New Mexico Epidemiology

September 12, 2014 Volume 2014, Number 8

Using Evaluation to Improve a Risk Communication Campaign about the Health Impacts from Wildfire Smoke

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When wildfires strike, accompanying smoke can result in poor air quality that can impact the health of New Mexicans. The drought conditions spanning the past several summers have made New Mexico vulnerable to wildfire. Neighboring states have also experienced drought and wildfires, which can impact the air quality in New Mexico.

Based on a previous analysis of emergency department visits and particulate matter ($PM_{2.5}$) exposure during the Wallow Fire in the summer of 2011, the New Mexico Department of Health's (NMDOH) Environmental Health Epidemiology Bureau (EHEB) already had evidence that $PM_{2.5}$ smoke exposure from the fire was associated with increased risk of respiratory and cardiovascular emergency department visits. Based on these data, and anticipating the continued pattern of large summer wildfires, an intervention to effectively signal to the public to protect themselves from the potential adverse health outcomes associated with breathing in wildfire smoke was developed.

NMDOH's Environmental Public Health Tracking (EPHT) Program concluded that New Mexicans needed a quick way to figure out when they should stay indoors to protect their health during wildfires. Building on previous messages, the Tracking Program began by creating a small campaign on its Web portal featuring a new web page: https://nmtracking.org/fires. Since a visibility of 5 miles during smoky conditions is associated with potential impacts to at-risk populations, it was initially called the "Five-mile" campaign and included steps for reducing exposure.

In arid climates, visibility can be used to judge how smoke has impacted air quality. Visibility can be estimated by finding a fixed object with a known distance and then determining if the object can be seen or if the object is obscured by smoke. Based on diminished visibility and pre-existing health conditions and/or age, residents can make a decision about what actions, if any, are needed.

Near the end of the 2013 wildfire season, this small campaign was evaluated, including assessing web user statistics, process data, and feedback from NM EPHT staff and its primary partners (referred to as the team): New Mexico Environment Department's Air Quality Bureau (AQB), the United States Forest Service (USFS) and the Bureau of Land Management (BLM). The small campaign resulted in big outcomes. The new webpage was heavily used once wildfire season broke out in 2013, as demonstrated by an additional 1,063 visits to the site in a day and 1,500 page views. Based on these and other findings, the team concluded that modifying and expanding the campaign would be a beneficial public health intervention. While the message was effective and large audiences were accessing it, there was still room for improvement by making the message more practical and easy to use.

The initial basic evaluation of the product released in 2013 served as the springboard to create an improved and expanded campaign. It was essential that the new message and related components be tested among potential audiences in communities most likely to be impacted by poor air quality during wildfires and discover which modes of communication would best be suited for communicating health protection tips. The aim was to test the message before the 2014 fire season began. The methods and results of the pilot test of the larger campaign are provided in this report.

Methods

Revise the message to be concise, versatile, and compatible. The team revised the messages in order to sim-

plify risk communication and focus on people with higher risks:

- Six original visibility categories (Figure 1) were collapsed into three categories, allowing for emphasis on when the air quality starts to diminish and can affect the health of at-risk populations.
- New mileage categories were "About 5 miles," "About 3 miles" and "About 1 mile."
- New base messaging was drafted:
    - Is the visibility about 5 miles? If it is, air quality is unhealthy for sensitive people; they should minimize outdoor activity. Is the visibility about 3 miles? If it is, air quality is unhealthy; sensitive people should avoid all outdoor activities. Is the visibility about 1 mile? If it is, air quality is very unhealthy; everyone should avoid all outdoor activities.
- From this base message, the new campaign was branded: *Know the 5-3-1* and *the 5-3-1 method.*

Package message in test designs and material. The base message was used in test messages/graphics which varied in look, design, wording, and included items for special audiences. The various styles of messages were put into six infographics which could be presented to different audiences for testing. In addition, work began on a new style of an interactive mapping tool on the website, complementing the infographics in look, style and color scheme and offering more functions than the beta tools offered in 2013.

Messaging Testing. The team outlined a plan for obtaining community feedback in order to determine if the new 5-3-1 message was simple enough to convey the complementary messages that would be included in the campaign. A mixed method approach was taken to gain insight from the communities and pre-test messages and the associated tools/resources. The formative evaluation was gathered at community events in areas affected by the Silver Fire. For example, message testing occurred at the Hillsboro Community Center on March 6, 2014 and at the Silver City/Grant County Symposium on Preparedness on March 7, 2014. Qualitative and quantitative data were generated during both meetings, including oral feedback and paper surveys about the six infographics. The surveys were provided to participants and space was provided to write their thoughts about the message. The feedback was facilitated through presentation, guided conversation, survey feedback, and mapping tool demonstration. The surveys were tailored according to the various identified audiences: 1. Community Member/ Advocate/Resident, 2. Community Agency/Local Program/Health Promotion, 3. Forest/Environment/ Emergency Response and Preparedness, 4. Media and 5. Medical/Clinical. For example, residents were asked if and where they heard or saw messages about smoke and health. People working in the public and community domains were asked about what resources and information would support their work. Individuals self-identified as to which audience they wished to represent. During the guided conversation and presentation the audiences were asked 1. Did you hear or see messages about smoke and your health during the Silver Fire? From where? 2. Is the concept of 5-3-1 presented today easy to understand and why? 3. Which style(s) of the 5-3-1 visual is most helpful to you? What do you find helpful?

Results

A total of 21 people signed in at the guided meetings and 22 completed a survey, although not everyone who signed in completed a survey. Of those who completed a survey, 13 were in the Community Member/ Advocate/Resident category, 4 were in the Community Agency/Local Program/Health Promotion category, and 5 were in the Forest/Environment/Emergency Response and Preparedness category. Not all completed surveys came from people who signed in at the presentation and event organizers did not sign in but periodically dropped in offering verbal feedback.

Infographic 1 (Figure 2) was the product that test audiences most liked overall for its simplicity and overall appearance. From the qualitative data, the team learned about where and how communities get their information. For example, even small rural towns have WiFi and social media, regardless of income and this is highly used to get the word out. Additionally, radio, local newspaper and bulletins, and electronic versions of the local paper are relied on for local information. Older methods such as bulletin boards are still used at staging areas for fire updates by local officials. USFS public information officers know the communities and can provide the best ways to get out the information. Needs were also identified. For example, while public and social service entities usually have access to the internet, they are in need of quick-to print resources for communicating with vulnerable populations. Local government entities also need quick and easy guidance

to decide if outdoor events should continue as planned or be rescheduled. Finally, although not every audience segment will have access to the internet, employees of agencies that serve the public expressed a need to have resources which they can quickly download and print and take with them to homes, public meetings and emergency staging areas.

The aggregated information was applied to create and plan for additional campaign items including the look and style (branding), formal name (*Know the 5-3-1*, the *5-3-1 Method)* and material for select audiences. The newly designed message with its matching infographics debuted on the NMDOH website before the first large fire of the 2014 season (Figure 3). The content on the website, including downloadable resources, was enhanced to address some of the concerns and questions revealed in the formative evaluation. Then a mini-info-graphic with the same theme was created to be used with the newly acquired social media outlets of the NMDOH, which had not been available during the 2013 season. Further, a communication toolkit in the form of an additional webpage was added to address the needs of public officials and community-based decision makers and provided resources which could be printed out and disseminated at the local level.

Discussion

Evaluation was used in order to inform the development of the 5-3-1 campaign and brand. This campaign sought to simplify the message about actions to take when visibility decreased to 5 miles, 3 miles and 1 mile as a result of wildfire smoke. The evaluation results also provided information about how two communities affected by wildfire in New Mexico access information and the types of information preferred. As a result, NMDOH not only had the messages ready for delivery during the 2014 wildfire season, but also had identified the best routes for delivery.

Based on the formative evaluation, complementary materials were created or are in the design process. The only remaining component that needs to be assessed is to track how audiences are becoming informed about the 5-3-1 campaign. Several measures have already been established including monitoring web usage and collecting qualitative feedback on external agency use by the USFS, the AQB, and the National Weather Service.

This evaluation demonstrates that simple and low-cost health communication methods can be used by staff members to develop validated, useful products. Tailoring that message to a broad audience can be a challenge. This is when the formative evaluation is useful in creating a well received and utilized end-product. Getting feedback from diverse and mostly impacted smaller audience segments generates enough information to create a final message and campaign that can be generalized to a larger audience and the most impacted populations. Cost is always a factor, but in this case the cost was reduced by utilizing internal skill sets, strategically using existing resources and tools such as the NMDOH website, and by making use of the free modes of mass communication available today, such as e-mail, social media, broad dissemination of news releases, and radio interviews.

Although health communication alone may not always influence long-term behavior change, a reminder or signal at the time of higher exposure can influence a person at risk for cardiovascular or respiratory emergencies to protect themselves, thus potentially reducing emergency department visits during wildfire season. Ultimately, the goal is to help prevent adverse health outcomes.

Figure 1. The Initial Message Style.

How far can you see? Visibility in Miles	Caution Category
10 miles or more	Good
6 to 9	Moderate
3 to 5	Unhealthy for Sensitive People
1½ to 2½	Unhealthy
1 to 1¼	Very Unhealthy
¾ mile or less	Hazardous

The New Mexico Epidemiology Report

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The New Mexico Epidemiology Report
(ISSN No. 87504642) is published monthly
by the
Epidemiology and Response Division
New Mexico Department of Health
1190 St. Francis Dr.
P.O. Box 26110, Santa Fe, NM 87502

24-Hour Emergency Number:
(505) 827-0006
www.health.state.nm.us

Figure 2. Preferred Test Version

Figure 3. Final Product