# THE ADEQUACY OF OBESITY CONTENT FOR THE GENERAL PUBLIC ON STATE PUBLIC HEALTH DEPARTMENT WEBSITES

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## ABSTRACT

This applied research study investigates the current state of online obesity information available to the general public as content on state public health department websites. The study provides insight into whether or not these sites provide access to consumer-targeted obesity prevention information to combat the current obesity epidemic in the United States. The states with the ten highest obesity rates were examined (CDC, 2014). Most of their sites did not mention obesity on the home page, lacked clear navigation for the word "obesity," or failed to provide current obesity-related consumer information. Health professionals, rather than consumers, were the predominate target audience. Recommendations for improving these sites include: increased focus on obesity information for consumers, links to obesity information on the home page, improved navigation to obesity content, increased quality of obesity content, and more interactive features on the site or on auxiliary sites to engage consumers.

## INTRODUCTION

For almost two decades, obesity has held the status of a public health epidemic by the Centers for Disease Control (CDC) (Dietz, 2015). According to "The State of Obesity Report," no state had an obesity rate above 15 percent in 1980. Currently, more than 34.9 percent of adults, or 78 million Americans, are obese and nearly 17 percent of 2 to 19 year-olds are obese (Ogden, Carroll, Kit, & Flegal, 2014). The United States needs to increase efforts to address the problem.

Obesity is one of the leading causes of death in the United States. Masters, Reither, Powers, Yang, Burger, and Link (2013, p. 1900) estimated that "obesity accounted for a large share of US adult mortality in recent decades—about 18% of all deaths between ages 40 and 85 years during the time period 1986 to 2006." The economic cost of obesity is estimated to be over 147 billion dollars per year in the United States (Cawley & Meyerhoefer, 2012).

Schwarte, Samuels, Boyle, Clark, Flores, & Prentice (2010) identify state public health departments as potential change agents in obesity prevention by advocating healthier lifestyles

consisting of consumers eating healthier foods and engaging in beneficial physical activity to decrease disease and maintain health. At the same time, experts maintain that "funding and staff skill may influence the degree of public health department engagement in obesity prevention" (Schwarte et al, 2010, p. E17). Public health departments as agents of civic engagement are expected to use online communication as a tool to provide consumer accessible and helpful health information. Research calls for civic websites such as state public health agency websites to move beyond functional usability to productive usability, which "allows citizens to access information but also provides guidance for them to understand and use that information" (Simmons & Zoetewey 2012, p. 271).

Owned media are online communication such as websites and social media platforms on which organizations create content for their audiences. The websites of public health departments and their social media pages are considered owned media. Research indicates that good quality content on owned media can provide a successful communication channel to reach and engage online audiences (Baetzgen & Tropp, 2015). When online content fails to provide useful information to users, it is considered a "content gap" (Atkinson, Saperstein, Desmond, Gold, Billing, & Tian, 2009). Given that content-centric factors are important in gaining audience engagement in organizational media messages, this case study examines how state public health departments are using their owned media to provide online content that educates and guides its publics to combat obesity. Additionally, this study provides insight into how state public health departments can better utilize online communication to address obesity as a public health crisis.

Since there is scant research on how state public health departments utilize owned media to address chronic public health crises, a descriptive case study method for data collection and analysis is employed. Case studies are well-suited to exploratory research seeking to identify and explain system complexities within set contexts (Rowley, 2002; Stake, 2005). Applying a cross-case instrumental case study, an analysis of state public health department websites was conducted on ten states in the United States ranked the highest in obesity according to the CDC 2014 report. After findings are presented, recommendations for improvements are provided.


**LITERATURE REVIEW: eHEALTH, PUBLIC HEALTH, AND OBESITY**


Regular evaluation of web-based health information is an effective process for improving health information resources meant for the public (Rosenfeld, Shepherd, Agunwamba, & McCray, 2013). eHealth can function as a means of informing the public about health concerns and motivating people to change their behaviors (Enwald & Huotari, 2010). eHealth is an emerging field crossing multiple disciplines, including information technologies, public health, business, supporting health services, and information delivered though web-based technologies to improve healthcare (Boogerd, Arts, Engelen, & van de Belt, 2015). In particular, eHealth has potential because "reducing the burden of chronic disease involves engaging patients and consumers in health promotion activities (e.g., healthy eating and increased physical activity) which require sustained behavior change" (Ahern, Kreslake, & Phalen, 2006). Websites, mobile health applications, social media platforms, and online social support networks can provide individuals

with information resources to gain greater control of their health (Gallant, Irizarry, Boone, & Kreps, 2011; Kreps & Neuhauser, 2010; Nagler, Ramanadhan, Minsky, & Viswanath, 2013).

Throughout the history of the Internet, searches for health and medical information have ranked as one of the most common online user activities (Akerkar & Bichile, 2004; Gallant, Irizarry, & Boone, 2008). People with a medical condition conduct online searches for health information more than healthy individuals (Goldner, 2006).

Audiences interested in tailored health information are enthusiastic and interested in online materials designed for their needs (Atkinson et al, 2009). This aligns with an important reason people use information technologies. Perceived usefulness of an information technology is defined as the degree a person deems a technology will enhance a task (Wang, Wang, Lin, & Tang, 2003). Perceived usefulness also is a strong predictor of why people use websites (Gefen, Karahanna, & Straub, 2003); thus, as an online task, healthcare consumers search to gain knowledge about their health and medical conditions (Nash & Gremillion, 2004). Given the use of the Internet to gain health information, health professionals need to use their websites and social media accounts to inform and engage people seeking health information.

"eHealth communication provides a new means to prevent obesity from becoming a global epidemic" (Enwald & Huotari, 2010). While social media also are considered owned media, state public health departments rarely use social media to communicate health information to their publics. A study of 281 public relations professionals from state public health departments in 48 states concluded that social media has a low adoption rate with only 17 percent of practitioners using social media to disseminate health information (Avery, Lariscy, Amador, Ickowitz, Primm, & Taylor, 2010).

Users can use online health information to evaluate personal health risks with the best practices connecting risk evaluations to more in-depth patient information (Holmberg, Harttig, Schulze, & Boeing, 2011). Evaluations of online health information have revealed numerous important issues discouraging its productive use: "inconsistent, incorrect or outdated content, high literacy demands of the presented content, confusion about the intended audience, lack of interactivity problems with layout and navigation, and overall design flaws" (Rosenfeld et al, 2013, p. 975).

Content should be updated continuously and meet the literacy needs of the target audience. An appropriate audience analysis to provide strategic alignment between online content and audience engagement goals, such as promoting healthy lifestyle changes to reduce obesity, should be evident on websites. Online audience activity and targeting are database driven analyses which rely on different organizational and diffusion patterns for informational messaging than in traditional mass media channels and contexts (Gallant & Boone, 2011). The organizational patterns or information architecture of a website has an impact on navigation and overall user interaction. Poor website usability, especially on health websites, decreases user trust and credibility (Gallant, Irizarry, & Kreps, 2007), which in turn can affect the credibility of the website's owners.

**RESEARCH QUESTION**

What is the extent of obesity-labeled content available to consumers on the websites of state public health departments in ten states in the U.S. with the highest obesity levels?

**METHOD**

A case study is an empirical inquiry used for exploratory research to gather insight where there is little established research (Rowley, 2002; Yin, 2009). Case studies provide insight into a system's complexities within environmental contexts (Stake, 2005). To be methodologically sound, the boundaries of the case need to be well defined (Culter, 2004; Stake, 2005). In applied communication research, important boundaries are: the institution or practitioner; the identified time line of a project; and, "the issue or campaign being focused upon" (Culter, 2004, p. 368). Further, a case study focusing on a particular situation provides a delineated analysis of a phenomenon (Culter, 2004; Yin, 2009).

Yin (2009) states four functions of case studies: 1) to explain; 2) to describe; 3) to illustrate; and 4) to enlighten. The most important application of a case study is to explain the "causal links in real-life interventions that are too complex for the survey or experimental strategies" (Yin, 2009, p. 19). The primary focus of this case study on state public health departments' earned media is to analyze how website content, layout, and navigation relate to obesity-labeled information intended for the public. Social media platforms also are appraised for obesity-labeled content.

The descriptive function defines the intervention or phenomena and the "real-life" context in which it happened. Illustrating provides a descriptive mode in which multiple parts of a case can be explored. The last application, *enlighten*, provides feedback on interventions and program situations with no clear set of outcomes.

This case study of state public health departments' earned media fulfills these functions by analyzing how website content, layout, and navigation relate to obesity-labeled information available to consumers. Social media platforms also are appraised for obesity information content. The environmental context is the long-standing national public health crisis in obesity. An illustrative example is the case concentrations on ten states in the U.S. ranked the highest in obesity according to the CDC 2014 report. Within the framework of the findings, the discussion section presents recommendations for how state public health departments can use earned media more effectively to reduce obesity by engaging users with access to relevant, well-designed content and online media.

Yin (2009) outlines a four-part process of case study development: case design; collecting data; analysis of data; and, reporting the data as a case study. The current research is best suited to an instrumental case study design with embedded multiple cases. An instrumental case study produces results that can foster understanding of other larger issues and disciplinary expectations (Stake, 2005). Illustrative cases are applied research which helps answer questions that researchers and practitioners need to know to advance research and practice (Stake, 2005).

The outcomes of this study can provide both theoretical insights and practice guidance. The rationale for using an embedded approach is that there is complexity to system and context (Yin, 2009). Since the use of social media and the design of websites' organizational structure, content, and interactive navigation are not standard, methods, such a content analysis and heuristic reviews, cannot capture the complexity of analyzing multiple state public health departments' owned media as catalysts for fostering changes in consumer behavior through online communication.

Data collection is framed by a directed content analysis approach which is primarily deductive in its use of predefined categories or concepts; yet, is open to the re-definition of concepts as analysis proceeds (Hsieh & Shannon, 2005).


**Directed Content Analysis Coding Categories**


The following coding categories were used in the directed content analysis:

***Mention of Obesity on Home Page.*** Did the word *obesity* appear on the home page of the state health department website? If found, the word *obesity* was noted. If *obesity* had a link on the home page, it was "clicked" to view the linked page and information. Since page layout varied among sites, linked page sections were searched, including upper banner, left, center, and right segments based on availability.

***Link to Obesity Page from Home Page.*** Is there a link on the home page that brings the user to another page with information on obesity?

***Number of Clicks to Obesity Information–Primary and Secondary Level Navigation.*** In a search using primary navigation, did the word "obesity" appear on the primary navigation bar of the state public health department website? If found, the word "obesity" was noted. If obesity on the primary navigation bar had a link, it was "clicked" to view the linked page and information. Since page layout varied among sites, linked page sections were searched, including upper banner, left, center, and right segments based on availability. In search using second tier navigation, did the word "obesity" appear ? If found, it was described. If not found on the second tier, search was under topics such as an A-Z index listing.

***Feature Box Labeled Obesity on Home Page.*** Did the home page have a feature box with "obesity" content? If found, it was noted.

***"O" in A-Z Topics Feature Opens to Obesity.*** Did the home page have an alphabetical topical subject search leading to "obesity" content? If found, it was noted.

***Link to Auxiliary Site on Obesity.*** If an auxiliary site was found, it was noted.

***Information in Top Search Results of Word* Obesity.** Information was noted.

***Social Media Links.*** Are there links on the site to social media platforms? If found, which ones?

***Search on Obesity Leads to Consumer Information on Obesity and/or Some Information on Healthy Eating and Lifestyle.*** Using the "Search" function feature, what results were generated from a search of the word *obesity*? First page results were analyzed and the first ten search results were described. When searching the word *obesity,* what links appeared? The results were analyzed and if the links brought the user to auxiliary or campaign sites, it was noted whether these were part of the state public health department site, or, if not, the type of partnering (government, grants, nonprofits, corporate health organization, or other) was noted.

***Resources.*** When information was found on obesity using any method, what types of resources were found? The results were analyzed for the presence of interactive tools, nutrition information, diet programs and tips, and physical activity information.

**FINDINGS**

The cross-case analysis shows that the ten state public health department websites do not provide an online communication vehicle effectively designed to engage consumers in fighting obesity. If obesity is mentioned there is little to no guidance to change health and behaviors; instead the content on obesity is overwhelmingly in the form of formal governmental documents reporting on obesity initiatives, statistics, policy level goals, and strategies. When state public health department websites provide content on consumer information to fight obesity, it is commonly provided in the form of auxiliary websites. These auxiliary or campaign sites often are a partnering or collaborative effort between the state public health department and another organization. Given the analysis, the answer to the research question is that there is little to no obesity-labeled content available to consumers on the websites of state public health departments in the ten states in the United States with the highest obesity levels.

More specific findings are presented in three tables and in individual case descriptions of each state's health department website. Table 1 provides findings on each coding category. Overwhelmingly, the results show a lack of obesity-labeled content and information on state public health department websites.

## TABLE 1. FINDINGS FOR DIRECT CONTENT CODING CATEGORIES

| Coding Category | Findings |
|---|---|
| **Mention of Obesity on the Home Page** | Only two out of the ten websites mention obesity on the home page. |
| **Link to Obesity Page from the Home Page** | Five out of ten websites provide a link from the home page to another page, which mentions obesity in some informational form. Most information is not directed at health consumers but is intended for healthcare officials or policy makers. |
| **Number of Clicks to Obesity Information: Primary and Secondary Level Navigation** | Navigating through the website by clicking links, other than the main navigation bar, proves difficult in finding obesity information. Using the navigation bar to reach obesity information is available on two state websites, Mississippi and Alabama. Users would not find obesity information on two websites. Users have to click either two or three levels down before reaching obesity information for seven websites. Only one website provided obesity information one click away from the home page. |
| **Feature Box Labeled Obesity on Home Page** | Two state websites, Arkansas and Mississippi, feature obesity in the main home page's content by highlighting the information in a feature box. |
| **"O" in A-Z Topics Feature Opens to Obesity** | One-half of the websites (five) provide obesity as a topic in informational guides such as health dictionaries or topical guides. |
| **Link to Auxiliary Site on Obesity** | Six websites provide links to auxiliary websites providing information on obesity. The information provided on these types of linked websites is the most consumer-friendly and tend to be part of health campaigns to prevent and decrease obesity. |
| **Information in Top Search Results of Word "Obesity"** | All of the ten websites had a search function that produced some results on obesity, but it does not lead to consumer information on obesity, such as diet, exercise, or healthy eating. |
| **Social Media Links** | Nine states out of ten had social media links on the main page or on related state public health department sites. |
| **Search Function on Obesity Leads to Citizen Consumer Information on Obesity and/or Some Information on Healthy Eating and Lifestyle** | Six of the websites produced consumer information. Four states did not have adequate consumer information on obesity (see Table 3). |

Tables 2 and 3 provide insight into user information-seeking by exploring pages and links as well as utilization of search functions. Table 2 presents findings on consumer obesity information by page browsing without using a website's dedicated search function. In other words, the website user searches for obesity-related information by reading pages and moving through the website by clicking links without using a search function. Table 3 shows whether or not each site's search function results in obesity information (e.g., diet and healthy life style behavior) that is tailored to consumers.

**TABLE 2. CONSUMER OBESITY INFORMATION WITHOUT SEARCH FUNCTION**

| | Ten States with the Highest Obesity Levels | Mention of Obesity on Home Page | Link to Obesity Page from Home Page | Number of Clicks to Obesity Information | Primary Navigation Bar Leads to Obesity Information | Feature Box Labeled Obesity on Home Page | "O" in A-Z Topics Feature Opens to Obesity | Link to Auxiliary Site on Obesity | Information in Top Search Results of Word *Obesity* | Social Media Links |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Arkansas | Yes | Yes | 2 | No | Yes | Yes | Yes | Yes | Yes |
| 2 | West Virginia | No | Yes | 3 | No | No | No | No | Yes | No |
| 3 | Mississippi | Yes | Yes | 1 | Yes | Yes | Yes | Yes | Yes | Yes |
| 4 | Louisiana | No | No | NA | No | No | No | Yes | Yes | Yes |
| 5 | Alabama | No | Yes | 2 | Yes | No | Yes | Yes | Yes | Yes |
| 6 | Oklahoma | No | No | 2 | No | No | No | Yes | Yes | Yes |
| 7 | Indiana | No | No | 2 | No | No | Yes | Yes | Yes | Yes |
| 8 | Ohio | No | No | NA | No | No | No | No | Yes | Yes |
| 9 | North Dakota | No | No | 3 | No | No | Yes | No | Yes | Yes |
| 10 | South Carolina | No | Yes | 2 | NA | No | No | Yes | Yes | Yes |

**TABLE 3. CONSUMER OBESITY INFORMATION USING SEARCH FUNCTION**

| | Ten States with the Highest Obesity Levels | Search on *Obesity* Leads to Some Consumer Information |
|---|---|---|
| 1 | Arkansas | No |
| 2 | West Virginia | No |
| 3 | Mississippi | Yes |
| 4 | Louisiana | No |
| 5 | Alabama | Yes |
| 6 | Oklahoma | No |
| 7 | Indiana | Yes |
| 8 | Ohio | Yes |
| 9 | North Dakota | Yes |
| 10 | South Carolina | Yes |

**Individual Case Analyses**

The individual case descriptions analyze each state health department's website for obesity-related information. The ten states are presented in rank order from highest obesity rank to the lowest.

*Arkansas.* The Arkansas Department of Health website (http://www.healthy.arkansas.gov) mentions obesity on the home page as a line item within the first box under *Health and Safety Topics* (bottom half of the page). *Obesity* appears as an option under the header *Diseases & Conditions* but it is not an active link. A click on the header results in a long list of diseases and conditions. The word *obesity* appears in the first category, *Chronic Disease*, as *Obesity Prevention*. Clicking on *Obesity Prevention* brings up an obesity prevention page which warns of the seriousness of obesity and presents BMI information and charts with Arkansas data from 2008 and National Heart Lung and Blood Institute data from 2009. At the bottom of the page,

there are links to an auxiliary site from the Arkansas Coalition for Obesity Prevention (ArCOP) (http://www.arkansasobesity.org). This site contains some obesity content but there is no consumer-friendly approach on the site to isolating current obesity-related information from the promotional information about the coalition that sponsors the site. Advice for consumers is most heavily represented under two box headings in the middle of the page: 1) *Increase Access to Health Foods*; and 2) *Increase Access to Physical Activity*. Clicking *Learn More* in either box leads to dated information. ArCOP has a Twitter page and a Facebook page that announce meetings, grants, and other basic information. Posts are infrequent. These social media pages do not focus on helping consumers prevent or reduce obesity.

***West Virginia.*** On the West Virginia Department of Health and Human Resources Bureau for Public Health website (http://www.dhhr.wv.gov/bph/Pages/default.aspx), there is no mention of obesity. The feature on the first page is on blue green algae. Obesity is not listed on the alphabetic topic listing on the navigation bar nor is it listed under any other topic. Obesity is listed under *healthy lifestyles* after three clicks. The *healthy lifestyles* webpage in early November 2015 had two goal statements from the Division of Health and Chronic Disease (HPCD). One goal is on increasing healthy weight with no other information on obesity on that page. Search on HPCD goes to *Everyday WVA* that does discuss the CDC guidelines written for health and community leaders on obesity. The healthy lifestyle page was not renewed. A notice states: "This domain name expired on 11/15/2015 and is pending renewal or deletion" (http://wvohl.com/?reqp=1&reqr=nzcdYaS1qJHhnzxhqTWc). The search does bring up 333 results on obesity. The audience for the search on obesity is not the general public. Instead the search results include technical reports for program administrators, average weight information, statistics, and maps with the highest and lowest obesity rates by county. There were no social media pages linked to the West Virginia Department of Health and Human Resources Bureau for Public Health website.

***Mississippi.*** The Mississippi State Department of Health website (http://www.msdh.state.ms.us) features the word *Obesity* on the home page as the second item in a list under *Healthy Living*. Clicking on *Obesity* opens a consumer information page on *Obesity and Obesity Prevention*. There are five buttons toward the top of this page: *Weighing Right, Getting Active, Links, Obesity, Action Plan,* and *Reports*. Each has consumer-related content. There also is a sidebar on the page leading to interactive tools, including a link to a *USDA SuperTracker* tool (http://www.ChooseMyPlate.gov) to track progress and a *Take Charge of Your Health* tool to help consumers lose weight and improve their health. Additional clicks on the buttons lead to additional interactive tools and other forms of consumer information. The Mississippi State Department of Health website was the strongest site among the ten analyzed for obesity-related content designed for consumers. The public health website has social media links to Facebook and Twitter. Only limited information on obesity is on its social media pages. One good example was found on Twitter on September 3, 2015–"What can parents do about childhood obesity? Start with the tips at http://www.cdc.gov/features/childhoodobesity."

***Louisiana.*** There is no obesity information on the home page of the Department of Health & Hospitals State of Louisiana Office of Public Health website (http://dhh.louisiana.gov). There is no link from the home page that a user can follow to reach obesity content. Since navigating through links to find obesity information was non-productive, the search function was used and

brought up information that was overwhelmingly focused on policy positions and annual reports. The search page results' URLs verify that a user could not follow a direct information architecture path flow to any of this content from the home page. Most of the obesity content found with the search option were governmental reports and not campaigns to change the health of consumers. The scant information available on obesity is predominantly associated with diabetes. While these two are connected, the predominance given to diabetes reduces information about obesity and strategies to reduce and prevent it. Instead, the focus is on diabetes, which could be a complication of obesity. There is a related website called *Own your Own Health* that links to eating plans, programs on obesity in children, and control or prevention of diabetes. Louisiana does have links to social media on Facebook, Twitter and YouTube, but there was little mention of obesity on these sites.

*Alabama.* The Alabama Department of Public Health has no direct mention of obesity on its home page (http://www.adph.org). There is a left sidebar with *Nutrition* and *Physical Activity*. These links go to information for the general public on losing weight, physical activity, healthy eating, my plate, and fruits and veggies. One of the best examples is the state program called *Scale Back Alabama* (http://scalebackalabama.com). This program offers people tips for reducing weight, expert advice, contests, support programs, local groups, and social media pages to engage the public. State and local winners are announced each year. The Facebook page for *Scale Back Alabama* has 5,400 likes. This was one of the best social media sites on obesity reduction among the ten states analyzed. The department's main page has a variety of links to social media sites such as Facebook, Twitter, Pinterest, Instagram, and a mobile site.

*Oklahoma.* The Oklahoma State Department of Health website (http://www.ok.gov/health) does not have the word *obesity* on its home page, nor does the word obesity appear on the navigation bar. While the word obesity is not used, the center page has a link to *Healthy Oklahoma 2020: OHIP Update*, which brings the user to an auxiliary website (http://ohip2020.com). At this auxiliary site, the user can click on the top obesity tab. This continuous scroll website automatically brings the user down the page to information on Oklahoma's obesity statistics and policies. The health department website center page also has a link to another auxiliary website, *Certified Healthy Oklahoma Programs* (http://certifiedhealthyok.com), which brings the user to a text heavy page describing a voluntary certification program for businesses, communities and schools to promote health behaviors. Overall, the Oklahoma State Department of Health website has little to no content on helping consumers with individual education and behavioral steps on obesity. There are links to social media sites for Facebook, Twitter, and YouTube but there is little content on obesity itself.

*Indiana.* The Indiana State Department of Health website (http://www.state.in.us/isdh) does not have the word obesity on its home page; thus, obesity is not on the navigation bar nor is it featured in a text box. The number of user clicks to obesity content is two and follows a path from the alphabetized topical list. Under *O* on the alphabetized topical list, the user can click on *Obesity*. This page, which is text heavy and makes the user scroll, has two major headings: *Baby-Friendly Hospital Initiative* and *Division of Nutrition and Physical Activity (DNPA)*. The first heading has a breast-feeding focus. The second section, which requires a user to scroll down the page below the fold, addresses the "problems of poor nutrition, sedentary behaviors, and obesity and other chronic diseases in Indiana." There are six bulleted points describing the division's

role. After finding obesity by clicking *O* on the main page alphabetical topic list, a user can click on *obesity* and is brought to the page: *Nutrition & Physical Activity Home*. On this page, there are links to auxiliary sites on the left side navigation bar. Two links focus on page content with health-related consumer campaigns. The first link brings the user to a page titled: *Indiana Healthy Weight Initiative*. There is a link to a PDF report: *Indiana's Comprehensive Nutrition & Physical Activity Plan, 2010-2020*. The page introduces the *Indiana Healthy Weight Initiative*, but does not provide an accessible link for users to the corresponding auxiliary website. The link to the auxiliary site is at the bottom of a text-heavy web page. The users must scroll below the fold to reach the auxiliary site, *INShape Indiana*, which also is the second link on the left navigation bar of the *Indiana Healthy Weight Initiative* page. The auxiliary website's core mission is presented on its home page: "INShape Indiana motivates, educates, and connects Hoosiers to valuable resources that help them eat better, move more and avoid tobacco." Social media sites such as Facebook, Twitter, and YouTube are linked to the main page of the department's website. Some information on reading food labels and healthy weight in pregnancy was on Facebook.

*Ohio.* The Ohio Department of Health does not mention obesity on the first page of its website (http://www.odh.ohio.gov) nor is obesity listed in the *A-Z* navigation bar on the first page. The search on obesity produces government statistics, medical reports, and data on obesity during pregnancy, childhood obesity, and BMI reports. Most results are for state, county, or medical officials. Some information as contained on *Reducing Obesity in Ohio* (https://www.odh.ohio.gov/features/odhfeatures/Strategic%20Priorities-Obesity/Reduce%20 Obesity.aspx) does have links to *Healthy Lifestyles*, *Healthy Eating*, and *Active Living* that has information for the general public on calories, my healthy plate, and exercise (http://www.ohioactionforhealthykids.org), as well as Let's Move (http://www.letsmove.gov/get-active), and Kids Eat Right (http://www.eatright.org/resources/for-kids). These state, national, or nonprofit programs are addressed to the public, and are intended to motivate people to get involved and to take action on their health. Some of the links go to county pages that have links to regional pages, programs, or local social media sites on obesity. The department has links to Facebook, Twitter, and YouTube. Its Facebook page had posts on exercise, the 200-calorie portion size, and on diabetes.

*North Dakota.* The North Dakota Department of Health (http://www.ndhealth.gov) has no direct mention of obesity on its public health department home page. Obesity is listed under the navigation bar, *Topics A-Z*. The page links to *Maternal and Child Nutrition* with a Microsoft Word document on nutritionists in North Dakota. On the home page there is left sidebar with a link to *Healthy North Dakota* (http://home.healthynd.org). This page discusses hunger prevention, healthy eating, physical activity, healthy living, and workplace wellness. These pages often are tailored to targeted groups such as families, children, adults, or seniors. Some of the copy is written for the public, such as *Families from Across North Dakota* which shares how to include more fruits and vegetables as you shop, in family meals, for kids, or eating "on the go." Other pages are toolkits (http://www.healthynd.org/publications/HKHW_Toolkit.pdf) with ideas for fitness, health, or nutrition and are filled with local sites and recommendations. The site has a Facebook and Twitter page. Its Facebook page had many good posts in November for Diabetes Month on weight loss, exercise, and obesity prevention.

***South Carolina.*** The South Carolina Department of Health and Environmental Control (DHEC) website (http://www.scdhec.gov) does contain the word *obesity* on its home page but navigating to any obesity content was not intuitive. The site has no left navigation bar. From the five-tab navigation block at the top of the page, users have options for: *Vital Records*, *Public Health*, *Environment*, *Food Safety* and *Permits & Compliance*. Users are given the choice of selecting *I want to…* or *I am a …*. The options under *I want to…* do not lead to obesity-related information. If the user selects *I am a…*, the user can then select *Citizen* – the last option on the list. A click on *Citizen* leads to *I want information about…* and a list of topics. Obesity is not on the list, although smoking and tattoos are listed. The easiest route to obesity-related information on the site is through the site's search function. A search on the word *Obesity* brings up an obesity link to www.scdhec.gov/Health/Obesity. This page is headed *Obesity* and the user can choose: *Resources for Community Partners, Nutritional Counseling Program,* or *Tips for Healthy Weight, and Nutrition* on the top line. Below these options under *Related Topics*, there is a BMI calculator from the CDC. *The Tips for Healthy Weight* option provides limited general information on obesity and a link to the South Carolina *Eat Smart, Move More* website (http://www.eatsmartmovemoresc.org). This is primarily an advocacy site and is not targeted directly at consumers. Its segments include: *Advocacy, Community Action, Youth Engagement,* and *Join the Movement*. The South Carolina site is primarily a vehicle of the department and its content is aimed at practitioners more than consumers. The social media pages linked from the public health website have an occasional consumer tip on reducing calories on Thanksgiving or on healthy eating on Facebook or Twitter.

## DISCUSSION AND RECOMMENDATIONS

State public health department websites in the ten states with the highest obesity levels in the United States need to increase their focus on obesity-labeled information for the general public on their websites. To help combat the obesity epidemic in the U.S., the sites need to provide links to obesity information on the home page, improve navigation to obesity content, increase the quality of obesity content, and have more interactive features either on the site or on auxiliary sites to engage consumers. If sites are not improved over current offerings, "…civic sites might fail to support technical literacy, productive inquiry, collaboration, and a multidimensional perspective—all essential ingredients for citizen-initiated change online" (Simmons & Zoetewey, 2012, p. 251).

Those who design state public health department sites must bear in mind that,
> Designing and testing websites for citizen knowledge work requires creating a relationship with the audience in which the designer believes that citizens have something to contribute to the conversation and in which the designer works to develop a site that supports how people really want to use the information at a particular moment in time. (Simmons & Zoetewey, 2012)

Three major areas for improvement are: audience analysis and user experience; information design; and engagement and content strategy.

**Audience Analysis and User Experience**

Segmenting and targeting people for enhanced user experiences starts with a defined audience analysis. This includes what information is desired and useful to the audiences as well as how is the information best delivered and designed for the audience:

- Prioritize the public as a target audience of state public health department sites.
- Prioritize space on owned media for state specific health concerns aimed at consumers.
- Leverage the health site and all owned media by creating a segment containing information for the general public with attention to health literacy for general populations.

**Information Design**

Basic design of the organization and information architecture of websites matched with users' information seeking can improve the usefulness and impact on behavioral changes for healthier lifestyles.

- Improve labeling of navigation terminology related to important and state prioritized health topics such as "obesity."
- Have links to prioritized health topics such as obesity information on the home page.
- Include prioritized health topics like obesity in the *A-Z* topic listings. (When pressing *O*, it leads to obesity information.)
- Develop individual pages on general consumer-oriented public health information for state prioritized health topics such as obesity.

**Engagement and Content Strategy**

User engagement is a mixture of providing audience-appropriate content to gain users' attention so that they consume the information and encouraging user interaction with online tools such as discussion boards or individual health applications.

- Populate the page with current information.
- Use updated interactive tools to engage the public.
- Augment state information by using auxiliary sites for content enhancement.
- Use social media platforms to engage the public in obesity prevention (e.g., Alabama).
- Ensure state public health department sites co-promote campaigns on its state site and on other state departmental sites (e.g., West Virginia, Department of Education; Arkansas banner on state).
- Perform web analytics to determine user search keywords.

State public health departments can use the findings in the three proceeding categories to increase their reach to at-risk population in a post-mass media environment.

## IMPLICATIONS FOR FURTHER RESEARCH

In addition to improving their websites, state public health departments need additional strategies to ensure more interactivity with users:

> Messages sent by email appeared to promote a modest short-lived increase in use of a disease prevention website by some adults. Those who responded to the messages by logging on to the website may have been influenced to improve their diet. (Woodall, et al, 2007)

Future research should focus on how social media can be utilized for public health campaigns on obesity. Online communication using social media can be successful in motivating users to make small behavior health changes and hold promise for public health campaigns (Cugelman, Thelwall, & Dawes, 2011; and, Freeman, Potente, Rock, & Melver, 2015).

## STRENGTHS AND LIMITATIONS

This descriptive analysis of ten state public health department websites and social media efforts provides an organic observational data collection and analysis approach in which the researchers provide details of user experience. Case studies are useful in applied fields such as health because the research is instructive leading to improved practices and possible policies changes. While the explanatory power of case analysis can lead to process improvement, care has to be taken with generalizing findings to circumstances not similar to the cases under study.

## CONCLUSION

To help combat the obesity epidemic in the United States, state public health departments need to increase consumer-targeted content and help support auxiliary campaigns on obesity that inform and engage the public. Constraints on these departments often consist of their need to adhere to guidelines for web content from the state site and on state public health department lack of resources for web development. Even with limited resources, state public health departments can improve navigation for obtaining obesity information, ensure that all content is current, and make increased use of social media and auxiliary sites to engage the public.

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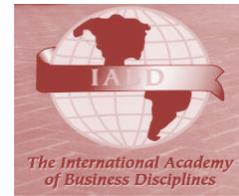
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