Published in final edited form as:

Appl Environ Educ Commun. 2009 July 1; 8(3&4): 195–203. doi:10.1080/15330150903269464.

Community Ecology and Capacity: Keys to Progressing the Environmental Communication of Wicked Problems

Rosemary M. Caron and

Department of Health Management and Policy, Master of Public Health Program, University of New Hampshire, Durham, New Hampshire, USA

Nancy Serrell

Dartmouth Toxic Metals Research Program, Dartmouth College, Hanover, New Hampshire, USA

Abstract

Wicked problems are multifactorial in nature and possess no clear resolution due to numerous community stakeholder involvement. We demonstrate childhood lead poisoning as a wicked problem and illustrate how understanding a community's ecology can build community capacity to affect local environmental management by (1) forming an academic–community partnership and (2) developing a place-specific strategy grounded in the cultural–experiential model of risk. We propose that practitioners need to consider a community's ecology and social context of risk as it pertains to wicked problems. These factors will determine how a diverse community interprets and responds to environmental communication and capacity-building efforts.

The term *wicked problem* does not refer to one that is morally bad nor is it “reflective of the character, ethics, or values of the community in which a problem surfaces” (Kreuter, De Rosa, Howze, & Baldwin, 2004, p. 442; see also Rittel & Webber, 1973). The term *wicked* is used to characterize problems that are multifactorial, dynamic in nature, and resistant to resolution. Rittel and Webber (1973) offer several characteristics of wicked problems that can apply to environmental health issues. For example, often, there are multiple stakeholders who define the problem differently and who possess uncoordinated solutions. In addition, the feasibility of numerous solutions may be viewed differently due to the varied perspectives and interests of many stakeholders (Kreuter et al., 2004). Because wicked problems often possess no definitive resolutions, we suggest that remediation must focus on how to best manage them.

We propose that childhood lead poisoning is a persistent wicked problem and although fatalities from pediatric lead poisoning are rare, the first reported death from lead poisoning in the United States since 1990 occurred in Manchester, New Hampshire in 2000 in a two-year-old refugee child (Caron et al., 2001). This tragedy emphasized the need for more

Copyright © Taylor & Francis Group, LLC

Address correspondence to **Rosemary M. Caron**, Ph.D., MPH, Associate Professor and Director of the Master of Public Health Program, University of New Hampshire, Department of Health Management and Policy, #319 Hewitt Hall, 4 Library Way, Durham, NH 03824, USA. Rosemary.Caron@unh.edu.

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

Publisher's Disclaimer: The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

resources, expertise, and community support. Thus, an academic–community partnership was formed among the Manchester Health Department, a local health department with several decades’ worth of experience inspecting homes and buildings for lead, issuing lead abatement orders, and providing case management and education on lead hazards; the Dartmouth Toxic Metals Research Program’s Community Outreach Group; and the Greater Manchester Partners Against Childhood Lead Poisoning (GMPALP), a broad-based community coalition comprised of representatives from low-income housing organizations, a minority health coalition, clinicians, the state Childhood Lead Poisoning Prevention Program, rental property owners, and other diverse community members to address the prevention of childhood lead poisoning. The evolution of this multiyear academic–community partnership and its utilization of community-based participatory research principles has been previously described (Serrell, Caron, Fleishman, & Robbins, 2009). This fatality underscored the way the community’s ecology, that is, how political, ethnic and socioeconomic factors, including zoning laws, housing policies, cultural practices, and language barriers contributes to health disparities for vulnerable populations in this community.

The purpose of this article is to demonstrate childhood lead poisoning as a case example of a wicked problem and describe the role of an academic–community partnership in facilitating how the practitioner’s understanding of a community’s ecology (i.e., its social, cultural, economic, and political composition) can contribute to building the community’s capacity to affect the local environmental management and communication of the wicked problem.

AN URBAN MICROCOSM OF THE CHILDHOOD LEAD POISONING PROBLEM

The nationwide decline in childhood lead poisoning in recent decades is widely regarded as a public health success story. Lead is a neurotoxin that can lead to impaired speech and hearing, hyperactivity, impairments in learning and memory, and irreversible brain damage. Young children may be extremely vulnerable to its effects due to low body weight, iron deficiency, poor nutritional status, and hand-to-mouth activity. For the past 30 years, epidemiologic studies have found inverse associations between children’s intellectual functioning and successively lower blood lead concentrations, thus prompting the Centers for Disease Control and Prevention (CDC) to repeatedly lower its definition of the level of concern. The current definition stands at 10 micrograms of lead per deciliter of blood (10 µg/dl). Despite the public health advances associated with removing lead from gasoline and paint, exposure to lead is a persistent hazard for children in many regions of the United States. In 2000, an estimated 434,000 children in the United States had blood lead levels (BLLs) of 10 µg/dl or higher (ATSDR, 2008; CDC, 2008a; CDC, 2008b).

New Hampshire has some of the oldest housing stock in the nation, with almost 40% of rental housing and 28% of owner-occupied housing built prior to 1950. Manchester is the largest community in New Hampshire with a population of approximately 110,000, thus representing an urban microcosm of the childhood lead poisoning problem. About 77% of Manchester’s housing units were built prior to bans on lead-based paint and the housing stock in the center city neighborhoods is generally of poor quality (MHD, 2008a). These environmental factors contribute to thousands of point sources for lead exposure.

In addition to these aforementioned environmental health challenges, Manchester also experiences the multifaceted economic and social disparities found in larger cities. For example, approximately 26% of the residents are considered “working poor,” with household incomes below the poverty level (Census, 2008). The city is a designated refugee resettlement site, and as such is considered the most racially and ethnically diverse

community in New Hampshire. Two out of every three refugees that resettled to New Hampshire between 2002 and 2007 reside in Manchester. Furthermore, between 1990 and 2000, the city's Latino immigrant population grew by 126% as compared to 72% for the state. Over 70 different languages are spoken as the primary language by children in the Manchester school system. Hence, language barriers represent another major challenge in addressing the wicked problem of childhood lead poisoning. As a result of being a dynamic community, Manchester has experienced growth in cultural diversity and manages various interpretations of health (MHD, 2008a; MSAP, 2008). This community's ecology has created a densely populated and impoverished center city area surrounded by a less populated and more prosperous suburban community.

Although Manchester represents 10% of the state's population, it experiences one-third of all childhood lead poisoning cases in New Hampshire, with the majority of these cases occurring in predominantly center city neighborhoods (MHD, 2008a; NHDHHS, 2006; Census, 2008). In 2007, approximately 25% of the lead-poisoned children in the local health department's caseload were refugees or children of refugees (MHD, 2008b). CDC recommends that all one- and two-year-old children residing in Manchester be tested for lead paint exposure (MHD, 2008a).

CHILDHOOD LEAD POISONING: WHEN SOMETHING WICKED THIS WAY COMES

The environmental health challenge of childhood lead poisoning exemplifies the classic scenario of a wicked problem. Although the common goal is to reduce childhood lead poisoning, consensus does not exist on how to achieve that endpoint because stakeholders address the problem from their own interests and expertise. Major stakeholders in Manchester's wicked problem include, for example, the residents of poor-quality housing, the local city health department, housing agencies, city building inspectors, realtors, property owners/managers, child care providers, and the healthcare community. Structured, open-ended interviews with these major stakeholders in Manchester have demonstrated that childhood lead poisoning in the community is socially complex; is viewed as the responsibility of multiple stakeholders; requires behavior change at the individual and organizational level; and is characterized by policy failure (Wehrly, 2006). Some stakeholders view the childhood lead poisoning problem in the community as indicative of a larger issue, namely a community that is undergoing growth and diversification due to its refugee and immigrant resettlement status. Hence, others believe they are not able to solve the problem due to its enormity and complexity.

Although most stakeholders agree that the major source of lead exposure is unsafe housing and that collective action is needed to address the issue, they differ regarding specific strategies that should be employed to mitigate lead exposure (Wehrly, 2006). There are two strategies for directly reducing the risk of lead exposure in dwellings: permanently removing all the lead paint (lead abatement), or removing or covering the lead paint on surfaces known to pose the highest risk (lead-safe renovation) (CDC, 2008a). Because primary prevention methods, such as lead abatement, are often expensive and time consuming, many communities rely on secondary prevention methods (e.g., educational interventions and environmental investigations that occur after the child presents with an elevated BLL (EBLL)). Some stakeholders argue that renovating housing to prevent lead paint exposure is a realistic solution because it balances safety and feasibility at a low cost, yet others believe that unless the lead is completely removed, the issue requires management because the environmental hazard still exists.

Nonetheless, research has shown that where one lives can impact one's health. For example, children in New Hampshire, as in other areas of the Northeast and Mid-Atlantic States, are at particular risk for lead poisoning due to this region's industrialization, urbanization, and economic history (Bailey et al., 1998). People who reside in neighborhoods that exhibit socioeconomic need are likely to experience inadequate housing, contaminated living environments, and lack of social support services which can all contribute to poor health. In almost all urban areas, serious health problems are highly concentrated in a relatively small number of distressed neighborhoods (Kawachi & Berkman, 2003). For example, Fig. 1 illustrates that a high percentage of children who reside in Manchester with EBLs do so in center city neighborhoods that are primarily comprised of older housing stock.

It is in these Manchester neighborhoods that people's concerns regarding basic needs for food, shelter, and clothing outweigh their concerns over exposure to any environmental hazard. There is a shortage of affordable housing in the city and the poverty status of the residents here contributes to the reason why some families might have to live in housing with improperly maintained lead paint. The risk of potential exposure to lead among one's children is unavoidable for some families if it means finding affordable housing. Qualitative research has shown that some stakeholders do acknowledge the lack of affordable lead-safe or lead-free housing as a complex contributing factor of this wicked problem, whereas others focus on providing financial assistance to property owners for reducing lead hazards in rental units. The problem with the latter remedy is that the cost of renovating a property to become lead-safe or lead-free is passed to the tenant as an increase in rent, thus making the housing unaffordable. Also, many of these families, due to worry about eviction, are reluctant to notify their landlord if their child is diagnosed with an EBL while in the home. Furthermore, many of the lower income families are refugees who do not speak or understand the English language proficiently and/or are illiterate in their native language so communicating environmental health messages about potential exposures in their home may not be effective. Potential exposure to lead dust among refugees in the home may be further compounded by cultural practices (Wehrly, 2006). In summary, childhood lead poisoning is a persistent wicked problem in this urban community.

COMMUNITY ECOLOGY AND CAPACITY BUILDING: PRACTICAL TOOLS TO ADDRESS A WICKED PROBLEM

Our academic-community partnership proposed to further examine the community's ecology and to utilize the findings to help build the community's capacity to address the wicked problem of childhood lead poisoning. The GMPALP identified the Latino community as being disproportionately affected by childhood lead poisoning, so our academic-community partnership conducted focus groups with Latina mothers in the center city neighborhoods of Manchester. We utilized the cultural-experiential model of risk, which requests information regarding the experience and views of impacted populations and their assessment of risk (Cox, 2006), to not only identify risks pertaining to childhood lead poisoning as perceived by Latina mothers, but to better comprehend their misunderstandings and knowledge deficit about the wicked problem. Our focus group sessions specifically inquired about Latinamothers' perception of illness; knowledge of lead poisoning; preferred communication methods regarding an environmental hazard; and feedback on existing childhood lead poisoning prevention materials.

The focus group sessions revealed that the Latina mothers were aware that their homes possibly posed risks to their children. However, few mentioned lead dust as a potential household hazard. The participants all mentioned that the property managers seemed more concerned about collecting their rent compared to maintenance and security issues. When asked about the concept of a poison, many referred to the presence of household chemicals

they had in their home. Some participants mentioned they heard about lead paint and that their children could be exposed to lead dust via window wells and walls. However, one participant stated, “I don’t even know how you get lead so I can’t give an opinion.” The participants expressed frustration with the local healthcare system and the lack of cultural competency among healthcare professionals, as well as the absence of translation services. When asked where they obtain information about health issues, the participants stated their main source of health education was their community. When asked what they needed with respect to health information pertaining to childhood lead poisoning, the participants replied that having more information in Spanish would be beneficial and that childcare providers need to be better informed. Lastly, participants indicated their preference for receiving health information through their community resources, specifically schools and supermarkets. Focus group findings were shared with the GMPALP for dissemination to local community organizations so they would be aware of community-level concerns and the broad ecological factors that contribute to childhood lead poisoning in this diverse community.

The effort our academic–community partnership put forth into understanding the community’s ecology assisted in helping to build their capacity to address this wicked problem via a place-specific strategy. For example, our partnership organized a “Call to Action: Eliminating Lead Poisoning in Manchester” community meeting where we conveyed the importance of understanding a community’s ecology when attempting to build capacity at the local level. The participants in Manchester’s “Call to Action” meeting identified “engaging health professionals to ensure that all Manchester children are screened for lead poisoning and treated as early as possible” as a priority for community action. Based on this identified community concern, our partnership developed a place-specific strategy that involved examining barriers to childhood lead screening in selected medical practices with diverse, at-risk patient populations throughout the city. Integrating our understanding of the community’s ecology with findings from retrospective medical chart reviews of screening-aged children and focus groups with participating medical practices to probe their understanding and protocols regarding childhood lead screening, we developed an online quality improvement tool to increase childhood lead screening among those same medical practices.

Our academic–community partnership facilitated local community change through collaboration in a sustainable way that utilized a “doing with” approach as opposed to a “doing to” or “doing for” approach (Altman, 1995). The place-specific strategy of increasing childhood lead screening assisted the community’s capacity to address this wicked problem and emphasized the importance of working with community stakeholders. Our partnership engaged in other community-driven initiatives that contributed to a New Hampshire law that helps to protect children before they become lead poisoned via proactive environmental investigation of dwellings that house at-risk children (NH, 2008).

PUBLIC SPHERE AND THE WICKED PROBLEM

We propose that part of the management of wicked problems involves not only understanding the community’s ecology but also the importance of engaging the public sphere to help build a community’s capacity to address the environmental health issue of concern. Cox (2006) defines the public sphere as “The realm of influence created when individuals engage others in communication—through conversation, argument, debate, questions, and nonverbal acts—about subjects of shared concern of topics that affect a wider community.” In the case of the Manchester community, this public sphere includes the stakeholders (e.g., refugee neighborhoods, social support systems, as well as local government, healthcare providers, and property owners/managers). The public sphere needs

to be the common ground to communicate misunderstandings, knowledge deficits, and environmental education.

We utilized the cultural–experiential model of risk, in order to better understand this wicked problem’s public sphere. This model “expands the technical model of risk to include considerations of the contexts in which risks occur and the values of those who are asked to live with environmental dangers” (Cox, 2006). Prior work indicated that the population that resides in the center city of Manchester is primarily concerned with basic necessities (Wehrly, 2006). As a result, this population is willing to risk exposure to wicked problems, such as deteriorating lead paint, because they are unwillingly ignorant on the topic and/or do not want to risk losing what they have and believe it is a risk worth taking. “There is a big difference between those who take risks and those who are victimized by risks others take” (Beck, 1998, p. 10). Furthermore, Manchester’s public sphere is complicated by populations that are racially and ethnically diverse; a low socioeconomic status, low literacy levels, non-English speaking groups, built environments with politically determined zoning plans and poor-quality housing.

Our work to date has shown that some Manchester residents may know about the wicked problem and out of fear they choose to not use their voice, or if they do, often they are not heard. Many residents do not know about the wicked problem and it is out of ignorance and more pressing needs for housing and food, financial stress, and social isolation that causes them to discount the risk and not raise their voice. Hence, the property owner’s voice is often louder than those directly impacted by the environmental issue. The stakeholders have an ethical obligation to use their voices but may not due to political and/or economic concerns, or a sense that they are not contributing to the wicked problem. Trotter (1990, p. 82) explains three types of communication resistance that can further compound this wicked problem’s public sphere: “One type ... is the inability of people to hear or understand information due to differences in language...” The other type is the “... willful process of not listening to, refusing to understand, or unwillingness to believe information that is available...” Another kind of communication resistance is that “People refuse to hear or understand because accepting the communication would demand a change in behavior that the individual does not want to make.” We advocate that understanding a community’s ecology is essential for practitioners to help build a community’s capacity to address a wicked problem. This action can reduce a population’s resistance to communication, especially if they are invited to participate in managing the problem, for example, through an academic–community partnership; and can advance the community’s acknowledgment and understanding of wicked problems to which they may be exposed.

CONCLUSIONS

The pediatric lead fatality of a refugee emphasized to the Manchester community the need for more resources, expertise, and community support. To address this necessity, our academic–community partnership proposed to examine the community’s ecology and to utilize the findings to help build the community’s capacity to address the wicked problem of childhood lead poisoning. Our experience has shown that a wicked problem may come and overstay its welcome in a community but through the practitioner’s understanding of the community’s ecology and an effective academic–community partnership that incorporates the community’s input, the population impact of the wicked problem can be lessened.

Our work demonstrated how taking the time to understand a community’s ecology from the standpoint of impacted residents (e.g., Latina mothers) and representative stakeholders (e.g., local healthcare providers) contributed to building the community’s capacity to address this wicked problem. The resultant place-specific strategy directly responded to the community’s

identified priority for action and has led to segments of the public sphere that are better informed about this wicked problem.

Our findings have relevance for major stakeholders of this wicked problem, for example: peer-to-peer educators who work in a temporary safe housing complex; refugee resettlement agencies who need to educate refugees who will be residing in the affected housing; property owners/managers who need to be educated on the consequences (i.e., fines and imprisonment) of not disclosing the presence of lead paint in their rental properties and how they must do so in a culturally and linguistically appropriate manner; healthcare providers who need to be aware of CDC's universal screening recommendation; building inspectors who are trained to recognize lead paint in poor condition and prevent occupancy of the unit by young children until the issue has been addressed; continuation of the local health department to collaborate with the community residents, community-based organizations, and academia in providing both education for residents and healthcare professionals, as well as providing secondary prevention services of screening all children at risk for exposure to lead paint.

We propose that practitioners need to consider a community's ecology and the social context of risk as it pertains to all types of wicked problems, as these factors will influence the management of the wicked problem and how a diverse community interprets and responds to educational messages and community capacity building efforts. Green, Fullilove, Evans, & Shepard (2002, p. 268) stated "... that any attempt to improve health in the area must address the multidimensional and complex nature of the environments under study."

Acknowledgments

The work described was supported by an Environmental Protection Agency (EPA) grant for the Combined Sewer Overflow project and by NIH Grant Number P42 ES007373 from the National Institute of Environmental Health Sciences. The project described is solely the responsibility of the authors and does not necessarily represent the official views of NIH or EPA. This project benefited from the support of the Manchester Health Department in Manchester, New Hampshire and the Greater Manchester Partners Against Childhood Lead Poisoning. The authors also thank Aaron Krycki, BS, Manchester Health Department for his GIS mapping skills; Kathy Mandeville, RN, MS, MPH, Manchester Health Department for discussions about this work; and Holly Tutko, MS, University of New Hampshire for her critical review of this work.

REFERENCES

- Agency for Toxic Substances Disease Registry (ATSDR). Toxicological Profile for Lead. [Retrieved December 14, 2008]. from <http://www.atsdr.cdc.gov/toxprofiles/tp13.html>
- Altman DG. Sustaining interventions in community systems: On the relationship between researchers and communities. *Health Psychology* 1995;14(6):526–536. [PubMed: 8565927]
- Bailey AJ, Sargent JD, Blake MK. A tale of two counties: Childhood lead poisoning. *Economic Geography* 1998;74:96–111.
- Beck, U. Politics of risk society. In: Franklin, J., editor. *The politics of risk society*. London: Polity Press; 1998. p. 9–22.
- Caron RM, DiPentima R, Alvarado C, Alexakos P, Filiano J, Gilson T, et al. Fatal pediatric lead poisoning—New Hampshire, 2000. *Morbidity and Mortality Weekly Report* 2001;50:457–459. [PubMed: 11414596]
- Centers for Disease Control and Prevention (CDC). National Center for Environmental Health. Preventing Lead Poisoning in Young Children. 2008a [Retrieved December 14, 2008]. from <http://www.cdc.gov/nceh/lead/publications/books/plpyc/contents.htm>
- Centers for Disease Control and Prevention (CDC). National Center for Environmental Health. National Health and Nutrition Examination Surveys. Children's blood lead levels in the United States. 2008b [Retrieved December 14, 2008]. from <http://www.cdc.gov/nceh/lead/research/kidsBLL.htm>

- City of Manchester, New Hampshire Health Department (MHD). Public Health Report Cards. 2008a [Retrieved December 14, 2008]. from <http://www.manchesternh.gov/website/Departments/Health/DataandReports/tabid/700/Default.aspx>
- City of Manchester, New Hampshire Health Department (MHD). Manchester Health Department Monthly Report Summary. 2008b [Retrieved December 14, 2008]. from <http://www.manchesternh.gov/website/Departments/Health/DataandReports/tabid/700/Default.aspx>
- City of Manchester, New Hampshire Health Department (MSAP). Manchester's Primary Care Safety Net "Intact but Endangered" A Call to Action. 2008 [Retrieved December 14, 2008]. from <http://www.manchesternh.gov/website/Departments/Health/DataandReports/tabid/700/Default.aspx>
- Cox, R. Environmental communication and the public sphere. Thousand Oaks, CA: Sage Publications; 2006.
- Green L, Fullilove M, Evans D, Shepard P. "Hey, Mom, thanks!": Use of focus groups in the development of place-specific materials for a community environmental action campaign. *Environmental Health Perspectives* 2002;110(2):265–269. [PubMed: 11929737]
- Kawachi, I.; Berkman, LF., editors. *Neighborhoods and health*. New York: Oxford University Press; 2003.
- Kreuter MW, De Rosa C, Howze EH, Baldwin GT. Understanding wicked problems: A key to advancing environmental health promotion. *Health Education & Behavior* 2004;31:441–454. [PubMed: 15296628]
- New Hampshire Division of Public Health Services, Department of Health and Human Services, Childhood Lead Poisoning Prevention Program. New Hampshire Childhood Lead Poisoning Prevention Program: 2002–2006 Blood Lead Screening Data.
- New Hampshire General Court—Legislation. [cited February 15, 2008]. Retrieved December 14, 2008 from <http://www.gencourt.state.nh.us/legislation/2007/SB0176.html>
- Rittel HJ, Webber MM. Dilemmas in a general theory of planning. *Policy Science* 1973;4:155–169.
- Serrell N, Caron RM, Fleishman B, Robbins ED. An academic-community outreach partnership: Building relationships and capacity to address childhood lead poisoning. *Progress in Community Health Partnerships: Research, Education, Action* 2009;3(1):53–59.
- Trotter RT II. The cultural parameters of lead poisoning: A medical anthropologist's view of intervention in environmental lead exposure. *Environmental Health Perspectives* 1990;89:79–84. [PubMed: 2088759]
- United States Census Bureau. Population finder. [Retrieved December 14, 2008]. from <http://www.census.gov>
- Wehrly, R. Senior Thesis. 2006. Constructing the problem of lead poisoning. Unpublished

Fig. 1.
Elevated blood levels (greater than or equal to 10 ug/dl) in children less than 7 years of age in Manchester, New Hampshire, 1990–2006.