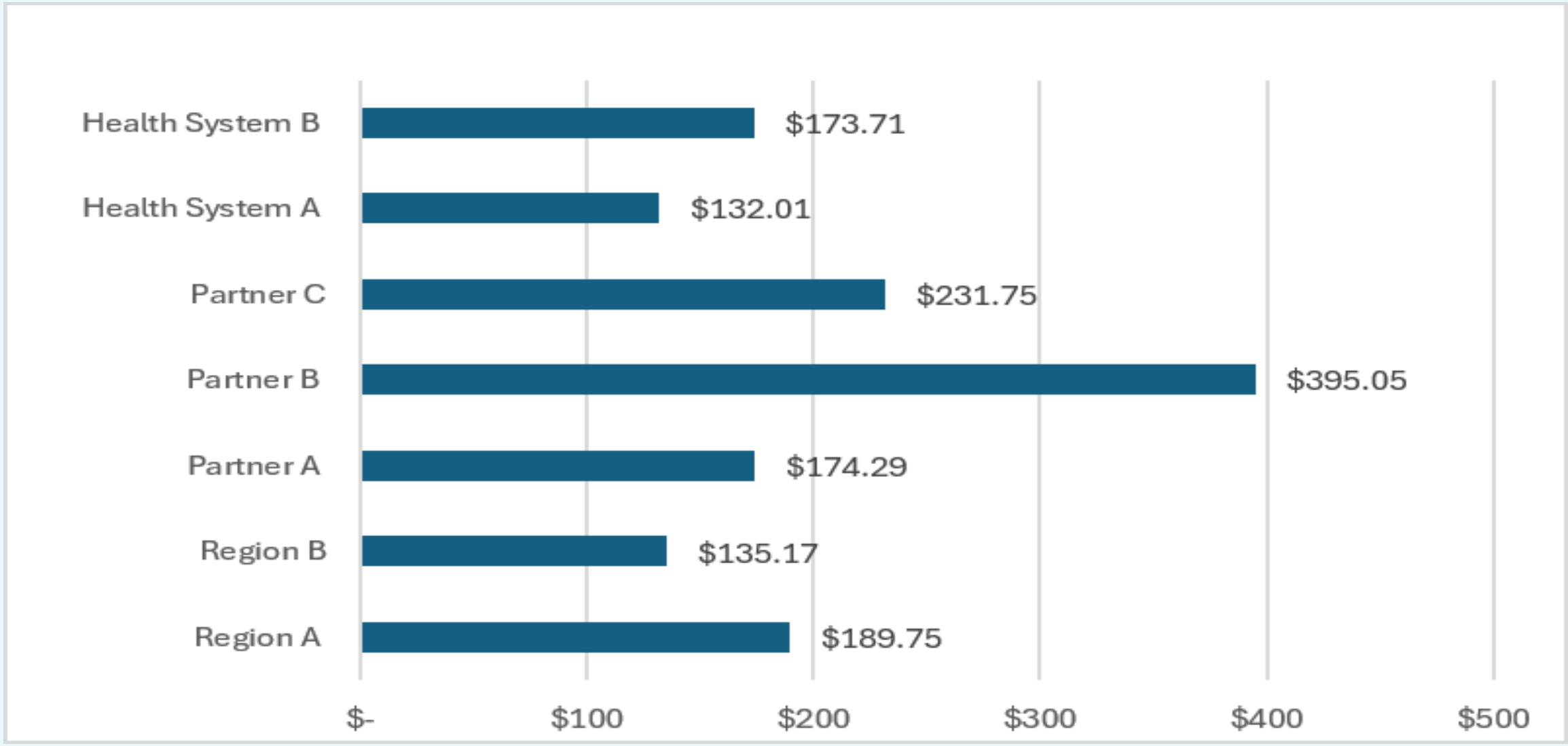
Labor Cost Per Client Served

Category	Cost range
Community engagement and provider training	$13.69 - $100.41
Client support service	$32.51 - $126.62
Data tracking, oversight and reporting	$26.61 - $172.59
Total per client	$128.37 - $375.45

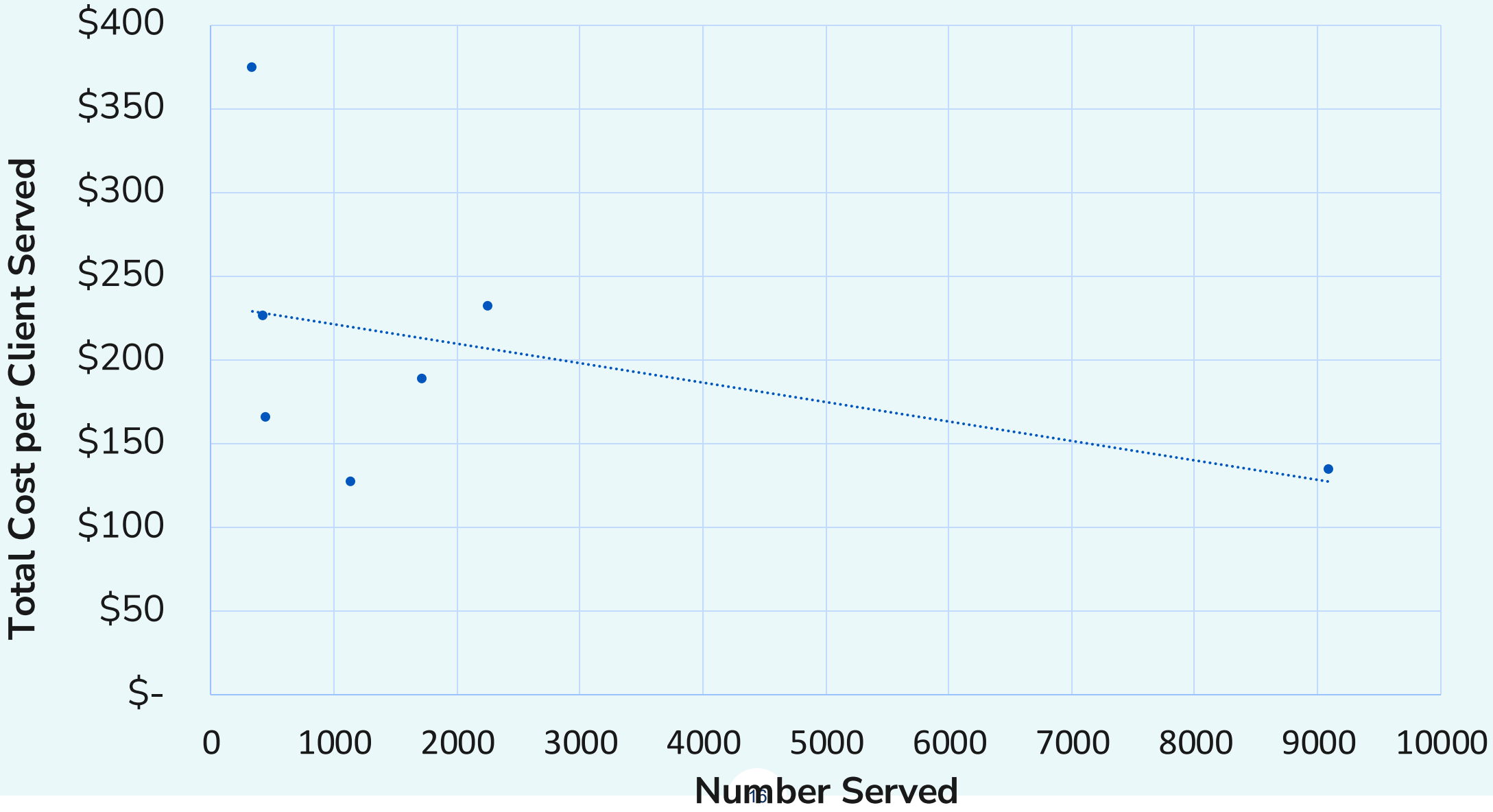
Labor Cost Per Client Served ($) – Distribution Across Activities

	Recipient 1		Recipient 2			Recipient 3	
	Region A	Region B	Partner A	Partner B	Partner C	Health System A	Health System B
Community engagement and provider training	80.15	58.50	13.69	100.41	72.60	32.12	23.50
Client navigation and support services	34.32	32.51	126.62	102.45	71.82	62.40	92.43
Data tracking, oversight and reporting	75.29	44.16	26.61	172.59	82.40	33.85	56.78
Total labor cost	189.75	135.17	166.93	375.45	226.82	128.37	172.70

Total Cost Per Client Served (Labor and Non-Labor)



Total Cost Per Client Served and Number Served



Key Learning: Cost Assessment of Patient Support in the NBCCEDP

- Patient support models vary in the intensity of the resources expended across activities; this could indicate that:

  1) there is variation in the activities prioritized by recipients based on specific goals
  2) the assessment was conducted at a point in time, and this may not have captured the distribution of activities over an annual period

- The findings show that the cost per person does vary by volume of client served; there is a fixed cost associated with the delivery of patient support, and therefore we cannot expect small programs to have the same resource needs per client as large ones
- Potential opportunities for efficiency gains include the centralization of specific activities, but further assessments are needed to identify these activities
- We have only compared the model across three recipients; our findings therefore may not be generalizable to all recipients and their partners

Long-Term Cost-Effectiveness Analysis of NBCCEDP

NBCCEDP long-term cost effectiveness

- NBCCEDP screening has long-term benefits to program-eligible women

- Long-term benefits are not fully observable during routine follow-up; simulation is needed to estimate future life-years, deaths averted, quality-adjusted life years (QALYs) and costs

- The objective of this study was to estimate the cost effectiveness due to the increased screening owing to the program

Simulation Model: CISNET Model W, Customized to program data

Simulation Model

- University of Wisconsin breast cancer microsimulation (Model W) — an NCI-funded CISNET model of incidence, detection, progression, and outcomes
    - Validated against SEER (1975–2019), the UK AGE trial, and the Wisconsin registry
    - Used by USPSTF for the 2009, 2016, and 2024 screening recommendations

Methods: Customizing Model W to program data

Tailored to the NBCCEDP program

- We calibrated screening behaviors to actual MDE mammogram counts, including 1.86M women
- Model leveraged observed clinical screening costs from NBCCEDP recipients.
- Simulated a 2022 cohort in the NBCCEDP and included only mammography screenings
- Assumed participation in NBCCEDP resulted in increased screening after leaving the program

Results: Lifetime impacts of NBCCEDP

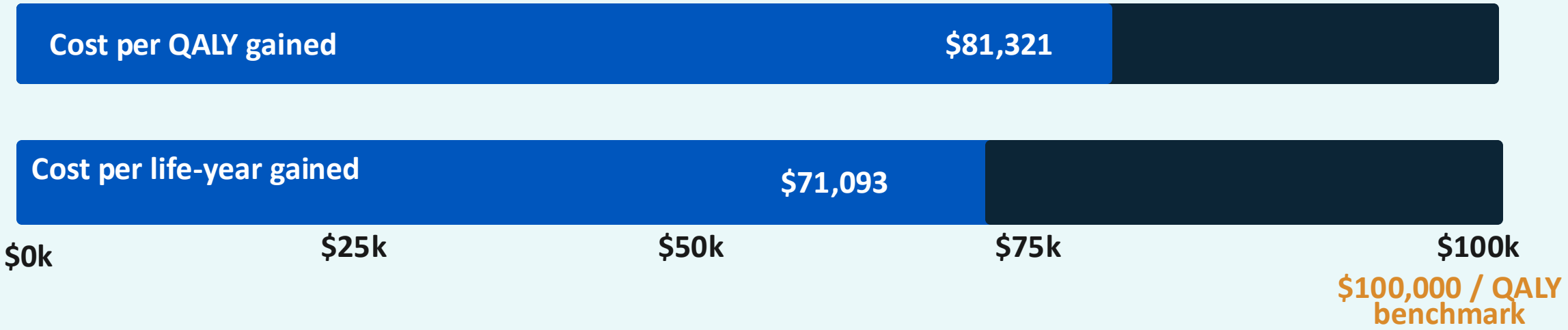
3.5
additional mammograms per woman

17
life-years gained per 1,000 women

0.82
breast cancer deaths averted per 1,000 women

Mammography use increased from 12.66 to 16.15 mammograms per woman over the course of her life

Results: Cost-effectiveness



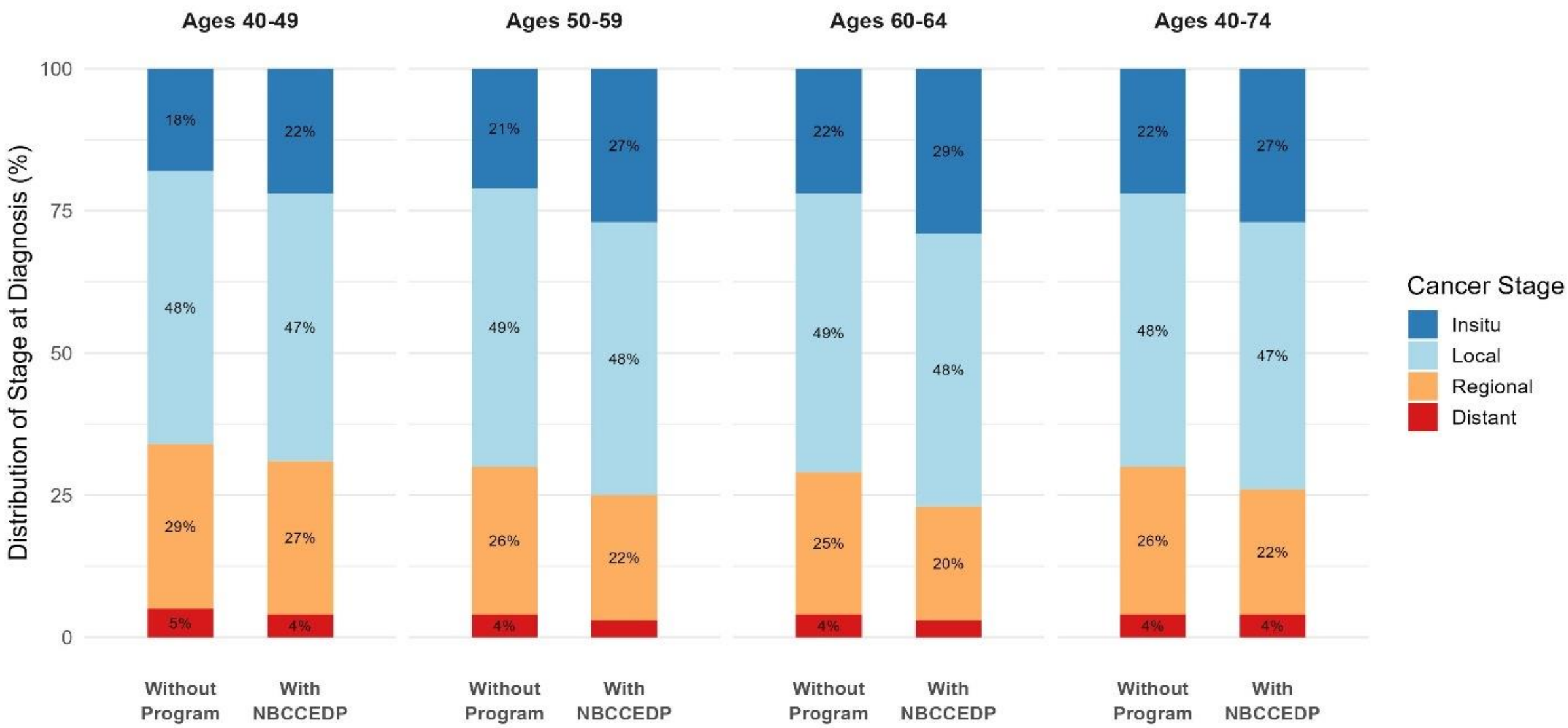
9.24
QALYs gained per 1,000 women (discounted)

$0.75M
incremental cost per 1,000 women

4.9
life-years gained per 1,000 mammograms

QALY = Quality-adjusted life year

Results: Earlier stage at diagnosis



Results: Detailed Costs and Effectiveness

Outcome	Result (per 1000 women)
Number of mammograms (without program)	12,664
Number of mammograms (with program)	16,150
Screening Costs (without program)	$1,519,229
Screening Costs (with program)	$2,064,458
Diagnostic costs (without program)	$632,512
Diagnostic costs (with program)	$756,117
Treatment costs (without program)	$16,525,326
Treatment costs (with program)	$16,606,598
Total Costs (without program)	$18,677,067
Total Costs (with program)	$19,427,173
ICER ($/LY) vs no program	$71,093
ICER ($/QALY) vs no program	$81,321

Key Learning: Long-term cost effectiveness of NBCCEDP

- Our findings indicate that NBCCEDP is cost-effective

- Cost per QALY of approximately $81,321, below a threshold of $100K/QALY

  → Cost-effective program with a WTP of $100K

- For women who continue similar screening behaviors after they leave the program, the benefits are significant
  - Lifetime increase of 3.5 more mammograms
  - 17 life-years gained per 1000 women

QALY = Quality-adjusted life years; WTP = Willingness –to-pay

Thank you.



For more information, contact CDC
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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the U. S. Centers for Disease Control and Prevention.

Appendix

Five input domains were combined to estimate lifetime outcomes, costs, QALYs, and ICERs.

Population

- NBCCEDP-eligible women
- Age groups 40–49, 50–59, 60–64
- Race/ethnicity cohorts
- Insurance status patterns

Screening behavior

- Observed MDE mammography volumes
- Annual / biennial / irregular screening
- Counterfactual screening without NBCCEDP
- NHIS, ACS, and Cronin estimates

Clinical model

- CISNET Model W natural history
- Incidence, detection, progression
- Stage at diagnosis
- Survival and mortality

Costs

- In-program screening costs
- CMS out-of-program screening costs
- Diagnostic work-up costs
- Stage-specific treatment costs

Health utilities & assumptions

- QALY utility weights
- Disutilities from screening/work-up
- 3% discounting
- DM / DBT modality mix

Breast Cancer Screening Outcomes and Efficiency Metrics Under the Conservative Scenario

Outcomes	All women
Number of mammograms with program (lifetime) per woman	14.56
Number of mammograms without program (lifetime) per woman	12.66
Additional number of mammograms with NBCCEDP per woman	1.89
LYs gained per 1000 women	10
LYs gained per 1000 additional lifetime mammograms	5.3
BC deaths averted per 1000 women with NBCCEDP	0.39

Note: The Conservative scenario assumes all screening increases occur only during the program, not after women leave the program.