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RESEARCH FINDINGS ON COMMUNITY AND  
ORGANIZATIONAL PREPARATIONS FOR AND RESPONSES  
TO ACUTE CHEMICAL EMERGENCIES

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Introduction

By almost any criteria the threat of sudden chemical disasters is on the increase. However, while the technical aspects of such incidents have been much studied, the social aspects of such situations have been largely ignored. To study this problem the Disaster Research Center recently concluded a four year study of community and organizational preparedness for and responses to actual and potential sudden disasters resulting from chemical agents. Field studies were conducted on preparedness planning in 19 communities around the United States; an additional 20 field studies were undertaken of responses in the emergency time periods of incidents involving chemical explosions, fires, and spills. Using a sociological framework which indicated relevant variables and factors, intensive interviews were obtained from over 400 respondents. In addition, considerable data were gathered from participant observing and document collecting. The data were quantitatively and qualitatively analyzed, and a general theoretical model of preparedness and response was derived. In this paper the major findings about the sociobehavioral aspects of disaster preparedness for and of the organizational and community responses to chemical disasters are briefly summarized.

Findings About Disaster Preparedness

1. Threat Perceptions

There is a degree of perception that chemical agents, compared with other agents, have more potential as disaster agents. However, different communities, sectors, and organizations selectively vary in their perceptions of the chemical threats. In particular, there are noticeable differences between threat perceptions of public and private groups, with the latter seeing chemically-based disasters as less likely than the former. This variability in perception may partially be the result of role expectations as they apply to these different sectors of the community. That is, many public sector groups (such as fire departments) have official responsibility for emergency preparedness and are expected by the community to carry out these responsibilities. This type of role expectation can sensitize these groups to the various demands of their domains. On the other hand, fewer private sector groups (with the exception of chemical companies) have formal responsibility for preparedness planning and, therefore, are less likely to be aware of disaster threats in general.

## 2. Availability and Mobilization of Resources

In principal, but not in fact, there are many potential resources available to prepare for chemical emergencies. Many tangible resources are either unknown, unrecognized as such, or are the property of private groups, and even when available tend to be segregated inefficiently from other kinds of community disaster resources. More intangible resources are also undependably and unevenly available and there is a lack of leadership and responsibility for their availability particularly prevailing in the public sector.

There is little collective mobilization of resources except in a minority of communities with local comprehensive mutual aid systems (i.e., networks of disaster-relevant organizations from both the public and private sector which form for the express purpose of sharing resources in disaster preparedness and response). Such systems have multiple chemical emergency functions and are particularly strong with respect to resource sharing and communication, although they are usually weak in risk assessment, in providing a role for the medical area, and in addressing the problem of evacuation. Extra-community resources are seldom part of any individual or collective mobilization of resources for chemical emergencies.

## 3. Patterns of Community Social Organization

There is a variety of social linkages (i.e., formal or informal contacts between and among organizations and groups) for chemical preparedness planning in most of the communities we studied. In particular, there tend to be links between local fire departments and the chemical companies in their areas. The general pattern, however, is one of weak vertical rather than horizontal linkages within communities. That is, the structure tends to be hierarchical in nature, with authority vested in the upper-most levels and with few provisions for effective cross-communication among the various disaster-relevant groups. There is also an almost total absence of local extra-community linkages even though the collective resources of the latter sources are extensive in nature. More integrated linkages are slowly evolving but overall there is a pattern of weak community social organization for chemical emergencies.

## 4. Social Climate

As a whole, the social climate in most local communities in the United States is not favorable to preparedness planning for chemical emergencies. While some of the existing norms, values, and beliefs provide incentives for planning, most do not. There is a tendency to believe that communities could respond to emergencies better than they probably could. This reinforces a disinclination to disturb local economic benefits from chemical plants or to argue against what is seen as a public unwillingness to spend governmental funds for most anything, including disaster preparedness planning.

## 5. The Planning Process and Preparedness

There is only a low degree of preparedness planning for chemical emergencies in most communities in the United States. In fact, such planning is frequently nonexistent among public emergency organizations, with the exception of some fire departments. Preparations for chemical disasters are especially

handicapped by the public-private sector split in the United States. An additional impediment to local planning efforts is the fact that the most relevant resources rest in the hands of extra-community groups (i.e., state and federal level organizations), rather than with the local community organizations which invariably are confronted with problems associated with the immediate post-incident response.

## Findings About Responses to Chemical Emergencies

### 1. Effects of Preparedness Planning on Response

Preparedness is often incorrectly equated with formal disaster plans, an end product of the planning process, or viewed as an extension of everyday operations. However, good preparedness is actually a knowledge-based realistic process stressing general principles aimed at reducing the unknown in a problematical situation. As such it is all the activities, practices, documents, formal and informal agreements, and associated social arrangements which, over the long or short term, are intended to reduce the probability of disaster and/or the severity of the community disruption occasioned by its occurrence.

Community disaster preparedness for chemical emergencies is generally poor if not nonexistent in most localities. However, the private sector is relatively well-prepared especially for in-plant accidents. Extra-community groups which do have resources for chemical emergencies are seldom incorporated into local planning. Nonetheless, to the extent there is preparedness planning of any kind, it tends to make for a better response to chemical emergencies.

### 2. Impact and Situational Contingencies

The way and the degree to which any community will respond to a particular chemical emergency is often greatly influenced by impact and situational contingencies. The impact contingencies resulting primarily from the property of the chemical agents themselves present different risk threats particularly in terms of the destructive or damaging potential of the chemical and the controllability of the chemical. Other contingencies are more situational in nature, resulting from spatial, temporal, or circumstantial factors such as the jurisdictional locale of the mishap, the social time in which it occurs, and if the speed of onset allows preventive measures. Both impact and situational contingencies introduce much variety and complexity in the organized response to chemical emergencies. However, they are not completely independent of perceptual and other social factors, and thus can be effected by preparedness planning.

### 3. First Responders and Initial Definitions

There are some important differences between responses in fixed site situations (mostly chemical plants) and those in transportation accidents involving dangerous chemicals. In general, the response is better in the former situations, although there are problems if the threat spreads from the plant to the community (primarily due to the lack of communication and coordinated efforts between public and private sector groups). In transportation accidents involving chemicals, the initial response is highly ad hoc (i.e.,

specific to that particular time and situation). Much effort is spent on trying to define the chemical threat (or identify the specific chemical agents involved) in the situation. This is not always easy to do correctly and often there is a delay in realizing that a transportation accident may have the potential for becoming a chemical disaster, depending partly on the definitions and behaviors in the situation by first responders.

#### 4. Convergence and Outflow Patterns

Much of what happens after the arrival of the first responders and their initial definition of the situation can be visualized as convergence and outflow patterns. There is a movement of organizations, things, and information outward from the disaster site, and a similar flow toward it. Both the outflow and the convergence patterns are marked by much uncertainty and unevenness of knowledge of the situation by selectively involved organizations. What flows out is even more erratic than what converges, and some behaviors tend to compound the difficulties in the situation and almost ensure lack of coordination. There are also special problems in chemical emergencies with respect to exactly how to handle the often overwhelming numbers of mass media representatives, how to obtain accurate information relevant to the diagnosis and treatment of victims (often the chemical agent is unknown, or if known, medical personnel are uncertain on measures to take especially in relation to very unfamiliar chemicals, and there are no centralized sources to turn to for quick references), and how to identify the appropriate procedures for the neutralization of the chemical threat.

#### 5. Similarities and Differences Between Chemical and Nonchemical Disasters

Differences in chemical and nonchemical disasters exist especially in the risks they pose. This requires some different preparations for chemical emergencies. However, many similar response tasks are necessary in both kinds of disasters and all disaster phases. Actual responses in chemical emergencies also differ somewhat from what occurs in natural disasters. Nonetheless, the similarities between both are more important than the differences. Therefore, a generic rather than agent-specific approach to preparedness and response seems warranted.

What are the implications of our study? From a general perspective, our work suggests that locally-based preparedness planning using existing resources can lead to an improvement in integrated community responses. From a more specific perspective, there are three aspects which preparedness planning ought to consider. There is a major public-private sector split, with weak linkages between the two sectors. The split hinders chemical disaster preparedness, and is not helpful in chemical disaster response. Also, chemical disasters are more problematical than disasters resulting from most other kinds of agents. A chemical disaster can be occasioned by rather different things, can physically have rather different outcomes, and frequently require rather different coping mechanisms. Put another way, chemical disaster agents tend to be relatively more heterogeneous than other kinds of disaster agents. This also makes for problems in preparedness and response. Finally, there is a strong technological bias in the planning activities and operational measures undertaken with respect to hazardous chemicals. There is the strong belief that technical solutions can be found to both prevent and soften

chemical disasters. While in one sense this is undoubtedly true, as we have suggested in our paper there are social as well as technical aspects of preparing and responding to acute chemical emergencies. Even if all the technical problems were solved, there would still be problems inherent in the group and human aspects of the situation. These require the application of a sociological perspective, which we have partly tried to illustrate in the remarks we have made.

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For further information, the following publications can be obtained from the Disaster Research Center.

Kathleen J. Tierney. A Primer for Preparedness for Acute Chemical Emergencies. Columbus: Disaster Research Center, The Ohio State University, 1980. (Can be obtained for \$7.50 from the Disaster Research Center.)

Jane Gray and E. L. Quarantelli (eds.). "Social Aspects of Acute Chemical Emergencies. Special Issue," Journal of Hazardous Materials 4 (March 1981): 309-394. (Copies can be obtained for \$10.00 from the Disaster Research Center.)

E. L. Quarantelli. Sociobehavioral Responses to Chemical Hazards: Preparations for and Responses to Acute Chemical Emergencies at the Local Community Level. Final Report #28. Columbus: Disaster Research Center, The Ohio State University, 1981. (Can be obtained for \$7.50 from the Disaster Research Center.)

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