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Negotiating public health and agricultural burning: a theoretical perspective on community conflict in northern Idaho

JD Wulfhorst[1] and Max Nielsen-Pincus[2]

[1]Department of Agricultural Economics and Rural Sociology, [2]Department of Forest Resources, University of Idaho, Moscow, Idaho, USA

Abstract: Public health continues to evolve from its medical and epidemiological roots to include more comprehensive perspectives. Lifestyle, social networks and wellbeing should be considered important components of public health, in addition to more conventional factors such as environmental and medical conditions. We propose a theoretical model of public health to address a case of community conflict surrounding agricultural burning practices in northern Idaho. This case reflects the complexity of influences on public health beyond conventional perspectives of public health institutions. Our model accounts for a community's external context such as its political, legal, social and environmental influences. This model of public health also represents a community's internal dynamics, including social cohesion, disease and epidemics, and economic vitality. Public health practice that includes external context and internal dynamics will lead to greater levels of participation and empowerment in public health conflicts.

Keywords: public health, community, social cohesion, agricultural field burning, Kentucky bluegrass

Introduction

A contemporary concept of public health has evolved in Western societies for a century and a half. As an institution and a practice, the concept has been predominantly guided by medical, epidemiological and demographic perspectives. In this paper we argue that public health exists in and should be considered in a much broader framework that includes a host of other contexts and dynamics such as politics, economics, culture and the environment. We suggest that previous conceptions of public health institutions have led to narrow definitions and perspectives about what constitutes public health. We propose that a new model of public health can help institutions and agencies meet the complex demands related to current and future public health problem-solving.

Community plays an integral part of the broader framework we propose here. We intend for community to have plural and related conceptual boundaries: community may emerge as a sphere of interests or activities as well as place-based phenomena given that those activities occur in some space or locale (Wilkinson 1991; Milroy and Wismer 1994). Moreover, we articulate multiple uses here with the intent for them to complement, rather than conflict or compete with, one another (Liepins 2000). As such, community becomes a robust concept to analyse social interaction related to public health.

The vision of a public health model that incorporates a community perspective, an increasingly complex socio-environmental perspective *and* a medical perspective is appealing. This paper ties these perspectives together at the community scale by examining the internal dynamics of a community as well as the external contexts that affect communities. To do this we develop a model of multidimensional public health based on the integration of these perspectives. The conceptual development of public health is examined as well as some current trends in the field. To apply this model we use an example of a community conflict over the practice of agricultural field burning in northern Idaho, USA. The case study juxtaposes public health in the traditional perspective against farm viability and ultimately community stability. The conflict over field burning illustrates the need for public health advocates and practitioners to adopt a broadened framework and thereby avoid narrower, and potentially adversarial, traps. Public health does not have to become a win-lose proposition. Instead, public health ought to be just that: collective and

Correspondence: JD Wulfhorst, Department of Agricultural Economics and Rural Sociology, University of Idaho, 6th & Rayburn Streets, PO Box 442334, Moscow, Idaho, 83844-2334 USA; tel +1 208 885 7645; fax +1 208 885 5759; email jd@uidaho.edu

healthy. A change in public health orientation should include representative perspectives from the contexts presented here.

Negotiating public health

What is public health?

Although the responsibility for health in many developed societies continues to lie primarily with the individual, we describe the discipline of public health as the collective practice of promoting improved conditions and wellbeing for the members of society. Conventionally, public health focused on medical treatments for disease and remediation of environmental health concerns such as water-borne disease. Vast arrays of demographic information and vital statistics facilitate analysis of the status and trends of disease, mortality and other health patterns. The institutional frameworks that reinforce disease-oriented medicine and demographic health data deserve recognition for many successes in our current standard of living.

In the latter half of the twentieth century, new philosophies about public health have emerged to claim that epidemiological sciences will not alone solve the dilemmas of public health (McMichael 1993). For instance, one argument suggests that historically the improvements in public health came from the rising standards of living associated with economic development (McKeown and Brown 1955; McKeown and Record 1962). Critique of this thesis centred on the notion that an oversimplified analysis of improvements to the general health of the public fails to recognise the specific achievements of the past century and a half of the public health movement (Colgrove 2002; Szreter 2002). However, this critical thinking may be overshadowed by the increasingly complex health challenges emerging from the continuing development of interconnected social structure and organisation from local to global levels (Waltner-Toews 2001).

Changes in society necessitate changes in public health

Opportunities and challenges of the twenty-first century present the discipline of public health with a new set of ecologically-based health problems as well as the persistence of challenges that public health practitioners have traditionally focused on (Detels and Breslow 1991; Kawachi 1997; Lee and Paxman 1997; Muntaner et al 2000; Link and Phelan 2002). Contemporary theory expands and informs public health to be viewed as a function of internal and external factors from individual to global scales, and calls for a re-evaluation of how to monitor and ensure both human and environmental health.

In recent decades, the shift away from risk-factor epidemiology has significantly reshaped public health (Pearce 1996; Lee and Paxman 1997). Simultaneously, human communities across the globe have converted native ecosystems to urban, agricultural and natural resource production zones, often devoid of their former ecological structure and function (Wilson 1992). Anthropogenic modification of the environment and ecologically sustainable thresholds necessitate the incorporation of environmental contexts into the practice of public health. Moreover, intracommunity dynamics and the effects of institutional forces play vital roles in how we ought to conceptualise, evaluate and create policy for a healthy society.

Critical to this viewpoint is the perspective that human societies and environmental support mechanisms have approached both spatial and functional thresholds. By thresholds, we refer to the capacity limits of environmental support systems to sustain processes related to natural resource use and agricultural production. Recent literature (Kay et al 1999; Waltner-Toews 2001) has outlined significant relationships between such environmental limits and a broadened perspective on health. Changes in environmental support systems can account for many health risks, including excess pollution, psychological maladies and deficient nutrition (Macy 1995; Carnegie et al 2000). Many people in societies around the world realise how unfettered development of the environment disrupts ecological systems necessary for the physical and economic health of populations (Steingraber 1997; Ricketts 2000).

This perspective draws heavily on the notion of *ecological integrity* defined by Miller and Rees (2000, p 10) as 'understand[ing] phenomena in their interrelationships as complex wholes and parts'. McMichael (1993, 2001), largely credited for pioneering the ecological integrity perspective, has argued that human health relates to economic disparity, environmental deterioration and rates of population growth. Soskolne (2003) has also added the importance of misuse and/or over-reliance on technology as another critical factor in the state of ecological integrity. Consistent with these points, Waltner-Toews and Wall's (1997) discussion of health analysis in the context of agroecosystems indicates a need to refocus scientific efforts away from causes of particular symptoms and toward evaluation of systemic goals. Environmental quality and social dynamics are critical factors in determining the state of a society's health.

Internal dynamics and external contexts of the community perspective

The structure and function of the world's societies have changed significantly over the past several decades. The way we communicate, how we make a livelihood, and the products we use have all undergone dramatic shifts, some fundamental. Two perspectives of social change are useful for the model of public health that we present here. First, external contexts, or how a social unit (in this case a community) perceives itself with respect to the rest of the world. Although community perception of external factors is important, social change also involves the imposition of larger scale social dynamics on a community. Second, internal dynamics, or the community's social structures and the ability of those structures to function for their intended purposes, help frame the health of a community. Both perspectives have important implications for health, especially in times of social change or community conflict.

External contexts affect communities in two ways. First, community-scale issues are often moulded on higher scale context. Environmental, legal, political and societal values all shape the nature of a community. Second, the self-perception of communities with respect to these external contexts is also important to the manner in which a community responds to social change. Three general and relevant changes in community self-perception have occurred. First, the combination of globalisation and increased education has resulted in an increased awareness of the nature of the interconnectedness of global environmental systems, social processes and human health (Waltner-Toews and Wall 1997). Second, that the forces of globalisation continue, suggests an increased recognition of some parts of that interconnectedness (Waltner-Toews and Wall 1997). Third, communities are increasingly recognising the social, economic, environmental and security risks associated with intensively connected societies (McMichael 2001). These perspectives of public health offer the opportunity to assess these risks from a unified standpoint that includes not only the medical perspective, but also is grounded in environmental justice and human rights (Farmer and Albrecht 1998; Pulido 1998).

In the 1990s, the environmental justice movement in the United States flourished (Bryant 1995), partially due to President Clinton's executive order on environmental justice in minority and low-income populations (Clinton 1994). Environmental justice efforts in the 1990s focused on social groups targeted by President Clinton's executive order (Wright 1995). However, from a health perspective, it is clear that environmental justice is a cause that merits application to all social groups that face external risks. Hence, Bryant (1995, p 23) defines environmental justice as 'those institutional policies, decisions and cultural behaviors that support sustainable development, that support the living conditions in which people can have confidence that their environment is safe, nurturing and productive, and that support communities where distributive justice prevails.' Other movements such as those which have evolved from the United Nations Universal Declaration on Human Rights (United Nations 1948) and the United Nations World Commission on Environment and Development's Earth Charter (Earth Charter Commission 2000) demonstrate an internationally significant commitment to recognising the rights of all humans to health and a clean environment. With respect to external contexts, environmental justice and human rights provide important indicators of internal community health (Dobson 2004).

From the perspective of internal community dynamics, social change has and will continue to influence the healthy functioning of communities. The effect of internal community dynamics on the promotion of healthy lives is also in the realm of interest for public health. Healthy internal dynamics depend heavily on coherent functioning of social structures, the value of which has been described as social capital (Nielsen-Pincus et al 2002). Although the positive role of social capital in health has been criticised (Muntaner et al 2000; Pearce and Smith 2003), the position of social function and cohesion in a healthy life is undeniable for our highly social species. Contrary to the simplistic positivist belief that individuals are self-interested utility-seeking machines, the public health perspective suggests that social function and cohesion are critical to achieving population-based health goals (Fullilove 1998; Scherer 2000). Social capital is, therefore, an important indicator of how well a community may be prepared to adapt to social change without experiencing significant negative consequences.

If this perspective is correct, the implication for the practice of public health is that successful public health representatives and agencies must recognise the value of community function as a health-related process. As internal community dynamics are increasingly recognised as an appropriate model for the promotion of healthy livelihoods in the community setting, social changes can be assessed for their implications to community health and justice.

Community and the system of public health

Public health has been classically conceived as a response to the 'environmental burden of illness' (Cole et al 1999, p 66). In the past two decades there has been an increased call for broadened models of health. New models have included determinants of health such as personal behaviour and the psycho-socio-economic environment (The Mandala of Health, see Hancock and Perkins 1985), sustainability and conviviality (Health and the Community Ecosystem, see Hancock 1993), and ecosystem integrity and cultural processes (Health, Environment, and Development, see Parkes and Panelli 2001). Although each of these models broadens the purview of health, none does so in a way that reflects the internal dynamics of a community within its external contexts. Furthermore, each is static and therefore misses the dynamic nature of the social, environmental and economic processes that affect public health. As such, we propose a dynamic, community-scale model to conceptualise public health (see Figure 1).

The model in Figure 1 illustrates both the external contexts as well as the internal dynamics that constitute public health in community. The factors on the outer realm of the model indicate the external contexts and the factors inside the 'community' box indicate internal dynamics within the model. Public health institutions have a reciprocal relationship with both the external contexts and the internal dynamics of community. This reciprocity is illustrated in Figure 1 by the multidirectional pathways between the external contexts, internal dynamics and the public health institutions. The interactions of these factors combined comprise the complexity of situations that public health institutions must address.

External contexts

Political and legal activities comprise two of the interrelated external contexts that affect public health. Bennett and DiLorenzo (2000) claim that the public health movement became highly political beginning in the 1960s. Litigation related to environmental quality has, for many, become a

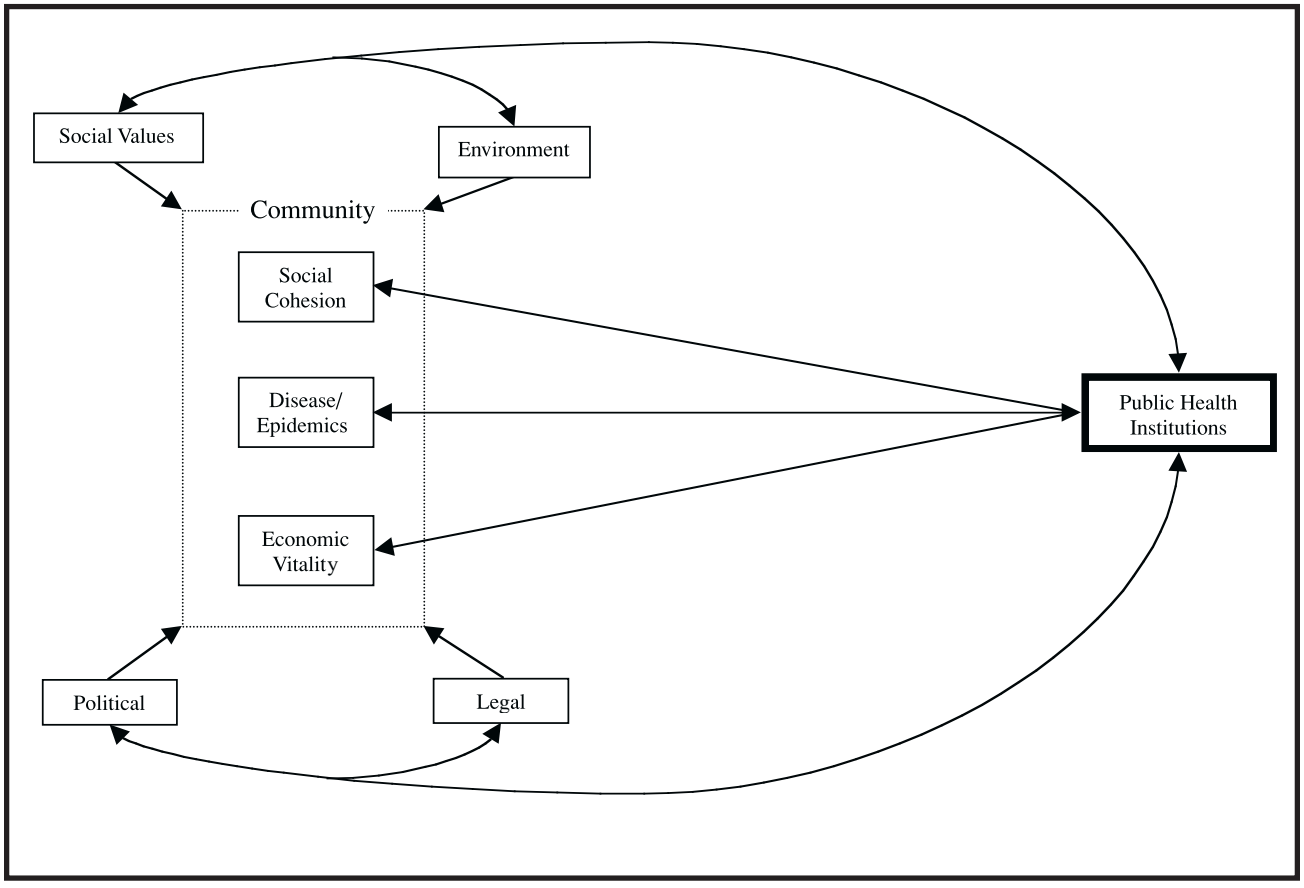

Figure 1 Community and the system of public health. The figure is a representation of the system of public health from the community perspective. The 'community' box contains the factors which constitute the internal dynamics of community, and is surrounded by the external contexts that impact the community. The multidirectional pathways between the external contexts, internal dynamics and public health institutions demonstrate the reciprocal nature of those relationships.

mechanism to frame and control public health policy through legal decision making and case law. Political and legal contexts also help identify cases of environmental justice that represent the differential and inequitable environmental impacts to which underserved populations get exposed.

Public health also includes social and environmental contexts in which planning and policy decisions occur. Increasingly, citizens continue to demand the burden of proof be shifted toward industry, producers and responsible entities rather than victims (Cranor 1999). An increasing polarisation of social values related to natural resource and environmental conflicts affects the context of public health and its management.

Internal dynamics

Within the model, we label one of the internal dynamics of community as 'social cohesion' to refer to the ability of community members to rely on, care for and enjoy one another. Although conventional perspectives of wellbeing have often framed wellbeing as medical phenomena, taken in a broader context wellbeing includes community social cohesiveness and collective measures of health, indicating properties of the whole (Fullilove 1998). By including notions of wellbeing from social cohesion, we can analyse and evaluate public health controversies on multiple levels.

More conventional notions of wellbeing related to disease, medical treatment and epidemiology play a significant role in this model as well. However, our intent is to stress the importance of collective-level epidemiological assessment (Pearce 1996) as well as not limit analyses to the relative risks now used to evaluate within-population comparisons (Rose 1985). Moreover, Soskolne (2003) recommends a framework for health and wellbeing integrally tied to an understanding and evaluation of ecological integrity.

We must also incorporate more in-depth understanding of economic vitality as a key internal component of public health. We often fail to consider a combination of short- and long-term economic perspectives, let alone multidimensional approaches to assessing costs and benefits. Public health exists as a collective good from which we all benefit.

Public health institutions

Our model includes the institutions that manage public health for the communities, regions and societies. By public health institutions, we mean to include those entities that have *direct* interaction with communities, such as federal resource management agencies, public school districts or city councils. Perspectives of public health that emphasise physical wellbeing often anchor common perceptions of what constitutes health. Within our model, public health institutions serve as the media through which the variety of contexts and dynamics discussed above filter and are translated into regulation, policy, enforcement and assistance. Through both direct and indirect pathways, public health institutions are affected by and affect the numerous community contexts and dynamics in a reciprocal manner.

The model suggests the need to approach public health differently, recognising it as multidimensional and dynamic. The model supports greater opportunity for engagement, participation and action on the part of citizens, communities and public health institutions.

A case study of public health: bluegrass field burning in northern Idaho

History and context

Agricultural growers in the Pacific Northwest produce nearly 75% of the nation's Kentucky bluegrass seed for golf courses and America's lawn fetish. The Idaho Panhandle ranks as the production leader yielding 50% of the nation's total (Mahler and Ensign 1989; Hirnck 2001). Prior to recent bans on residue burning following bluegrass seed harvest, eastern Washington and western Oregon contributed greater proportions to the regional yield. With the exception of parts of eastern Oregon, Idaho is the only state in the region that maintains growers' rights to practice post-harvest residue burning for bluegrass.

The bluegrass seed industry in northern Idaho began in the early 1950s, largely in response to the need for an agricultural crop that would conserve soil in the erosion-prone hilly terrain of the Palouse and Camas Prairies. Legend has it that the bluegrass industry discovered the practice of field burning after a wayward cigarette tossed out of a passing car ignited a field fire in Spokane Valley, Washington, resulting in increased yields the following year (Hengen 2002). Today, bluegrass residue burning occurs on about 45 000 acres across northern Idaho during an average of 8–10 selected days over a six-week period in late summer, and has become increasingly managed by local, state, federal and tribal authorities. Within this region, bluegrass seed crops are harvested from private lands as well as tribally owned lands within the Coeur d'Alene and Nez Perce Indian reservations. The standard practice for most bluegrass farmers in the region is to ignite the crop residue with propane

torches and manage the blazes through wind pattern monitoring, on-the-ground personnel and decades of cumulative intergenerational experience.

Several key benefits are derived from the practice of burning bluegrass residue, which is now considered 'traditional'. First, having become the predominant cropping system in specific steeply graded riparian areas of northern Idaho (especially around the amenity-based economy of Lake Coeur d'Alene, a new tourist Mecca), the perennial bluegrass fields are given credit for reducing significant levels of soil runoff and revitalising water quality following decades of wheat production (Painter 1997). Conventionally, bluegrass crops are not tilled, but seeded for up to twenty years of perennial harvest when combined with burning practices. Second, the burning practices clearly remain the most effective economic option for eliminating residue from the fields and sustaining economically viable crop yields (Van Tassell 2002).

Perhaps most important, as well as controversial however, is the link between economic vitality and the biological effects of burning. Producers contend that fire, in addition to getting rid of the residue, 'shocks' the plant's biological core triggering a physiological response to produce more tillers (stems) with increased seed productivity – both of which affect yields. Regional research on bluegrass cropping systems for over thirty years has continued to deliver mixed results on the validity of this claim as scientific fact; however, substantial evidence does exist to support this case (Murray and Johnston 1995; Chastain et al 1997; Murray and Swensen 1997).

Opposition to the bluegrass field burning practices originally began in the late 1960s. At the time, agriculture and its political power as an industry still dominated the cultural, environmental and economic landscapes in the Inland Northwest region. A new critical mass of opposition to bluegrass field burning appears to stem largely from recent residential in-migration to the northern Idaho area. Kootenai County for instance – home to the booming Lake Coeur d'Alene area – experienced a 56% residential growth rate since 1990 (US Census Bureau 2001) and shows no sign of those rates slowing. Demographic as well as anecdotal evidence indicates that much of the growth has occurred from in-migrants leaving California, the southwest and other areas, who seek the amenities of a more rural lifestyle combined with the conveniences of nearby urban centres (Kenworthy and Overberg 2002). This trend follows a similar pattern that has been studied in many other communities in the Intermountain West experiencing rapid growth (Smith and Krannich 1998).

Consequential to the bluegrass field burning practices, some residents living within this region have become increasingly vocal about their concerns for amenity and perceived health impacts due to effects on air quality from drifting and lingering smoke. Not altogether new (Painter 1997), these concerns have heightened in terms of media attention, local- and state-level discussion, as well as the related community conflict surrounding the issue in the last three years within Idaho (Flowers 2002; Geranios 2002; Hedberg 2002; Ross 2002a) as well as on an international scale (Burnett et al 2003). Local doctors in northern Idaho and the surrounding region have attributed several deaths to the air quality effects from bluegrass smoke, the most recent of which received national press attention (Whitman 2001). Currently, a well-funded community-based interest group – Safe Air For Everyone (SAFE) – has filed numerous ongoing lawsuits against the bluegrass farmers. SAFE, a group that represents commercial interests and physical health interests, expresses a zero-tolerance position for allowing the field burning practices to continue.

Policy conflict and public health: insensitivity versus intolerance

Public health institutions affecting the case of bluegrass field burning have related but separate objectives. The United States Environmental Protection Agency (EPA) enforces federal law such as the Clean Air Act, but in this case has thus far honoured the sovereign rights of the Coeur d'Alene and Nez Perce Indian Tribes to establish and operate their own smoke management programmes for bluegrass burning on the reservations overlapping the agricultural production region. The State of Idaho also has oversight through the Departments of Environmental Quality and Agriculture. All of these agencies must coordinate their efforts in order to be effective, as well as find cooperation with the public. Often, the agencies find themselves within the middle of litigation and conflict.

In the late winter and early spring of 2001, the US Environmental Protection Agency hosted a series of forums in the Inland Northwest region to solicit stakeholder input related to the bluegrass field burning issue. A number of experts, such as physicians, public health officers and regulators, made presentations at these forums. Most of the presenters at the forums represented a public health institution of some form. These perspectives tended to focus on reviews

of 'the literature' and emphasised the negative effects to human health of increasing particulate matter, often discussed within the media as PM[sub10] or PM[sub2.5] to refer to the size of particulates in microns (Roberts and Corkill 1998; Downey and Martin 2001; Ross 2002b). Furthermore, the forums emphasised problems associated with particulate matter from bluegrass smoke rather than the range of or combination of other sources – automobiles, industries, fireplaces, and wild or controlled forest burns – all of which exist in the region.

While this focus of the EPA forums captures the essence of some of the debate about bluegrass field burning, it fails to incorporate a wide range of perspectives about public health in the sense of the internal and external costs and benefits. In the simplest dichotomy, if we analyse perspectives as either for or against the field burning, evidence exists for both points of view. Community interests opposed to the burning tend to focus on the medical context to make the case against the practice. Community members, farmers and others who wish to retain the right to burn, focus on agricultural science, economic vitality, community stability, tradition and individual rights as the means to their end. Proponents of *each* perspective also make 'environmental' arguments to support the case for or against burning – soil conservation versus air quality.

This debate has deteriorated literally and symbolically, serving as an indicator of public health 'interaction' within the communities where the smoke becomes an issue. This deterioration is especially evident within the ongoing litigation over the field burning practices. The community members-turned-foes converse and negotiate primarily through attorneys. Those opposed to the burning label the farmers as 'insensitive to health needs of a growing population', while those in support of burning view the opposition as 'intolerable of necessary and traditional agricultural practices'. Based on demographic trends of the Inland and Intermountain West regions, the amenity interests of regional newcomers often bring a varied set of backgrounds and cultural values to traditional rural communities. Newcomers often cite the relative high quality of the local environment as a reason for regional immigration (Flowers 2002; Hedberg 2002; Ross 2002a). Thus, based on growth demographics, the population increase in this region, which has centred on Coeur d'Alene, Idaho, may also be correlated to a decrease in familiarity and tolerance of agricultural burning practices. As such, many new residents tend to view the handful of burning days allowed per year as insensitive to the needs of the public's health.

Alternatively, those supporting burning remain puzzled by the uncompromising push from community interest groups to identify bluegrass farmers' practices as the primary particulate-related health risk in a sea of other particulate matter that come from burning wheat field stubble, forest fires and slash burning, industry and automobiles. In the winter of 2002, one major newspaper in the region reported a feature article on the negative long-term health effects of the variety of particulate matter generated in the region with little impact attributed to bluegrass field burning (Ross 2002b). On the other hand, one leader of the perspective opposed to bluegrass burning recently likened the farmers' practice to '30 years of experimentation on the people of North Idaho' (Russell 2003, p B2).

This struggle raises questions about what criteria we use to evaluate public health in situations that are complicated by the interrelationships between external contexts and internal community dynamics as illustrated in Figure 1 and Table 1. Do we have 'rights' to public health like those we grant to individuals in relation to property and civil relations? This debate helps illustrate the ongoing importance of understanding how we define public health, and how we frame who helps and who hurts that effort. Table 1 illustrates the dimensions and factors expressed in the theoretical model above as generic indicators as well as applied to the case of bluegrass residue burning. This table is an effort to better articulate and summarise the multiple aspects of public health. Although presented here as if the categories are discrete, the various factors found in the table intuitively connect and, in many cases, overlap.

Discussion and application of the model

The case of bluegrass field burning in Idaho suffers from ambiguous legal authorities and regulatory jurisdictions. Political and legal management of the practice connects a variety of state, federal and tribal laws. Long traditions of agricultural burning have led farmers to consider burning practices as a right accompanying the land's productive value, rather than as a privilege to pollute.

Farmers have a long history of their own political and legal battles (Schwab 1988). Until recently though, agricultural communities have not faced the same intensity of environmental concern emanating from contemporary local community interests such as SAFE. As the population of rural areas continues to migrate toward more ex-urban areas (areas where development patterns have begun to filter into rural areas proximate, but not necessarily adjacent, to

Table 1 Linkages between public health indicators and the case of bluegrass burning

Community factors	*Public health indicators*	*Bluegrass field burning in northern Idaho*
Internal dynamics		
Social cohesion	Level of conflict and cooperation	Antagonism between and among farmers and non-farmers
Disease/epidemics	Rates of illness	Cases of smoke-induced chronic respiratory problems
Economic vitality	Opportunities for livelihood and development	Farm viability and stigma to local industries
External contexts		
Societal values	Pattern of addressing conflict resolution	Bureaucracy and media influence on ex-urban development
Environment	Biophysical integrity of surrounding ecosystems	Smoke and erosion-related air and water quality
Legal	Concerns of social and environmental justice	Financial inequities and legal inexperience among farmers
Political	Degree of constituent power to control social change	Influence on politicians to shape field burning policy
Public health institutions	Scope and number of regulatory entities that monitor social, environmental and medical issues	State Departments of Agriculture and Environmental Quality created a smoke management plan to monitor smoke-related impacts and foster public input

urban areas; Travis et al 2002; Maestas et al 2003), so does the political power to affect policy and legal outcomes. These contexts affect the abilities of the farmers *and* community-based special interest groups to reach collaborative resolutions about public health controversies related to agricultural production. Instead, *individuals* often remain tied to their own perspective on *public* health and how they impact or contribute to it. The interconnected aspects of factors expressed in Table 1 also support the notion that community members have their own understandings and knowledge about the multiple dimensions of public health. In this case, the farmers' current legal rights to burn residue have come under scrutiny as customary practice is redefined as a contemporary public health problem.

In the case of bluegrass field burning, environmental trade-offs mix inconsistently with social perspectives of the situation. For instance, farmers suggest a ban on burning would shift production back to a cropping system that will increase soil erosion and affect water quality for the growing tourism industry. Alternatively, community interests across the region opposing the burning maintain that the farmers jeopardise public health in the name of personal profit as they produce environmental risk. Both constituent sides in this debate fail to account for, and take offence to, the other's perspectives. For the community interest group opposing the field burning, scientific or regulatory dismissal of their concerns as 'emotional', 'biased' or 'subjective' does not account for how many people discuss and learn about public health issues in society. The public health community has failed to address these concerns within the arena of public policy. Similarly, a recent media article in a regional newspaper focusing on particulate matter from a variety of sources showed bluegrass field burning may peak higher on the air quality monitors during acute events, but does not maintain the chronic average particulate concentration usually seen from wood stoves, forest slash-burning and automobiles (Ross 2002b).

To be certain, the particulate matter standards that apply to this case count for a lot in the questions of public health, regardless of perspective (Roberts and Corkill 1998). Even the farmers agreed to regulatory monitoring of the particulate matter in the interest of public health. Medical and epidemiological factors remain central to any public health issue. Individuals in the region with respiratory illnesses may be impacted by smoke plumes that drift off burning bluegrass fields. Medical concerns associated with health controversies must be included in any model of health. However, within any community-based controversy, there also exist social and economic dynamics internal to public health.

Field burning in the Northwest has long been a source of controversy, but the magnitude of adversarial relations between groups has increased with the bluegrass residue burning practice in Idaho. On one level, it appears the constituents have coalesced within their camps to confront each other in the public health debate. However, the additional financial stresses placed on many bluegrass farmers force some to compromise their level of commitment to the collective struggle. Similarly, the attempt to document

public response to the controversy reveals a wide range of perspectives within the general population about the costs and benefits of bluegrass field burning. Social cohesion is compromised by conflict in the community that leads to increased domestic stress, disagreements with friends and loss of trust that the past alliances will be ongoing (Scherer 2000). In these conditions, social cohesion in each sector of a community gets constrained, leading to negative consequences for public health.

Bluegrass farmers in northern Idaho maintain they cannot grow bluegrass as an economically viable crop without burning the residue. One study, using yield trends over a 25-year period, showed that moving to an alternative residue management system (ie baling, harrowing, livestock grazing or chemical applications) could cost the farmers up to US$166 per acre per year under no-burn constraints (Van Tassell 2002). For a farmer that has the local average of 220 acres, this difference could amount to over US$36 000 annually. Economic analyses such as these often play a role in predicting the costs and benefits of systemic changes. Information and discussion produced by economic analyses of this sort also produce abstract controversy because of the implications that environmental and/or human health can be articulated as having a particular economic value.

Summary and conclusion

Our theoretical perspective on public health and its application to the case of bluegrass field burning suggests several concluding points. First, public health – as a concept and a practice – would benefit from a broader set of factors associated with it. This approach will support the focus on connections between things rather than identifying a single source or cause of public health problems. Previous research has demonstrated that identification of single causes narrows explanation and blames a single source for what likely comes from many. Such an approach misses the synergistic effects of the physical, cultural, environmental and economic landscapes that combine to constitute important and overlooked effects (Mullan 2000). A more comprehensive model allows for an inclusive array of factors.

Second, because this model promotes inclusivity, it fosters participation and engagement among the public. From a local knowledge perspective, we should at least consider members of the public as valid interpreters of their own public health needs and issues. If engaged, then community members have a lot to offer one another as well as public health 'experts' that rarely, if ever, becomes part of the discussion bounded by a more limited institutional framework. Public health as a field of inquiry and discussion ought to support those interested in an active and local role. This will advance institutional awareness beyond the perspective that public health matters are problems best addressed at the level of the individual.

Third, if we understand the model of public health included here as reflexive, it becomes a strategy and mechanism for empowerment. Conceptually, public health practitioners should understand the positive health effects of social empowerment, economic opportunity and cohesion as much as an absence of illness. As controversy at the community levels escalates, local, state, federal, formal and informal public health institutions must seize the opportunity through a greater range of stakeholder interaction to operate within the broader contexts suggested here (Hemmati 2001). Such an approach will also reinforce a positive perspective of public health as both collective and healthy.

References

Bennett JT, DiLorenzo TJ. 2000. From pathology to politics: public health in America. New Brunswick: Transaction Publishers.

Bryant B. 1995. Issues and potential policies and solutions for environmental justice: an overview. In Bryant B, ed. Environmental justice: issues, policies and solutions. Washington, DC: Island Pr. p 8–34.

Burnett RT, Jessiman B, Stieb D et al. 2003. Population health issues in the management of air quality. In Rapport DJ, Lasley WL, Rolston DE et al, eds. Managing for healthy ecosystems. Boca Raton, LA: Lewis Publishers. p 55–67.

Carnegie R, McKee N, Dick B et al. 2000. Making change possible: creating an enabling environment. In McKee N, Manoncourt E, Yoon CS et al, eds. Involving people, evolving behavior. New York: United Nations Children's Fund. p 157–211.

Chastain TG, Keimnec GL, Cook GH et al. 1997. Residue management strategies for Kentucky bluegrass seed production. *Crop Sci*, 37:1836–40.

Clinton WJ. 1994. Executive Order 12898 of February 11, 1994: federal actions to address environmental justice in minority and low-income populations. *Federal Register*, 59(32). Accessed 15 Sep 2003. URL: http://www.archives.gov/federal_register/executive_orders/pdf/12898.pdf

Cole DC, Eyles J, Gibson BL et al. 1999. Links between humans and ecosystems: the implications of framing for health promotion strategies. *Health Promot Int*, 14:65–72.

Colgrove J. 2002. The McKeown thesis: a historical controversy and its enduring influence. *Am J Public Health*, 92:725–9.

Cranor CF. 1999. Asymmetric information: the precautionary principle and burdens of proof. In Raffensperger C, Tickner J, eds. Protecting public health and the environment: implementing the precautionary principle. Washington, DC: Island Pr. p 74–99.

Detels R, Breslow L. 1991. Current scope and concerns in public health. In Holland WW, Detels R, Knox G, eds. Oxford textbook of public health. 2nd ed. Oxford: Oxford Univ Pr. p 49–65.

Dobson A. 2004. Ecological citizenship and global justice – two paths converging? In Haugestad A, Wulfhorst JD, eds. Future as fairness: ecological justice and global citizenship. Amsterdam: Rodopi. Forthcoming.

Downey S, Martin DM. 2001. Agricultural burning stakeholder forums: putting the pieces together. US EPA 910/F-01-007, November. Seattle: EPA Office of Air Quality.

Earth Charter Commission. 2000. The Earth Charter [online]. Accessed 28 Feb 2003. URL: http://www.earthcharter.org/files/charter/charter.pdf

Farmer FL, Albrecht SL. 1998. The biophysical environment and human health: toward understanding the reciprocal effects. *Soc Nat Resources*, 11:707–17.

Flowers E. 2002 Aug 25. Field-burning war heats up: farmers consider changing livelihoods. *Coeur d'Alene Press*; Sect A1, A2.

Fullilove MT. 1998. Promoting social cohesion to improve health. *J Am Med Womens Assoc*, 53:72–6.

Geranios NK. 2002 Mar 20. EPA plans new rules for reservations. *The Idaho Spokesman-Review*; Sect A5.

Hancock T. 1993. Health, human development and the community ecosystem: three ecological models. *Health Promot Int*, 8:41–7.

Hancock T, Perkins F. 1985. The mandala of health: a conceptual model and teaching tool. *Health Promot Int*, 24:8–10.

Hedberg K. 2002 Jan 20. Fired-up mom joins battle for cleaner air. *Lewiston Morning Tribune*; Sect C1, C4.

Hemmati M. 2001. Multi-stakeholder processes for governance and sustainability – beyond deadlock and conflict. London: Earthscan.

Hengen N. 2002. When the smoke has cleared: triumph of activism. *Wheat Life*, 45(11):4–7.

Hirnck R. 2001. Idaho grass seed crop file. Moscow, ID: Department of Plants, Soils and Entomological Sciences, University of Idaho.

Kawachi I. 1997. Long live community: social capital as public health. *The American Prospect*, 8(35). Accessed 15 Sep 2003. URL: http://www.prospect.org/print/V8/35/kawachi-i.html

Kay J, Regier H, Boyle M et al. 1999. An ecosystem approach for sustainability: addressing the challenge of complexity. *Futures*, 31:721–42.

Kenworthy T, Overberg P. 2002 Oct 28. How the mountain west was won by the GOP. *USA Today*; Sect A1.

Lee P, Paxman D. 1997. Reinventing public health. *Annu Rev Public Health*, 18:1–35.

Liepins R. 2000. New energies for an old idea: reworking approaches to 'community' in contemporary rural studies. *J Rural Stud*, 16:23–35.

Link B, Phelan J. 2002. McKeown and the idea that social conditions are fundamental causes of disease. *Am J Public Health*, 92:730–2.

Macy J. 1995. Working through environmental despair. In Roszak T, Gomez ME, Kanner AD, eds. Ecopsychology: restoring the earth, healing the mind. San Francisco: Sierra Club Books. p 240–59.

Maestas JD, Knight RL, Gilgert WC. 2003. Biodiversity across a rural land-use gradient. *Conservation Biol*, Forthcoming.

Mahler RL, Ensign RD. 1989. Evaluation of N, P, S and B fertilization of Kentucky bluegrass seed in northern Idaho. *Commun Soil Sci Plant Anal*, 20:989–1009.

McKeown T, Brown R. 1955. Medical evidence related to English population changes in the eighteenth century. *Popul Stud*, 9:119–41.

McKeown T, Record R. 1962. Reasons for the decline of mortality in England and Wales during the nineteenth century. *Popul Stud*, 16:94–122.

McMichael AJ. 1993. Planetary overload: global environmental change and the health of the human species. Cambridge, UK: Cambridge Univ Pr.

McMichael AJ. 2001. Environment, sustainability and health: the learning curve steepens. *Med J Aust*, 175:569–70.

Miller P, Rees WE. 2000. Introduction. In Pimentel D, Westra L, Noss RF, eds. Ecological integrity: integrating environment, conservation and health. Washington, DC: Island Pr.

Milroy BM, Wismer S. 1994. Communities, work and public/private sphere models. *Gend Place Cult*, 1:71–90.

Mullan F. 2000. Public health then and now – Don Quixote, Machiavelli and Robin Hood: public health practice, past and present. *Am J Public Health*, 90:702–6.

Muntaner C, Lynch J, Smith GD. 2000. Social capital and the third way in public health. *Crit Public Health*, 10:107–24.

Murray GA, Johnston WJ. 1995. Cultivar identification and on-farm technology for sustained Kentucky bluegrass seed production. Grass Seed Production Systems for Sustainable Agriculture Progress Report. Moscow, ID: University of Idaho. p 37–40.

Murray GA, Swensen JB. 1997. Kentucky bluegrass floral induction and cultivar response to mechanical removal of harvest residue. In: International Grasslands Congress Proceedings. 1997 Jun 8–19; Winnipeg, Manitoba and Saskatoon, Saskatchewan. Session 7: plant physiology and growth; p 13–14.

Nielsen-Pincus M, Sheldon D, Cowan S. 2002. Social capital and sustainability: a qualitative study of community leaders in the conservation economy [online]. Accessed 15 Sep 2003. URL: http://www.conservationeconomy.net/pdfs/Social_Capital_Sustainability.pdf

Painter KM. 1997. Estimates of farm and environmental costs of increased restrictions on grass seed field burning. Technical Report to Washington Department of Ecology. Pullman, WA: Department of Agricultural Economics, Washington State University.

Parkes M, Panelli R. 2001. Integrating catchment ecosystems and community health: the value of participatory action research. *Ecosystem Health*, 7:85–106.

Pearce N. 1996. Traditional epidemiology, modern epidemiology and public health. *Am J Public Health*, 86:678–83.

Pearce N, Smith GD. 2003. Is social capital the key to inequalities in health? *Am J Public Health*, 93:122–9.

Pulido L. 1998. Environmentalism and economic justice: two Chicano struggles in the southwest. Tucson: Univ Arizona Pr.

Ricketts T. 2000. The changing nature of rural health care. *Annu Rev Public Health*, 21:639–57.

Roberts RA, Corkill J. 1998. Grass seed field smoke and its impact on respiratory health. *J Environ Health*, 60(10):10–16.

Rose G. 1985. Sick individuals and sick populations. *Int J Epidemiol*, 14:32–8.

Ross W. 2002a Feb 7. Field burning suit looms. *The Idaho Spokesman-Review*; Sect A1, A6.

Ross W. 2002b Dec 1. A burning question. *The Idaho Spokesman-Review*; Sect A1, A14.

Russell BZ. 2003 Jan 31. Lawmakers hear case for, against field burning. *The Idaho Spokesman-Review*; Sect B2.

Scherer CW. 2000. Community network linkages during a health controversy. *J Public Health Manag Pract*, 6(2):21–9.

Schwab J. 1988. Raising less corn and more hell: Midwestern farmers speak out. Urbana, IL: Univer Illinois Pr.

Smith MD, Krannich RS. 1998. Tourism dependence and resident attitudes. *Ann Tourism Res*, 25:783–802.

Soskolne CL. 2003. Measuring the impact of ecological disintegrity on human health: a role for epidemiology. In Rapport DJ, Lasley WL, Rolston DE et al, eds. Managing for healthy ecosystems. Boca Raton, LA: Lewis Publishers. p 259–65.

Steingraber S. 1997. Living downstream: an ecologist looks at cancer and the environment. Reading, MA: Addison-Wesley.

Szreter S. 2002. Rethinking McKeown: the relationship between public health and social change. *Am J Public Health*, 92:722–5.

Travis WR, Theobald DM, Fagre D. 2002. Transforming the Rockies: human forces, settlement patterns, and ecosystem effects. In Baron JS, ed. Rocky Mountain futures: an ecological perspective. Washington, DC: Island Pr. p 1–24.

United Nations. 1948. The universal declaration of human rights. General Assembly resolution 217 A (III) [online]. Accessed 15 Sep 2003. URL: http://www.un.org/Overview/rights.html

US Census Bureau. 2001. Counties in alphabetic sort within state, 1990 and 2000 population, numeric and percent change: 1990 to 2000 [online]. Accessed 15 Sep 2003. URL: http://www.census.gov/population/cen2000/phc-t4/tab01.xls

Van Tassell L. 2002 unpub. Assessment of non-thermal bluegrass seed production. Moscow, ID: Department of Agricultural Economics and Rural Sociology, University of Idaho.

Waltner-Toews D. 2001. An ecosystem approach to health and its applications to tropical and emerging diseases. *Rep Public Health*, 17(Suppl):7–21.

Waltner-Toews D, Wall E. 1997. Emergent perplexity: in search of post-normal questions for community and agroecosystem health. *Soc Sci Med*, 45:1741–9.

Whitman D. 2001. Fields of fire. *US News & World Report*, 131(8):10–14.

Wilkinson KP. 1991. The community in rural America. New York: Greenwood Pr.

Wilson EO. 1992. The diversity of life. New York: WW Norton.

Wright B. 1995. Environmental equity justice centers: a response to inequity. In Bryant B, ed. Environmental justice: issues, policies and solutions. Washington, DC: Island Pr. p 57–65.