



Chronic Illness and Public Health: Evaluating Influential Intersections Between Politics and Policy

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**Chronic Illness and Public Health: Evaluating Influential Intersections Between Politics
and Policy**

A dissertation presented

by

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to

The Committee on Higher Degrees in Health Policy

in partial fulfillment of the requirements

for the degree of

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ABSTRACT

Public health emphasizes preventing the onset of disease and detecting disease in its early stages. This focus has cultivated interest in how health information is presented and the public's responsiveness to information regarding practices believed to promote health. The chapters composing this dissertation investigate prevention, screening, and living with chronic illness in the United States. These three papers may inform efforts to improve public health, particularly when politics and health policy influence opinions and behaviors.

Chapter one investigates the political bias of the U.S. news media in its coverage of two recent controversial preventive care recommendations: the 2009 USPSTF mammography guidelines and state HPV vaccination mandates. We analyze the content and sources cited in newspaper articles and opinion pieces to determine the position towards these controversial cancer prevention practices expressed in print news. After applying a standardized measure of political slant (i.e. conservative or liberal leaning) to the newspapers we evaluated, our results demonstrate that news coverage of the 2009 mammography guidelines and state HPV vaccination mandates disproportionately mirrored the political attitudes aligned with that news outlet's political leaning. Other than staff writers/editorial boards, the types of sources frequently authoring opinion pieces on both health policy controversies significantly differed between conservative-leaning and liberal-leaning newspapers. We conclude that policymakers and public

health agencies may consider developing a political communication and media strategy for disseminating policy recommendations, especially when government health authorities are involved in contentious health debates.

Chapter two uses the Truven MarketScan database to assess the impact of state breast density notification laws passed from 2009-2013 in the U.S. on the use of supplemental imaging to detect breast cancer. We studied the claims of women aged 40-64 years with employer-sponsored health insurance to identify women who underwent mammography in 2008-2014. With a differences-in-differences approach, we compare additional breast imaging (ultrasound, MRI, tomosynthesis, scintimammography, and thermography) among women living in states that implemented breast density notification laws and those in matched comparison states without notification laws. Among 2,115,917 women who underwent an initial mammography exam, rates of additional breast imaging increased in states with notification laws in comparison to control states, with larger increases in Connecticut, who mandated insurance coverage of supplemental breast ultrasounds. When compared with women in control states, rates of supplemental breast imaging increased for women in states with breast density notification laws within the first 6 months after implementation of the laws and increased further in the 6-12 months following the legislation. Our results also show that breast ultrasounds have been the predominant form of supplemental breast cancer screening, with many fewer women undergoing tomosynthesis, breast MRI, or other imaging procedures. As breast density notification laws are implemented or considered at the federal or state level, policymakers and clinicians should be aware of the potential effects on care and the cost burden associated with these laws.

Chapter three examines the challenges African-American and Hispanic adults experience in multiple areas of their lives and compares the life experiences of low-income and higher

income subgroups within each racial/ethnic population. We conducted a weighted analysis of survey responses from 757 African-American and 697 Hispanic participants, age 18 and older, who reported a chronic illness as the biggest health problem in their families. African Americans and Hispanics with chronic illness in their families experienced challenges with the health care delivery system, with financial/economic insecurity, and with their communities that may influence how they live with chronic disease. Low-income African Americans and Hispanics were more likely to experience financial issues and problems accessing health care. Even though the majority of respondents had health insurance, neither insurance nor income completely protected against challenges like getting health care that was needed and having enough money to pay for doctors, hospitals, or prescriptions drugs. African Americans and Hispanics living with chronic conditions also expressed significant concerns in their personal lives outside of their interactions with the health care system. These personal challenges included being treated with less courtesy or respect and serious concerns about the areas where they live, especially crime and the state of the economy. To fully address health disparities, policymakers and clinicians should consider the different challenges faced by economic subgroups within a race/ethnicity when designing proper interventions that will assist minority populations effectively manage chronic illness within their communities.

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*For
my grandfather
Dr. Guy O. Saulsberry
whom I never got the chance to meet
but whose legacy lives on in the hearts of so many
and whose loving memory has instilled a deep
commitment to improving the health of people from
all walks of life*

Chapter I

Political Media Bias in U.S. News Coverage of Health Policy Controversies

INTRODUCTION

Cancer is a large concern for the American public as it was recently ranked as the most serious health condition facing the nation today.¹ Public health guidelines and requirements promoting the early detection and prevention of cancer are intended to inform health behaviors. In the current political climate, ideological polarization exists over the role of government in health, and the guidelines government agencies issue for evidence-based medicine are central to political conflicts over the extent to which the government's power should extend into the health care decisions of providers and patients. Traditionally, conservatives in the Republican party have advocated for a limited, small government role in health care. Diverging from this view, liberals in the Democratic party have promoted the expansion of the government's involvement in health care. The 2009 United States Preventive Services Task Force (USPSTF) guidelines on breast cancer screening and state mandates for vaccination against human papillomavirus (HPV) exemplify recent political debates on cancer prevention practices where the appropriate role of government in health was questioned.

Mass media serve as a filter for the content and scope of information presented on evidence-based public health practices, and thus, has a critical position in communicating health recommendations on the early detection and prevention of cancer to a range of audiences.^{2,3} In fact, the media has served as the primary and most frequent source of memorable breast cancer messages.⁴ Antagonism towards the government and emphasis on conflict in news reports involving politics and government have also been documented in the media.^{5,6,7} This treatment of politics and government in the press has increased public cynicism that the government operates for the public good when setting public policy.⁷

Fowler and Gollust (2015) demonstrated that the media emphasizes conflict between opposing sides of controversial health debates. They also showed that when the media conveyed medical and political conflict over state HPV vaccination requirements, there was an increase in reported distrust in medicine and government.⁸ In an examination of the role of media coverage and trust in public health agencies, Chen and Murphy (2011) demonstrated that confidence in government health authorities was a key predictor in willingness to engage in preventive health behaviors and that this trust might be necessary to motivate compliance with more controversial public health recommendations.⁹

Seminal research on the formation of public opinion demonstrates that the public takes cues from elites (i.e. policymakers, physicians, experts of a field, etc.) to form their opinions on issues.¹⁰ The media not only provides a platform for these elites and experts to communicate with the public, but it also lends credibility to these sources. In addition, some “elite” national news sources impact the news coverage reported by other news outlets.¹¹ Public health agencies and organizations issuing recommendations on health services for the early detection and prevention of cancer derive their influence from their credibility with the public, which the media can reinforce or discredit. A Pew Research Center study found that people trusted information from the news media more than all other sources including those associated with federal government agencies, Congress, and state governments.¹² Messages from spokespersons the media deems trustworthy and cites on health information may be particularly instrumental to strategies for the early detection and prevention of cancer, which often rely on the voluntary, preemptive actions of patients. Thus, political slant in media coverage of controversial public health practices and the government’s role in those conflicts could have meaningful effects on public opinions and behaviors.

Multiple studies investigate the effects of ideologically biased news content on political attitudes and outcomes,^{13, 14} yet little attention has been dedicated to how political slant manifests in news coverage of controversial cancer prevention practices. The current media analysis evaluates the relationship between political slant in the media and news coverage of health policy controversies, namely the 2009 USPSTF mammography guidelines and state HPV vaccination mandates. We hypothesized that news coverage with a political bias would reflect associated partisan attitudes towards these cancer prevention policies.

DATA AND METHODS

Selection of Health Policy Controversies

The 2009 USPSTF breast cancer screening guidelines and the state laws passed and proposed from 2006-2009 mandating vaccination against HPV represent two recent health policy controversies dealing with the early detection and prevention of cancer. The intense public conflict over these cancer prevention policies in the media, distinguishable political party attitudes towards these health controversies, and the framing of government as a distinct stakeholder in each debate make these cases ideal for our analysis.

2009 USPSTF mammography guidelines

Historically, the use of mammography for breast cancer screening has been widely debated and controversial. Over time, it has become enshrined in clinical practice as the best tool for decreasing mortality due to breast cancer. Powerful interest groups, lobbying organizations, and the public have galvanized around breast cancer and mammography as an early detection tool that can improve cancer outcomes.³ As a result, any changes to mammography practices

garner concentrated public attention and inspire heated debate. In 2009, the USPSTF updated their prior recommendations regarding breast cancer screening, changing the recommended age to begin routine mammograms from 40 to 50 and recommending biennial rather than annual screening for most women.¹⁵ The reaction from the general public and policymakers from both political parties (Republican and Democrat) to these updated guidelines was overwhelmingly negative.¹⁶ More than 3 out of 4 women (76%) ages 35-75 disagreed or strongly disagreed with the 2009 USPSTF mammography guidelines according to a Gallup poll from immediately after the release of the updated recommendations.¹⁷

In addition, there is confusion and lack of knowledge about the USPSTF and its relationship to the federal government. The USPSTF was created with the purpose of being an apolitical, independent panel of experts that would advise on evidence-based medicine and prevention. Since 1998, the Agency for Healthcare and Research Quality (AHRQ), a federal agency a part of the U.S. Department of Health and Human Services, assembles the panel members and provides support to the task force.¹⁸ Though the USPSTF has a relationship with the federal government through its health agencies, the panel does not serve as a direct representative of the government nor does it have the authority to set national health care policy. The nuance of this distinction is not well established among the public. In fact, a recent national survey showed that less than 10% of the American public had ever even heard of the USPSTF.¹⁹ Therefore, the association in the media of the USPSTF with the government could be many individuals' first introduction to the task force.

Confusion about the USPSTF's relationship with the federal government is particularly significant to the updated 2009 mammography guidelines because these recommendations were released amid a bitter, political debate over national health reform and reducing health care costs.

Insurance coverage for preventive services in health reform legislation was tied to USPSTF recommendations, so the concurrent release of updated USPSTF breast cancer screening guidelines advocating for fewer, less frequent mammograms offered evidence favoring the misconstrued public perception that the same source was responsible for both policies: the federal government. The prevalence of equating the USPSTF with the government allows for us to identify this association in news coverage and treat reference to the USPSTF as a reference to the government.

HPV vaccination mandates

State HPV vaccination mandates are also contentious for numerous reasons: 1) there were conflicting views amongst experts on the safety and value of the HPV vaccine even after it was approved by the U.S. Food and Drug Administration (FDA); 2) HPV is a sexually transmitted disease that once acquired can increase the risk for developing cervical cancer; and 3) state legislation required the vaccination of middle school girls for school entry because the HPV vaccine is most effective before sexual activity. It is generally accepted that state governments pass laws to protect public health. While we did not anticipate any confusion in news content around the source of state HPV vaccination mandates, we did expect variation in the language used to reference the government (e.g. state, House, Senate, Council, Assembly, etc.).

Data Source and Collection

Using the Lexis Nexis Academic database, we collected news articles, opinions, editorials, and letters to the editor from all U.S. newspapers that reported on the 2009 USPSTF mammography guidelines and the state mandates for HPV vaccination. Newspapers remain a major source of information reaching the vast majority of U.S. adults. Approximately 7 in 10

adults (69%) accessed newspaper media in print or online platforms in 2013.²⁰ Newspaper coverage also draws the attention of government officials and shapes policy debate²¹.

The following Boolean search term was used to collect all relevant articles to the 2009 USPSTF mammography guidelines:

“(United States Preventive Services Task Force OR US Preventive Services Task Force OR USPSTF) AND (mammography OR mammogram OR breast cancer screening)”

The following Boolean search term was used to collect all relevant articles to the HPV state vaccination mandates:

“(HPV OR Human papillomavirus OR human papillomavirus) AND vaccine AND (law OR legislation OR mandate OR bill)”

These final search terms were iteratively developed to compile a set of all news articles and opinion pieces (opinions, letters to the editor, and editorials) that would focus on our topics of interest.

Lexis Nexis consistently updates their database altering the availability of newspaper content (articles and opinion pieces). We collected data using the exact same search terms on two occasions over a six-month period on April 12, 2015 and October 12, 2015 to incorporate as many news articles and opinion pieces in our analysis as possible. After a comparison between all content collected in April and October 2015, ninety-nine additional relevant news articles and opinion pieces on the 2009 USPSTF mammography guidelines were included in our study. All additional content on state HPV mandates retrieved in October 2015 was published by news

outlets not included in our original sample of 60 newspapers, and therefore, were excluded from our analysis.

2009 USPSTF mammography guidelines

Previous studies involving content analyses of the 2009 USPSTF mammography guidelines demonstrate that the media coverage of the new recommendations peaked immediately following their release.^{8, 22, 23} We included all relevant news reports from the date the 2009 USPSTF recommendations were released through one year after their publication (11/16/09-11/16/10). This time period for collecting news reports included data from the most intense period of media coverage.

HPV state vaccination mandates

Prior content analyses demonstrate that the highest volume of media coverage on the HPV state mandates was from 2006-2007 and was concentrated around public debate over state action leading up to the consideration or passage of vaccination mandate legislation in a state.^{23, 24} We included all relevant news reports on the HPV state vaccination mandates to cover a year before and a year after this period of most intense media coverage (6/1/05-6/1/08). This time period for collecting news reports incorporates debate over the HPV mandates before and after they were passed into law.

Exclusion Criteria

Articles were excluded if they had no mention of the 2009 USPSTF mammography guidelines or the state HPV vaccination mandates. Newspaper content on the state HPV vaccination mandates was also excluded if the news article or opinion piece focused on

legislation mandating information/education about HPV as opposed to requiring the vaccine. The final sample of relevant articles and opinion pieces focusing on the 2009 USPSTF mammography guidelines and the state HPV vaccination mandates originate from 60 newspapers that reported on both cancer prevention practices. The total sample size for the 2009 USPSTF breast cancer screening guidelines is 135 news articles, 145 opinion pieces (including opinions, letters to the editor, and editorials). The total sample size for state HPV vaccination mandates was 227 news articles, 142 opinion pieces (see Appendix I, Figures I.A1 and I.A2).

Measuring Political Bias in the Media

Gentzkow and Shapiro (2010) generated an index of ideological slant in news coverage from 433 U.S. newspapers. To measure political slant in the media, they examine the 2005 Congressional Record to identify phrases more frequently used by Republican and Democratic congressmen. Next, they index newspapers according to the frequency with which their news coverage included these politically charged phrases Republican and Democratic politicians used when describing their respective party positions. Gentzkow and Shapiro interpreted the increased propensity to publish these phrases from one political party more than the other as a political bias. Therefore, their final index provided a scale to compare newspapers to one another according to the extent to which they reflected ideological, partisan attitudes on issues.

The 60 newspapers in our study were among the 433 newspapers Gentzkow and Shapiro included in their index. Since Gentzkow and Shapiro's index did not incorporate a benchmark for true, unbiased news coverage,²¹ we created a standardized media slant scale for these 60 newspapers in our study to distinguish between liberal-leaning (Democratic) and conservative-leaning (Republican) newspapers. Newspapers affiliated with publishing more phrases

resembling the speech of Democratic congressmen had negative standardized scores and were defined as liberal-leaning newspapers. Newspapers affiliated with publishing more phrases resembling the speech of Democratic congressmen had positive standardized scores and were defined as conservative-leaning newspapers. In the context of our study, we define political bias as when positions, or partisan attitudes, towards debated health practices are overrepresented by a media outlet. We expected that the political leaning of a newspaper determined from our standardized scores would be associated with its news coverage reflecting a position towards the 2009 USPSTF mammography guidelines and the state HPV vaccination mandates that aligned with respective party attitudes.

Applying the standardized slant scores to the 60 newspapers of interest, 28 newspapers were categorized as liberal-leaning and 32 newspapers were categorized as conservative-leaning. For a list of these 60 newspapers, their original slant measures, and their standardized slant scores see Appendix I, Tables I.A1 and I.A2.

Coding Instrument

A coding instrument was developed by incorporating variables from previously validated codebooks in other content analyses on the 2009 USPSTF mammography guidelines and state HPV vaccination mandates.^{8, 22, 23} Though the variables coded were compiled from other content analyses of these health policy controversies, their use in this analysis extends beyond noting their presence or absence in the text of news reports to evaluating their contribution to the articles' overall position towards the guidelines or mandates. Table 1.1 presents the variables documented in our codebook. We selected variables from the literature for our coding schema

Table 1.1 Codebook to determine article position

Codebook (variables in text)	Definition
<i>Sources</i>	
Sources cited	To address any potential ambiguity, we focused only on the sources cited with a direct position (i.e. <i>supportive</i> , <i>neutral</i> , or <i>opposed</i>) towards the 2009 USPSTF mammography guidelines or state HPV vaccination mandates in our analysis. <i>Neutral</i> sources were defined as those described as taking an impartial stance encouraging consideration of both arguments for and against these cancer prevention practices.
<i>Arguments</i>	
Imperfections and Limitations	Mention of inherent imperfections of mammography as a screening tool, the possible scientific limitations of the HPV vaccination, flaws with the current process for determining health recommendations, limitations around vaccination compliance that suggest the HPV vaccine will be ineffective.
Benefits	Direct citation of the benefits of mammography screening and HPV vaccination (i.e. lowering mortality and morbidity due to breast and cervical cancers).
Risks/harms	Direct citation of the risks/harms that can result from mammography screening and HPV vaccination.
<i>Government Reference</i>	
Direct reference to government	For the news articles on the 2009 USPSTF guidelines, we recorded direct mention of the USPSTF as a “government panel” and/or “government task force.” For the news articles on the state HPV vaccination mandates, we recorded any direct mention of the state government (e.g. state, House, Senate, Council, Assembly, etc.) or politicians. We also recorded text in news articles and opinion pieces discussing government intrusion via the mandate legislation.

that captured information from three domains: 1) sources cited by their position towards the guidelines and mandates, 2) information pertinent to arguments in favor and opposed to these cancer prevention practices, 3) references to government directly in the text of news articles and opinion pieces. The variables from the *Sources* and *Arguments* domains were selected because they offer important context for determining the position towards the 2009 USPSTF mammography guidelines and the state HPV vaccination mandates expressed in newspaper content. We noted direct references to the government to document: 1) when the USPSTF was equated with the federal government in the news coverage of the 2009 USPSTF mammography guidelines and 2) when news reporting of the state HPV vaccination mandates directly mentioned state governments, legislatures, or politicians.

We recorded both excerpts from the text of the news articles and opinion pieces as well as a binary code indicating the absence or presence of all variables except the sources cited. All binary indicators assigned a 0 to the variables if they were absent from the text and a 1 if they were present in the text. Sources cited were listed by name and their position towards the guidelines or mandates in the codebook. These sources and their positions were later quantified and compared to determine the overall position of the news article or opinion piece.

Analysis

The first level of analysis categorizes news articles and opinion pieces according to their position (i.e. support, neutral, or oppose) towards the 2009 USPSTF mammography guidelines or the state HPV vaccination mandates. We determined the positions of newspaper content through a hierarchical, systematic assessment of newspaper content using the variables in the *Codebook* (Table 1.1). First, we evaluated the number of sources cited expressing support or opposition to

the guidelines and mandates. Second, we evaluated the proportion of the text dedicated to describing the sources on each side of the debate. Third, we evaluated the comparative volume of positive information (e.g. benefits) and negative information (e.g. imperfections and risks/harms) presented in news coverage of mammography and HPV vaccination as this information formed the basis of arguments that supported and opposed the 2009 USPSTF mammography guidelines and the state HPV vaccination mandates. Finally, we also assessed the language and tone of the news articles and opinion pieces. These analytical steps produced a collection of data from newspaper content that was positive and negative towards the 2009 USPSTF mammography guidelines and the state HPV vaccination mandates. We weighed the aggregated positive data against the aggregated negative data gathered through content analysis to establish a final overall position towards the health policy controversy covered.

Sources authoring opinion pieces

Prior evidence suggests that the sources cited in news articles and the authors of opinion pieces reflect the journalistic orientations of a media outlet.²⁵ The choice to include or omit particular sources can reflect a position towards a topic without compromising journalistic professional norms of balanced reporting. Less confined by the stringent standard of impartiality, opinion pieces often convey stronger positions than news articles. Due to this latitude for a more fervent expression of political attitudes towards the 2009 USPSTF mammography guidelines and the state HPV vaccination mandates, we examined the types of sources authoring opinion pieces and the frequency of their authorship in newspapers by political leaning.

Interrater Reliability

Two coders analyzed a randomly selected sample of 10% of news stories and opinion pieces for both health controversies. The coding process replicated content analysis techniques established in the literature.²⁶ The statistical test employed to determine intercoder reliabilityⁱ was Cohen's kappa²⁸. The reliability criterion set for this study was kappa greater than or equal to 0.60 as is recommended in prior literature.²⁶ The result of the Cohen's kappa test on a 10% sample of articles on the 2009 USPSTF breast cancer screening guidelines produced a statistic of $\kappa = 0.83$, $p = 0.0007$. The result of the Cohen's kappa test on a 10% sample of articles on the HPV vaccination mandates produced a statistic of $\kappa = 0.69$, $p = 0.0013$.

RESULTS

Newspapers published approximately equal numbers of news articles ($n=135$) and opinion pieces ($n=145$) about the 2009 USPSTF mammography guidelines whereas more news articles ($n=227$) than opinion pieces ($n=142$) were published on the state HPV vaccination mandates (Table 1.2). Though a similar number of newspapers were categorized as liberal-leaning ($n=28$ newspapers) and conservative-leaning ($n=32$ newspapers), liberal-leaning newspapers published the majority (over 65%) of news articles and opinion pieces on both the 2009 USPSTF mammography guidelines and the state HPV vaccination mandates. Conservative-leaning newspapers published slightly greater proportions of news articles (34%) and opinion pieces (29%) on the 2009 USPSTF mammography guidelines compared with the state HPV vaccination mandates (27% of news articles and 25% of opinion pieces).

ⁱ Reliability is the extent to which a measuring procedure produces the same results in repeated trials (Carmines and Zeller, 1979).

Table 1.2 Number of News Articles and Opinion Pieces by Political Leaning of Newspapers

	TOTAL		Conservative-leaning newspapers		Liberal-leaning newspapers	
	News articles (n)	Opinion Pieces (n)	News articles (n)	Opinion Pieces (n)	News articles (n)	Opinion Pieces (n)
<i>Health controversy</i>						
USPSTF mammography guidelines (2009)	135	145	46	42	89	103
HPV vaccination mandates (2006-2009)	227	142	62	35	165	107

NOTES: Content analysis included 135 news articles and 145 opinion pieces on the 2009 USPSTF mammography guidelines and 227 news articles and 142 opinion pieces on the HPV vaccination mandates. Opinion pieces include opinions, editorials, and letters to the editor.

SOURCE: Lexis Nexis Academic.

News Coverage of Health Policy Controversies

2009 USPSTF mammography guidelines

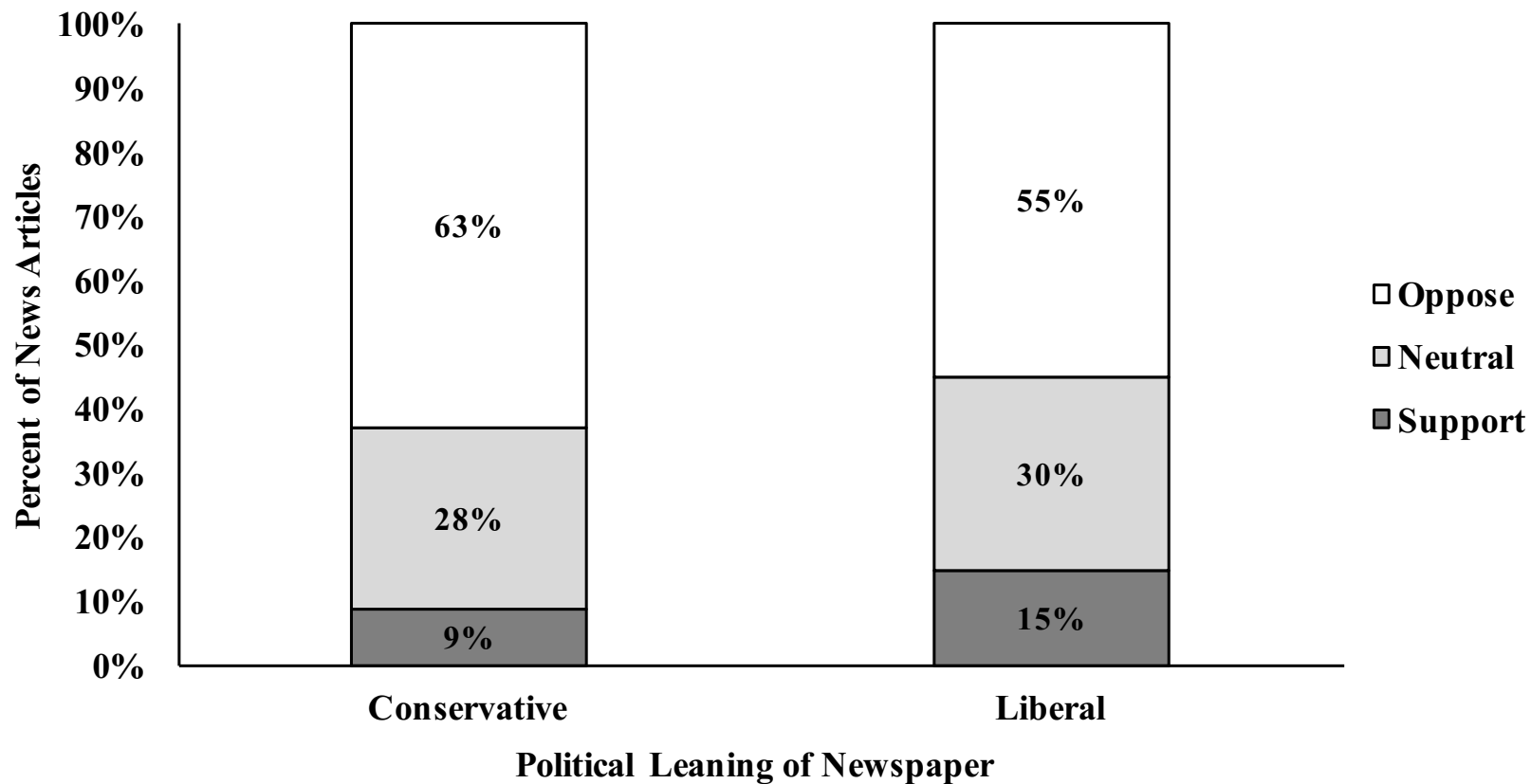
Most news articles published in both conservative-leaning (63%) and liberal-leaning (55%) newspapers opposed the 2009 USPSTF mammography guidelines (Figure 1.1). Liberal-leaning newspapers were more likely than conservative-leaning newspapers to publish articles in support of the 2009 USPSTF mammography guidelines (15% vs. 9% respectively), although these differences were not statistically significant ($\chi^2 = 1.22$, $p = 0.54$).

Similar trends were observed between news articles and opinion pieces in their positions towards the 2009 USPSTF mammography guidelines (Figure 1.2). Most opinions pieces (60%) in liberal-leaning and conservative-leaning newspapers opposed the 2009 USPSTF mammography guidelines. Liberal-leaning newspapers were slightly more likely than conservative-leaning newspapers to publish opinion pieces that supported the 2009 USPSTF mammography guidelines (22% vs. 17% respectively), but these differences were also not statistically significant ($\chi^2 = 1.23$, $p = 0.54$).

HPV vaccination mandates

News articles published in conservative-leaning newspapers (43%) were significantly more likely than those published in liberal-leaning newspapers (22%) to convey an opposed position towards state HPV vaccination mandates ($\chi^2 = 9.32$, $p < 0.01$). Liberal-leaning newspapers (27%) were more likely than conservative-leaning newspapers (18%) to express a supportive position towards the HPV vaccination mandates. Almost 40% of news articles from conservative-leaning newspapers and over half (51%) from liberal-leaning newspapers were neutral to the HPV vaccination mandates, many focusing solely on the current status of the state

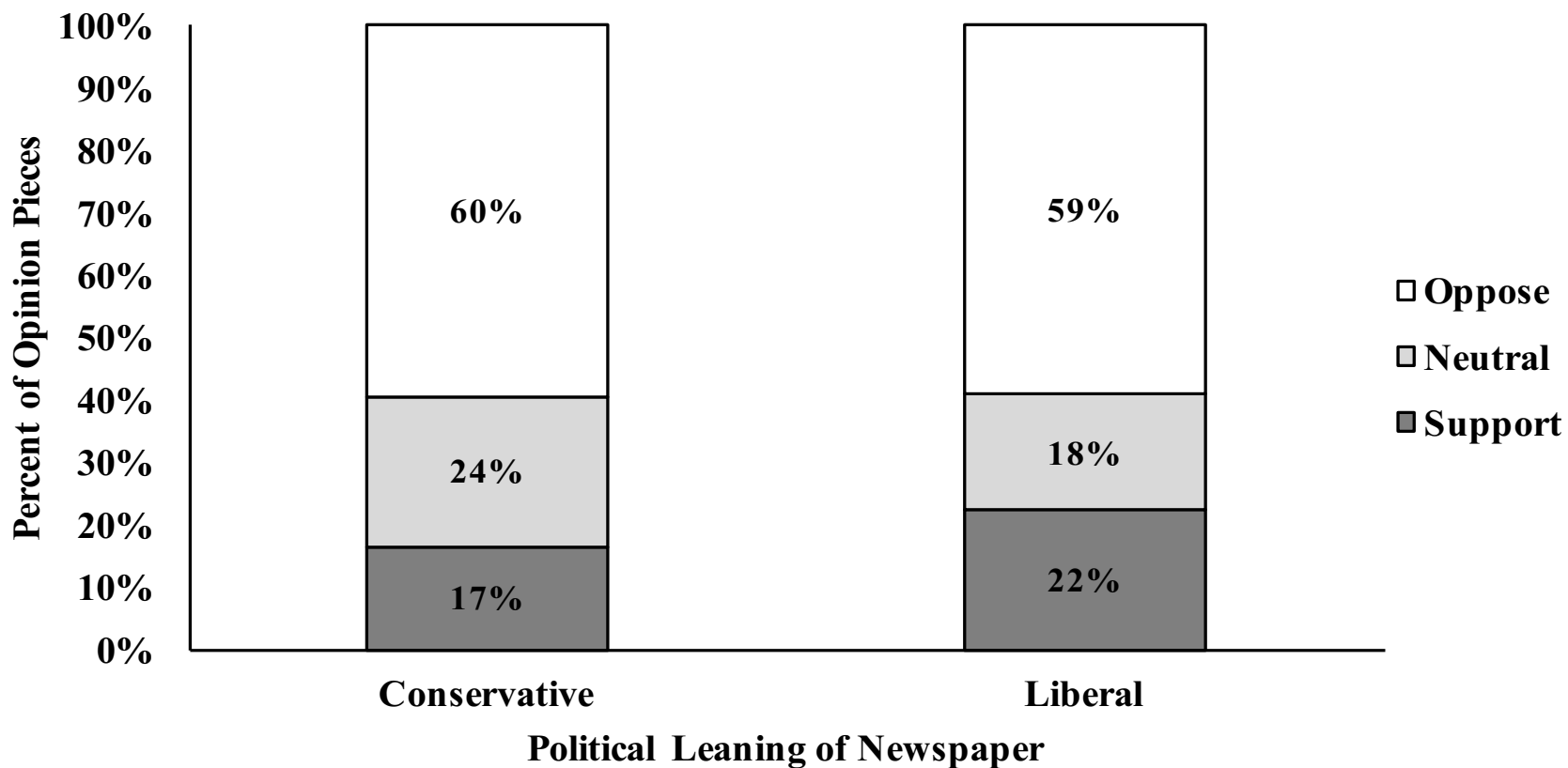
Figure 1.1 Position of News Articles Towards the 2009 USPSTF Mammography Guidelines (N = 135)



NOTES: Figure 1.1 displays results from content analysis of 135 news articles on the 2009 USPSTF mammography guidelines. Comparisons between the positions of news articles published in conservative-leaning and liberal-leaning newspapers were not statistically significant according to a chi-squared test of independence, $p = 0.54$.

SOURCE: Lexis Nexis Academic.

Figure 1.2 Position of Opinion Pieces Towards the 2009 USPSTF Mammography Guidelines (N= 145)



81

NOTES: Figure 1.2 displays results from content analysis of 145 opinion pieces on the 2009 USPSTF mammography guidelines. Opinion pieces include opinions, editorials, and letters to the editor. Comparisons between the positions of conservative-leaning and liberal-leaning opinion pieces were not statistically significant according to a chi-squared test of independence, $p = 0.54$.

SOURCE: Lexis Nexis Academic.

mandate in the legislative process (i.e. proposed, passed, or implemented) (Figure 1.3).

Parallel trends were observed for the position of news articles and opinion pieces on the state HPV vaccination mandates (Figure 1.4). Opinion pieces published in conservative-leaning newspapers (69%) were significantly more likely than opinion pieces in liberal-leaning newspapers (54%) to oppose the state HPV vaccination mandates ($\chi^2 = 6.14$, $p < 0.05$). A higher proportion of opinion pieces from liberal-leaning newspapers (33%) compared to opinion pieces from conservative-leaning newspapers (14%) supported the HPV vaccination mandates.

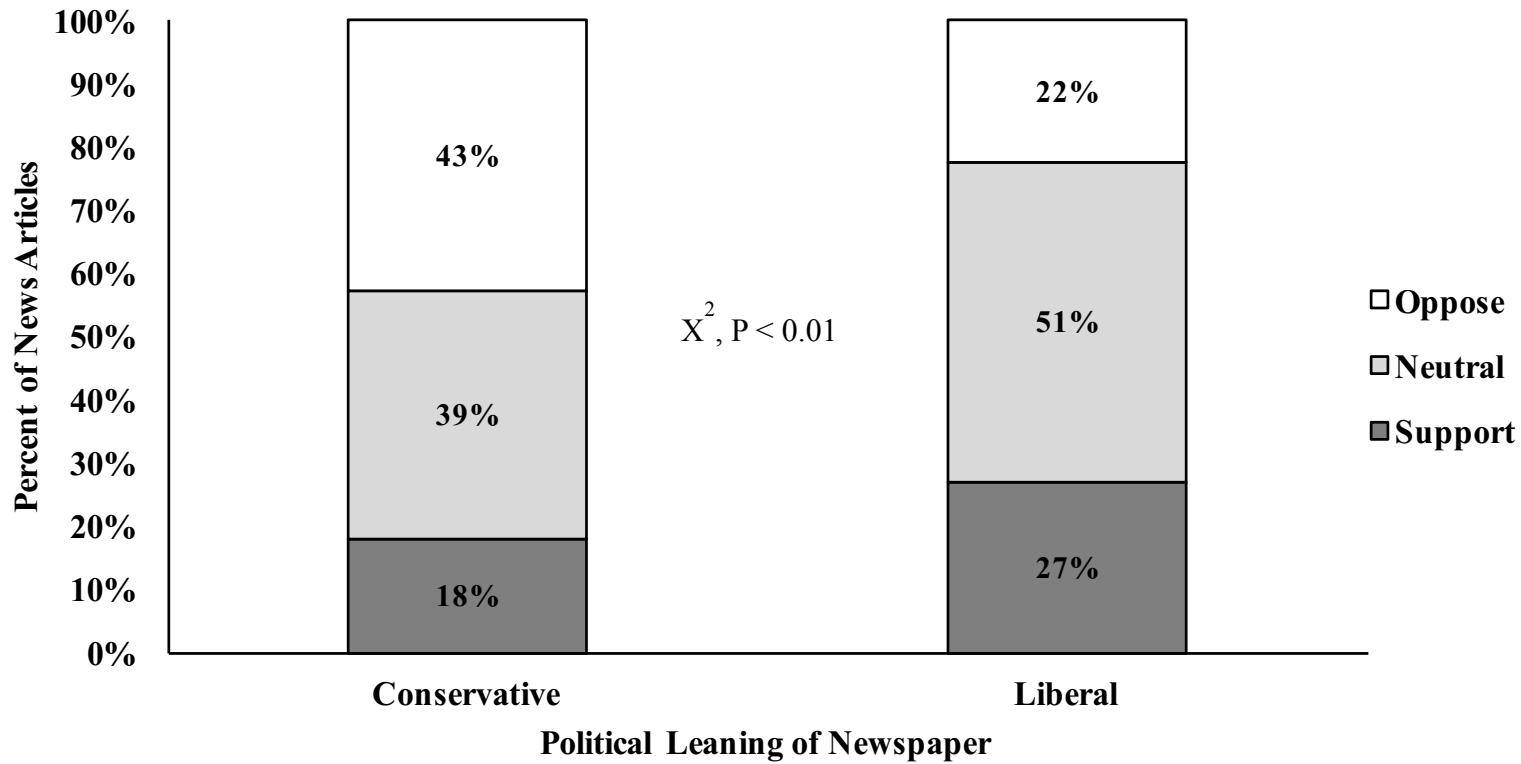
Authors of Opinion Pieces on Health Policy Controversies

2009 USPSTF mammography guidelines

In commentary on the 2009 USPSTF mammography guidelines, staff writers or the editorial board authored the largest proportion of opinion pieces published in conservative-leaning newspapers (62%) while breast cancer survivors authored the greatest share of opinion pieces printed in liberal-leaning newspapers (26%) (Figure 1.5).

Conservative-leaning newspapers were three times more likely than liberal-leaning newspapers (62% and 21% respectively) to have staff writers or their editorial board author their published opinion pieces on the 2009 USPSTF mammography guidelines. Only liberal-leaning newspapers printed opinion pieces that researchers/academics authored (4%) on the 2009 USPSTF mammography guidelines. Researchers/academics were largely unrepresented among the authors of opinion pieces on the 2009 USPSTF mammography guidelines. Physicians authored at least 1 out of every 5 opinion pieces (20%) published in both conservative-leaning and liberal-leaning newspapers. Conservative-leaning newspapers (24%) were significantly more likely to print opinion pieces authored by physicians than liberal-leaning

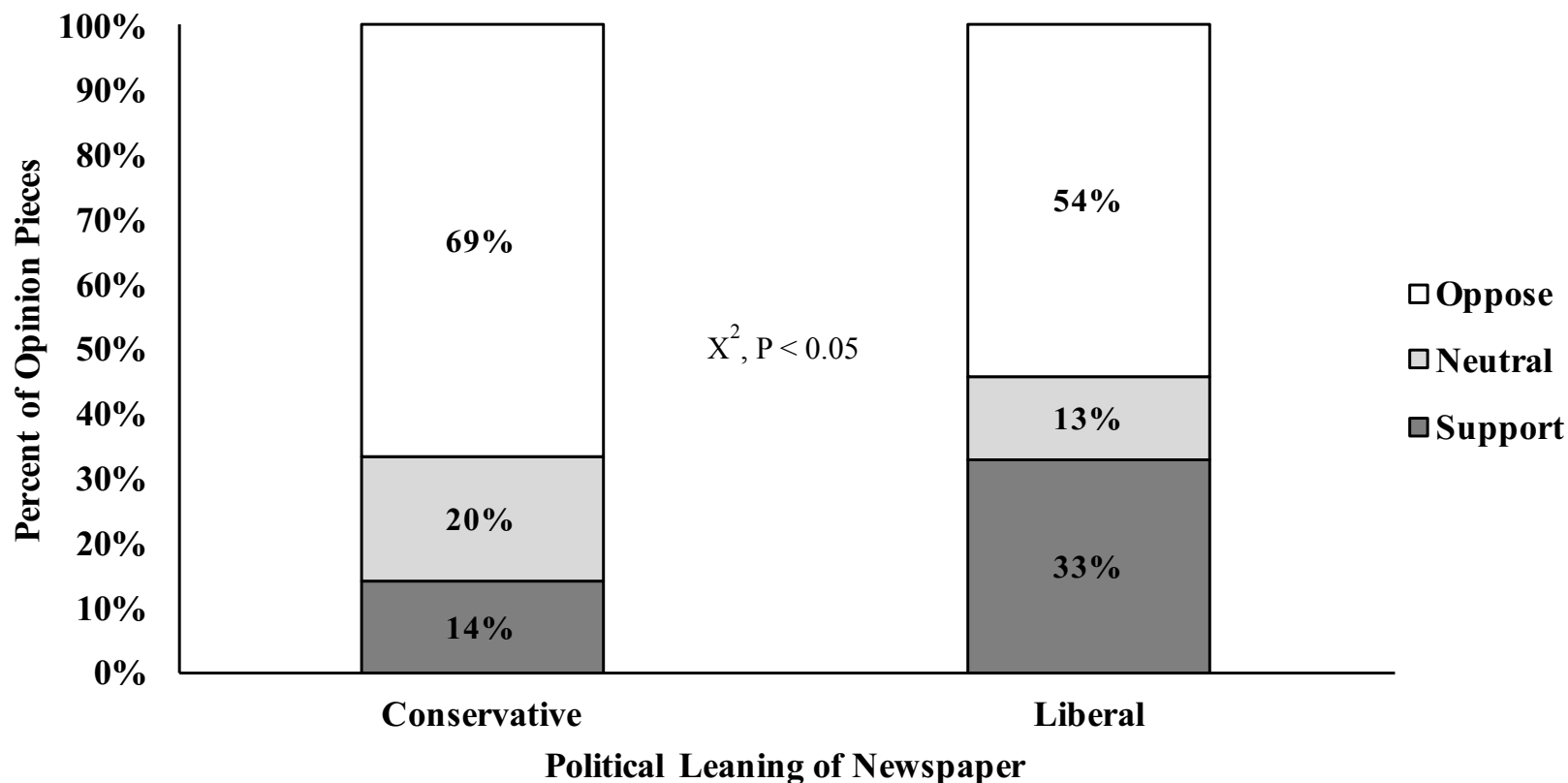
Figure 1.3 Position of News Articles Towards the HPV Vaccination Mandates (N = 227)



NOTES: Figure 1.3 displays results from content analysis of 227 news articles on the state HPV vaccination mandates proposed and implemented from 2006-2009. Comparisons between the positions of conservative-leaning and liberal-leaning news articles were statistically significant according to a chi-squared test of independence, $p < 0.01$.

SOURCE: Lexis Nexis Academic.

Figure 1.4 Position of Opinion Pieces Towards the HPV Vaccination Mandates (N= 142)

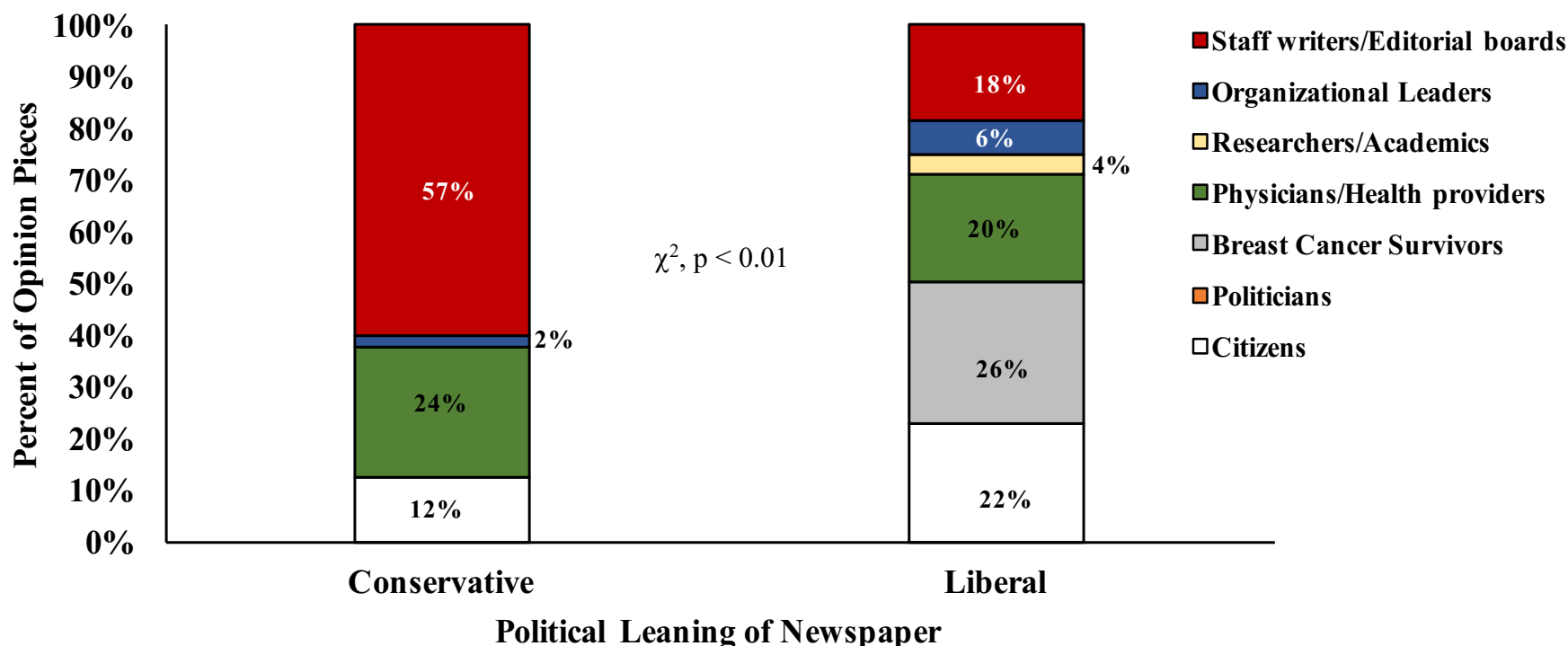


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NOTES: Figure 1.4 displays results from content analysis of 142 opinion pieces on the state HPV vaccination mandates proposed and implemented from 2005-2009. Opinion pieces include opinions, editorials, and letters to the editor. Comparisons between the positions of conservative-leaning and liberal-leaning opinion pieces were statistically significant according to a chi-squared test of independence, $p < 0.05$.

SOURCE: Lexis Nexis Academic.

Figure 1.5 Authorship of Newspaper Opinion Pieces on 2009 USPSTF Mammography Guidelines (N= 145)



NOTES: Figure 1.5 displays results from content analysis of 145 opinion pieces on the 2009 USPSTF mammography guidelines. Opinion pieces include opinions, editorials, and letters to the editor. Organizational leaders include individuals representing non-governmental/non-profit organizations, advocacy organizations, professional/trade organizations, or other interest groups. Comparisons between the types of authors of conservative-leaning and liberal-leaning opinion pieces were statistically significant according to a chi-squared test of independence, $p < 0.01$.

SOURCE: Lexis Nexis Academic.

publications (20%) ($\chi^2 = 30.58, p < 0.01$). The proportion of opinion pieces written by private citizens in liberal-leaning newspapers (22%) on the 2009 USPSTF mammography guidelines was also significantly higher than those published by conservative-leaning newspapers (12%).

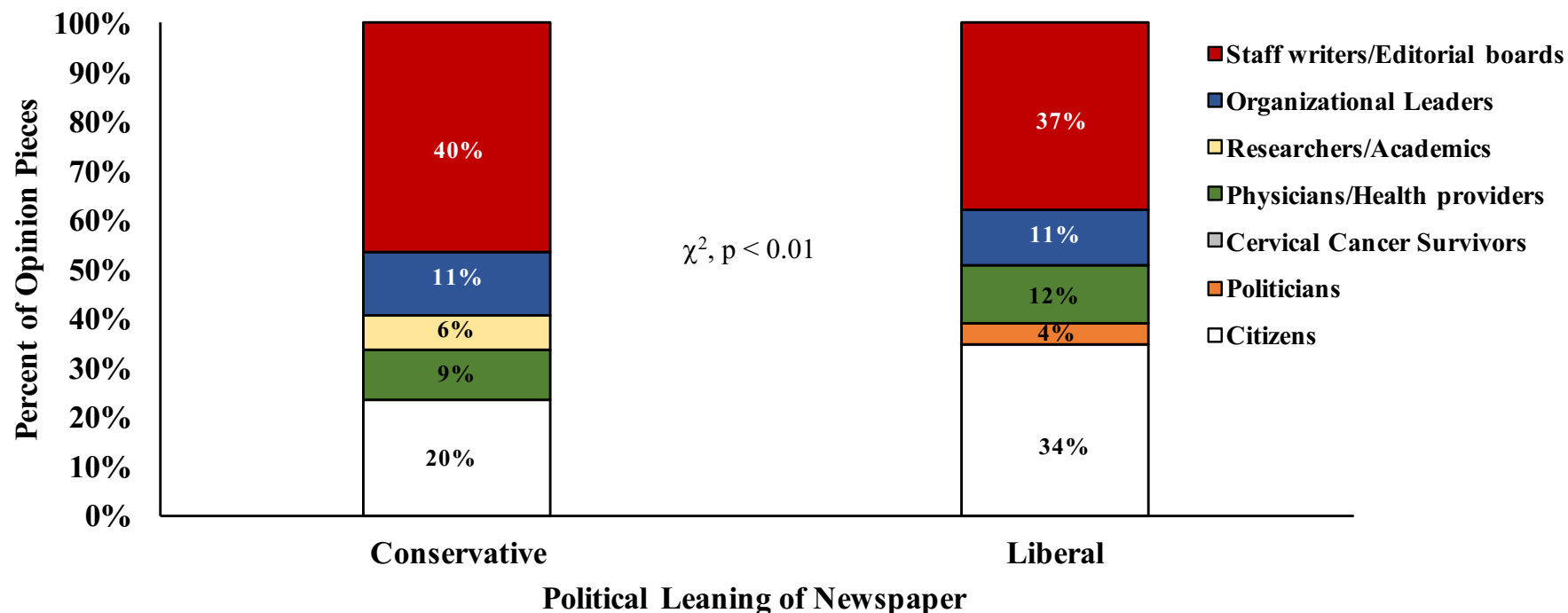
HPV vaccination mandates

In commentary on the state HPV vaccination mandates staff writers or the editorial board authored the largest proportion of opinion pieces published in both conservative-leaning (40%) and liberal-leaning newspapers (37%) (Figure 1.6). Organizational leaders and physicians authored similar proportions of opinion pieces in both conservative-leaning and liberal leaning newspapers. Researchers/academics were largely unrepresented among the authors of opinion pieces on the state HPV vaccination mandates. Only conservative-leaning newspapers printed opinion pieces that researchers/academics authored (6%) on the state HPV vaccination mandates. While cervical cancer survivors authored none of the opinion pieces on the HPV vaccination mandates, individual politicians authored opinion pieces in only conservative-leaning newspapers. The proportion of opinion pieces written by private citizens in liberal-leaning newspapers (34%) on the HPV vaccination mandates was also significantly higher than those published by conservative-leaning newspapers (20%) ($p < 0.01$).

DISCUSSION

The current analysis evaluates news coverage of health guidelines and mandates relating to the early detection and prevention of cancer. We demonstrate the variation in the position of

Figure 1.6 Authorship of Newspaper Opinion Pieces on HPV Vaccination Mandates (N= 142)



NOTES: Figure 1.6 displays results from content analysis of 142 opinion pieces on the state HPV vaccination mandates proposed and implemented from 2005-2009. Opinion pieces include opinions, editorials, and letters to the editor. Organizational leaders include individuals representing non-governmental/non-profit organizations, advocacy organizations, professional/trade organizations, or other interest groups. Comparisons between the types of authors of conservative-leaning and liberal-leaning opinion pieces were statistically significant according to a chi-squared test of independence, $p < 0.01$.

SOURCE: Lexis Nexis Academic.

news articles and opinion pieces towards controversial cancer prevention practices between newspapers with conservative and liberal political leanings. Both conservative-leaning and liberal-leaning newspapers published mostly news articles and opinion pieces that were opposed to the 2009 USPSTF mammography guidelines, with no statistically significant differences based on the political leaning of the publication. These results align with the bipartisan backlash and political opposition to changes in the USPSTF mammography recommendations discouraging women in their 40's from receiving annual breast cancer screening. The USPSTF changes to the recommendations reflected a departure from decades of public health campaigning encouraging women to get mammograms starting at the age of 40. It also represented a loss of a widely accepted health service with broad public support. These results also reinforce prior research indicating a media bias in favor of mammography screening for women 40 years of age and older, which seems to persist despite alternative recommendations by the USPSTF and some other national organizations.²⁹

Alternatively, significantly more news articles and opinion pieces from conservative-leaning newspapers when compared to liberal-leaning newspapers expressed opposition to the HPV vaccination mandates. Conservatives and liberals were more ideologically polarized on state HPV vaccination mandates than they were on the 2009 USPSTF mammography guidelines given that HPV is a sexually transmitted disease. In the debate on HPV vaccination mandates, conservative politics and religious ideology were closely tied augmenting opposition to the state HPV vaccination mandates. In addition, unlike mammograms, the HPV vaccine was new and would be added to the vaccination schedule for adolescents before building a long-term foundation of evidence.

The 2009 USPSTF mammography guidelines and the state HPV vaccination mandates proposed and passed from 2006-2009 are recent health policy controversies that demand varying degrees of government involvement. Historical precedent would suggest that the presence of government in U.S. health care is not likely to disappear any time soon, ensuring the continuation of debate about the appropriate role of government in health and almost guaranteeing future intersections between politics and health policy.³⁰ Political attitudes reflected in the media that oppose the 2009 USPSTF mammography guidelines and the state HPV vaccination mandates may also indicate opposition to the particular role of government in health represented in these health controversies: in one instance the government as an authority suggesting limiting a health service women value and in another instance the government as an authority requiring a vaccination for adolescents.

Traditionally, health guidelines the USPSTF established were recommendations for best practices unlikely to be directly enforced. Proposed national health reform legislation altered this precedent with the inclusion of a provision that required insurance coverage only for USPSTF recommendations receiving an A or B rating. The updated 2009 USPSTF mammography guidelines only rated mammograms for women ages 50-74 with a B, a rating high enough to require insurance coverage of this health service. Concerned the health reform bill would result in the loss of insurance coverage for mammograms, politicians on both sides of the aisle supported legislation to require health insurance companies continue their coverage of breast cancer screening for women starting at age 40 in spite of the USPSTF's 2009 recommendations.

Health guidelines lacking any legislative authority fundamentally differ from the laws of state legislatures mandating particular health behaviors. Legal mandates requiring specific health behaviors are more stringent and entail a greater degree of government involvement in health

care. Compared to liberal-leaning newspapers, conservative-leaning newspapers were significantly more likely to publish news content reflecting an opposition to the HPV vaccination mandates. The opposed political attitude in conservative-leaning newspapers may reflect the conservative political preference for a limited, small government role in public policy.

Policy Implications

Our results have meaningful implications for policymakers and government public health agencies that determine and communicate health recommendations. The findings in this study illuminate that the political environment matters for how controversial cancer prevention practices are portrayed in the media. We reveal the presence of a political bias in news coverage that reflected partisan positions on controversial public health practices. Political bias signifies that the positions towards debated health practices will not be evenly distributed across the media landscape and that political ideology acts as a filter through which health guidelines and mandates are presented in the news.

Understanding the role of political slant in the news media is especially important when health and medical experts do not agree over the best course of action and/or when political actors adopt competing ideological stances towards public health practices. The public has a difficult time understanding and processing how they should respond to heavily debated, contentious issues.³¹ As an information source for conflicting messages, the media plays a role in cancer prevention.² Therefore, policymakers and public health officials seeking to effectively communicate evidence-based policy recommendations should be aware of the divergent political attitudes towards contentious public health practices that could be represented in the media.

Timing and an appreciation for the political environment into which those policy recommendations are released will influence how the policies are framed. For example, the 2009

USPSTF mammography guidelines were published in the middle of a politically polarized national health care reform debate. Policy proposals for health reform legislation focused on controlling costs and limiting their increasing burden on the health care system without sacrificing quality of care. In this setting, a recommendation for fewer mammograms from a perceived federal task force gave the appearance of government rationing of care, which political opponents to health reform used to exemplify the deleterious effects of passing the law. Prior studies indicate that readers prefer like-minded news,²¹ and that individuals engage in motivated reasoning where they interpret issues according to their biases, whereby their political or ideological slant determines (consciously or unconsciously) their willingness to accept particular views.³² When the media presents information about controversial public health practices through a political lens, policymakers and public health agencies may be risking only partial uptake and loss of support for health policy recommendations amongst audiences with competing political ideologies. Investments in targeted messages designed for media outlets with different political leanings may allow for more effectively communicating health guidelines or requirements across a population.

Traditional approaches in public health which have assumed a definitive separation between politics and science may no longer be ideal for promoting improvements in health. Scholars are increasingly recognizing the politics of science and its role in shaping opinions about health practices and government public health agencies.³³ Consequently, policymakers and public health agencies may consider developing a political communication and media strategy for disseminating policy recommendations, especially when government health authorities may face challenges from opposing parties in contentious health debates. Such a strategy would

expand upon current standards of press releases and publishing a general report of the scientific evidence in an academic journal.

Viewed as the authority responsible for the 2009 USPSTF mammography guidelines and the state HPV vaccine requirements, the government represents a distinct side in these controversial health debates that individuals, organizations, and other interest groups challenge. News articles predominantly cited cancer survivors and their families, physicians/providers, other political actors, medical professional organizations, religious organizations, and non-profit organizations as the sources directly challenging the government (i.e. USPSTF and state governments).^{8, 22, 29} Proactively building consensus with opponents prior to releasing policy recommendations and limiting public conflict that can be exploited in the media, government entities may minimize public confusion and encourage greater compliance with health policies.

We analyzed the types of sources authoring opinion pieces in newspapers because opinion pieces, by convention, include more direct expression of views and sentiments than news articles. When individuals write these commentaries, opinion pieces additionally provide the opportunity to express individual political attitudes. Authorship of newspaper opinion pieces reflects an endorsement from the media of a source as an expert or an influential voice on certain health issues. The public takes cues from these elite sources signaled in the media to form their opinions on issues.¹⁰ Identifying the sources that newspapers select to author their opinion pieces on controversial health policies indicates potential strategic collaborators that government health agencies and governments can work with to frame the discussion around health guidelines and requirements. On the 2009 USPSTF mammography guidelines, physicians/health providers were well represented among the authors of opinion pieces from conservative-leaning and liberal-leaning newspapers. On the state HPV vaccination mandates, private citizens more frequently

authored opinion pieces from both conservative-leaning and liberal-leaning newspapers after staff writers/editorial boards. Sources that frequently authored opinion pieces in conservative-leaning and liberal-leaning newspapers potentially have broad appeal and influence across the political aisles.

While conservatively and liberally slanted newspapers published some common authors they both deemed as credible, overall, conservative-leaning and liberal-leaning newspapers differed in the frequency with which they published opinion pieces from some sources compared to others. Breast cancer survivors authored more than a quarter of opinion pieces published in liberal-leaning newspapers and none of the opinion pieces from conservative-leaning newspapers. Working alongside potentially influential sources, like breast cancer survivors, that differentially appeal to audiences with diverging political ideologies could assist in defining messages about public health guidelines and requirements that resonate with multiple segments of the population.

Staff writers/editorial boards frequently authored opinion pieces in conservative-leaning and liberal-leaning newspapers. The large representation of internal authors (i.e. staff writers/editorial boards) writing opinion pieces on health controversies emphasizes the importance of political slant as authors of opinion pieces reflect the journalistic orientations of a media outlet.²⁵ While there may be less opportunity to alter journalistic practices and norms for reporting in news articles or editorializing on prominent issues, public health officials, policymakers, and other interested parties can more actively pursue opportunities to author opinion pieces to convey messages about health policy recommendations. Opinion pieces offer unique opportunities to set a tone and shape public discourse.

This study has some limitations. No causal attributions can be derived from this content analysis. While the methods employed in this analysis can be broadly applied to other evaluations of political bias in health news coverage, our results related to the 2009 USPSTF mammography guidelines and HPV vaccination mandates may not be generalizable to all public health controversies. Contextual circumstances surrounding the specific health debate may have meaningful effects. Gentzkow and Shapiro's newspaper index for political slant was developed using the 2005 Congressional Record to assign political leaning to the newspapers. The media is a dynamic institution that is constantly evolving such that the political leanings for newspapers as they were in 2005 may have shifted by the time some of the articles analyzed in this study were published.

Additional research is needed to determine the effects of politically biased news coverage. The media can influence the outcome of elections, set agendas and priorities for public officials, and impact health policy decisions. Media effects on opinions and behaviors could meaningfully impact future directions in health policy. Newspapers have a critical role in educating the electorate.³⁴ Ideologically biased news may undermine public confidence in the government, political leaders, and public health agencies responsible for health guidelines and requirements. Fewer than 1 in 4 physicians (23%) report trusting the USPSTF guidelines for mammography.³⁵ In the present environment of deep political divisions in the U.S., conflict-based news coverage emphasizing competing views has become the norm; this conflict framework in the media has been shown to increase public cynicism towards political actors, government, and medicine.^{7, 8} Trust in American institutions has been declining over time.³⁶ One of the many factors thought to contribute to the decline in government trust is the documented negative presentation of politics and government in the media.^{5, 6, 7} Media studies illuminate that

the Watergate scandal and the Vietnam crisis inspired a movement towards investigative journalism catalyzing a major institutional shift: the media's adoption of a noticeable antagonistic attitude towards the government.^{6, 7, 37} How political slant might interact with the adversarial role of the media towards government to exacerbate distrust in government as an institution and any policy recommendations it sets is not known. The information and political attitudes presented in the news media about health policy could have important effects on public support for expanding the role of government in health.

Political media bias could also possibly influence willingness to engage in specific health behaviors. Nationally representative surveys from 2014 and more recently in 2016 revealed that physicians have largely continued to recommend mammography to women 40 years and older.^{35,}
³⁸ Studies on the clinical impact after the 2009 USPSTF breast cancer screening guidelines demonstrate mixed results; some reveal low adoption of new recommendations for mammography utilization while others suggest trends in mammography use have shifted since 2009.³⁹⁻⁴⁴ Similarly, research has demonstrated that HPV vaccination rates have remained mostly static over time,⁴⁵ but currently, the contribution of political bias in news media coverage to trends in clinical utilization and outcomes is unknown.

Politics influence the interpretation of scientific evidence that public health agencies and governments use to guide health policymaking.⁴⁶ The mere delivery of evidence-based policies to the public will not ensure support for or compliance with health policy recommendations. The evidence does not speak for itself but rather it is interpreted and employed to sway the policymaking process in one direction or another. With greater knowledge of political media bias in news coverage of controversial public health recommendations, policymakers and government

health agencies will be better equipped to preemptively engage with the media and influence the evolution of health debates instead of reacting to established frames on the issues in the press.

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Chapter II

The Impact of Breast Density Notification Laws on the Use of Supplemental Breast Imaging

INTRODUCTION

Breast density refers to the mammographic appearance of the breast and is affected by the amount of specific types of tissue and fat in the breast.¹ Higher breast density is associated with increased risk for developing breast cancer.^{2,3} More than 40% of women 40-74 years of age have dense breast tissue (classified as either heterogeneously dense or extremely dense on mammography), which is particularly frequent among younger women.^{4,5} Among women with dense breast tissue, mammography, the primary method of breast cancer screening, has lower sensitivity for detecting breast cancer.⁶

Because dense breasts have implications for both breast cancer risk and the accuracy of mammograms, some patient advocates have called for increased awareness of breast density. Breast density notification laws mandate that providers (ordering physicians or radiologists) and/or mammography facilities notify women about their breast density. In 2009, Connecticut became the first state in the U.S. to enact a breast density notification law.⁷ As of January 1, 2016, 23 other states had passed similar laws.^{8,9} However, the content of breast density notifications vary across states. A content analysis of these 24 states' breast density notification laws revealed that all of the laws require notification that mammography is less sensitive in women with dense breast tissue, and most (19) also require a statement that breast density is associated with an increased risk of cancer.⁹ Many of the laws (14) also require a statement that additional imaging may be considered to supplement mammography for dense breasts, while laws in only two states, Connecticut and Rhode Island, specifically mention considering additional screening modalities like breast ultrasound and magnetic resonance imaging (MRI).⁹

¹⁰ The laws in Connecticut⁷ and New Jersey¹¹ also require that private health insurers cover the costs of supplemental breast ultrasounds.

While supplemental breast imaging has been suggested to be more effective at detecting breast cancer in women with dense breast tissue, the value of these additional screening procedures is uncertain. There is no evidence to suggest that supplemental screening improves clinical outcomes. Current guidelines from the United States Preventive Services Task Force (USPSTF) state that there is insufficient evidence on supplemental breast cancer screening to fully endorse it as a standard in preventive care.¹² Some evidence suggests that breast ultrasounds for women with dense breast tissue identified on a mammogram may increase early detection rates for breast cancer, but these ultrasounds also may lead to unnecessary biopsies for women without cancer.^{13, 14} Sprague and colleagues determined that for women with dense breast tissue and otherwise average risk, supplemental breast ultrasound screening was not cost-effective because these procedures produced limited health benefits while greatly increasing expenditures.¹⁵ The effects of supplemental screening on breast cancer mortality for women with dense breast tissue is also not known.¹⁶

Few studies evaluated the impact of breast density notification laws on utilization of supplemental breast imaging. Existing studies have focused on Connecticut, the state whose breast density notification law has been in place the longest.¹⁷⁻¹⁹ In women with dense breast tissue, two studies found that supplemental breast ultrasound following mammography had an additional diagnostic yield of about 3.2 cancers per 1000 women in the first year after the law.^{17, 18} One study reported that 30% of women in Connecticut with dense breast tissue received breast ultrasound in the first year after the notification law and that among women with dense breasts, when breast ultrasound was combined with mammography over that year, the rate of cancer detection improved compared with when only a mammogram was performed.¹⁸ Another study observed an increase in the number of breast ultrasounds following a mammogram in the year

after the Connecticut law was passed compared with the year before the law.¹⁹ Mason et al. analyzed use of breast MRI exams at a single medical center in Dallas a year before and two years after Texas enacted its breast density notification law. They reported a 23-fold increase in the number of breast MRIs performed for the evaluation of dense breasts after the law.²⁰ These studies assessed one form of supplemental screening in a single state without including any control populations who were not subjected to a breast density notification law.

In this analysis, we used a difference-in-differences design to investigate the impact of breast density notification laws on utilization of supplemental breast imaging across the U.S. from 2009 to 2013. We compared use of supplemental breast imaging in states that enacted laws to use of supplemental imaging in matched control states that did not have breast density notification laws. We hypothesized that states with breast density notification laws would experience larger increases in the use of supplemental breast imaging than states without those laws.

DATA AND METHODS

We used the Thomson Reuters' MarketScan[®] database from 2008-2014. The MarketScan database includes claims data for health care services collected from approximately 100 insurance companies, Blue Cross Blue Shield plans, and third party administrators who provide insurance to employees and dependents of large employers.

Breast density notification states and matched controls

We assessed the use of supplemental breast imaging 6 months before and up to a year after each state breast density notification law was effective. Since the most recent year of

MarketScan data available was 2014, we studied states that passed laws from 2009 through 2013. From 2009 to 2013, seven states passed breast density notification laws: Connecticut, Texas, Virginia, California, Alabama, Maryland, and New York (Table 2.1). For each state with legislation, we identified a neighboring control state that did not pass a breast density notification law during the study period (2009-2013). We used U.S. Census data to match that passed breast density notification states and control states by similar median income and population characteristics (i.e., median household income, proportion living below the federal poverty level, proportion with at least a high school education, proportion of residents who are white, and proportion of residents who are black). Baseline mammography rates for women ages 40-64, based on data from the Behavioral Risk Factor Surveillance Survey in 2010 were also included in our matching criteria. The year of the U.S. Census data we used for state matching corresponded to the year in which the breast density notification law was effective. The breast density notification states, control states, and the content of each state's notification law are listed in Table 2.1. Characteristics of the breast density notification states and their matched controls are available in Appendix II.

Study population

We identified women within the MarketScan database who lived in a state with breast density legislation or a control state, were aged 40-64 years, and had a mammogram during any of 3 distinct time periods: 1) 6 months before a notification law went into effect (i.e. 6 months before law) or similar period for control states, 2) 6 months after a notification law went into effect (i.e. 0-6 months after law) or similar period for control states, and 3) between

Table 2.1 Breast density notification states, control states, and content of breast density notification laws by state, 2009-2013

Breast Density Notification States	Date Law Effective	Control States	Content of Breast Density Notification Laws				
			Decreased mammography sensitivity^a	Increased Risk of Cancer^b	Supplemental screening^c	Breast ultrasound and MRI^d	Mandatory Insurance Coverage^e
Connecticut	10/1/2009	New Hampshire	+		+	+	+
Texas	9/1/2011	Oklahoma	+		+		
Virginia	6/1/2012	DC	+	+	+		
New York	1/19/2013	Vermont	+	+	+		
California	4/1/2013	Washington	+	+			
Alabama	8/1/2013	Mississippi	+	+	+		
Maryland	10/1/2013	Delaware	+	+			

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NOTES: Notification law requires: ^a mammography has a decreased sensitivity to detect breast cancer in women with dense breast tissue, ^b information about how breast density increases risk for breast cancer, ^c mention of the possibility of supplemental screening, ^d specific mention of breast ultrasound and MRI as supplemental breast imaging tests, ^e law includes mandatory insurance coverage for supplemental breast ultrasounds. Generic notifications (regardless of breast density) are provided to all women in CT, TX, and MD. All others could have different text depending on breast density.

6 and 12 months after a notification law went into effect (i.e. 6-12 months after law) or similar period for control states. We also required women to be enrolled in an insurance plan as of 6 months before the breast density notification law in their state became effective or the similar time period for women in control states to be sure that there was no mammogram in the 6 months before an index mammogram.

Measures

Identification of index mammograms

We identified index mammograms in the 3 time periods of interest using designated Current Procedural Terminology (CPT) codes (Appendix III). Specifically, we identified 2-dimensional mammograms or breast tomosynthesis (3-dimensional mammograms) for women who had no mammogram in the prior 6 months. We included codes for both screening and diagnostic mammograms because a) standardized reporting systems include both in their measures, b) women receiving either are considered to be screened for breast cancer for the following 1 to 2 years, and c) procedure codes may not always indicate the original purpose of the mammogram.²¹ More recent procedure codes distinguish between screening versus diagnostic tomosynthesis, but they were not in use during our study period. We included both 2-dimensional mammograms and tomosynthesis as index mammograms due to the increased use of tomosynthesis for initial breast cancer screening in recent years.²²

Identification of supplemental breast cancer screening procedures

We used CPT codes to identify five additional forms of breast imaging used for supplemental breast cancer screening in women with dense breast tissue: breast ultrasound,^{24, 25, 26} MRI,^{22, 23} tomosynthesis,^{27, 28, 29} scintimammography,³⁰ and thermography^{31, 32} (Appendix III). Only breast imaging procedures that a woman received within 180 days following an initial mammogram were considered to be supplemental imaging procedures and included in our analysis. We examined supplemental imaging within 180 days because prior evidence suggests that the mean time between mammography and a supplemental breast ultrasound examination was approximately 60 days¹⁷ and most previous studies of the effects of breast density legislation examined the utilization of additional screenings within the first several months after legislation was implemented.^{18, 19, 20, 33}

We were primarily interested in assessing the use of supplemental breast imaging before and after breast density notification laws. Our primary outcomes included binary measures indicating receipt of a supplemental breast imaging test. Five separate binary outcome variables were created to represent each breast cancer screening modality: breast ultrasound, breast MRI, tomosynthesis, scintimammography, and thermography. We also created a binary outcome variable for a composite measure representing all forms of additional breast imaging; this composite variable indicated receipt of at least one supplemental screening procedure.

The independent variables of interest were whether a state had enacted a breast cancer notification law, the time period of a woman's index mammogram (i.e., 6 months before law, 0-6 months after law, or 6-12 months after law) and the interaction of law by time period. Covariates included age at the time of the index mammogram, U.S. region where health services were received (Northeast, South, West; no legislation or control states were in the Midwest), the

relationship of the enrollee to the primary health insurance beneficiary (employee, spouse, child/other), and the type of health plan (preferred provider organization, health maintenance organization, point of service plan, consumer-driven/high-deductible plan, or comprehensive plan).

Statistical Analyses

We performed difference-in-differences analyses using logistic regression models with the following general structure:

$$Y = \beta_0 + \beta_1[\text{law}] + \beta_2[\text{time}_{0-6\text{mos}}] + \beta_3[\text{time}_{6-12\text{mos}}] + \beta_4[\text{law}*\text{time}_{0-6\text{mos}}] + \beta_5[\text{law}*\text{time}_{6-12\text{mos}}] + \beta_6[\text{age}] + \beta_7[\text{region}] + \beta_8[\text{emprel}] + \beta_9[\text{plantyp}] + \varepsilon$$

The dependent variable (Y) represents the binary outcome measure for having a supplemental breast imaging test. Law is a binary indicator for whether a state had enacted a breast cancer notification law. Time₀₋₆ denotes the time period 0-6 months after a breast density notification law was effective, and time₆₋₁₂ represents the 6-12 months after a breast density notification law was effective. Age, region, employee relationship, and plan type reflect control variables as described above.

The coefficients of interest include β_1 , reflecting the effect of living in states that passed breast density notification laws compared with control states, β_2 , the effect of having an index mammogram in the 6 months after a breast density notification law was effective compared to the 6 months before the law was implemented, and β_3 , the effect of having an index mammogram in the 6-12 months after a breast density notification law was effective compared to

the 6 months before the law was implemented. The primary coefficients of interest are β_4 , and β_5 reflecting the effect of the interaction terms (i.e. difference-in-differences) estimating the difference in changes to supplemental breast imaging use over time between states that passed breast density notification laws and control states during the two 6 months periods after a breast density notification law was effective compared with the 6 months before the law was implemented.

All logistic regressions were conducted using generalized linear models (GLMs).³⁴ We calculated adjusted probabilities of supplemental testing for patients in states with breast density legislation and in control states at the various time periods, adjusted for all other covariates, by direct standardization under the regression models.³⁵ In this standardization procedure, the mean of predicted probabilities is generated by the model for each observation, allowing other covariates to retain values from the original data.

Supplemental imaging for women with dense breasts may not be covered by insurance companies particularly in states that do not mandate coverage of supplemental screening. Lack of insurance coverage would limit our ability to ascertain use of supplemental imaging procedures in insurance claims. Therefore, we conducted additional analyses after stratifying the cohort to include women living in Connecticut and New Hampshire (the control state for Connecticut) versus all other states because the Connecticut law also mandated that private health insurance cover breast ultrasounds for women with dense breast tissue.

Sensitivity Analyses

Tomosynthesis is utilized increasingly for both breast cancer screening³⁶ and as a supplemental breast imaging test for women with dense breast tissue.^{8, 28, 37} In primary analyses, we considered

only tomosynthesis that women received on a different service date after an index mammogram as a supplemental breast imaging procedure. A very large number of women had billing codes for both 2-dimensional mammography and tomosynthesis on the same service date. This may be because some facilities billed for tomosynthesis in 2 parts, since a two-dimensional mammogram is part of the tomosynthesis procedure. Because we could not be sure if any of these tomosynthesis claims actually reflected supplemental screening completed as a follow-up to dense breast tissue discovered on a two-dimensional mammogram, we conducted a sensitivity analysis where we considered all of these tomosynthesis claims with the same date of service as a 2-dimensional mammogram to reflect supplemental screening procedures.

Analyses were performed with SAS statistical software, version 9.2 (SAS Institute, Inc., Cary, NC). The study protocol was exempt by the Harvard Medical School Institutional Review Board.

RESULTS

Study Population Characteristics

Characteristics of the study population in the six months preceding legislation for women in states with breast density laws and control states are included in Table 2.2. More women had an index mammogram in states that passed breast density notification laws (n= 617,693) than in matched control states (n = 95,900), consistent with the larger populations in states with laws compared with control states. Similar proportions of women across age groups received index mammograms in both states with breast density notification laws and control states. Most women in both breast notification states (61%) and control states (64%) that received index mammograms had preferred provider organization (PPO) health insurance plans.

Table 2.2 Characteristics of women receiving index mammograms six months prior to breast density notification law

Patient Characteristics	Breast Density Notification States		Control States	
	n=	617,693	95,900	
	No.	%	No.	%
Age range (years)				
40-44	105,137	17.0	15,376	16.0
44-49	123,933	20.1	18,489	19.3
50-54	140,624	22.8	22,187	23.1
55-59	133,151	21.6	21,678	22.6
60-64	114,848	18.6	18,170	19.0
Region				
Northeast	140,231	22.7	7,312	7.6
Midwest	--	--	--	--
South	237,448	38.4	53,108	55.4
West	240,014	38.9	35,480	37.0
Type of Health Plan				
Preferred provider organization	360,687	61.3	60,472	64.4
Exclusive Provider Organization or Health Maintenance Organization	142,321	24.2	7,729	8.1
Point-of-service plan	41,413	7.0	19,375	20.2
Consumer-driven or high-deductible health plan	36,740	6.2	4,805	5.0
Comprehensive	7,020	1.2	1,491	1.6
Relation to Employee				
Employee	373,594	60.5	63,549	66.3
Spouse	243,719	39.5	32,306	33.7
Child/Other	380	0.1	45	0.1

NOTES: Point-of-service (POS) includes non-capitated POS and POS w/ capitation. None of the states that passed breast density notification laws that went into effect from 2009-2013 and none of the control states were located in the Midwest region.

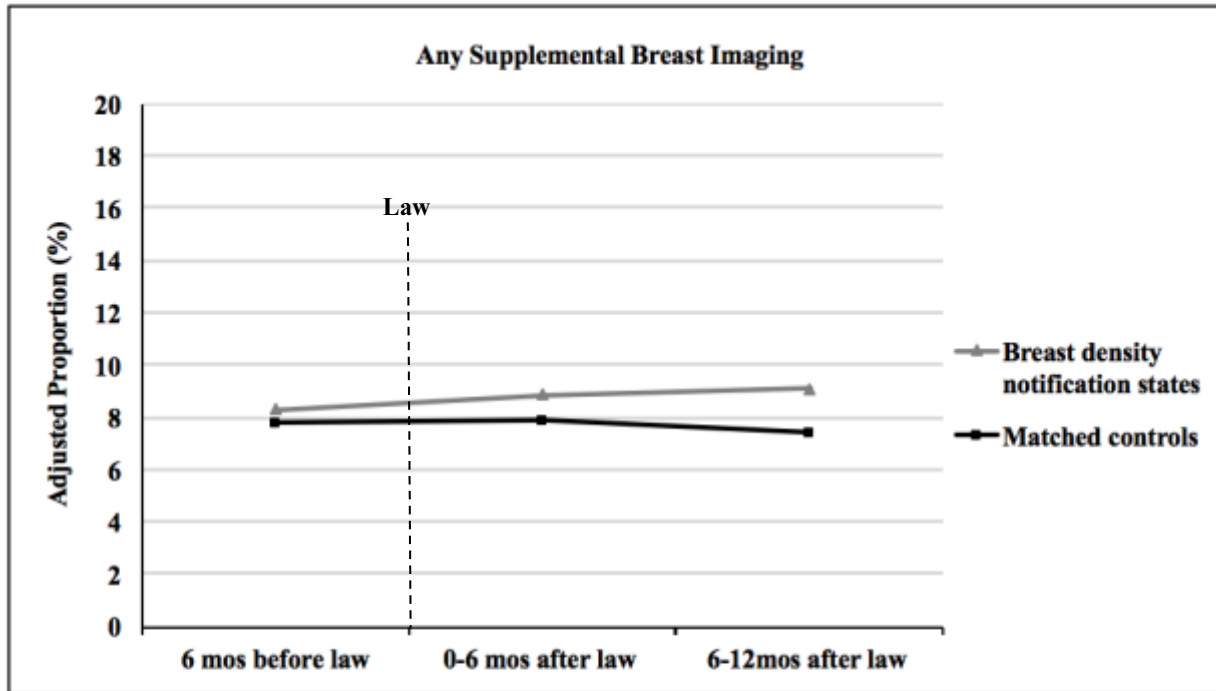
SOURCE: Authors' analysis of data for 2008–2014 from the Truven Health MarketScan Commercial Claims and Encounters database.

More than 60% of women in states with notification laws and states without notification laws were the direct employees provided insurance coverage as opposed to enrolled spouses or dependents.

Supplemental breast imaging

Figure 2.1 presents changes in the adjusted proportion of women with supplemental breast imaging following index mammograms over time in states that passed breast density notification laws versus control states. In the 6 months before breast density laws were effective, the adjusted proportion of women with at least one supplemental breast imaging procedure was slightly higher in breast density notification states than in control states (8.3% vs. 7.8%). In breast density notification states, the adjusted proportion of women receiving supplemental breast imaging increased in the first year after the law, with the largest increase observed in the first 6 months after the law went into effect (8.9% 0-6 months after the law, 9.1% 6-12 months after the law). In control states, there was an overall drop in the adjusted proportion of women with additional breast imaging over time (7.9% 0-6 months after the law, 7.4% 6-12 months after the law). Compared with the 6 months before the law, the proportion of women with supplemental imaging between breast density notification states and control states differed both in the 6 months immediately following the laws (difference-in-differences estimate 0.5%, $P=0.002$) and in the 6-12 months after the laws (difference-in-differences estimate compared with pre-law 1.2%, $p<0.001$). These proportional differences indicate significant differences in trends of supplemental breast imaging use over time in breast notification states versus control states.

Figure 2.1 Adjusted proportion of women with a supplemental breast imaging after an index mammogram before and after breast density notification laws, 2009-2013



Adjusted proportion with any supplemental breast cancer screening procedure pre-post notification law

Time Period	Breast density notification states (%)	Control States (%)	P value for interaction of law*time period
6 mos before law	8.3	7.8	reference
0- 6 mos after law	8.9	7.9	0.002
6-12 mos after law	9.1	7.4	< 0.001

SOURCE: Authors' analysis of data for 2008–2013 from the Truven Health MarketScan Commercial Claims and Encounters database.

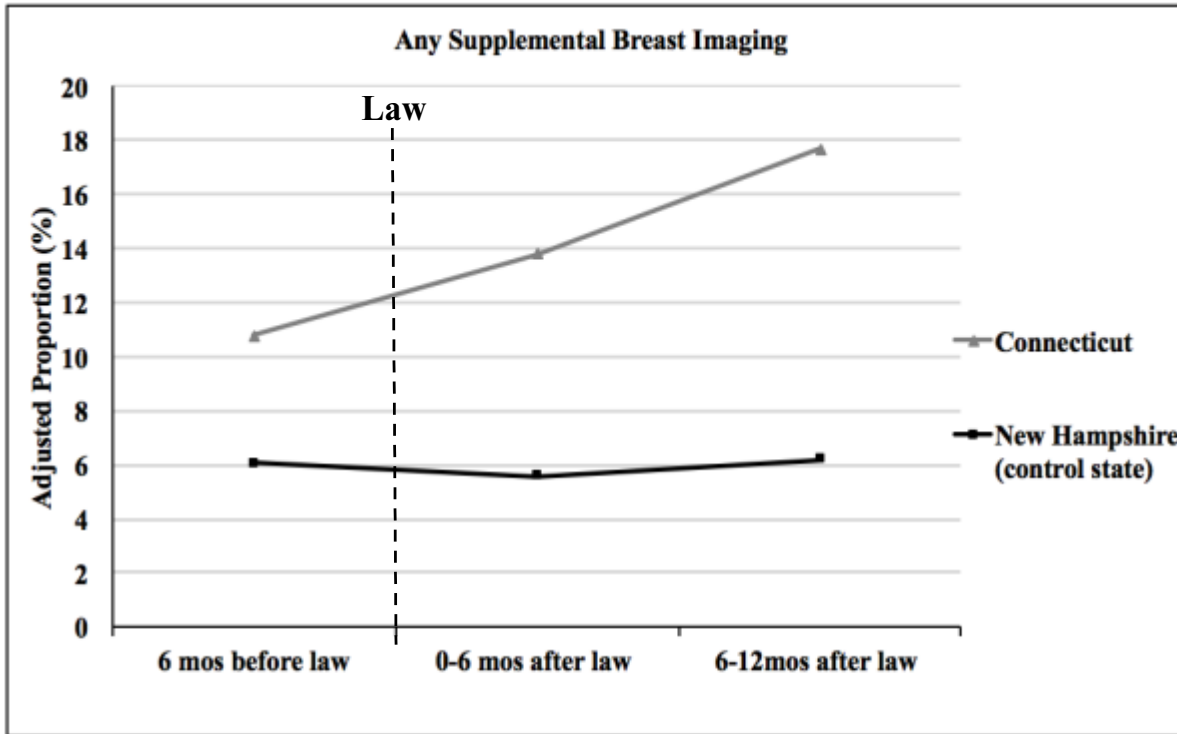
Stratified analysis based on mandated insurance coverage of supplemental breast imaging

As noted above, the Connecticut law required private health insurers to cover supplemental ultrasounds for women identified to have dense breasts. We conducted stratified analyses to assess if the effect of the legislation differed for women in Connecticut versus other states where such coverage is not mandated. Specifically, we repeated analyses stratified by: 1) Connecticut versus New Hampshire (control state) and 2) all other legislation states (Texas, Virginia, California, Alabama, Maryland, and New York) versus control states (Oklahoma, District of Columbia, Washington, Mississippi, Delaware, and Vermont).

As shown in Figure 2.2, in Connecticut, the adjusted proportion of women receiving supplemental breast imaging increased in the first year after the law, and the magnitude of this increase was greatest between the time periods of the first 6 months after the law went into effect and the 6-12 months after the law (Figure 2.2, Panel A). Overall, the adjusted proportion of women in New Hampshire with additional breast imaging remained about the same prior to the laws and up to a year (12 months) after the laws. There was a significant difference between the 2 states in the changes in the proportion of women with supplemental imaging during the 6 months before the laws compared to the 6 months immediately following the laws (adjusted difference-in-differences 3.5%, $P < 0.001$) and the 6-12 months after the laws (adjusted difference-in-differences 6.8%, $P < 0.001$). These proportional differences indicate significant differences in trends of supplemental breast imaging use over time in the 2 states.

In the other states that passed breast density notification laws without mandatory insurance coverage, there was a much smaller overall increase in the adjusted proportion of women with supplemental breast imaging over time (Figure 2.2, Panel B). However, a slight decrease in the adjusted proportion of women with supplemental breast imaging occurred

Figure 2.2 Adjusted proportion of women with a supplemental breast cancer screening procedure after an index mammogram before and after breast density notification laws, 2009-2013, stratified by presence of mandate requiring ultrasound coverage



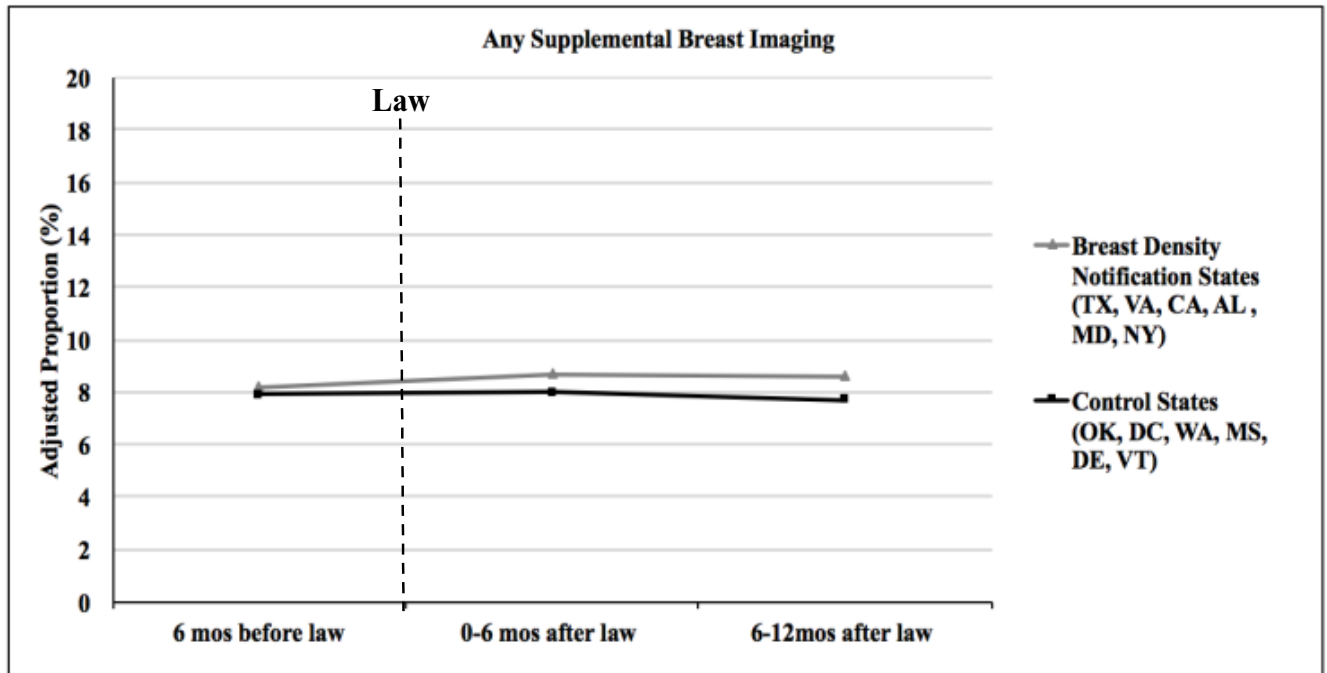
PANEL A:

Adjusted proportion with any supplemental breast cancer screening procedure pre-post notification law

Time Period	Connecticut (%)	New Hampshire (Control state) (%)	P value for interaction of law*time period
6 mos before law	10.8	6.1	reference
0- 6 mos after law	13.8	5.6	< 0.001
6-12 mos after law	17.7	6.2	< 0.001

SOURCE: Authors' analysis of data for 2008–2013 from the Truven Health MarketScan Commercial Claims and Encounters database.

Figure 2.2 (Continued) Adjusted proportion of women with a supplemental breast cancer screening procedure after an index mammogram before and after breast density notification laws, 2009-2013, stratified by presence of mandate requiring ultrasound coverage



PANEL B:

Adjusted proportion with any supplemental breast cancer screening procedure pre-post notification law

Time Period	Breast Density Notification States (TX, VA, CA, AL, MD, NY) (%)	Control States (OK, DC, WA, MS, DE, VT) (%)	P value for interaction of law*time period
6 mos before law	8.2	7.9	reference
0- 6 mos after law	8.7	8.0	0.01
6-12 mos after law	8.6	7.7	< 0.001

SOURCE: Authors' analysis of data for 2008–2013 from the Truven Health MarketScan Commercial Claims and Encounters database.

between time periods of 6 months after the law and 6-12 months after the law. Trends in the adjusted proportions over time in control states were similar to earlier findings where an overall drop in the adjusted proportion of women with additional breast imaging was observed over time. For control states, the adjusted proportion of women with additional breast imaging remained about the same from the 6 months preceding the laws to the 6 months immediately following the breast density notification laws but then slightly declined in the 6-12 months after the law. Compared with the 6 months before the law, the proportion of women with supplemental imaging between states that passed breast density notification laws without mandatory insurance coverage and control states differed both in the 6 months immediately following the law (adjusted difference-in-differences 0.4%, $P=0.01$) and in the 6-12 months after the laws (adjusted difference-in-differences 0.6%, $P<0.001$).

Effects of breast density notification laws on specific types of supplemental breast imaging

Table 2.3 shows the adjusted difference-in-differences estimates for receipt of any supplemental breast imaging and specific tests. The most frequently used form of supplemental breast imaging was breast ultrasound, which comprised the vast majority of tests (Table 2.3), and the difference-in-differences estimates were quite similar to those for the composite measure of any supplemental imaging. Many fewer women underwent supplemental tomosynthesis, breast MRI, or other testing (i.e. scintimammography and thermography); as such, there were minimal differences in use of these procedures following breast density legislation.

Table 2.3 Adjusted proportion of women with a supplemental breast imaging after an index mammogram before and after breast density notification laws, overall and by type of supplemental testing, 2009-2013

	Breast Density Notification States						Difference in Differences			
	Breast Density Notification States			Control States			0-6 mos after law vs. 6 mos before		6-12 mos after law vs. 6 mos before	
	6 mos before law (%)	0-6 mos after law (%)	6-12mos after law (%)	6 mos before law (%)	0-6 mos after law (%)	6-12mos after law (%)	(%)	p-value	(%)	p-value
Supplemental breast imaging										
Any supplemental breast imaging	8.4	8.9	9.0	7.9	8.0	7.6	0.4	0.002	1.0	< 0.001
Ultrasound	7.3	7.8	8.0	6.9	7.1	6.6	0.3	0.02	1.0	< 0.001
Tomosynthesis	0.8	1.0	0.9	0.8	0.8	0.9	0.23	0.49	0.03	0.92
Magnetic Resonance Imaging (MRI)	0.9	0.9	0.9	1.0	0.9	0.9	0.2	< 0.001	0.1	0.11
Other (Scintimammography, Thermography)	2.3	2.3	2.5	2.0	2.0	2.4	-0.03	0.82	-0.22	0.11

NOTES: Table 2.3 includes only tomosynthesis within 180 days following the index mammogram service date as supplemental breast imaging. Composite includes breast ultrasound, tomosynthesis, MRI, scintimammography, and thermography.

SOURCE: Authors’ analysis of data for 2008–2013 from the Truven Health MarketScan Commercial Claims and Encounters database.

Sensitivity analysis

In primary analyses, we only considered tomosynthesis that a woman received on a day following an index 2-dimensional mammogram as a supplemental test. In a sensitivity analysis, we considered tomosynthesis that women received on the same service date as an index 2-dimensional mammogram in addition to tomosynthesis that women received on a different service date after an index mammogram as supplemental breast imaging procedures. The difference-in-differences analysis assessing receipt of any supplemental breast imaging was similar to the primary analysis, although the increase in supplemental imaging was larger. Specifically, we estimated that compared with the 6 months before a breast density notification law was effective, 1.4% more women received any supplemental breast imaging in breast density notification states than in control states during the 6 months immediately following the date the law went into effect (Table 2.4) and compared with the 6 months before a breast density notification law was effective, 2.0% more women received any supplemental breast imaging in breast density notification states than in control states during the 6-12 months after the date the law went into effect.

DISCUSSION

We assessed the trends in the use of supplemental breast imaging over time in states that passed breast density notification laws compared with control states without notification laws to evaluate whether these laws were associated with increases in the utilization of supplemental breast imaging. We observed higher adjusted proportions of women receiving supplemental breast imaging in states with breast density notification laws compared with control states during all time periods examined following implementation of the laws. We also observed

Table 2.4 Adjusted proportion of women with a supplemental breast imaging after an index mammogram before and after breast density notification laws, 2009-2013: Sensitivity analysis considering tomosynthesis performed on same day as index mammogram as supplemental imaging

							Difference in Differences			
	Breast Density Notification States			Control States			0-6 mos after law vs. 6 mos before		6-12 mos after law vs. 6 mos before	
	6 mos before law (%)	0-6 mos after law (%)	6-12mos after law (%)	6 mos before law (%)	0-6 mos after law (%)	6-12mos after law (%)	(%)	p-value	(%)	p-value
Supplemental breast imaging										
Any supplemental breast imaging	9.1	10.9	11.6	9.7	10.1	10.3	1.4	< 0.001	2.0	< 0.001
Ultrasound	7.3	7.8	8.0	6.9	7.1	6.6	0.3	0.02	1.0	< 0.001
Tomosynthesis	2.9	4.5	5.0	3.9	4.3	5.0	1.2	< 0.001	1.1	< 0.001
Magnetic Resonance Imaging (MRI)	0.9	0.9	0.9	1.0	0.9	0.9	0.2	< 0.001	0.1	0.11
Other (Scintimammography, Thermography)	2.3	2.3	2.5	2.0	2.0	2.4	-0.03	0.82	-0.22	0.11

NOTES: Table 2.4 includes tomosynthesis on the same service date as an index 2D mammogram as supplemental breast imaging. Composite includes breast ultrasound, tomosynthesis, MRI, scintimammography, and thermography.

SOURCE: Authors' analysis of data for 2008–2013 from the Truven Health MarketScan Commercial Claims and Encounters database.

statistically different trends between notification states and control states indicating that breast density notification was associated with greater increases in the utilization of supplemental breast imaging over time compared with control states. Although the estimated effect sizes were small, with approximately 39 million³⁸ women having mammograms every year in the U.S., increases of 0.4% within 6 months and 1.0% at 6-12 months would translate to about 156,000 additional women having supplemental imaging if such notification laws were adopted by all states. In 2015, federal legislation to require breast density notification, the Breast Density and Mammography Reporting Act, was introduced in Congress but has yet to be passed into law.³⁹ These findings expand on results from smaller, single-state studies demonstrating that breast density notification laws were associated with increases in the use of supplemental breast imaging. However, using a differences-in-differences study design, we additionally illuminated differential trends in utilization of supplemental breast imaging between breast density notification states and control states. Our study design also permits measuring changes in utilization in multiple states as opposed to the within state design of prior studies.

When compared with women in control states, women in states with breast density notification laws were consistently more likely to receive supplemental breast imaging in the 6-12 months following a law than in the first 6 months after a law. The larger estimated effect of breast density notification laws in the time period 6-12 months after the law suggests that the increase in supplemental breast imaging occurred gradually and may increase further. This observed increase of supplemental breast imaging over time could be related to a rising awareness among both patients and providers of: 1) the notification law, 2) breast cancer risk associated with breast density, and/or 3) subsequent options for breast cancer imaging. Notification law advocates believe these laws increase awareness about the lower efficacy of

mammograms for women with dense breast tissue. In a national survey, conducted in 2012, Connecticut residents were substantially more likely than residents in other states without similar notification laws to have knowledge about how breast density can decrease cancer detection.⁴⁰

While prior studies on the effects of breast density notification laws evaluated a single breast imaging test as supplemental breast cancer screening, we assessed five different modalities that are used in clinical practice.²⁹ Our results showed that ultrasounds have been the predominant form of supplemental imaging, with many fewer women undergoing tomosynthesis, breast MRI, or other imaging procedures. Evidence suggests that breast ultrasounds may produce limited health gains for women while greatly increasing costs in the healthcare system.¹³ Further research is needed to determine the reasons underlying choice of supplemental imaging among providers in breast density notification states.

Connecticut was the only state evaluated with a breast density notification law that included an insurance coverage mandate for supplemental screening procedures, breast ultrasound in this case. The adjusted proportions for women receiving supplemental breast imaging were greater for Connecticut than other states with breast density notification laws without an insurance mandate. The higher adjusted proportions of women receiving supplemental breast imaging in Connecticut and larger difference between the trends of supplemental breast imaging use over time in Connecticut versus New Hampshire (control) may suggest that the impact of breast density notification laws on the use of supplemental breast imaging is amplified when coupled with mandatory insurance coverage. Insurance plays a key role in access to preventive health care services,⁴¹ and supplemental breast imaging tests can result in additional costs for patients.

We identified a large number of women who had claims for both 2-dimensional mammograms and tomosynthesis on the same service date. Breast tomosynthesis is a relatively new breast screening procedure whose popularity and integration into clinical care is growing.⁴² Furthermore, prior research indicates that tomosynthesis combined with digital mammography might be more cost-effective than other forms of supplemental imaging for breast cancer screening.³⁷ Sensitivity analyses demonstrated that our focus on tomosynthesis performed at least one day following 2-dimensional mammography did not explain the effects we observed; in fact, when tomosynthesis on the same day as an index 2-dimensional mammogram was considered a supplemental test, the observed effect of breast density legislation on rates of supplemental imaging was larger.

The results of this study must be interpreted in light of some limitations. First, our data source only included supplemental tests that were reimbursed by insurers and would not have captured imaging paid by women out of pocket. If some women paid out of pocket for supplemental imaging, our analysis would underestimate the legislation's effect. In addition, we were unable to confirm the delivery of letters to women notifying them of their mammography results, nor were we able to verify that women in our final cohort read their notification letters. Finally, we studied women aged 40-64 who were insured with employer-sponsored insurance plans; whether our findings are generalizable to older women or women with other types of health insurance requires further study.

In conclusion, we observed a modest increase in use of supplemental breast imaging following breast density notification legislation. As breast density notification laws are implemented or considered in additional states, policymakers and clinicians should be aware of the potential effects on care and the cost burden associated with these laws. More research is

needed to understand the effects of these laws on cancer outcomes, including stage at breast cancer diagnosis, potential overdiagnosis of breast cancer, and cancer-related mortality. Breast density notification has been lauded as an opportunity to strengthen the patient-provider relationship by encouraging conversation about breast cancer screening.⁴³ Some physicians lack awareness about breast density notification laws and also feel uncomfortable answering questions about breast density and its health implications,⁴⁴ making the generation of additional evidence on the effects of breast density notification laws timely and critical to health policy and patient care. Especially since providers reported an upsurge in inquiries about supplemental breast imaging after breast density notification laws were passed,¹⁰ up-to-date knowledge of the effects of breast density notification laws will assist in guiding patients that rely on physicians for health information. The national impact of breast density notification will require consideration as policies are instituted to promote value and improve the quality of breast cancer screening in the U.S. health care system.

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Chapter III

Disparities in Health Care: Understanding the Challenges of African Americans and Hispanics Living with Chronic Illness in Their Families

INTRODUCTION

While chronic conditions are the nation's leading causes of death and disability,¹ the chronic disease burden differentially impacts subgroups of the population. African Americans and Hispanics experience a disproportionate chronic disease burden, with higher rates of morbidity and mortality.^{2, 3} Comparative studies across races/ethnicities illuminate how an uneven distribution of chronic illness intensifies health disparities for minorities. These studies obscure variation in experiences with chronic illness that could exist within a racial/ethnic group. This analysis of two large nationally representative surveys of African Americans and Hispanics demonstrates the diversity in experiences within the same racial/ethnic population among those living with a personal chronic illness and/or that of a family member.

Multiple studies document the health disparities minorities face, including serious problems with the health care delivery system.⁴⁻⁶ Areas within the health care system where African Americans and Hispanics experience deleterious health inequalities include health insurance coverage,⁷⁻⁹ access,^{5, 10} and quality.^{6, 10} Socioeconomic, cultural, and environmental factors are also associated with racial/ethnic health disparities. These factors can create additional obstacles for minorities living with chronic conditions.¹¹⁻¹⁴

Socioeconomic (SES) disparities in education, employment, and income are linked with health disparities.¹⁵ Critical to the relationship between race/ethnicity and health,^{16, 17} SES is a main determinant of having health insurance and access to health care, which improve the effectiveness of chronic illness management.^{12, 13}

Culture influences patients' interpretation of their chronic conditions, affecting their approach to disease management.¹¹ Cultural differences between providers and patients can present challenges in communicating about symptoms, treatment, and daily care strategies.^{11, 18}

Health care delivery that appropriately accounts for a chronically ill patient's culture may reduce health disparities.¹⁹

Minority populations face a greater burden of illness due to environmental factors that can inhibit health, like housing, transportation, and neighborhood characteristics.¹⁴ Suboptimal physical and social environments serve as sources of stress and concern for African Americans and Hispanics. The chronically ill have previously reported that such stressors in multiple areas of life impede the management of chronic conditions, negatively affecting their overall health.²⁰

Inadequate attention has been dedicated to conveying the perspectives and experiences of minority populations that grapple with chronic illness in their families. A few studies involve qualitative focus groups/interviews in one geographic location, but none that we know of have been completed since the passage of national health reform legislation in 2010, known as the Affordable Care Act (ACA).¹¹⁻¹³ We address this gap in the literature through survey analyses of personal experiences of African Americans and Hispanics who reported a chronic illness as the biggest health problem in their families. This article addresses what problems within and beyond the health system may affect how these populations live with their own chronic conditions and/or those of others in their families. Do African Americans and Hispanics experience financial stress that impacts their ability to pay for the health care services needed to manage a chronic illness? Where do they receive most of their health care? What characteristics of the communities where they live (e.g. safety from crime) do they view as major issues?

We recognize the large role that income inequality could have in exacerbating challenges. Because poverty is related to many of the experiences we report, we attempt to present the differences within African-American and Hispanic groups in the aggregate and between low-income (earning less than \$25,000 in annual income) and higher-income (earning greater than

\$25,000 in annual income) groups by race/ethnicity. We evaluate the perspectives of African Americans and Hispanics living with chronic conditions in their families to provide a holistic view of their lives and where challenges arise for them that affect health.

DATA AND METHODS

Data sources

The data include surveys by the Harvard School of Public Health, the Robert Wood Johnson Foundation, and National Public Radio. Survey instruments were the appropriate research design to ascertain the self-reported, personal experiences of African Americans and Hispanics. For both surveys, the independent survey firm, SSRS, conducted telephone (landline and cell phone) interviews. The phone numbers were called using random-digit dialing to produce a randomly-selected, nationally-representative sample. Nearly all of the questions were closed-ended, minimizing the chance of inter-coder variation. Potential respondents were told the reason they were being called, that their household was selected randomly, and that their responses were confidential. It was clear verbally on the telephone that they did not have to participate in the interview. These criteria for consent meet the Harvard School of Public Health Institutional Review Board's standards.

Respondents self-identified their race/ethnicity, and we relied on these self-identifications. The first survey (https://cdn1.sph.harvard.edu/wp-content/uploads/sites/21/2013/06/AfrAmer_report_final_with_topleft.pdf) included a total of 1081 African Americans, age 18 and older, who were interviewed from January 10 – February 7, 2013, in English and Spanish. The sample for our analyses consists of 757 African Americans who indicated their personal chronic illness and/or that of a family member was the biggest

health problem for their families. The margin of error for our final sample is +/- 5.1 percentage points at the 95% confidence level.

The second survey (http://www.rwjf.org/content/dam/farm/reports/surveys_and_polls/2014/rwjf407545) included 1478 Hispanics, age 18 and older, who were interviewed from June 11 – July 14, 2013, in English and Spanish. The sample for our analyses consists of 697 Hispanics who indicated their personal chronic illness and/or that of a family member was the biggest health problem for their families. The margin of error for this group is +/- 5.4 percentage points at the 95% confidence level.

Both datasets are available from the archive of the Roper Center for Public Opinion Research.

Measures

In order to determine our final sample of African-American and Hispanic adults, we examined all respondents' verbatim responses to a particular survey measure:

What disease or health condition is the biggest problem for your family?

We excluded respondents not reporting a chronic illness, or anyone whose response included "Influenza," "None," "Other," and "Don't Know/Refused." The "Other" response category was excluded because many of its respondents did not indicate a particular disease making it an unreliable response category to indicate chronic illness.

Analysis

To compensate for known biases inherent to telephone surveys (i.e. non-response bias) and variation in probability of selection within and across households, the data in both surveys are weighted by household size, cell phone/landline use and demographics (sex, age, education, marital status and census region) to reflect the true population. Other techniques, including random-digit dialing, replicate subsamples, and systematic respondent selection within households, are used to ensure that the sample is representative. Our weighted analysis evaluated a range of demographic characteristics including age, gender, marital status, education, employment, income, and region of residence. The analysis relies on two-sided P-values of less than 0.05 to indicate statistical significance. When comparisons yielded P-values less than 0.025, this level of significance is indicated.

Ethics Review Committee Approval

The Institutional Review Board at the Harvard TH Chan School of Public Health ruled that this study was not human subjects research.

RESULTS

Top Health and Community Problems

For African Americans and Hispanics living with chronic illness in their families, the health issue mentioned most was diabetes. More than one in four African Americans (29%) and four in ten Hispanics (40%) indicated that diabetes was the biggest health problem for their family. African Americans and Hispanics are almost twice as likely as non-Hispanic whites to be diagnosed with diabetes by a physician.^{21, 22} Other top reported chronic conditions were high blood pressure/stroke, cancer, and heart disease/heart attack (Table 3.1). Low-income and

higher-income African Americans and Hispanics reported these top chronic diseases in similar proportions. The Centers for Disease Control and Prevention (CDC) lists the chronic illnesses reported in Table 3.1 as leading causes of death in the African-American and Hispanic communities.²³

When asked to say in their own words what was the most important issue facing the area where they live, African Americans and Hispanics living with chronic illness in their families mention crime the most. Almost one in three African Americans and close to one in four Hispanics expressed concern with crime in their local community (Table 3.1). The problem cited most often next was the economy. Less than half of African Americans and Hispanics in our analysis were employed full-time.

Challenges with the Health Care Delivery System

African Americans and Hispanics experience significant health care challenges, with low-income groups of both more likely to report problems with health care access (Table 3.2). Almost one in four African Americans (24%) and four in ten Hispanics (38%) living with chronic conditions in their families had no form of health insurance or health plan. Twice as many low-income African Americans (36%) were uninsured in comparison to higher-income African Americans (16%) living with chronic illness in their families. About half (49%) of low-income Hispanics living with chronic illness in their families were uninsured compared to the three in ten (31%) higher-income Hispanics.

African Americans and Hispanics living with chronic illness have concerns about being able to afford the costs associated with a major illness. Approximately half of African Americans (46%) and Hispanics (50%) living with chronic conditions in their families were not too confident/not at all confident that they would have enough money/health insurance

Table 3.1 The Health Diseases and Community Issues African Americans and Hispanics Living with Chronic Illness in their Families View as their Biggest Problems (weighted, in percent)

	Living with Chronic Illness in their Families	
	African Americans	Hispanics
<i>(Unweighted n=)*</i>	<i>n= 757</i>	<i>n= 697</i>
What disease or health condition is the biggest problem for your family?		
Diabetes	29	40
High blood pressure/Stroke	28	8
Cancer	10	11
Heart disease/Heart attack	9	6
What is the most important issue facing the area in which you live?		
Crime (net)**	31	22
Economy (net)†	15	13
Housing (net)~	4	3
Environment (net)°	5	8
Social issues (net)^	3	4
Infrastructure (net)√	7	4
Education	4	4
Healthcare	<1	1
None	6	28

NPR/Robert Wood Johnson Foundation/Harvard School of Public Health polls 2013

Only the top verbatim responses for chronic conditions shown

Percent values may not sum to 100 percent due to rounding effects and the exclusion of "Don't Know/Refused" responses

* The question(s) that immediately follow were asked of the number of (unweighted n) of respondents indicated in each column

** Crime (net) includes crime, drug activity, need for law/police surveillance, safety/security, and other crime.

† Economy (net) includes economy, cost of living, economic development/lack of businesses, low wages, poverty, taxes, jobs/lack of jobs/unemployment, and other economy

~ Housing (net) includes foreclosures, decreased property value, housing market, abandoned/dilapidated houses, lack of open space/overbuilding/new development/overcrowding, and other housing issues

° Environment (net) includes traffic, noise, pollution, upkeep of/cleaner neighborhood, and other environment

^ Social issues (net) includes limited resources for youth (activities/no work), social discrimination (racism/religious/intolerance, and other social issues)

√ Infrastructure (net) includes highways/roads/road maintenance, transportation, utility issues (sewers/electricity), inadequate street lights, parking, and other infrastructure

Table 3.2 Health Care Challenges of African Americans and Hispanics Living with Chronic Illness in their Families, by Income (weighted, in percent)

	Living with Chronic Illness in their Families					
	African Americans			Hispanics		
	Total	<\$25K (a)	\$25K+ (b)	Total	<\$25K (c)	\$25K+ (d)
<i>(Unweighted n)*</i>	<i>n= 757</i>	<i>n= 263</i>	<i>n= 435</i>	<i>n= 697</i>	<i>n= 281</i>	<i>n= 344</i>
Are you, yourself, now covered by any form of health insurance or health plan? This would include any private insurance plan through your employer or that you purchase yourself, as well as a government program like Medicare or Medicaid?						
Yes, covered	76	64	83 ^a	61	50	69 ^c
No, not covered	24	36 ^b	16	38	49 ^d	31
How confident are you that you would have enough money or health insurance to pay for a major illness? Are you very confident, somewhat confident, not too confident, or not at all confident?						
Very confident/Somewhat confident	52	36	63 ^a	48	32	59 ^c
Not at all confident/Not too confident	46	64 ^b	35	50	66 ^d	40
In the past 12 months, have you or a family member had a SERIOUS problem with any of the following? How about?						
Having enough to pay doctor and hospital bills						
Yes	30	36	27	30	32	32
Paying for prescription medicines that were needed						
Yes	26	33 ^b	21	25	31 ^d	21
Getting health care that was needed						
Yes	17	25 ^b	13	23	31 ^d	19
Was there a time over the past 12 months when you or another family member living in your household needed medical care, but did not get it?						
Yes	15	22 ^b	11	18	25	15
In the last 12 months, what type of health care facility did you use most often for your own care?						
A private physician	46	30	57 ^a	41	27	52 ^c
A hospital emergency room	11	18 ^b	7	12	17 ^d	9
A hospital (non-emergency room)	12	11	12	10	10	9
A specialty clinic	9	10	9	10	14 ^d	6
A neighborhood community health center	10	17 ^b	7	16	23 ^d	12
Veteran's Administration/Military (vol)	2	1	3	1	<1	1
Somewhere else	2	5	<1	1	<1	<1
Did not get health care in the last 12 months	5	6	4	9	7	10

NPR/Robert Wood Johnson Foundation/Harvard School of Public Health polls 2013

Percent values may not sum to 100 percent due to rounding effects and the exclusion of "Don't Know/Refused"

* The question(s) that immediately follow were asked of the number of (unweighted n) of respondents indicated in each column

**Only asked of those that responded "Yes" to the previous question.

^a Statistically higher proportion than **low-income** (<\$25K) African Americans, $p < 0.025$

^b Statistically higher proportion than **higher income** (\$25K+) African Americans, $p < 0.025$

^c Statistically higher proportion than **low-income** (<\$25K) Hispanics, $p < 0.025$

^d Statistically higher proportion than **higher income** (\$25K+) Hispanics, $p < 0.025$

to cover a major illness. While the majority of low-income African Americans (64%) and Hispanics (66%) were not too confident/not at all confident that they would have enough money/health insurance to cover a major illness, most higher-income African Americans (63%) and Hispanics (59%) felt very confident/somewhat confident that they would be able to afford a major illness (Table 3.2).

African Americans and Hispanics living with chronic illness expressed difficulties financing and accessing needed health care. Thirty percent of African Americans and Hispanics living with chronic conditions reported having a serious problem with paying for doctor and hospital bills. In addition, about one in four African Americans (26%) and Hispanics (25%) reported having a serious problem with paying for prescription medicines that they or a family member needed. Low-income African Americans (33%) and Hispanics (31%) were more likely than higher-income African Americans (21%) and Hispanics (21%) to report having problems paying for needed prescription medicines (Table 3.2).

Low-income African Americans living with chronic illness were almost twice as likely (25% to 13%) as higher-income African Americans to report having problems getting health care for themselves or a family member. Thirty-one percent of low-income Hispanics in comparison to 19% higher-income Hispanics reported having this problem. Low-income African Americans living with chronic illness were twice as likely (22% to 11%) as higher-income African Americans to report that there was a time in the last year when they or a family member needed medical care but did not get it (Table 3.2).

African Americans and Hispanics living with chronic conditions use a range of health care facilities most frequently for their care (Table 3.2). Overall, African Americans and Hispanics living with chronic illness report having received health care in the past twelve months

most often from a private physician. More than four in ten African Americans and Hispanics frequented a private physician. Low-income African Americans (30%) and Hispanics (27%) living with chronic conditions were less likely than higher-income African Americans (57%) and Hispanics (52%) to report a private physician as their most often used source of care in the last year.

Eleven percent of African Americans and twelve percent of Hispanics living with chronic illness report using a hospital emergency room most often for their health care in the past twelve months. Low-income African Americans (18%) living with chronic illness in their families were about twice as likely to frequent a hospital emergency room than higher-income African Americans (7%). Low-income Hispanics (17%) living with chronic illness were approximately twice as likely to frequent a hospital emergency room than higher-income Hispanics (9%).

Ten percent of African Americans and 16% of Hispanics living with chronic illness report using a neighborhood community health center most often for health care in the past year. The proportion of low-income African Americans (17%) living with chronic illness reporting a neighborhood community health center as their most used site of care was more than double that of higher-income African Americans (7%). Low-income Hispanics (23%) with chronic illness in their families were almost twice as likely to frequent a neighborhood community health center than higher-income Hispanics (12%).

Additional Personal Concerns Potentially Impacting Overall Health

African Americans and Hispanics living with chronic conditions have significant concerns in their personal lives. African Americans and Hispanics express insecurities about their finances (Table 3.3). More than half (53%) of African Americans living with chronic

Table 3.3 Personal Concerns of African Americans and Hispanics Living with Chronic Illness in their Families, by Income (weighted, in percent)

	Living with Chronic Illness in their Families					
	African Americans			Hispanics		
	Total	<\$25K (a)	\$25K+ (b)	Total	<\$25K (c)	\$25K+ (d)
<i>(Unweighted n=)*</i>	<i>n= 757</i>	<i>n= 263</i>	<i>n= 435</i>	<i>n= 697</i>	<i>n= 281</i>	<i>n= 344</i>
STATE OF PERSONAL FINANCES						
Would you describe the state of your own personal finances these days as excellent, good, not so good, or poor?						
Excellent/Good	46	26	58 ^a	59	42	71 ^c
Not so good/Poor	53	73 ^b	41	40	58 ^d	29
TREATED WITH DISRESPECT/LESS COURTESY THAN OTHERS						
In the past 12 months, did any of the following things happen to you or not? How about you were treated with less courtesy or respect than other people?						
Yes	49	48	48	33	37	32
No	51	52	51	66	62	66
COMMUNITY RATINGS						
Rate this aspect of life in YOUR community as excellent, good, fair, or poor?						
Safety from crime						
Excellent/Good	54	43	61 ^a	59	46	69 ^c
Fair/Poor	46	57 ^b	39	40	52 ^d	30
Quality of available housing						
Excellent/Good	45	41	47	47	39	52
Fair/Poor	50	55	47	50	58	47
Cleanliness of the streets and maintenance of public areas						
Excellent/Good	57	48	64	64	49	73 ^c
Fair/Poor	42	51	35	36	51 ^d	27

NPR/Robert Wood Johnson Foundation/Harvard School of Public Health polls 2013

Percent values may not sum to 100 percent due to rounding effects and the exclusion of "Don't Know/Refused" responses

* The question(s) that immediately follow were asked of the number of (unweighted n) of respondents indicated in each column

^a Statistically higher proportion than **low-income** (<\$25K) African Americans, $p < 0.025$

^b Statistically higher proportion than **higher income** (\$25K+) African Americans, $p < 0.025$

^c Statistically higher proportion than **low-income** (<\$25K) Hispanics, $p < 0.025$

^d Statistically higher proportion than **higher income** (\$25K+) Hispanics, $p < 0.025$

conditions viewed the state of their personal finances as not so good/poor. Almost three in four low-income African Americans living with chronic illness in their families (73%) viewed their finances as not so good/poor while less than half (41%) of higher-income African Americans experience the same financial insecurity. Four in ten Hispanics living with chronic conditions in their families (40%) viewed the state of their personal finances as not so good/poor. Low-income Hispanics were twice as likely as higher-income Hispanics (58% vs 29%) to describe the state of their finances as not so good/poor.

African Americans and Hispanics express concerns with the areas where they live (Table 3.3). About four in ten African Americans (46%) and Hispanics (40%) living with chronic illnesses reported safety from crime in their communities as fair/poor. The majority of low-income African Americans (57%) and Hispanics (52%) rated safety from crime in their communities as fair/poor in comparison to approximately one-third of higher-income African Americans (39%) and higher-income Hispanics (30%) rating crime safety similarly. Half (50%) of the African Americans and Hispanics living with chronic conditions rate the quality of housing in their communities as fair/poor. More than one-third of African Americans (42%) and Hispanics (36%) living with chronic illness rate the cleanliness of the streets and the maintenance of public areas as fair/poor.

DISCUSSION

The current study illuminates that African Americans and Hispanics with a personal chronic illness and/or that of a family member as the biggest health problem for their families, deal with many problems that could have significant implications for health. The majority of African Americans and Hispanics in our samples had some form of health insurance, but greater

proportions of low-income African Americans and Hispanics were uninsured in comparison to their higher-income counterparts. In spite of having health insurance, respondents still faced obstacles in financing and accessing health care services and prescription drugs. Low-income African Americans and Hispanics were more likely to experience financial and access problems. Neither insurance nor income had a completely protective effect for minorities confronted with the major health challenges of chronic illness. Our results suggest that the ACA's extension of health insurance coverage through health exchanges and the expansion of Medicaid (the public insurance program for the low income) may not eliminate all barriers to health care.

Chronic conditions can be some of the costliest forms of illness.¹ African Americans and Hispanics with chronic illness in their families expressed anxieties about financial instability and the quality of the communities where they lived. Higher proportions of low-income respondents reported these concerns. These personal and community issues represent sources of stress that could compound the difficulties of chronic illness as well as detract time and attention away from tending to health needs.

These results build on prior literature that shows racial disparities in health persist in both higher and lower income groups when comparing African Americans and whites.²⁴ We compare low-income and higher-income subgroups within African-American and Hispanic populations to demonstrate that health care disparities also persist by income within each minority group. We extend prior qualitative research indicating associations between being low-income, lacking of health insurance, and difficulty accessing health care,¹² for, to our knowledge, no prior analysis of this magnitude has allowed for African Americans and Hispanics confronted with chronic illness in their families to express the full range of challenges in their lives that could impact

health. Our study also widens the evidence base on how those broad life experiences can differ substantially within racial/ethnic groups.

As with any study, the current analysis is not without limitations. Our surveys are cross-sectional preventing any causal inferences. Due to survey designs, our analysis cannot determine whether it is the respondent and/or a family member who has the chronic condition reported. Our study conveys only the perspectives of African Americans and Hispanics who report that chronic illnesses pose serious problems for their families. These responses may not reflect true chronic disease prevalence in the U.S. We cannot compare the experiences of African Americans and Hispanics to other racial/ethnic populations because our survey samples exclude any other groups. The purpose of our study was not to compare across completely distinct racial/ethnic groups but to shed light on African-American and Hispanic intragroup variability.

Improving health for African Americans and Hispanics confronted with chronic illness will require identifying where challenges arise and developing appropriate ways of addressing them. Given the complex web of factors that contribute to health disparities, determining the suitable policy levers for improvement has presented challenges. One barrier has been the lack of consensus on how to prioritize addressing the social determinants of health in a world of limited resources. Diverse approaches exist for targeting interventions, determining who should design them, and establishing financing mechanisms.^{25, 26} The variation observed across the experiences measured in our surveys suggests that African Americans and Hispanics living with chronic illness in their families might require different levels of assistance and supplementary supports to maintain health. Given their lower resources, higher rates of reporting problems financing and accessing health care, and their higher likelihood for expressing concerns in other areas of life, the low-income may greater needs for assistance to effectively handle chronic conditions. The

highest quality of care for these vulnerable populations will entail health care providers working alongside patients to determine which tools and supports fit within the context of patients' overall lives.

There is notable diversity between racial/ethnic groups and within those populations in their experiences with chronic illness. To propose any standard set of interventions fails to properly address health disparities at the various levels where those gaps arise. The differences our study finds between income groups highlights the critical need to augment efforts narrowing the inequality gap within minority groups who experience income disparities.

To achieve this goal, payment mechanisms must account for the additional supports and services required for clinicians to effectively care for minority groups dealing with chronic illness. Medicaid has traditionally paid less than other insurers for health care services, so to ensure that low-income minorities living with chronic illnesses in their families who are eligible for this valuable public resource receive comparable guidance and assistance, payment schemes must facilitate equitable care for publicly and privately insured beneficiaries. Our study highlights potential areas for health care providers and policymakers to start bridging the gap of health disparities for African American and Hispanic adults living with chronic illness.

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APPENDIX I. SUPPLEMENT TO CONTENT ANALYSIS OF HEALTH POLICY CONTROVERSIES

Figure I.A1 Flow chart of article search, screening, and inclusion for content analysis on the 2009 USPSTF mammography guidelines after October 2015 data collection

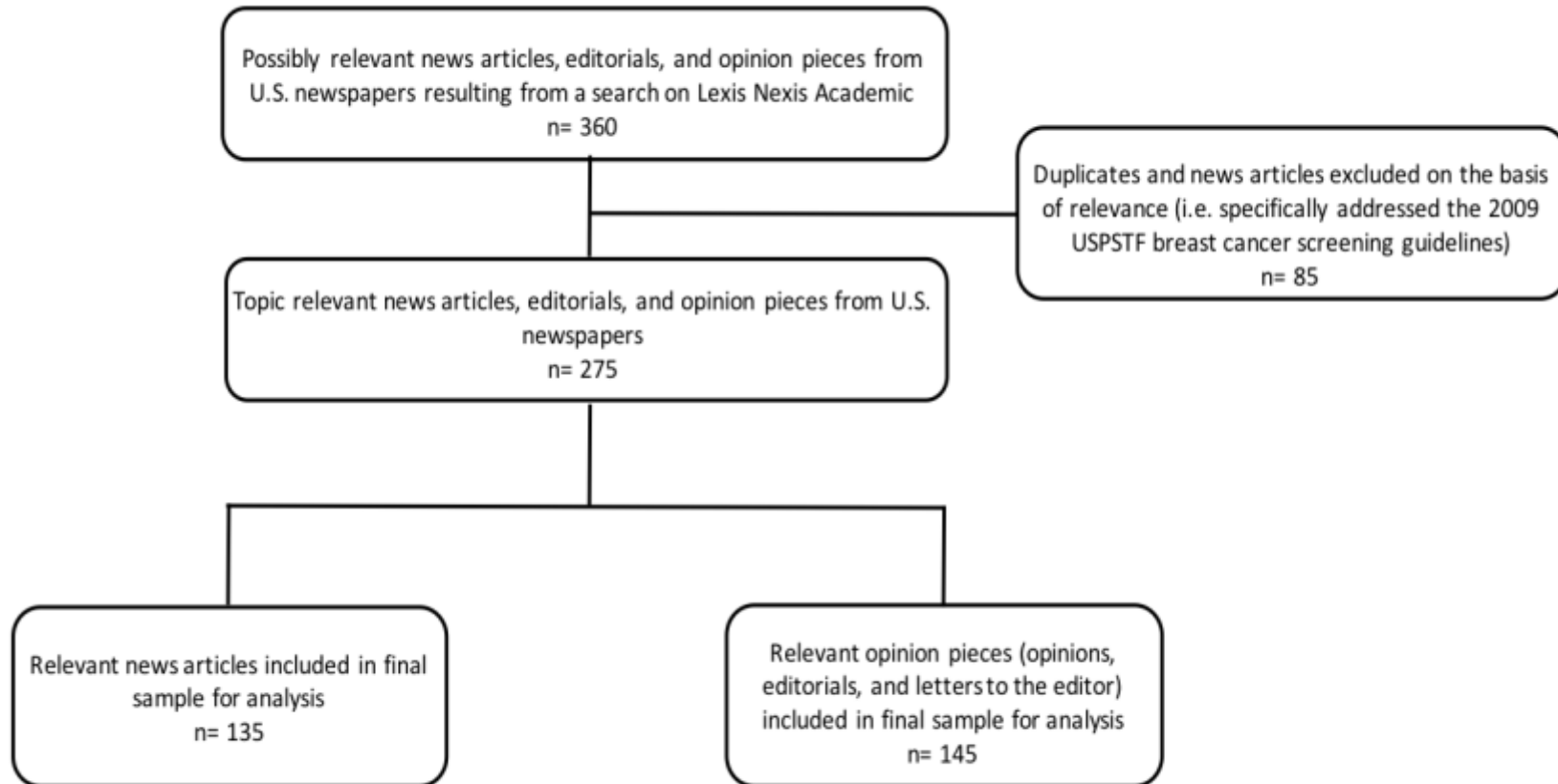


Figure I.A2 Flow chart of article search, screening, and inclusion for content analysis on state HPV vaccination mandates (2005-2009) after October 2015 data collection

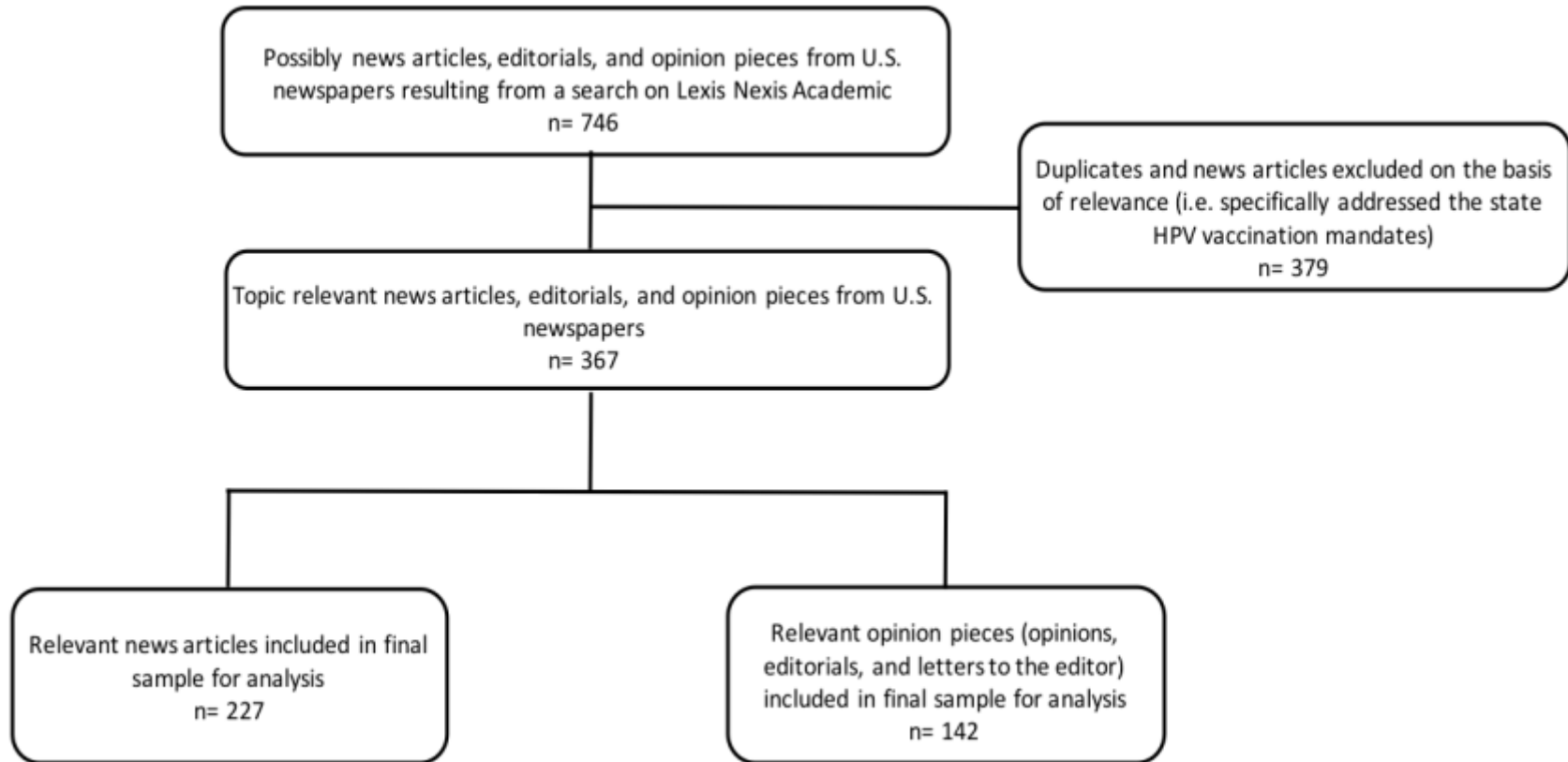


Table I.A1 Liberal-leaning Newspapers Analyzed for 2009 USPSTF Breast Cancer Screening Guidelines and HPV Vaccination Mandates (N=28)

Newspapers (n=28)	Location	Slant (Gentzkow and Shapiro)	Slant (standardized)
The Philadelphia Daily News (PA)	Philadelphia, PA	0.322781	-3.498567
Daily News (New York)	New York, NY	0.3648315	-2.455826
The Atlanta Journal-Constitution	Atlanta, GA	0.3929396	-1.758821
The Capital (Annapolis, MD)	Annapolis, MD	0.4107743	-1.316568
The Austin American-Statesman	Austin, TX	0.4178446	-1.141244
The Daily News of Los Angeles	Los Angeles, CA	0.4196298	-1.096975
USA Today	Arlington, VA	0.4211672	-1.058852
The Philadelphia Inquirer	Philadelphia, PA	0.4220949	-1.035847
Providence Journal	Providence, RI	0.4229281	-1.015186
The Florida Times Union	Jacksonville, FL	0.4244967	-0.9762889
The New York Times	New York, NY	0.4270599	-0.912729
Star-News (Wilmington, NC)/Morning Star	Wilmington, NC	0.4329339	-0.7670692
The New York Post	New York, NY	0.4332205	-0.7599621
The Washington Post	Washington, DC	0.4338641	-0.744003
The Berkshire Eagle (Pittsfield, MA)	Pittsfield, MA	0.4348512	-0.7195253
The Buffalo News (New York)	Buffalo, NY	0.435327	-0.7077268
Monterey Country Herald (CA)	Monterey, CA	0.4401262	-0.5887191
Pittsburgh Post-Gazette	Pittsburgh, PA	0.4455552	-0.4540944
Marin Independent Journal (Marin, CA)	Novato, CA	0.4480114	-0.3931875
The Hartford Courant	Hartford, CT	0.4481501	-0.3897482
The Charleston Gazette	Charleston, WV	0.4487364	-0.3752095
Dayton Daily News	Dayton, OH	0.4556347	-0.2041497
Sarasota Herald-Tribune	Sarasota, FL	0.4584003	-0.1355703
The Denver Post	Denver, CO	0.4593008	-0.1132409
The State Journal-Register (Springfield, IL)	Springfield, IL	0.4606675	-0.0793503
The Palm Beach Post	West Palm Beach, FL	0.4618546	-0.049913
The Tampa Tribune (Florida)	Tampa, FL	0.4618795	-0.0492959
South Bend Tribune	South Bend, IN	0.4630596	-0.0200323

Table I.A2 Conservative-leaning Newspapers Analyzed for 2009 USPSTF Breast Cancer Screening Guidelines and HPV Vaccination Mandates (N=32)

Newspapers (n=32)	Location	Slant (Gentzkow and Shapiro)	Slant (standardized)
St. Paul Pioneer Press (Minnesota)	St. Paul, MN	0.4649097	0.0258452
St. Louis Post-Dispatch	St. Louis, MO	0.4650089	0.0283054
Intelligencer Journal/New Era (Lancaster,	Lancaster, PA	0.4667485	0.0714426
The Augusta Chronicle	Augusta, GA	0.4675316	0.0908611
Eureka Times-Standard (California)	Eureka, CA	0.4726448	0.2176551
Lowell Sun (Lowell, MA)	Lowell, MA	0.4740586	0.2527134
San Gabriel Valley Tribune (San Gabriel Valley, CA)	Covina, CA	0.4740736	0.2530851
Sentinel & Enterprise (Fitchburg, MA)	Fitchburg, MA	0.4768117	0.3209831
The Patriot Ledger	Quincy, MA	0.4807964	0.4197927
The Pantagraph	Bloomington, IL	0.4824172	0.4599842
San Bernardino Sun (California) vs. San Bernadino	San Bernardino, CA	0.4825922	0.4643238
Wall Street Journal Abstracts	New York, NY	0.482949	0.4731713
Topeka Capital-Journal	Topeka, KS	0.4835347	0.4876952
The Salt Lake Tribune	Salt Lake City, UT	0.4840898	0.5014601
Lincoln Journal Star (Nebraska)	Lincoln, NE	0.4850635	0.5256053
Telegram & Gazette (Massachusetts)	Worcester, MA	0.4877869	0.5931383
The Santa Fe New Mexican	Santa Fe, NM	0.4882959	0.6057607
Deseret Morning News (Salt Lake City)	Salt Lake City, UT	0.4895594	0.6370921
Telegraph Herald (Dubuque, IA)	Dubuque, IA	0.4899126	0.6458502
Tulsa World (Oklahoma)	Tulsa, OK	0.4937172	0.740194
The York Dispatch (York, PA)	York, PA	0.4943449	0.7557591
Omaha World Herald	Omaha, NE	0.4989081	0.8689146
Chicago Daily Herald	Chicago, IL	0.4995639	0.8851767
The Columbian (Vancouver, WA)	Vancouver, WA	0.5036181	0.9857105
Public Opinion	Chambersburg, PA	0.5103226	1.151963
Bangor Daily News (Maine)	Bangor, ME	0.5133967	1.228193
The Daily Oklahoman (Oklahoma City, OK)	Oklahoma City, OK	0.514004	1.243252
The Evening Sun (Hanover, PA)	Hanover, PA	0.5142131	1.248437
The Bismarck Tribune	Bismarck, ND	0.5183617	1.351311
Las Cruces Sun-News (New Mexico)	Las Cruces, NM	0.5219724	1.440848
The Wyoming Tribune-Eagle	Cheyenne, WY	0.5263003	1.548168
Investor's Business Daily	Los Angeles, CA	0.5564181	2.295009

APPENDIX II. STATE CHARACTERISTICS AFTER MATCHING, 2009-2013

	Breast Density Notification States	Control States
<i>State-level Census Variables</i>		
Median Household Income	\$57,060	\$55,114
Percent Below Poverty	14%	15%
High School Graduate or Higher	86%	88%
College or Higher	32%	33%
Percent Black	18%	18%
Percent White	73%	75%
Baseline Mammography rates*	77%	76%

NOTE: State characteristics after matching, 2009-2013 (including CT and NH). All values represent averages for all states in each group.

SOURCES: US Census data for the year each state law was effective. * Baseline mammography data from Behavioral Risk Factor Surveillance Survey (BRFSS) 2010.

APPENDIX III. CODES FOR IDENTIFYING BREAST CANCER SCREENING PROCEDURES IN CLAIMS

Type of Breast Cancer Screening	CPT, HCPCS, & ICD-9 Procedure Codes for Breast	ICD-9 Diagnosis
Mammography	77051, 77052, 77055, 77056, 77057, G0202, G0206, G0204	V76.11, V76.12
Ultrasound (ultrasonography)	76645, 88.73 77058 (+0159T), 77059 (+0159T), C8903, C8904, C8905, C8906, C8907, C8908, 88.91-88.95, 88.97, 76498 (unlisted)	
Magnetic Resonance Imaging (MRI)	MRI), S8042 (MRI Low-field)	
3D Mammogram/Digital Breast Tomosynthesis (DBT)	76499 (+G0202), 76376, 76377	
Molecular Breast Imaging (MBI)/Breast specific gamma imaging (BSGI)/ Scintimammography	S8080, 78800, 78801, 78802, 78804, 78803, A4641, A4642, A9500, 92.19	
Thermography/Digital Infrared Thermal Imaging (DITI)	93740, 99429	