Creating Policy-Relevant Evidence for Population Health Science: A Public Health of Consequence, January 2019

See also Mohanty et al., p. 96; Goldstein et al., p. 102; Blue Bird Jernigan et al., p. 132; and Moyer et al., p. 140.

Population health science is concerned with understanding population health so that it can inform public health efforts. We currently have a fair bit of evidence about what affects health in populations and how we may go about improving it; we refer the reader to some good summaries of the best available evidence that can serve as foundational guidance for further work in the field.[1,2] However, there is also little question that we have substantially less scholarship that can guide population health efforts than that can guide individual-based curative work. This reflects, in part, the overwhelming dominance of medical and individual-based approaches to our understanding of health and disease.

It also reflects, however, particular challenges that characterize efforts to create evidence for population health science. Although a full view of population health science principles would suggest the breadth of issues with which efforts at generating such evidence must contend,[3] we summarize three particular challenges and highlight four articles in this issue of *AJPH* that, to our mind, successfully overcome these challenges and set the stage for formative population health science that can guide public health.

ADDRESSING DETERMINANTS OF HEALTH

Population health is affected by forces that are present all around us, by the features of social, physical, and economic environments that determine behaviors and biology. The very ubiquity of these forces makes them difficult to identify and a challenge to causal inference. Science that is concerned with these widespread forces benefits from innovative study designs that allow potential drivers of population health to be measured in a manner that allows us to draw inferences about how these drivers shape health.

The article in this issue of *AJPH* by Moyer et al. (p. 140) does just that. Moyer et al. were concerned with understanding whether remediating blighted vacant urban land reduces firearm shooting incidents resulting in injury or death. Blighted vacant urban land is a classic example of a prevalent determinant that we frequently overlook, and, commensurately, it is a potential target for population health intervention. Using a cluster-randomized design, Moyer et al. show that a greening intervention that remediated vacant land significantly reduced shootings that resulted in serious injury or death. This provides compelling evidence that place-based interventions can be developed as an effective firearm violence reduction strategy. This work addresses the challenge posed by a pervasive, often overlooked determinant—in this case urban form—and offers experimental evidence that can indeed guide policy, building on observations from sound population health science.

MOVING BEYOND HEALTH DICHOTOMIES

Population health is not dichotomous—populations are not either sick or not sick. Rather, populations manifest a range of health indicators, and it is the full range of health indicators that must be considered in efforts to understand—and to improve—the public's health. Unfortunately, this is easier said than done. Our dominant biomedical paradigm continues to center on dichotomous health outcomes and is supported by the epidemiologic methods that we are most comfortable using to document the risks of particular binary outcomes.

The work of Blue Bird Jernigan et al. (p. 132) in this issue of *AJPH* gets around this challenge by conducting a cluster-controlled intervention trial to assess a full range of nutrition-related potential determinants of health, including fruit and vegetable intake, store environment perceptions, and pre- and post-intervention food purchases. These authors found that intervention exposure was associated with healthy purchasing but not fruit and vegetable intake. Importantly, this work sets the stage for future work because it considered a range of indicators that can contribute to health. Had this work focused only on healthy purchasing or only on fruit and vegetable intake, we might well have drawn conclusions that would ill inform policy setting.

CONDUCTING EXTERNALLY VALID SCIENCE

Populations are heterogenous and are characterized by interconnections and spatial dependencies. Population health, therefore, emerges from a complex causal architecture, and any effort to understand what shapes population health must consider the determinants of determinants. Unless we take these forces into account, our science will not be generalizable to contexts where early drivers are different from those in our narrow context; our science will do little for our understanding of populations. We need work that considers the forces around us that shape the consequences to our health. Two articles in this issue of *AJPH* consider the drivers of vaccination and, importantly, in doing so, look at

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factors that if neglected would limit any effort to understand interventions that aim to improve population vaccination rates.

Mohanty et al. (p. 96) conducted semistructured telephone interviews with health officers and local health department staff in California to understand the experiences of local health jurisdictions after the passing of Senate Bill 277, the California law that eliminated nonmedical vaccine exemptions for public and private school entry. Mohanty et al. found that the regulatory language in this law led to variation in how the law was interpreted and implemented within and across jurisdictions and school districts. This work provides a simple demonstration of how any effort to improve population vaccination rates must consider local legislative frame-works and, critically, how these laws are implemented across jurisdictions.

Complementing this work, Goldstein et al. (p. 102) conducted a content analysis of proposed bills in state legislatures that would directly affect states' immunization exemption laws. They found that although most proposed legislation would have expanded access to exemptions, bills that limited exemptions were more likely to be enacted into law. This is mixed news for public health, showing that legal barriers continue to threaten vaccination success, even though, encouragingly, bills that promote vaccination are more likely to pass. From the viewpoint of the science, Goldstein et al. provide evidence about the role of the structural forces that shape population health, creating the foundation for future intervention science that may guide public health efforts.

IN SUMMARY

Creating policy-relevant evidence for population health science is particularly challenging. We focus here on the challenges posed by the need for science that considers ubiquitous forces, that moves beyond a simplistic conception of health as a binary indicator, and that is externally valid. That the articles in this issue of *AJPH* rise to these challenges is promising and indicates that we have an emerging generation of science that can adequately produce population health evidence to improve the public's health. AJPH

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