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RESEARCH ARTICLE

Public communication in unplanned biomass burning events

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Abstract
Public communication related to emergency, unplanned, or "wildfire" biomass burning is best understood as a function of the audience for that communication. Two enduring communication models, the Health Belief Model and the Stages of Change or Transtheoretical Model, are instructive in analyzing and preparing differing communication response strategies that are indicated for communities with varying degrees of experience in responding to unplanned biomass burning smoke events.

Keywords: *Emergency; public notification; response; unplanned burn*

Introduction

Public communication related to emergency, unplanned, or "wildfire" biomass burning is best understood as a function of the audience for that communication. The August 2007 International Biomass Smoke Health Effects (IBSHE) conference, cosponsored by the University of Montana and the Centers for Disease Control and Prevention (CDC), provided an instructive comparison of fire-experienced and comparatively fire-naive communities, a comparison that illustrates the enduring applicability of two of the more venerable health communication models, the Stages of Change or Transtheoretical Model (Table 1), and the Health Belief Model (Table 2). While both models address individual attitudes and behaviors, both are also based, in part, in the concept of how community norms and common knowledge influence those attitudes and behaviors.

Experiential differences, reflected by a panel of discussants at the conference, are the key to understanding public response to air quality events associated with unplanned biomass burning. (While time limitations prevented a cohesive discussion of communication approaches related to non-emergency biomass burning, parts of this discussion may be relevant to prescribed forest and agricultural fires or domestic biomass burning).

In regions such as western Montana, wildfire is a familiar occurrence, and local public health staffs have integrated air quality messaging into emergency response communication efforts for several years. In southeast Georgia, where wildfires of historic proportion occurred in spring 2007, recent experience with such unplanned events is more limited.

Georgia residents can be characterized as in many ways not having considered a plan for reacting to a wildfire smoke/air quality event. In the terminology of the Stages of Change Model, they are largely "precontemplative," not having thought about making a behavioral change. Montana residents, comparatively more familiar with such events, are largely at the opposite end of the model's continuum, having considered, developed, and in some cases even acted upon a behavioral plan, putting them now at the "maintenance" stage where they are considering whether to repeat the desired behaviors (Prochaska et al. 1997). IBSHE conference attendees attested to wildfires being an almost routine occurrence in Montana, making it a challenge to craft health messages sufficiently "new" to garner attention, let alone adherence.

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Table 1. Health Belief Model.

Concept	Definition	Potential change strategies
Perceived susceptibility	Beliefs about the chances of getting a condition	• Define what populations(s) are at risk and their levels of risk • Tailor risk information based on an individual's characteristics or behaviors • Help the individual develop an accurate perception of his or her own risk
Perceived severity	Beliefs about the seriousness of a condition and its consequences	• Specify the consequences of a condition and recommended action
Perceived benefits	Beliefs about the effectiveness of taking action to reduce risk or seriousness	• Explain how, where, and when to take action and what the potential positive results will be
Perceived barriers	Beliefs about the material and psychological costs of taking action	• Offer reassurance, incentives, and assistance; correct misinformation
Cues to action	Factors that activate "readiness to change"	• Provide "how to" information, promote awareness, and employ reminder systems
Self-efficacy	Confidence in one's ability to take action	• Provide training and guidance in performing action • Use progressive goal setting • Give verbal reinforcement • Demonstrate desired behaviors

Adapted from *Theory at a Glance* (National Institutes of Health 2005).

Table 2. Stages of Change Model.

Stage	Definition	Potential change stratagies
Precontemplation	No intention of taking action within the next 6 months	Increase awareness of need for change; personalize information about risks and benefits
Contemplation	Intent to take action in the next 6 months	Motivate; encourage making specific plans
Preparation	Intent to take action within the next 30 days and some behavioral steps taken in this direction	Assist with developing and implementing concrete action plans; help set gradual goals
Action	Behavior changed for less than 6 months	Assist with feedback, problem solving, social support, and reinforcement
Maintenance	Behavior changed for more than 6 months	Assist with coping, reminders, finding alternatives, avoiding slips/relapses

Adapted from *Theory at a Glance* (National Institutes of Health 2005).

While the Stages of Change Model assists us in characterizing an audience, the Health Belief Model (HBM) reveals a way forward to positively altered behavior. To encourage residents to adopt self-protective actions relative to wildfires and air quality, residents need to believe that they are potentially susceptible to a serious health threat—that there is a relative advantage to taking the action or actions and that they are capable of taking an action. In HBM terms, they need to believe that they possess sufficient "self-efficacy". In addition, they must see themselves as able to overcome any barriers to taking an action and, importantly for the health communicator, they must be appropriately cued about when to take the action (Stretcher and Rosenstock 1997).

Methods

"Communications Gaps" was one of the 90-minute breakout sessions at the IBSHE conference. Brief presentations by public health staff members from western Montana, southeastern Georgia, and the U.S. Environmental Protection Agency (EPA) were followed by discussions focusing on the following questions:

1. What are the basic tools needed for communicating respiratory risk from biomass burning?
2. What is the basic information you need to know about a particular wildfire incident (e.g., wind direction, smoke contents, smoke duration) to be able to communicate effectively with affected populations?
3. How can you get this information in a timely and useful manner?
4. What is the basic information you need to know about the audiences at risk (e.g., health vulnerabilities, geographic location, demographics) to be able to communicate effectively with them?
5. How can you get this information in a timely and useful manner?
6. What doesn't work?

Panel participants' comments were hand-recorded by the panel facilitator and an assistant, and the facilitator, with input from panel presenters, analyzed the expertise offered to develop the discussion of messaging tools and response strategies that follows.

Results

Several key points were identified and discussed during the IBSHE breakout session, with the following recommendations being issued by the group:

- The most important existing vehicle for sharing experiential learning is *Wildfire Smoke: A Guide for Public Health Officials* (Lipsett et al. 2008). The panel recommends that mechanisms be developed to regularly

update this guide to reflect such experiences as Georgia's for the benefit of other states and localities in a pre-contemplative state. This guide should include lessons for a comparatively fire-novice state about resources that require pre-positioning.

- Communicators must be prepared to address the challenges of making behavioral messages sufficiently "new" to garner the desired response and avoid public "backsliding" to an earlier stage of change, such as "decision," wherein an individual is considering whether an action in question should be taken. While the public and public health partners in Georgia were reported to have been attentive to public health efforts aimed at securing their safety and well-being, the opposite can occur if the public perceives unplanned wildfire as an annual, predictable event. When unplanned wildfires occur regularly, public perception of personal risk becomes tempered by the experience of having weathered previous years' events.
- Enhance efforts to collect the data needed to convince the public both of the personal relevance of a threat to which individuals are susceptible and of their ability to take recommended protective actions. Any state, regardless of wildfire response experience, faces challenges created by the dearth of real-time raw data on which to base such recommendations as evacuating individuals at risk or estimating which regions are more likely to experience the worst air quality and when. Discussant recommendations to address this issue included more rapid and widespread deployment of mobile air monitors available from the U.S. EPA and others and better pre-event information on factors such as availability of shelters and transportation and likely road closures.
- Conduct further research and studies on both exposure and the health effects of biomass smoke in order to develop public messaging that is at the same time protective and non-alarmist. Evaluate the effectiveness of public health intervention and communication strategies used to date in accomplishing the objective of limiting exposure, particularly among vulnerable populations, to biomass smoke. Because universal deployment of monitors will not be possible, research-based messaging that convinces residents of the existence of a threat, their susceptibility to it, and their ability to act upon it will remain needed for the foreseeable future.

Discussion and conclusions

Response strategies

In Montana and Georgia, differing experience with wildfire has led to the evolution of differing response strategies. However, some consistencies exist as well:

- All emergency response is local. While the CDC, the U.S. EPA, the Department of Homeland Security (DHS), and state agencies can pre-place resources and provide aid during an event, initial responsibility and response coordination inevitably and correctly fall on local personnel. It is therefore crucial that such federal and state resources be both internally integrated and externally connected with local social service agencies, community-based organizations, local emergency response, and local media.
- It is preferable to have some profile of affected audiences available, whether research based or empirical. The extent and location of clinically at-risk populations, the need for low-literacy and non-English materials and approaches (and where they are needed), the identification, using tools such as the Health Belief Model, of groups less likely to comply with public health recommendations, and the characterization of an audience's status on the Stages of Change continuum all impact response success.
- "Stay inside" is an almost traditional public health recommendation when wildfire smoke permeates an area. If the underlying public health concern is limiting exertion rather than limiting potential exposure, research to determine whether "stay inside" is the most credible and effective behavioral recommendation may be merited. It may also be useful to assess whether the use of indoor air purifiers or similar technology would render "stay inside" a more scientifically valid recommendation.
- Another strategic choice is the selection of communication channels. When feasible, particularly in situations where the responding agency has little relevant experience, blanketing all media with air quality and public health messages is prudent. In Georgia in 2007, such message blanketing proved economically feasible because local media outlets in the affected region were both cooperative and relatively few in number. Interpersonal media—the engaging of local opinion leaders and organizations—also proved valuable in Georgia, in part because most of the towns involved were small and the degree of social interconnectedness was high. In the situation of a responding agent familiar with wildfire, a more nuanced response is the norm. In Montana, staff members know from experience which media to use and which messages generally work best. Documenting such lessons learned in Montana and in regions with similar experience will be invaluable to states such as Georgia. While these lessons must be adapted for other states, they do provide a valuable guide for effective response communication.

Challenges

Finally, with regard to wildfire-related air quality, a number of specific logistical challenges to effective response emerged at the conference:

- *Air quality staff may not be trained in emergency response*. While in small health departments air quality, emergency response, and other concerns may be under the purview of only a very few people, in many cases individuals who issue daily air quality warnings

covering particulate matter and ozone may not be well versed in incident command. Air quality personnel who may be pulled into emergency response need to be trained in general incident command procedures, in their own agency's particular emergency response protocols, and in crisis communication. Incorporating information on the National Incident Management System and Incident Command procedures into *Wildfire Smoke: A Guide for Public Health Officials* could assist in this regard.

- *Air quality may not be a part of emergency response planning*. In some regions, particularly those with lesser wildfire experience, air quality may not be integrated into planning for fire prevention, protection of property, and evacuation. Because air quality inevitably does become a concern during a wildfire response, it should be included in emergency response plans.
- *Messages need to be flexible*. When smoke shifts or changes in content, messages and messaging strategies need to be altered quickly to alert populations to new risks they face and to cue them to new behaviors they may need to practice. Health departments that have used the same messages for years need to develop means to break through accumulated public opinion if and when a new year's fire season brings different and greater air quality dangers. The same is true if new research indicates that long-standing warnings need to be altered to prevent backsliding to an earlier stage of change.

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