Coordinating Independent Cancer Catchment Area Surveys to Estimate Health Information Access for an Entire State: The Case of Virginia

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Authors

Thomas M. Guterbock, University of Virginia
Bernard F. Fuemmeler, Virginia Commonwealth University
Kara S. Fitzgibbon, University of Virginia
Deirdre Middleton, ICF
Kelly Martin, ICF
Lee Harding, ICF
David Wheeler, Virginia Commonwealth University
Gordon D. Ginder, Virginia Commonwealth University
Roger T. Anderson, University of Virginia
Rajesh Balkrishnan, University of Virginia
Ronaldo Iachan, ICF
Overview

• Background and purpose
• Coordination efforts
• Two surveys, similar methods
• Weighting the combined sample
• Comparison to Virginia BRFSS
• Our statewide estimates: HINTS variables
• Concluding remarks
Background

• National Cancer Institute awarded supplements to 29 NCI-designated cancer centers in 2016 and 2018
• Each center surveyed populations in its catchment area, using HINTS questions
  – HINTS: Health Information National Trends Survey
• Two Virginia cancer centers received 2018 awards
  – UVA: University of Virginia Emily Couric Cancer Center
  – VCU: Virginia Commonwealth University Massey Cancer Center
• Their two catchment areas jointly cover most of the state
Purpose

• HINTS asks about cancer beliefs, behaviors
  – But HINTS results are only available at national and regional levels

• BRFSS does not have key indicators of cancer perceptions, information sources
  – Not available at county level, so match to catchment area is only approximate

• *Can we combine our results to generate valid state-wide estimates of cancer beliefs and behaviors?*
Coordination efforts
VCU Catchment Area

- VCU main hospital is in Richmond, VA
- Includes Virginia’s Eastern Shore
- Does not reach into Northern Virginia
UVA main hospital is in Charlottesville, region 2
Divided into six analysis regions
Does not reach into Northern Virginia (23% of state pop’n)
Region 6 is in West Virginia (excluded from this analysis)
• Catchment areas overlap (blue-colored counties)
• Neither covers Northern Virginia
Sampling the whole state

• **Overlap counties**
  - Included in sample for both UVA and VCU surveys
  - Sample lists checked for duplicates
  - Sampling rates are affected by inclusion in both samples

• **Counties outside both (Northern Virginia)**
  - Allocated between UVA and VCU
  - All were sampled
    - But sampled at lower rates (due to cost)

• **Result:** Surveys jointly covered ALL of Virginia
Harmonizing the questionnaires

- NCI specified a list of “core” questions recommended for all participating centers
  - Many of these were included in both surveys
- UVA questionnaire was reviewed by VCU before fielding, and several questions modified to match UVA wording
- Both questionnaires include key items asked statewide by BRFSS and nationally by HINTS
Comparison of Survey Methods
VCU & UVA methods similar

- Both surveys used both probability and non-probability methods
  - Only probability samples considered here
- Both used ABS samples
  - With multiple mailings, incentives, web option
- Both survey instruments were lengthy
- UVA sample was stratified by 6 Virginia regions
  - Sampled at unequal rates
- UVA added cell phone RDD sampling
  - But only 68 completions resulted [RR3 ≈ 3%]
  - UVA phone completions are included here
Mail-out protocols comparable

**UVA Survey**
- Advance letter
- First packet with $2
- Reminder postcard
- Second packet
  - Web option offered
  - $10 contingent incentive
- Close-out postcard

- Mailed to: 2,380
- Mail completes: 601
- AAPOR RR4: 25.3%

**VCU Survey**
- Advance letter
  - Includes web link
- First packet with $2
  - Web option offered
  - $20 contingent incentive
- Reminder postcard
- Second packet

- Mailed to: 6,000
- Mail completes: 895
- RR4: 17.0%
Weighting the Combined Samples
Multi-step weighting process

- Weighting conducted by ICF (using SAS)
- Base weights to correct for . . .
  - Region-specific sampling rates in UVA catchment
  - Dual sampling of overlap counties
  - Lower sampling rate in non-covered counties
- Post-stratification raking for . . .
  - Sex
  - Race/ethnicity
  - Age
  - Education
Effect of weighting

• Design effects range around ~ 3.0
• Final case count:
  – VCU: 767
  – UVA: 729
  – Total: 1,496
• Approximate effective sample size:
• ~500
  – Margin of error: +/- 4.4 percentage points
Comparison to 2018 Virginia BRFSS results
Comparable items

- The Behavioral Risk Factor Surveillance Survey [BRFSS] is conducted annually in Virginia
  - Statewide n for 2018: 10,321
- Directly comparable items:
  - HADMAM—Ever had a mammogram [asked of women over 40]
  - HOWLONG—Time since last mammogram
  - BLDSTOOL—Ever had blood stool test [asked of all over 40]
  - LSTBLDS3—How long since last blood stool test
  - HADCOL—Ever had a colonoscopy [asked of all over 40]
  - LASTCOL—How long since last colonoscopy
- None of these was asked of all respondents
Combined sample compared to BRFSS

**Mammogram**

- Ever had a mammogram?
  - Combined VA Sample: 82.0%
  - 2018 VA BRFSS: 68.1%

- Mammogram last year?
  - Combined VA Sample: 65.9%
  - 2018 VA BRFSS: 61.7%
Combined sample compared to BRFSS

Blood Stool Test

- Ever had blood stool test:
  - Combined VA Sample: 22.0%
  - 2018 VA BRFSS: 25.3%

- Blood stool test last year?
  - Combined VA Sample: 39.7%
  - 2018 VA BRFSS: 32.4%
Combined sample compared to BRFSS

![Bar chart showing colonoscopy rates]

- **Ever had a colonoscopy**
  - Combined VA Sample: 63.8%
  - 2018 VA BRFSS: 71.6%

- **Colonoscopy last year?**
  - Combined VA Sample: 20.2%
  - 2018 VA BRFSS: 23.9%
New Estimates for the State of Virginia

Key variables from HINTS
### Results for HINTS behavior Q’s

<table>
<thead>
<tr>
<th>Item</th>
<th>Combined VA Sample Estimate</th>
<th>n of cases</th>
<th>National HINTS</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have looked at your medical records online</td>
<td>52.2%</td>
<td>1460</td>
<td>38.9%</td>
<td>13.3%*</td>
</tr>
<tr>
<td>Have been diagnosed as having cancer</td>
<td>17.4%</td>
<td>1449</td>
<td>9.5%</td>
<td>7.9%*</td>
</tr>
<tr>
<td>Have smoked at least 100 cigarettes in your entire life</td>
<td>41.6%</td>
<td>1460</td>
<td>35.9%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Now smoke cigarettes everyday</td>
<td>22.1%</td>
<td>607</td>
<td>24.4%</td>
<td>-2.3%</td>
</tr>
<tr>
<td>Have used an e-cigarette, even one or two times</td>
<td>14.5%</td>
<td>1448</td>
<td>19.4%</td>
<td>-4.9%</td>
</tr>
<tr>
<td>Now use an e-cigarette every day</td>
<td>2.5%</td>
<td>283</td>
<td>10.7%</td>
<td>-8.2%*</td>
</tr>
<tr>
<td>Talked with health professional about lung cancer test, past 12 months</td>
<td>7.1%</td>
<td>1454</td>
<td>4.0%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Have heard of the cervical cancer vaccine or HPV shot</td>
<td>72.3%</td>
<td>1436</td>
<td>64.2%</td>
<td>8.1%*</td>
</tr>
<tr>
<td>Health care professional recommended HPV vaccine, last 12 months</td>
<td>13.1%</td>
<td>1443</td>
<td>23.1%</td>
<td>-10.0%*</td>
</tr>
</tbody>
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* Indicates the difference is statistically significant at .05 level
## Results for HINTS attitude Q’s

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<tr>
<td>It seems like everything causes cancer</td>
<td>59.0%</td>
<td>1423</td>
<td>71.6%</td>
<td>-12.0%*</td>
</tr>
<tr>
<td>There’s not much you can do to lower your chances of getting cancer</td>
<td>23.6%</td>
<td>1427</td>
<td>30.9%</td>
<td>-7.4%*</td>
</tr>
<tr>
<td>It's hard to know which recommendations to follow about preventing cancer</td>
<td>74.1%</td>
<td>1430</td>
<td>74.8%</td>
<td>-1.1%</td>
</tr>
<tr>
<td>Cancer is most often caused by a person's behavior or lifestyle</td>
<td>43.6%</td>
<td>1421</td>
<td>62.7%</td>
<td>-18.5%*</td>
</tr>
<tr>
<td>When I think about cancer, I automatically think about death</td>
<td>58.8%</td>
<td>1428</td>
<td>62.9%</td>
<td>-4.1%</td>
</tr>
</tbody>
</table>

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## Results for HINTS info search Q’s

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<th>Difference</th>
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</thead>
<tbody>
<tr>
<td>It took a lot of effort to get the information you needed</td>
<td>35.3%</td>
<td>1170</td>
<td>37.9%</td>
<td>-2.6%</td>
</tr>
<tr>
<td>You felt frustrated during your search for the information</td>
<td>36.1%</td>
<td>1166</td>
<td>34.5%</td>
<td>1.6%</td>
</tr>
<tr>
<td>You were concerned about the quality of the information</td>
<td>52.1%</td>
<td>1171</td>
<td>56.0%</td>
<td>-3.9%</td>
</tr>
<tr>
<td>The information you found was hard to understand</td>
<td>27.0%</td>
<td>1168</td>
<td>34.7%</td>
<td>-7.7%</td>
</tr>
</tbody>
</table>

These differences are not statistically significant.

Percentages in this table combine strongly agree and somewhat agree.
Concluding remarks

... and Limitations
Concluding remarks

• Hope these results will inform cancer action planning for the State of Virginia
  – Results to be shared with policy leaders at the state level

• Possible biases
  – Higher engagement with health system?
  – Topic-salience bias? Sponsors were Cancer Institutes

• Limitations
  – NoVa sample not large enough, given region size
  – Large design effect from weighting to correct differences between sample and population
Acknowledgements
VCU: Sources of Funding & Team Members

FUNDING
P30CA016059-37S2 ("Massey Cancer Center Support Grant – Population Health Assessment in Cancer Center Catchment Areas")

TEAM MEMBERS
Gordon D. Ginder, MD and Robert Winn, MD (PI)
Bernard F. Fuemmeler. PhD, MPH – PD
David C. Wheeler, PhD, MPH – Co-I
Sun Jung (Sunny) Kim, PhD – Co-I
Bassam Dahman, PhD – Biostatistician
Tamas Gal, PhD – Cancer Informatics
Carrie A. Miller, PhD – NCI T32 Post Doctoral Fellow
Albert J. Ksinan, PhD – Data Scientist
Bonny B. Morris - Doctoral Candidate
Elizabeth K. Do, PhD, MPH – Program Coordinator
Westley L. Fallavollita, BS – Research Assistant
Kendall Fugate-Laus, BS – Research Assistant
UVA: Sources of Funding & Team Members

FUNDING
P30CA044579-27S5 ("Population Health Supplement to the University of Virginia Cancer Center")

TEAM MEMBERS
Thomas P. Loughran, Jr. – PI
Roger T. Anderson – Co-I
Rajesh Balkrishnan – Co-I
George P. Batten – Project coordinator
Wendy F. Cohn – Associate Director, Community Outreach & Engagement
Raj P. Desai – Biostatistician
Noelle E. Voges – Project coordinator
Lindsay Hauser – Community Outreach Coordinator
Bryan E. Price – Community Outreach Specialist
Kara S. Fitzgibbon – Director, Center for Survey Research
Thomas M. Guterbock – Academic Director, Center for Survey Research
Sean M. Johnson – Survey Operations Manager, Center for Survey Research
Hexuan Zhang – Research Analyst, Center for Survey Research
Contact info

*For further information contact:*

- Ronaldo Iachan, ICF: [Ronaldo.Iachan@ICF.com](mailto:Ronaldo.Iachan@ICF.com)
- Roger Anderson, UVA: [ra2ee@Virginia.edu](mailto:ra2ee@Virginia.edu)
- Bernard Fuemmeler, VCU: [Bernard.Fuemmeler@vcuhealth.org](mailto:Bernard.Fuemmeler@vcuhealth.org)
- Tom Guterbock, UVA: [TomG@Virginia.edu](mailto:TomG@Virginia.edu)
Appendix Tables

With confidence intervals
## Combined sample compared to BRFSS

<table>
<thead>
<tr>
<th>Item</th>
<th>Combined Sample</th>
<th>n of cases</th>
<th>2018 BRFSS</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever had a mammogram?</td>
<td>82.0%</td>
<td>713</td>
<td>68.1%</td>
<td>13.9%*</td>
</tr>
<tr>
<td></td>
<td>(76.0%, 88.0%)</td>
<td></td>
<td>(66.2%, 70.0%)</td>
<td></td>
</tr>
<tr>
<td>Mammogram last year?</td>
<td>65.9%</td>
<td>643</td>
<td>61.7%</td>
<td>4.2%</td>
</tr>
<tr>
<td></td>
<td>(60.0%, 71.8%)</td>
<td></td>
<td>(59.6%, 63.9%)</td>
<td></td>
</tr>
<tr>
<td>Ever had blood stool test</td>
<td>22.0%</td>
<td>1208</td>
<td>25.3%</td>
<td>-3.3%</td>
</tr>
<tr>
<td></td>
<td>(18.1%, 26.0%)</td>
<td></td>
<td>(23.9%, 26.8%)</td>
<td></td>
</tr>
<tr>
<td>Blood stool test last year</td>
<td>39.7%</td>
<td>358</td>
<td>32.4%</td>
<td>7.3%</td>
</tr>
<tr>
<td></td>
<td>(29.9%, 49.4%)</td>
<td></td>
<td>(29.2%, 35.5%)</td>
<td></td>
</tr>
<tr>
<td>Ever had a colonoscopy</td>
<td>63.8%</td>
<td>1216</td>
<td>71.6%</td>
<td>-7.8%*</td>
</tr>
<tr>
<td></td>
<td>(58.7%, 68.8%)</td>
<td></td>
<td>(70.0%, 73.2%)</td>
<td></td>
</tr>
<tr>
<td>Colonoscopy last year?</td>
<td>20.2%</td>
<td>873</td>
<td>23.9%</td>
<td>-3.7%</td>
</tr>
<tr>
<td></td>
<td>(15.8%, 24.5%)</td>
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<td>Have been diagnosed as having cancer</td>
<td>17.4% (14.4%, 20.5%)</td>
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<td>9.5% (9.4%, 9.6%)</td>
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<tr>
<td>Have smoked at least 100 cigarettes in your entire life</td>
<td>41.6% (37.1%, 45.9%)</td>
<td>1460</td>
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<td>Now smoke cigarettes everyday</td>
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<td>Health care professional recommended HPV vaccine, last 12 months</td>
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<td>-18.5%*</td>
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