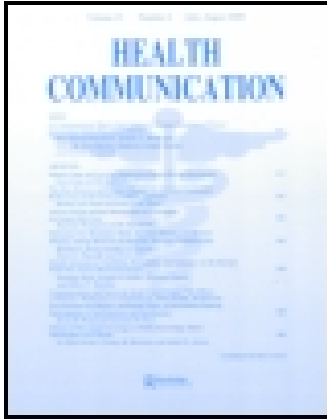


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## Health Communication

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/hhth20>

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Published online: 18 Jun 2015.



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To cite this article: Jeff Niederdeppe, Sungjong Roh & Caitlin Dreisbach (2015): How Narrative Focus and a Statistical Map Shape Health Policy Support Among State Legislators, Health Communication, DOI: [10.1080/10410236.2014.998913](https://doi.org/10.1080/10410236.2014.998913)

To link to this article: <http://dx.doi.org/10.1080/10410236.2014.998913>

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# How Narrative Focus and a Statistical Map Shape Health Policy Support Among State Legislators

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This study attempts to advance theorizing about health policy advocacy with combinations of narrative focus and a statistical map in an attempt to increase state legislators' support for policies to address the issue of obesity by reducing food deserts. Specifically, we examine state legislators' responses to variations in narrative focus (individual vs. community) about causes and solutions for food deserts in U.S. communities, and a statistical map (presence vs. absence) depicting the prevalence of food deserts across the United States. Using a Web-based randomized experiment ( $N = 496$ ), we show that narrative focus and the statistical map interact to produce different patterns of cognitive response and support for policies to reduce the prevalence of food deserts. The presence of a statistical map showing the prevalence of food deserts in the United States appeared to matter only when combined with an individual narrative, offsetting the fact that the individual narrative in isolation produced fewer thoughts consistent with the story's persuasive goal and more counterarguments in opposition to environmental causes and solutions for obesity than other message conditions. The image did not have an impact when combined with a story describing a community at large. Cognitive responses fully mediated message effects on intended persuasive outcomes. We conclude by discussing the study's contributions to communication theory and practice.

Short narratives and images that summarize statistical information are frequently used as evidence in public policy debates (Brownson, Chiqui, & Stamatakis, 2009; Stone, 2002). There are also growing literatures in communication, psychology, and policy studies, albeit not always in conversation with one another, that examine how citizens and policymakers process narratives differently than other forms of evidence (e.g., Green & Brock, 2000; Jones & McBeth, 2010; Niederdeppe, Shapiro, & Porticella, 2011). At the same time, little is known about the degree to which design features of policy narratives influence their impact on the policymaking process. Furthermore, few studies have

examined whether the addition of population-level statistical information, presented in the form of a map of U.S. communities, may change how people process narratives that are focused on a single person or case study (Brownson et al., 2009). This study addresses these gaps in the literature by using a randomized experiment to test the independent and interactive effects of narrative focus (on an individual vs. a community at large) and the presence or absence of a statistical map<sup>1</sup> (a map showing the prevalence of food deserts, geographic locations where low-income communities have limited access to healthy foods, to place the story in a broader context) on policymaker support for policies to reduce the

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<sup>1</sup>We use the term *statistical map* throughout the rest of the article to refer to maps that depict statistical information (in this case, a map of the United States showing neighborhoods that are considered food deserts based on statistical criteria; see later description of the criteria used to determine which geographic locations constitute food deserts).

prevalence of food deserts in the United States. Specifically, we report findings from a survey-based experiment involving nearly 500 state legislators from 49 of 50 U.S. states,<sup>2</sup> identifying conditions under which narrative focus may influence policymaker support for health-related public policy.

## DEFINING NARRATIVES IN THE CONTEXT OF PUBLIC POLICY DEBATES

Although the term has been defined in a variety of ways, Kreuter et al. (2007) offer an inclusive definition of narrative: “a representation of connected events and characters that has an identifiable structure, is bounded in space and time, and contains implicit or explicit messages about the topic being addressed” (p. 221). Researchers in communication, psychology, and policy studies have all focused attention on the role of narratives in promoting individual and social change. At the same time, researchers working within and across these fields have studied narratives somewhat differently. In communication and psychology, many researchers and studies (although certainly not all) focus primary attention on (a) the degree to which a story absorbs, engages, or transports an audience member into the story (e.g., Busselle & Bilandzic, 2008; Green & Brock, 2000), and/or (b) connections with individual characters in the form of identification or perceived similarity (e.g., Cohen, 2001; Moyer-Gusé, 2008). Scholars studying these processes often gauge the success of narratives in persuading individuals to engage in healthy or prosocial behavior (e.g., Murphy, Frank, Chatterjee, & Baezconde-Garbanati, 2013), although a growing body of work in these fields examines the influence of narratives about specific individuals on support for social policy (e.g., Niederdeppe, Shapiro, Kim, Bartolo, & Porticella, 2013; Slater, Rouner, & Long, 2006; Strange & Leung, 1999).

Recent research in policy studies, however, defines narratives from an alternate perspective. While there is some agreement about the basic ingredients that comprise a narrative (“a policy narrative has a setting, a plot, and characters [hero, villain, and victim]”: Shanahan, Jones, & McBeth, 2011, p. 539), recent work in policy studies focuses less attention on stories of specific individuals and more attention on groups, organizations, and communities as heroes, villains, and/or victims in a particular policy context (Jones, 2013; Shanahan et al., 2011; Shanahan, Jones, McBeth, & Lane, 2013). In addition, these researchers emphasize how policy narratives focus centrally on cause and effect: the causes of social problems, and policy solutions to address them (Jones & McBeth, 2010; Shanahan et al., 2013). The idea that integrating causes and effects is central to

narratives is also consistent with some research in communication and psychology (Dahlstrom, 2010, 2012; Green, 2006; Niederdeppe et al., 2013). Some of these studies argue that narratives, due to their inherently causal nature, have a persuasive advantage over other message forms in conveying causal information about social issues (Lundell, Niederdeppe, & Clarke, 2013a; Niederdeppe et al., 2013; Tsoukas & Hatch, 2001).

Despite this proliferation of research, we know little about designing narratives to increase support for specific policy objectives to address the causes of social problems, or the extent to which narratives may complement other forms of evidence (including statistical data) in policy debates. This study examines one narrative design feature—narrative focus (on a specific individual or a community at large)—in shaping cognitive responses and support for story-targeted public policies. The study further examines the independent and interactive effects of adding a statistical map (a geographic information systems [GIS] map to illustrate the prevalence of the social problem targeted by the narrative) to supplement and contextualize the narrative.

## The Context: State Legislator Support for Policies to Reduce Food Deserts

The current study focuses on the effects of narrative focus and statistical maps on state legislator support for public policies to reduce the prevalence of food deserts (as a broader strategy to reduce obesity and obesity-related inequality) in the United States. We chose state legislators because U.S. state legislative bodies hold considerable authority to enact and enforce public health legislation (Boehmer, Luke, Haire-Joshu, Bates, & Brownson, 2008; Kersh, 2009), and mediated messages can play a role in shaping the likelihood of policy passage (Dodson et al., 2009). All 50 U.S. state legislatures proposed at least two bills related to childhood obesity prevention between 2006 and 2009, and the number of obesity-related bills introduced increased from 239 per year from 2003–2005 to 440 per year from 2006–2009 (Boehmer et al., 2008; Eyler, Nguyen, Kong, Yan, & Brownson, 2012). Rates of success in passing these policies also increased over time, from 17% in 2003–2005 to 27% from 2006 to 2009 (Boehmer et al., 2008; Eyler et al., 2012; see Cawley & Liu, 2008).

We focus on policies designed to reduce the prevalence of food deserts in U.S. communities. The U.S. Department of Agriculture (USDA, 2013) defines food deserts as census tracts where at least 20% of the population lives at or below the poverty line, and where there isn’t a supermarket within a one-mile radius (in urban areas) or a 10-mile radius (in rural areas). Over 13 million people, across all 50 U.S. states, live within a food desert.

We selected three policies designed to reduce food deserts for this study. The first policy offers incentives to encourage the establishment of farmers’ markets. The second policy

<sup>2</sup>None of the state legislators from Alaska agreed to participate in the study.

provides grants to independent grocery stores to sell healthy products in locations where supermarkets are not present. The third policy provides incentives for full-service grocery stores to open locations in areas with limited access to healthy foods. The Centers for Disease Control and Prevention recommends all three policies (Frieden, Dietz, & Collins, 2010; Khan et al., 2009), and several U.S. jurisdictions have proposed and implemented one or more of them (Boehmer et al., 2008; Eyer et al., 2012). At the same time, all three policies have only modest support among state legislators (Welch, Dake, Price, Thompson, & Ubokudom, 2012). We thus sought to examine the effects of a narrative and a statistical map supporting the story on support for these policies.

### Narrative Focus (on an Individual or a Community) and Persuasion

As described earlier, much of the research on narrative persuasion focuses on stories that describe the circumstances and actions of an individual character. Most definitions of narrative, however, include stories that focus on groups of people rather than specific individuals (Kreuter et al., 2007). There is little agreement about the conditions under which narrative focus (in this case, individual-focused versus community-focused stories) may shape persuasive outcomes.

Several bodies of research, including work informed by exemplification theory (Zillmann & Brosius, 2000) and the “identifiable victim” effect (Kogut & Ritov, 2005; Small, Loewenstein, & Slovic, 2007), argue that short stories about single individuals can increase motivation to address social problems (e.g., increasing the perceived magnitude of the problem; promoting donations to a social cause) relative to a series of vignettes about multiple individuals or quantitative information about the magnitude of the problem. Other scholars, however, make opposing claims. Iyengar (1991), for example, argues that episodic portrayals of single individuals (news stories describing a person struggling with a social problem versus statistical depictions of the problem) can shift attributions away from broader societal factors and point blame toward individuals themselves. Lundell et al. (2013a), in a series of focus groups, found that participants were more likely to consider societal causes and solutions for health issues when a question was framed in terms of community (what makes some communities healthier than others?) versus individual health (what makes some people healthier than others?).

These seemingly opposing findings suggest that there may be additional factors that influence the extent to which individual versus community-focused narratives are more effective. Many of the aforementioned studies, for example, compared individual narratives (INs) to short statistical depictions of the problem in a community, which confounds

the level of focus (individual vs. community) with the type of evidence offered (narrative vs. statistical). Niederdeppe, Kim, Lundell, Fazili, and Frazier (2012) further complicated matters in an attempt to separate narrative focus from evidence type, finding that the persuasive effects of narrative focus were contingent upon whether or not the narrative was one-sided (describing only societal causes of obesity) or two-sided (acknowledging both individual and societal causes of the problem). Two-sided INs and one-sided community narratives (CNs) were more effective at promoting policy support than the alternative combinations (one-sided INs and two-sided CNs). All told, we still know very little about the conditions under which people process individual and community narratives differently, and what implications this processing has for narrative persuasion. We also do not yet understand how narrative focus may interact with statistical information about the prevalence or distribution of a social problem (Brownson et al., 2009).

### Combining Narrative and Statistical Evidence

Advocates often strategically employ narratives and short summaries of statistical evidence alongside one another in political debates (Brownson et al., 2009; Stevens, 2011; Stone, 2002). Although at times people extrapolate from single case examples or stories in making larger judgments about the prevalence of a social problem (Zillmann & Brosius, 2000), narratives hold potential to be judged as reflecting atypical situations and offering contextual details that distract from the story’s intended theme (Kreuter et al., 2007; Lundell, Niederdeppe, & Clarke, 2013b). Some evidence suggests that the combination of narrative and statistical evidence is more persuasive, on average, than either form of evidence in isolation (Allen et al., 2000). At the same time, statistical information can be used in many different ways (e.g., prevalence estimates, associations between variables, and causal effects) and presented in a variety of forms (e.g., the numbers themselves, bar/pie charts, and maps/other images that convey statistical information). The relative persuasiveness of statistical evidence may also be contingent on the type of narrative evidence that accompanies it; previous studies offer little guidance in predicting the independent or interactive effects of various types of narrative portrayals and statistical information.

### COGNITIVE RESPONSES TO NARRATIVES ABOUT FOOD DESERTS: STUDY HYPOTHESES

We continue with predictions about expected cognitive responses to variations in narrative focus and the presence of a statistical map. Based on these cognitive responses, we also predict differences in message effects on support for public policies to reduce food deserts.

## Cognitive Responses

Social issues like obesity are caused by a multitude of factors, some that are under individual control and modifiable via behavioral changes, and some that are outside that control and modifiable primarily via changes to public policy. These causes are also interconnected and complex. However, since many Americans view obesity as an individual problem, messages intended to increase support for obesity policies could also generate thoughts that are focused on individual causes or solutions to the problem (e.g., Niederdeppe et al., 2011).

Niederdeppe et al. (2012) outlined five types of cognitive responses that could occur in response to a narrative about causes and solutions for a social problem like obesity: simple elaboration, complex integration, counterelaboration, counterarguing, and noncausal thoughts (see Table 1). Simple elaboration refers to thoughts focused exclusively on societal causes or solutions for obesity, including public policies. Complex integration refers to thoughts that integrate both individual and societal causes and/or solutions for obesity. Simple elaboration and complex integration would be consistent with the persuasive intent of a message designed to raise awareness of food deserts and promote policy action to address the issue, since they favorably engage with the

premise that environmental factors play a major role in shaping rates of obesity. Counterelaboration refers to thoughts focused exclusively on individual causes or individual solutions for obesity, since these thoughts run counter to such a message's persuasive intent. Counterarguments are thoughts that explicitly refute the source's intended message, that broader societal forces (like food deserts) cause obesity and should be addressed via changes to the food environment. Noncausal thoughts are those that have nothing to do with the message's persuasive intent, and should be inconsequential in shaping persuasive responses to narratives.

## Study Hypotheses

Recent years have witnessed increased emphasis on the role of evidence in public policymaking among legislators (e.g., Brownson et al., 2009). While individual anecdotes (individual narratives) represent a form of evidence, the contemporary policy environment combined with increased availability of statistical information about policy issues places increased pressure on legislators to use the best information available when making decisions about policies, programs, and practices. We thus suggest that reliance on individual narratives alone has potential to generate frequent counterarguments (e.g., "this is not a typical example?") unless the narratives are accompanied by broader descriptions of the problem (Lundell et al., 2013a). Previous work further suggests that narratives focused on single individuals can focus attention on individual causes and solutions to social problems, reducing the likelihood of simple elaboration (thoughts about societal-level causes and solutions to food deserts) and increasing the likelihood of counterelaboration (thoughts about individual causes and solutions; Niederdeppe et al., 2011, 2012). We contend, however, that adding population-level statistical information could offset these concerns by placing the individual narrative in a broader context, providing stronger evidence for its typicality. We utilized a GIS map, produced by the USDA Economic Research Service (ERS, 2013), that documented the prevalence and location of food deserts across all 50 states in the United States. Several authors suggest that GIS maps have considerable promise in public health policymaking due to their ability to convey information about geographic patterns of disease or environmental conditions (Brownson, Royer, Ewing, & McBride, 2006; Parrott, Hopfer, Ghetian, & Lengerich, 2007; Severtson & Vatovec, 2012). We contend that the inclusion of statistical prevalence information via GIS mapping should matter less for a narrative focused on a broader community, which by its focus on a larger collective places the discussion of policies to address food deserts in a broader context (Lundell et al., 2013a).

We thus predict that the presence of a statistical map will interact with narrative focus, such that the addition of population-level statistical information will offset the tendency for an individual-focused narrative to

TABLE 1  
Possible Thoughts in Response to Messages about Issues Like Obesity with Multiple Attributions

	<i>No Individual Attribution</i>	<i>Individual Attribution</i>
Societal attribution (source-intended processing)	Simple elaboration, <i>n</i> = 555 thoughts Example: "Lack of access to good food is very troubling."	Complex integration, <i>n</i> = 458 thoughts Example: "Obesity is influenced by food availability, choices, and amount."
No societal attribution (source-unintended processing)	Noncausal thoughts, <i>n</i> = 269 thoughts Example: "Childhood obesity can lead to negative peer attitudes."	Counterelaboration, <i>n</i> = 208 thoughts Example: "Children are more sedentary, participate in less exercise."
Explicit rejection of societal attribution	Counterarguing, <i>n</i> = 41 thoughts Example: "I doubt the location of a supermarket is going to fix Jason's problem."	Counterarguing, <i>n</i> = 79 thoughts Example: "Solutions begin at home. Let's stop enabling everyone to look to the government for answers so more dependency results."

Note. *n* shows the number of thoughts (out of 1,490 total thoughts from narrative conditions) that were classified into each category.

increase counterarguing (H1), reduce simple elaboration (H2), and increase counterelaboration (H3). Since increased counterarguing, reduced simple elaboration, and increased counterelaboration should each reduce the likelihood of the message achieving its ultimate persuasive goal, we further predict that the presence of a statistical map will interact with narrative focus to predict support for policies to reduce the prevalence of food deserts in the United States (H4). If these predictions are correct, we should also find evidence that counterarguing, simple elaboration, and counterelaboration explain (mediate) any observed interaction effect of narrative focus by statistical information on policy support (H5).

## METHODS

### Procedure and Stimuli

We purchased a comprehensive database from the National Conference of State Legislators (NCSL) with contact information for 7,345 state legislators who were in office in all 50 U.S. states as of February 2012. We invited each of these legislators via e-mail to participate “in a study to explore policymaker perceptions about what might be done to address the challenge of obesity in the United States.” We sent five additional reminder e-mails to encourage participation, and conducted follow-up phone calls to ensure that the e-mails had been received and to answer any questions potential participants may have had about the study. Of the 7,345 contacts, 14 had e-mail addresses that were not valid, resulting in an eligible population of 7,331 state legislators. Of these, 551 individuals provided informed consent and completed the study, although 55 of them indicated in response to the question about their political office (which featured a the categories of “senator,” “member of the state assembly,” “member of the state house,” or “other—please specify” with a text box in which to enter additional details) that they were members of the representative’s legislative staff, not a legislator her-/himself. We removed these participants from the sample, resulting in a final analytic sample of 496 legislators, a 6.8% response rate. The median time for state legislators to complete the study was 15 minutes. We collected data between March 8 and May 31, 2012. The institutional review board of the authors’ home institution deemed the study exempt from review (protocol 1201002739).

We randomly assigned participants to read one of five versions of the survey using a 2 (narrative focus: individual or community) by 2 (presence or absence of a statistical map) factorial design with an offset, no-exposure control group. Those assigned to one of the four experimental conditions read a two- or three-page story (depending on whether or not they were assigned the statistical map) that began by describing the problem of food deserts and ended by describing three policy solutions to address them. We based all versions of the narrative on information presented in two news articles

describing the nature and impact of local policy initiatives to reduce food deserts in Philadelphia (Cadman, 2010; Faison, 2010).

The first part of the narratives emphasized high rates of childhood obesity, the high cost and lack of access to healthy foods, and the widespread availability and marketing of unhealthy food in lower income Philadelphia neighborhoods. The last part of the narrative described efforts by the Food Trust and Philadelphia Health Department to implement policies (i.e., bringing full-service grocers and farmer’s markets to low-income areas and offering grants to local stores to offer fresh produce and healthy snacks) to address the challenge of food deserts in the city. The stories described estimates of the impact of these initiatives for the local economy. They did not report on the health impact of these initiatives because these data were not yet available; the stories described only the evidence available to date. The stories concluded by suggesting that statewide legislation would be needed to expand these programs to other communities.

The individual narrative described Jason Footes, a real Philadelphia youth who was the focus of one of the original source news articles (Faison, 2010). The individual narrative described Jason’s discomfort with his weight, his efforts to get healthy, and the challenges that he faced in his challenging neighborhood environment in losing weight (Appendix A). The community narrative focused on Philadelphia children more generally but provided equivalent information (i.e., discomfort with their weight, making an effort to get healthy, and facing challenges in their neighborhood environments; Appendix B). Where possible, we kept the wording identical or as similar as possible. The stories were of comparable length, although the individual narrative was longer (497 vs. 452 words) due to the nature of individual (requiring some character detail—age, height, weight, and specific quotes) versus community stories.

Those assigned to the statistical map were also shown, after the story’s verbal description, a map (with accompanying verbal explanation) that conveyed the prevalence and geographic distribution of food deserts across the United States. The image and description were taken from the Food Access Research Atlas, a resource produced by the USDA ERS (2013).

After reading the story, respondents listed up to three thoughts that occurred to them as they read the message and answered questions about their support for policies to reduce obesity, political party affiliation and ideology, and basic demographics (including height and weight, from which we calculated body mass index [BMI], a measure of weight status). Those assigned to the control condition proceeded directly to the questionnaire without reading a message.

### Study Participants

Table 2 describes the demographics of the sample and population of state legislators (as of February 2012) from which participants were drawn. The first data column

TABLE 2  
Demographics of Study Participants ( $N = 496$ )

	Sample Percentage ( $n$ ), or Mean ( $SD$ )	Population Percentage	Test for Difference Between Sample and Population
Political office			$\chi^2(1) = 68.1, p < .001$
State senate	26.6 (132)	45.5	
State house or assembly	73.4 (364)	54.5	
Political party			$\chi^2(3) = 98.4, p < .001$
Republican	36.7 (182)	54.1	
Democrat	60.1 (298)	43.4	
Independent	1.6 (8)	0.3	
Something else	0.2 (1)	2.2	
Female sex	34.5 (171)	24.0	$\chi^2(1) = 31.9, p < .001$
Age (mean)	55.7 (11.7)		
Highest formal education			
Some college or less	14.8 (73)		
Bachelor's degree	34.8 (171)		
Master's degree	26.4 (130)		
Professional or doctorate degree	24.0 (118)		
Race/ethnicity			
White, Non-Hispanic	85.7 (401)		
Black, Non-Hispanic	8.1 (38)		
Asian, Non-Hispanic	8.0 (1.7)		
Hispanic	2.4 (11)		
2+ Races, non-Hispanic	2.1 (10)		

*Note.* All sample characteristics are percentages with sample sizes in parentheses, except for age, which is a mean (standard deviation in parentheses). We used chi-squared to test for differences between the sample and population.

describes sample demographics, the second describes population demographics, and the third presents results from one-sample chi-squared tests comparing the sample to the population (where the available data permitted these comparisons). The sample overrepresents women, members of the state house of representatives or assembly, and Democrats relative to the state legislator population, but still contained a reasonable number ( $>180$ ) of legislators from the two major political parties. The majority of the sample was non-Hispanic White. None of the effects of message design (narrative focus or statistical map) differed by demographics or political party, and randomized conditions were equivalent for all observed demographic and political characteristics (using chi-squared or  $t$ -tests, depending on the level of measurement).<sup>3</sup> We thus do not consider these variables further in the analysis.

## Measures

### *Cognitive Responses*

We asked participants to type up to three thoughts, using complete sentences where possible, that occurred to them

<sup>3</sup>We measured a variety of other state legislator characteristics, including details about their political history and future political goals (e.g., number of previous terms in office, desired number of future terms) and their own weight status. None differed by condition.

as they read the story (Cacioppo, von Hippel, & Ernst, 1997). A team of undergraduate coders classified each thought ( $N = 1,491$ ) into one or more of three categories: (a) internal attributions (thoughts focused on individual, controllable (not genetic) causes or solutions for obesity), (b) external/environmental attributions (thoughts focused on causes or solutions for obesity external to the individual, including but not limited to food deserts or policies to address them), and (c) counterarguments (thoughts that directly refuted external/environmental attributions or conveyed irritation toward Jason or Philadelphia youth in being portrayed as a beneficiary of a community intervention to change the environment). We focused on attributions in general, not just those thoughts specific to the policies under debate, in light of previous research showing that these attributions frequently occur in response to obesity-related narratives and are strong predictors of support for obesity-related policies (e.g., Niederdeppe et al., 2011). In addition, the narratives alluded to a variety of external/environmental causes and solutions, not just policies designed to reduce food deserts.

Coders double-coded each thought; we resolved all disagreements by consensus. Coder reliability was acceptable for each coding decision (Krippendorff's  $\alpha_{\text{internal}} = .86$ ;  $\alpha_{\text{external}} = .83$ ;  $\alpha_{\text{counter}} = .68$ ). From these codes we created four mutually exclusive categories: (a) counterarguing, (b) complex integration (thoughts that combined external

and internal attributions without refutation), (c) simple elaboration (thoughts only about external attributions without refutation), and (d) counterelaboration (thoughts that focused exclusively on internal attributions without refuting external ones). Respondents engaged in more simple elaboration ( $M = 1.01$  thoughts per respondent,  $SD = .93$ ;  $n = 555$  total thoughts) and complex integration ( $M = .83$ ,  $SD = .87$ ;  $n = 458$  thoughts) than counterelaboration ( $M = .38$ ,  $SD = .67$ ;  $n = 208$  thoughts) or counterarguing ( $M = .21$ ,  $SD = .50$ ;  $n = 120$  thoughts; Table 1).

### *Support for Public Policies to Reduce the Prevalence or Impact of Food Deserts*

We asked respondents about their support for a series of 10 randomly ordered policies that have been proposed to address rates of obesity in recent years (Eyler et al., 2012). Respondents were asked: "Many different ideas have been proposed to address the number of children who are overweight in the US. Please indicate whether you strongly oppose (1), oppose (2), neither oppose/support (3), support (4), or strongly support (5) each of the following policies." Within this set of 10 policies, we focus on three that were specifically described in the stories and have been proposed to reduce the prevalence of food deserts. The first, termed "farmer's markets" throughout the article, would "support the sale of local foods across the community by offering incentives to encourage the establishment of farmers' markets" ( $M = 4.02$ ,  $SD = 1.01$ ). The second, described heretofore as "healthy product grants," would "provide grants to encourage independently owned grocery stores to sell healthy products that match local customers' preferences and tastes" ( $M = 3.32$ ,  $SD = 1.16$ ). The third, described heretofore as "full service grocer initiatives," would "provide incentives for full-service grocery stores to open locations in communities with limited access to healthy foods" ( $M = 3.66$ ,  $SD = 1.11$ ). We examined these items separately in light of the potential for the messages to influence them differently.

### Analytic Approach

We tested H1 through H4 (interactions between narrative focus and the statistical map in predicting cognitive responses and support for the three policies targeting food deserts) with a series of analyses of variance (ANOVAs) that featured independent variables for narrative focus (community coded 1, individual coded 0), statistical map (presence coded 1, absence coded 0), and an interaction term between them. These models excluded the control group, since these individuals did not have a message to respond to. We considered a statistically significant interaction ( $p < .05$ ) between the two message design characteristics, as well as a significant overall  $F$ -test for the model ( $p < .05$ ), to be evidence in support of H1 through H4. If the  $2 \times 2$  ANOVA revealed a significant interaction between narrative focus and the

statistical map, we probed the interaction with simple main effects analysis within study conditions (e.g., within individual narratives). Although not explicitly hypothesized, we tested three additional ANOVA models (one for each food desert-related policy) to test whether any conditions produced significantly higher support than the condition that did not feature a story or map (control group). In these models, we examined each possible combination of narrative focus and the statistical map separately and tested whether any of these coefficients were statistically different from the omitted, no-exposure control group.

We tested H5 in two steps. First, we examined whether each of the aforementioned cognitive responses were correlated with support for any of the three food desert-related policies. If not, they were excluded from further consideration because an association with the outcome is a necessary condition for mediation. We then used bootstrap methods with the PROCESS macro developed by Preacher and Hayes (2008), which correct for bias associated with traditional Sobel tests of mediation, to test whether interactions effects between narrative focus and the statistical map on support for food desert-related policies were explained (mediated) by cognitive responses. We calculated the indirect effects of each potential mediator and assessed whether the 95% confidence interval surrounding this estimate included zero. If the confidence interval did not include zero, we interpreted this finding as evidence for the variable being a mediator.

## RESULTS

### Testing the Interactive Effects of Narrative Focus and the Statistical Map

Table 3 presents mean levels of each dependent variable by randomized condition. Supporting H1, there was a significant interaction between narrative focus and the statistical map in predicting counterarguing,  $F(1, 368) = 5.58$ ,  $p = .02$ ,  $\eta^2_p = .03$ ). Among those who read individual narratives, adding the statistical map reduced the volume of counterarguments relative to the individual narrative without this information,  $F(1, 368) = 9.06$ ,  $p = .003$ ,  $\eta^2_p = .02$  (see Table 3). There was no difference in counterarguing by the presence or absence of the statistical map among those who read the community narrative,  $F < 1$ . Respondents in the individual narrative condition without the statistical map engaged in more counterarguing than each of the other three other conditions (vs. individual with the statistical map,  $p = .007$ ; vs. community with the statistical map,  $p = .005$ ; vs. community without the statistical map,  $p = .001$ ; all of these pairwise contrasts were conducted using a Bonferroni correction).

Supporting H2, there was a significant interaction between narrative focus and the statistical map in predicting simple elaboration,  $F(1, 368) = 5.00$ ,  $p = .03$ ,  $\eta^2_p = .01$ . Adding the statistical map to an individual narrative



TABLE 3  
Thoughts and Intended Persuasive Outcomes (Policy Support) by Study Condition

	<i>Community, Map, M (SD)</i>	<i>Community, No Map, M (SD)</i>	<i>Individual, Map, (SD)</i>	<i>Individual, No Map, M (SD)</i>	<i>Control, M (SD)</i>
<b>Thoughts</b>					
Simple elaboration*	1.25 (0.99)	1.27 (1.00)	1.33 (0.94)	0.91 (0.84)	–
Complex integration*	0.82 (0.80)	0.77 (0.90)	0.73 (0.82)	1.13 (0.94)	–
Counterelaboration	0.20 (0.42)	0.22 (0.51)	0.24 (0.52)	0.30 (0.58)	–
Counterarguing*	0.22 (0.49)	0.19 (0.42)	0.22 (0.51)	0.46 (0.69)	–
<b>Policies</b>					
Local food sales	4.09 (0.97)	4.13 (0.86)	3.98 (1.07)	3.97 (1.06)	3.96 (1.07)
Healthy product grants*	3.34 (1.20)	3.61 (1.28)	3.35 (1.16)	3.10 (1.03)	3.24 (1.08)
Full-service grocer incentives+	3.66 (1.06)	3.94 (0.97)	3.72 (1.08)	3.58 (1.23)	3.59 (1.09)

Notes. Significance: *asterisk* denotes significant interaction between narrative focus and use or not of the statistical map using OLS regression at  $p < .05$ , two-tailed test; + denotes  $p = .068$ .

increased the volume of simple elaboration compared to the individual narrative without this information  $F(1, 368) = 9.13, p = .003, \eta^2_p = .01$ . There was no difference in simple elaboration by the presence or absence of the statistical map among those who read the community narrative,  $F < 1$ . Respondents in the individual narrative condition without the statistical map engaged in less simple elaboration than the three other conditions by at least a marginally significant margin (vs. individual with the statistical map,  $p = .01$ ; vs. community with the statistical map,  $p = .09$ ; vs. community without the statistical map,  $p = .04$ ; all of these pairwise contrasts were conducted using a Bonferroni correction).

Rejecting H3, the interaction between narrative focus and the statistical map was not a significant predictor of counterelaboration,  $F(1, 368) < 1$ . Although not hypothesized, there was also a significant interaction effect on complex integration,  $F(1, 368) = 6.24, p = .01, \eta^2_p = .02$ . Adding the statistical map to the individual narrative increased complex integration relative to the individual narrative without it,  $F(1, 368) = 9.96, p = .002, \eta^2_p = .03$ . There was no difference in complex integration by the presence or absence of the statistical map among those who read the community narrative,  $F < 1$ . Respondents in the individual narrative condition without the statistical map engaged in more complex integration than two of the other three other conditions (vs. individual with the statistical map,  $p = .02$ ; vs. community with the statistical map,  $p = .13$ ; vs. community without the statistical map,  $p = .03$ ; all conducted with a Bonferroni correction).

H4 received partial support. The interaction between narrative focus and the statistical map was a significant predictor of support for healthy product grants,  $F(1, 365) = 4.41, p = .04, \eta^2_p = .01$ , and a marginally significant predictor of support for full-service grocer initiatives,  $F(1, 365) = 3.34, p = .07, \eta^2_p = .01$ , but the interaction was not significant in predicting support for local food sales,  $F(1, 367) < 1$ . None of the pairwise comparisons between conditions with

and without the statistical map, however, were significantly different within the individual narrative conditions, although the patterns were comparable to those observed for cognitive response. None of the ANOVAs including all five conditions found any statistically significant differences between any of the four message conditions or and the no-exposure control group ( $ps > .17$ ).

#### Testing for Mediated Moderation

Table 4 shows patterns of association between cognitive response variables and all three policies. As expected, counterarguing and counterelaboration were negatively associated with all three policies, while simple elaboration was positively associated with them ( $ps < .05$ , two-tailed). Complex integration, however, was not associated with support for any of the policies. We thus are able to rule out both counterelaboration (since it did not differ by randomized condition) and complex integration (since it was not associated with policy support) as potential mediators of the observed relationships between message design features and support for food desert-related policy. We also focus on the two policies, healthy product grants and full-service grocer incentives, for which the interaction between narrative focus and the statistical map was at least marginally significant, excluding farmer's markets from further consideration.

Testing for mediation between an interaction (narrative focus, conceptualized as the treatment, by the statistical map, conceptualized as the moderator), multiple explanatory variables (counterarguing and simple elaboration), and discrete outcomes (support for specific policies) is called mediated moderation (Preacher & Hayes, 2008). Two conditions are required to establish the form of mediated moderation being tested here: (a) The effect of treatment on the mediators depends on the moderator, and (b) the moderation of the residual direct effect of the treatment should be reduced when controlling for the indirect effect of the mediators

TABLE 4  
Correlation matrix among narrative conditions (n = 372)

	<i>Complex Integration</i>	<i>Counter-Elaboration</i>	<i>Counter-Arguing</i>	<i>Local Food Sales</i>	<i>Healthy Product Grants</i>	<i>Full-Service Grocer Incentives</i>
Simple elaboration	-.31***	-.32***	.06	.12**	.15**	.13**
Complex integration	1.00	-.19***	.25***	.05	.02	.03
Counterelaboration		1.00	-.10*	-.16***	-.15**	-.21***
Counterarguing			1.00	-.24***	-.32***	-.34***
Local food sales				1.00	.62***	.66***
Healthy product grants					1.00	.71***
Full-service grocer incentives						1.00

Note. Significance: asterisk denotes correlations significantly different from zero at  $p < .05$  using a two-tailed test; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

(whether or not this effect is moderated). A significant, overall effect of treatment on the outcome being dependent on the moderator, when mediators are not included in the model, is not required (Preacher & Hayes, 2008), although we did see such evidence (with at least marginal statistical significance) for support for healthy product grants and full-service grocer incentives.

As described above, we used the PROCESS macro for SPSS to examine these conditions. First, previous OLS regression models had already established that the effect of narrative focus on both counterarguing (H1) and simple elaboration (H2) was moderated by the statistical map (establishing condition 1). Second, the interaction between narrative focus and the statistical map became nonsignificant for support for both healthy product grants and full-service grocer initiatives when controlling for indirect effects of counterarguing and simple elaboration.

For healthy product grants, the residual direct effect of the interaction on policy support, when controlling for both of the proposed mediators, was not significant ( $B = .19$ ,  $p = .40$ ; reduced from  $B = .51$ ,  $p = .04$  when the mediators were not included). Using a 95% confidence interval (CI) and 5,000 bootstrap resamples, the CIs for the overall indirect effects of counterarguing ( $B = .23$ , CI from .07 to .45) and simple elaboration ( $B = .09$ , CI from .02 to .21) did not include zero, establishing these variables as significant mediators of this relationship. Combined with the nonsignificant residual direct effect of the interaction, these results are consistent with full mediation of support for healthy product grants.

For full-service grocer initiatives, the residual direct effect of the interaction on policy support, when controlling for both of the proposed mediators, was not significant ( $B = .13$ ,  $p = .55$ ; reduced from  $B = .43$ ,  $p = .07$  when the mediators were not included). The 95% CIs for the indirect effects of counterarguing ( $B = .24$ , CI from .06 to .47) and simple elaboration ( $B = .06$ , CI from .01 to .16) did not include zero, again establishing these variables as significant mediators of this relationship. Along with the nonsignificant residual direct interaction effect, findings are again consistent with full mediation of support for full service grocer initiatives.

## DISCUSSION

This study provides evidence that the relative impact of variations in narrative focus (individual versus community-focused narratives) depends on whether or not statistical prevalence information (presented in the form of a GIS map depicting the location of food deserts in the United States) accompanies it. In the context of state legislator responses to messages promoting policy to reduce the prevalence and impact of food deserts, the presence of a statistical map mattered only when combined with an individual narrative. The image was less influential when combined with a story describing the impact of food deserts (and remedies for them) on a community at large. The addition of statistical information reduced the tendency for state legislators to counterargue the individual narrative and increased the extent to which their thoughts focused on the intended persuasive theme of the message, environmental causes of obesity and policy solutions to address them. These cognitive processes, in turn, predicted the degree to which policymakers supported policies to reduce food deserts in the United States.

It is noteworthy that this pattern of effects was consistent for two policies, healthy product grants and full-service grocer initiatives, but not for promoting the proliferation of farmer's markets. We offer a speculative explanation for this pattern. State legislators' support was higher for farmer's markets than for the other two policies to address food deserts. Farmer's markets have been among the most popular state-level obesity-prevention policies in recent years, perhaps reflecting previous debates about the merits of these policies, their political feasibility, and/or other factors (Eyler et al., 2012). High levels of support (>4 on a 5-point scale), along with the potential for previous exposure to arguments about the merits of these policies, may have created a ceiling for the effects of the messages presented in this study.

We did not observe any differences in effects on cognitions or policy support by political ideology, a somewhat surprising finding in light of existing differences in support for policies targeting social causes of obesity (Welch et al., 2012) and previous studies testing messages that emphasize

these causes (Niederdeppe et al., 2011, 2013). One possibility is that this reflects the composition of study respondents. It seems likely that legislators who were already concerned and informed about childhood obesity chose to participate in a study on the subject, which in turn could have minimized partisan differences in response to the messages.

We also observed an unexpected interaction between narrative focus and the presence of statistical information on complex integration, thoughts that integrated both individual and societal causes and/or solutions for obesity. At the same time, these thoughts did not predict increased (or decreased) support for any of the food desert-related policies studied here. This finding runs counter to a previous study where a narrative designed to integrate information about individual and environmental determinants of obesity increased the number of respondents who engaged in complex integration, which in turn predicted increased support for policies targeting obesogenic environments (Niederdeppe et al., 2013). The narratives tested in the current study, while acknowledging individual decisions about diet and exercise, did not focus on the complex and interactive nature of obesity's determinants, emphasizing policies that target environmental determinants of the problem. Although we can only speculate, complex integration may only matter when communicators make a strategic effort to convey information about the complex and interrelated nature of individual decisions and the social, economic, and physical environments in which they are made. This possibility warrants further research.

### Theoretical Implications

The current study offers both theoretical and practical implications for the use of narrative and statistical evidence in health-related policy debates. Theoretically, it describes cognitive pathways through which narrative persuasion may occur. The fields of communication and psychology have focused considerable attention on responses to individual characters within a narrative, emphasizing the importance of identifying, empathizing, and perceiving oneself as similar to a narrative's main protagonist (Cohen, 2001; Moyer-Gusé, 2008). While we have no doubt that thoughts and feelings about a specific character are likely to be consequential in some types of stories, the fact that at least two studies (Niederdeppe et al., 2012; and the current study) find evidence that people process individual and community stories differently, at least in the absence of supporting statistical information, suggests that connections with specific individuals may not play a central role in all types of narratives. Thoughts about how a story's plotline conveys causal information may be particularly meaningful for community-focused narratives.

Findings also highlight the conditional nature of statistical impact on policy beliefs. Previous meta-analytic research has asked whether narrative or statistical evidence is more persuasive (Allen & Preiss, 1997; Allen et al., 2000). Our findings suggest that other questions may be more germane:

Under what conditions do narrative and statistical evidence matter more, and when is their combined impact greater than the sum of their parts (Hoeken & Hustinx, 2009)? Narratives can take many different forms, placing different emphasis on character, plot, setting, emotional tone, voice, and quality. Statistical data can also serve a variety of functions, from documenting the prevalence of an object or behavior, to showing relationships between variables, to offering evidence to support a particular causal explanation. Future theorizing might consider both the form and function of narrative and statistical evidence in predicting the nature of their impact.

### Practical Implications

Practically speaking, the current study highlights the challenge involved with persuading policymakers (who have limited time and desire concise and efficient forms of information; Brownson et al., 2006). It also illuminates both the promise and potential limitations of using personal stories and GIS maps to convey prevalence and causal information about social issues.

Narratives and statistics are commonly utilized in health policy debates, although these forms of evidence are often used strategically to support a particular perspective on an issue (Brownson et al., 2006). Public health advocates seek to promote evidence-based public policies by conveying the prevalence and impact of factors that influence health, including characteristics of the environment. Policymakers seek short and concise summaries of evidence in narrative and statistical form (Brownson et al., 2006; Stone, 2002), yet none of the messages studied here were successful at increasing support for food desert-related policies relative to a no-exposure control group. While it is possible that the narratives and statistical map used here were not as persuasive as they could possibly be, findings may also underscore the difficulty of using short, mediated messages to influence state legislators' views on a complex topic. While evidence can play a role in policymaking, legislative decisions are also based on a wide variety of other factors, including the political climate, core values, and the desire to be reelected to office, to name a few (Brownson et al., 2006). At the same time, the fact that none of the messages increased policy support relative to the control group does not render these findings of no value. To the contrary, understanding patterns of cognitive response to narratives and statistical maps offers valuable lessons for future efforts to bring evidence to bear on health and social policy debates.

Our findings highlight the potential limitations of individual anecdotes, in isolation, in health policy debates. State legislators offered more counterarguments to the individual narrative (without the statistical map) than the other conditions. They were also less likely to focus their thoughts on environmental determinants of obesity (simple elaboration of the message's intended theme) in response to the narrative depicting a single individual (without the image), including

the potential for policy to reduce the number and impact of food deserts in local communities. This is not to say that personal stories about single individuals have no role to play in policy debates; rather, the current study suggests that when used, they could be accompanied by additional information to convey the prevalence of the problem depicted in the narrative. Public health officials and advocacy groups may be well served to pair individual stories with other forms of evidence (e.g., statistical prevalence data) in an effort to maximize the likelihood of policymakers engaging with their policy argument and reducing the likelihood of countering it.

### Study Limitations

The study response rate was low (under 7%), and the sample was biased toward women, members of the state house of representatives or assembly, and members of the Democratic Party (relative to the population of state legislators as of February 2012). While we cannot claim that the sample is representative of all state legislators, the sample was politically diverse and featured both normal and overweight legislators. Random assignment further ensured that the causal interpretation of message effects is not due to demographic differences between study conditions, which did appear to produce balanced groups, and we found no evidence that message effects were moderated by demographics, suggesting that effects were consistent across groups.

We exposed respondents to only a single, mediated message at a single point in time, which is not likely to reflect the reality of policy debates in U.S. states. We made an effort to keep the study short to maximize the likelihood of participation. Nevertheless, this decision may have reduced the likelihood of a single message having a large, sustained impact on state legislators. This decision also limited our ability to test alternative mechanisms through which narrative persuasion may occur, including emotional responses and character perceptions, or longer term effects of message exposure. Furthermore, we did not test the impact of narrative and statistical information conveyed interpersonally—the mode in which many communicators engage in strategic policy advocacy. Future work should test the impact of both the source of narrative and statistical messages, and whether the mode of delivery changes their impact.

We focused attention on cognitive responses as mediators of message effects in an attempt to test narrative persuasion theory and to connect these responses, indirectly, to policy outcomes. However, this limits the extent to which we can make claims about the effectiveness of narrative and statistical forms of evidence in shaping policy decisions among state legislators. Future work should gauge the impact of policymaker responses to strategic messages over a longer period of time that encompasses various stages of the policy process: policy formation, formal introduction into legislative debate, the debate itself, passage, and implementation.

## CONCLUSIONS

This study indicates that the focus of a narrative (an individual versus a larger community) interacts with the presence or absence of statistical prevalence information to shape cognitive responses among state legislators and, in turn, their support for obesity-related policies. These findings invite future research to test how specific elements of narrative design for policy advocacy may influence attitudes about political issues via theory-driven cognitive mechanisms.

## FUNDING

This work was supported by the Robert Wood Johnson Foundation via a grant to the University of Wisconsin Population Health Institute entitled “Mobilizing Action Toward Community Health (MATCH).” The funder played no role in the collection, analysis, or interpretation of these data, in the writing of the article, or in the decision to submit it for publication. We are grateful to Cornell’s Survey Research Institute (SRI) for managing study recruitment, respondent follow-up, data management, and data cleaning, and to Kristen Holl and Sarah Saulsbury for their assistance with thought-listing content coding.

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## How Narrative Focus and a Statistical Map Shape Policy Support among State Legislators

### Appendices

#### Appendix A

##### *Individual-Focused Narrative*

##### **Jason's Story**

Jason Footes of Philadelphia was a pudgy child who grew into an overweight teen. By the time he turned 12, a doctor's visit revealed that Jason stood at 5 feet, 4 inches tall but weighed 164 pounds, putting him in the obese category.

"I felt out of the ordinary, especially when I tucked in my shirt," Jason recalled recently. "I felt too big and wanted to do something about it."

The family made changes to their diet and daily routines to build in more physical activity. However, Jason and his family also discovered that good health takes more than motivation or a wise doctor. It also depends on environmental factors like where a person lives, works and plays.

Although obesity is most prevalent in Southern states and rural areas, it has a chokehold on the city famous for cheesesteaks and soft pretzels. In Philadelphia, the number of obese children is double the national rate.

In addition, the Footes family lives in what some experts call a "food desert" for its lack of healthy dietary choices. Fast-food and pizza shops dominate their neighborhood. With the nearest grocery store out of sight, the most convenient options are corner stores and mini-markets, which are overpriced and poorly stocked.

"The worst food that you could possibly eat for nutrition they make it easy for you to get to," said Jason's father, Ben, 56, a U.S. Postal Service mail handler who does the family's grocery shopping. "On every other corner, you can pick up a cheesesteak, fries, pizza, or chicken wings."

Obesity experts have conducted studies which find that high-calorie foods and beverages are heavily advertised, and healthier options are harder to find in many low-income communities.

[Randomly assigned to presence or absence of a statistical map; see Appendix C]

##### **Addressing the Food Desert Problem in Jason's Neighborhood**

Fortunately for Jason, there is help. The Food Trust and the Philadelphia Health Department are transforming Jason's

neighborhood by bringing in a supermarket and starting weekly farmer's markets. They are also seeking to help upgrade 1,000 corner stores. Store owners can apply for grants to have new shelves installed for fresh vegetables and healthy snacks or refrigerators to store more water and fruits. These resources make it easier for Jason and his family to access affordable, healthy foods like fresh fruits and vegetables.

The Food Trust has worked with several grocery stores to expand their operations and offer more fresh food and healthy options to the community. In addition, the stores help boost the economy in these areas by bringing in jobs. The projects are expected to bring 3,723 jobs and over 1.2 million square feet of fresh food retail across Pennsylvania.

Advocacy groups have been pushing for statewide legislation to build on this successful program.

These initiatives rest on the premise that people will choose healthier options if they are offered to them. Will they choose them? Until millions of Americans living in food deserts have that choice, we won't know.

#### Appendix B

##### *Community-Focused Narrative*

##### **A Philadelphia Story**

Philadelphia children are growing into overweight teenagers. Many young people are learning from their family doctors that their weight puts them in the obese category.

These teenagers often feel out of the ordinary, uncomfortable in their own skin. They feel too big and want to do something about it.

Philadelphia teens and their families can make changes to their diet and daily routines to build in more physical activity. However, many have discovered that good health takes more than motivation or a wise doctor. It also depends on environmental factors like where a person lives, works and plays.

Although obesity is most prevalent in Southern states and rural areas, it has a chokehold on the city famous for cheesesteaks and soft pretzels. In Philadelphia, the number of obese children is double the national rate.

In addition, many Philadelphia families live in what some experts call "food deserts" for their lack of healthy dietary choices. Fast-food and pizza shops dominate these neighborhoods. With the nearest grocery store out of sight, the most convenient options in these locations are corner stores and mini-markets, which are often overpriced and poorly stocked.

For instance, on many corners a person can pick up a cheesesteak, fries, pizza, or chicken wings. Fresh fruit and vegetables are very rarely found in these stores.

Obesity experts have conducted studies which find that high-calorie foods and beverages are heavily advertised, and healthier options are harder to find in many low-income communities.

[Randomly assigned to presence or absence of a statistical map; see Appendix C]

### Addressing the Food Desert Problem in Philadelphia

Fortunately, there is help. The Food Trust and the Philadelphia Health Department are transforming neighborhoods by bringing in new supermarkets and starting weekly farmer's markets. They are also seeking to help upgrade 1,000 corner stores. Store owners can apply for grants to have new shelves installed for fresh vegetables and healthy snacks or refrigerators to store more water and fruits. These resources make it easier for Philadelphia families to access affordable, healthy foods like fresh fruits and vegetables.

The Food Trust has worked with several grocery stores to expand their operations and offer more fresh food and healthy options to the community. In addition, the stores help

boost the economy in these areas by bringing in jobs. The projects are expected to bring 3,723 jobs and over 1.2 million square feet of fresh food retail across Pennsylvania.

Advocacy groups have been pushing for statewide legislation to build on this successful program.

These initiatives rest on the premise that people will choose healthier options if they are offered to them. Will they choose them? Until millions of Americans living in food deserts have that choice, we won't know.

### Appendix C

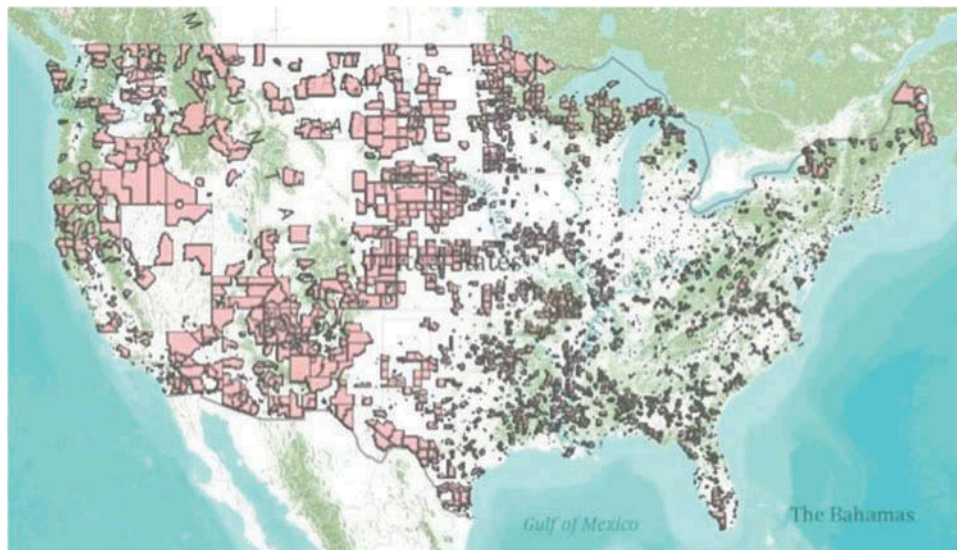
*Statistical Map and Description Showing the Prevalence of Food Deserts in the U.S.*

#### Food Deserts are Found in Every State

The city of Philadelphia is not the only place where food deserts can be found – all US states have them.

The U.S. Department of Agriculture's Economic Research Service released a "Food Desert Map" earlier this year, revealing a stunning 6,500 food deserts that exist across the country.

13.5 million people have limited or no access to supermarkets or grocery stores.



This map, based on data from the U.S. Census Bureau, shows areas in the continental 48 states where at least 20 percent of families are at or below the federal poverty line, or make 20 percent less than the median families in surrounding areas, and a third of the families in that area are a mile away from a supermarket in urban areas, or 10 miles away in rural areas.