US Health Protection Policy and Potential Cost Savings

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ABSTRACT

This presentation describes the prevalence of noise exposure in the US and its economic ramifications before exploring how federal and local noise policy interact. By identifying how different levels of government may exercise their authority to protect public health from noise within their respective jurisdictions, we demonstrate that most US governmental entities fail to implement policies that protect health. The implications of this failure should be considered widespread and serious because millions of Americans remain exposed to levels of environmental noise that are harmful to their health and welfare. With this foundational knowledge, we then discuss which policies can best protect health and how scientists can best communicate public health risks associated with noise to policy makers using a risk governance framework.

INTRODUCTION

Noise is an environmental pollutant that is difficult to identify because there are numerous sources that effect different populations at various levels. Noise pollution is usually harmful only at the cumulative level, so often each source alone is not the sole source of the problem. Quantifying these hazards poses additional challenges because discoveries are still being made to better understand how noise affects human health.

Harder-to-identify and quantify hazards such as noise tend to be left behind in policy decisions centered on cost-benefit analysis. Recent changes in US law, specifically the Affordable Care Act and Health Care Education and Reconciliation Act seek better health outcomes for an expanded population at reduced cost (ACA 2010). The triple aim of these laws, to improve care, health, and cost, means that the US is relying on economic analysis in health policy decision-making.

As public policy decision-making increasingly looks for economic justification for mitigating environmental hazards such as noise, it has become important to estimate the quantifiable economic ramifications related to proposed public investments and communicate the risk of noise in a way that policy makers can understand. In this paper, we discuss the prevalence of noise exposure in the US, share preliminary estimates about the economic ramifications, and explore current US policy related to

noise before concluding with recommendations on how scientists can best communicate risk to influence health protection policy.

PREVALENCE OF NOISE EXPOSURE IN THE US

Part of the challenge in quantifying the impacts of noise in the US is that exposure data in the US is dated. The most recent US Environmental Protection Agency (EPA) estimates of exposure to environmental noise are more than 30 years old (Simpson and Bruce 1981). In our recent paper, we estimated that the same proportion of the current population is exposed to elevated levels of noise as in 1981 (Hammer et al 2014). Assuming these proportions, we estimated that in 2013 145.5 million Americans (46.2%) are exposed to 58 dBA L_{DN} (L_{DN} is a measure with night time exposure weighted more heavily) or greater.

We also used this figure as a conservative underestimate of the number of Americans exposed to 55 dBA L_{DN} or greater in the economic analyses that follow. We estimated that 43.8 million (13.9%) are exposed to 65 dBA L_{DN} or greater. We believe this to be a conservative estimate because noise levels have likely increased due to urbanization. These are only projections, based on data more than 30 years old. We believe this to be woefully inadequate and more up-to-date data on exposure levels in the US would greatly improve evaluation of the impacts of noise in the US.

ECONOMIC IMPACTS OF NOISE

We have been working on a framework for valuing environmental noise by quantifying the impacts of noise on health. We believe that providing an economic valuation for investing in noise reduction can help make public investments in noise mitigation comparable. Noise mitigation can be viewed more competitively as a policy priority when economic ramifications are made clear to decision-makers.

We are seeking to create a more accessible and comparable metric for policymakers by quantifying health impacts of noise, both direct costs of health care, and indirect costs of lost productivity. We are currently looking at cardiovascular disease (CVD) impacts, and we will look more closely at noise-induced hearing loss (NIHL) and associated indirect impacts in the future. We can combine estimates of exposure with estimates of the connection between noise and CVD, together with the costs of CVD, to create an estimate of the value of noise impacts on health.

We chose to begin our analysis with CVD because increasing evidence shows a considerable link between environmental noise and CVD (Sorenson 2012). Also, CVD is both common and expensive in the US. Nearly 27% of Americans had some form of CVD in 2010, and CVD accounted for 15% of all health expenditures in the US in 2009, a total of $324 billion in direct health care costs and a further $179 billion in lost productivity (Go et al 2013, Lloyd-Jones et al 2010). Even if noise has a small impact on CVD, we can expect this impact to affect many Americans and to have a substantial cost.

We can match the number of Americans exposed to 55 dBA L_{DN} or greater to elasticities linking noise to different types of CVD. For example, Gan et al 2012

established a link between noise levels and CHD mortality. This study estimated that a 10 dBA L_{DEN} (Day-Evening-Night level, a metric similar to L_{DN}) reduction in environmental noise reduced the risk of death from CHD by 9%. Babisch and van Kamp (2009) conducted a meta-analysis of aircraft noise and hypertension, and estimated a pooled effect relative risk estimate of 1.13 for each additional 10 dBA L_{DN} of exposure. Sørensen et al (2012) estimated a 12% higher risk for MI per 10 dBA L_{DEN} increased noise exposure. We believe we can create a scenario demonstrating reduced CVD resulting from reduced environmental noise, and then calculate costs saving from reduction in health care costs and productivity loss.

NOISE POLICY

There are a number of interventions that protect public health, ranging from procurement policies to indirect regulation through the tort system (Gostin 2008). Among these interventions, regulations that sets emission levels for noise sources is the most reliable way to reduce population-level exposures (Hammer et al 2014). Other effective interventions include altering the built environment and altering the informational environment.

While the states have inherent police powers to protect health and safety, the US Constitutional grants powers to Congress under the Commerce Clause to pass legislation related to interstate commerce. This power includes the power to pass laws regulating goods and services that produce noise. In 1972, Congress passed legislation that grants the EPA primary authority to control noise at its source in most circumstances (NCA 1972). This authority is based on principles of cooperative federalism, where the federal government occupies certain domains of activity and preempts and excludes any state and local action in the area.

The NCA and Quiet Communities Act of 1978 also gives the EPA broad authority to set emission levels, educate the public on the dangers of noise, require product disclosure, assess noise exposures in the environment, and facilitate public disclosure on techniques for controlling noise (NCA 1972, QCA 1978). The EPA has authority to coordinate environmental health policy, and specifically lead on noise control efforts (NCA 1972). Some other federal agencies such as the US Occupational Safety and Health Administration, US Department of Transportation, and US Federal Aviation Administration also exercise control over limited arenas that influence public health. Despite their authority, the EPA has not operated as leader on noise control since the early 1980's (Hammer et al 2014).

Even though the US does not have a national strategy to protect health from noise, states are not necessarily given free reign to act on their own in a way that makes a substantial impact in noise reduction due to the principle of cooperative federalism. Regulating noisy machinery, for example, is preempted in some circumstances and impracticable given the small market power of most US states. Often, states have disinvested from their noise protection measures because they lack guidance and resources.

Local government has been left to respond to citizen complaints alone and use the limited tools at their disposal to impact the noise environment. Local noise ordinances are narrow in their scope because they regulate the time and level of

noise that individuals may emit. It is important to note that both citizens complaints and most local government responses lack foundational knowledge on the health effects of noise. Even more importantly, local government has limited power to take bold action that improves population health due to federal and state overriding authority. Exemptions of powerful sources of noise (such as airplanes and transit)undermine the collective efforts of the rest of the community, and enforcement is expensive and difficult.

CONCLUSION

Scientists can facilitate a thoughtful and well-informed US health protection strategy. In order to assist policy makers and communities in making informed decisions about how to best protect themselves from the damaging effects of noise pollution, research should document public health interventions that will help educate citizens and consumers about the risks of noise and benefits of prevention. This information can lead to advocacy and support of cost effective solutions to noise pollution.

We believe an economic analysis of healthcare costs is one essential element of risk communication that will inform public policy about noise. Whereas most policy makers are unlikely to see noise as a crucial problem compared to other environmental pollutants such as air pollution, we believe economic analysis can help heighten awareness of noise as a health problem. Indirect impacts may be more difficult to garner policy attention, but direct healthcare costs are easier to compare and difficult to ignore.

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