Opinion

Guns, Obesity, and Opioids: A Population Health Science Perspective on 3 Contemporary Epidemics

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THE FIREARM, OBESITY, AND OPIOID EPIDEMICS ARE AMONG the most important public health crises of our time. Each epidemic has a complex etiology that challenges efforts at mitigation. From this, a central question arises for researchers, clinicians, and policymakers: How can we identify what matters most within a broad range of causal factors in these epidemics, and can we draw cross-epidemic inferences that will help inform our thinking?

The principles of population health science can shed light on the fundamental forces that drive each epidemic. Because population health science is a relatively new field, we do not yet have substantial agreement on a set of axioms to guide our work.¹ Two years ago, building on the work of Geoffrey Rose,² a colleague and I proposed 9 principles to guide the science of population health.³ These principles, presented in the box, offer a framework that can inform research on the drivers of population health. I focus here on 2 of these principles to illustrate how they can apply to—and help set priorities for—these 3 wide-ranging epidemics.

The first principle is that population health is not a dichotomous indicator (eg, sick vs well) but manifests as a full range of indicators, from risk factors to preclinical signs to clinical symptoms, and eventually to disease.

Recognizing this principle sharpens our thinking about the obesity epidemic, for example. While we may regard obesity as dichotomous—one is obese or one is not—the cutoff between the 2 states is in fact arbitrary. To have a meaningful impact on the epidemic, therefore, our interest should focus on the range of body weights that make

up populations, or on the range of risk behaviors that predispose us to obesity. This would then push us to consider the drivers of these body weights across the full population. Our science, then, moves away from asking “who is obese?” to asking “what drives the distribution of weights within a population?” or “what are the drivers of risk of obesity?” Shifting our question in this manner also shifts our potential interventions. The first question encourages us to look for individual molecular factors that predispose us to obesity. The latter pushes us to consider the changing elements in the American diet over the past decades, which have resulted in many of us eating more calories and contributing to a shift in the population distribution of weight. This perspective urges us to grapple with, for example, the commercial forces that have resulted in a surplus of calorie-dense, nutrient-poor foods, increasingly so over the past decades. Hence, research priorities and our potential interventions change if we adopt a population health science perspective.

This principle applies equally well to the firearm epidemic. The vast majority of the firearm literature and the public conversation in the area focuses on the outcome of the firearm epidemic as binary, ie, whether the victim of a firearm dies. The consequences of firearms, however, extend well beyond deaths, with firearms causing about twice as many nonfatal injuries as fatalities—each with long-tail health and economic consequences—as well as mental health costs that compound the burden of firearms on communities many times over. Again, shifting our understanding to the full range of health consequences of firearms moves the question we ask from “what increases the likelihood of gun-related death?” to “what contributes to the overall burden of firearm-related injury in society?” This shift once again suggests different research questions and potentially different interventions. It pushes us to consider, for example, the feasibility of smart guns that can limit the interuser operability of handguns that contributes to the widespread availability of guns with minimal screening on gun ownership.

The second population health principle is that small changes in ubiquitous causes will result in more substantial change in the health of populations than larger changes in rarer causes. This principle has ready relevance to all 3 epidemics discussed.

The opioid epidemic itself could be considered 3 epidemics in 1, starting from an epidemic driven by overprescription and use of opioids,

to one driven by more widely available and cheap heroin, to the present, where the key substances that are influencing the epidemic are synthetic opioids, particularly fentanyl. Much effort has been invested in reversing overdose through the widespread dissemination of naloxone among first responders. Although this effort is important, it does not obviate the need to address the shifting foundational causes of the epidemic, such as reducing the widespread availability of opioids from multiple sources. Indeed, the early successes in curtailing the epidemic have come from initiatives such as the physician drug monitoring programs (PDMPs), which targeted a ubiquitous source of opioids to stem the epidemic.⁴

While many factors contribute to the firearm epidemic, one—the availability of guns—is central to reckoning with it. There is abundant evidence that gun availability drives the epidemic. Any effort to mitigate it must deal with the political issues that impede policy to reduce the availability of guns.⁵ Hence, this principle pushes us to tackle the challenge that a country faces given the presence of nearly 1 gun for each resident.

Approaches to the obesity epidemic can also be guided by this principle. While there may well be genetic factors that predispose some of us to obesity, at its core obesity is the result of an energy mismatch between calories consumed and expended. Efforts to curb the epidemic should focus on why we consume more calories than we used to and expend fewer. This requires that we tangle with politically difficult issues that include the role of commercial interests—sometimes called Big Food—in increasing consumption of food that contributes to weight gain, hence obesity, and to diseases that are secondary to obesity.

The firearm, opioid, and obesity epidemics represent enormous challenges for population health. In large part these challenges arise from the complexity of factors driving the epidemics. A population health science perspective can offer an organizing set of principles that can guide the questions scientists ask about these epidemics, and therefore the actions policymakers and public health practitioners take. The 2 principles I have applied here exemplify how disciplining our approach to these epidemics can reduce their impact sooner and, perhaps, prepare us to better mitigate the next epidemic.

Box. The Foundational Principles of Population Health Science

1. Population health manifests as a continuum.
2. The causes of differences in health across populations are not necessarily an aggregate of the causes of differences in health within populations.
3. Large benefits to population health may not improve the lives of all individuals.
4. The causes of population health are multilevel, accumulate throughout the life course, and are embedded in dynamic interpersonal relationships.
5. Small changes in ubiquitous causes may result in more substantial change in the health of populations than larger changes in rarer causes.
6. The magnitude of an effect of exposure on disease is dependent on the prevalence of the factors that interact with that exposure.
7. Prevention of disease often yields a greater return on investment than curing disease after it has started.
8. Efforts to improve overall population health may be a disadvantage to some groups; whether equity or efficiency is preferable is a matter of values.
9. We can predict health in populations with much more certainty than we can predict health in individuals.

Source: Keyes and Galea (2016).³

References

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