



Opinion

Mobilizing an underused resource: cohort studies for population health intervention research

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Introduction

Prospective, longitudinal cohort studies involve large, expensive and long-term investments by research funders. Traditionally, these studies have focused on risk factor analysis—contributing substantially to our understanding of disease trends, predisposing and protective influences on illness and injury, and susceptibility during life course transitions. However, we have now entered the era of big data and megacohorts, supported by unprecedented computing and statistical analytical power, and fuelled by biobanks that capture hundreds of thousands of biologically diverse samples to answer questions in the field of epigenetics and genomics.¹ To this end, a number of national research funding councils have reviewed existing and planned cohorts, and developed research agendas to maximize these investments.^{2–4} Whereas we applaud these efforts, we are concerned that this new emphasis on links to biorepositories overlooks the potential for a complementary population health intervention research agenda. We use Hawe and Potvin's⁵ definition for this commentary: 'Population health intervention research uses scientific methods to produce knowledge about policy and program interventions that operate within or outside of the health sector and have the potential to impact health at the population level' (p. 1–8).

The status quo

To be fair, the use of cohorts for population health intervention research is not starting from a position of strength.

Recent reports^{2,3,6,7} rarely make reference to population health intervention research emanating from cohort studies. Less than one-third of cohort profiles published in *IJE* between 2015 and 2017 mention population health intervention research as a primary or secondary purpose of their studies.⁸ Furthermore, in a review we undertook of all publications reported for two purposefully chosen, large and long-term cohort studies [i.e. the Australian Longitudinal Study of Women's Health (ALSWH), and the Survey of Health, Ageing and Retirement in Europe (SHARE)], we found that only 1.9% (22/1162) of publications from these cohorts were in the domain of population health intervention research.

It is our contention that longitudinal cohorts could be used to buttress several areas of weakness identified in existing population health intervention research.⁹ First, many of these intervention studies fail to examine longer-term issues of equity, scalability and sustainability.^{10–13} Second, programme interventions designed by researchers are more frequently examined in population health intervention studies than natural experiments of policy interventions.^{14,15} Third, population health intervention research studies often have a narrow range of outcomes due to funding constraints, time limitations and efforts to reduce response burden. Thus, examinations of the unintended and longer-term consequences of population health interventions and whether or not they have been successfully scaled up, have often been severely curtailed.

Longitudinal cohort studies typically follow populations over several cycles of measurement, providing a means to determine whether the outcomes of intervention scale-up are distributed equitably, whether intervention effects are sustained beyond the research funding period and what longer-term consequences (desired or undesired) have resulted from the introduction of an intervention. Larger-scale cohorts, such as national or multi-national longitudinal studies on ageing, and occupational or birth cohorts, typically sample populations from a range of jurisdictions, providing an innate comparative base for policy change. It is this subset of population health intervention research, examining natural policy experiments, to which we now turn our attention.

Priority directions

To maximize the use of cohort data for policy-oriented population health intervention research, we suggest three priority directions: enhance jurisdictional diversity, attend to health equity and consider policy exposure.

Enhance jurisdictional diversity

Whereas population representativeness has been a major consideration in the design of cohort studies, contextual representativeness also warrants attention. Jurisdictional diversity is often essential for questions of policy impact, since policies, their implementation and enforcement may differ substantially between organizational settings (e.g. workplaces, schools) or among and between levels of government (e.g. municipality, state/province or nation). Comparisons across jurisdictions may provide a set of counterfactuals to interrogate the impact of: (i) interacting policies and regulations across governance levels; (ii) different constellations of policies across jurisdictions; and (iii) pervasive structural policies such as universal health or social programmes or discriminatory legislation. Furthermore, cohort studies can be used to examine both health-damaging and health-enhancing policies. When selecting jurisdictions for inclusion, these types of queries need to be taken into account. The adequacy of samples for cross-jurisdictional comparisons and multilevel analysis should be carefully considered during planning stages. For instance, real-life examples of policy-oriented questions can be used to test statistical assumptions for analytical approaches such as hierarchical linear modelling.

Attend to health equity

The intent of population health interventions is to improve health equity—levelling up health for the entire population

while reducing social and class disparities. It is imperative that cohorts include measures of these variables, keeping pace of developments in this field such as more progressive ways of describing gender. Analytical tools such as the health equity concentration index and the Lorenz curve,¹⁶ or analytical approaches such as intersectionality, can be used to examine the health equity impact of policies and their enforcement. Data linkage (often to administrative records) is critical, both to expand the range of equity variables that may be used and to potentially augment cohort samples with individuals who may not typically participate in longitudinal cohort studies. The health equity impact of population health interventions can only be assessed by comparing population subgroups, such as those representing the full continuum of the socioeconomic gradient. When prioritizing administrative databases for their linkage to cohorts, these equity considerations should be taken into account.

Those who fund and design cohort studies need to make their health equity aims explicit. There are excellent examples of strategic funding opportunities (e.g. Health Life Trajectories Initiative, Canadian Institutes of Health Research) that purposefully ask researchers to consider health equity issues such as the ‘social implications of any new policies, practices, health services or interventions resulting from the study’.¹⁷

Consider policy exposure

Links to policy frameworks, regulations and enforcement strategies are needed to examine the impact of policy interventions. These are sources of policy-related exposure data—complementary to those already being tapped in data linkage initiatives using registries, administrative databases and electronic medical records. Some of the most successful policy research has been in the field of tobacco control, fuelled by deliberate efforts to use policy as a primary lever for change. There are important lessons to be learned from this field for other population health policy questions. Specifically, approaches are needed to measure policy exposure, since policy itself is a rather blunt intervention that is moderated and/or mediated by self-regulation, formal enforcement, informal efforts to undermine enforcement and social movements. Because of their longitudinal design, cohort studies can help examine multiple and cumulative exposures, providing much needed evidence on how interventions interact either synergistically or antagonistically to produce particular effects. When the evaluation of policy interventions is embedded within cohort studies using randomized controlled trials or other study designs, cohorts may provide researchers with a wider range of potential outcomes, including those reflecting unintended effects in both the shorter

and the longer term. This, in turn, may yield important findings concerning whether and how such policy interventions were successfully scaled up and sustained.

Realizing the potential of longitudinal cohorts for population health intervention studies

Cohort studies represent a major, recurring research investment; maximizing the potential of these platforms for population health intervention studies is an important obligation to the scientific community and the public. Practical yet robust approaches for integrating nested randomized controlled trials and other evaluation strategies within longitudinal cohorts need to be considered. Trade-offs may have to be made including population representativeness, oversampling population subgroups, frequency of follow-up, survey content and response burden. We suggest that exemplary policy questions should be posed before implementation to determine whether and how a cohort study can be better structured and designed for future questions of this type. Important new policy questions will undoubtedly emerge over the life of a cohort, but this initial testing will help ensure that this class of studies are considered during the cohort design phase.

Many can contribute to the aims of maximizing the potential population health intervention policy yield of longitudinal cohort studies outlined in this paper. Funding agencies should consider specific funding streams to support this kind of research. Explicitly integrating intervention goals into the overarching aims of cohort studies would help to signal their potential use for this purpose. Universities can offer training on how to access and use longitudinal cohorts for population health intervention policy studies. Journals such as *IJE* can encourage the publication of population health policy studies linked to cohorts.

We contend that longitudinal cohorts can meet the multiple aims of risk factor analysis, genome associations and population health interventions. Cohort design trade-offs for these alternative purposes need to be made explicit as research funding organizations consider how to maximize past and ongoing investments in longitudinal cohorts. Optimizing the use of cohorts for population health intervention research and, in particular, policy research needs to be considered when the utility and efficiency of cohort studies are reviewed by funders.

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