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Commentary: What is a population-based intervention? Returning to Geoffrey Rose

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Geoffrey Rose made some remarkable contributions to the field of public health. In his definitive book *The Strategy of Preventive Medicine*¹ Rose developed the idea that public health interventions, rather than focusing on change in individual risk profiles for a particular health problem, should focus instead on altering the conditions that lead to the distribution of risk in a given population: an idea now known as the population approach. The population approach is based on a number of premises, one of which is

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particularly important for this commentary, namely that the distribution of risk exposure in a population is shaped by contextual conditions. Therefore population-health interventions should attempt to change the contextual conditions of risk in order to alter the distribution of health risk in populations.

In their paper, Yang *et al.*² argue whether population-based interventions widen or narrow socioeconomic inequalities, using the case study of a large cluster-randomized controlled trial on

breastfeeding in Belarus. I will discuss two fundamental and related issues raised by this provocative paper. The first is: what counts as a population intervention? The second is: are cluster-randomized controlled trials an appropriate evaluation method when concerned with population-based interventions?

To begin, Yang *et al.* ask whether population-wide intervention strategies might inadvertently worsen socioeconomic inequalities in health, a most valid question.³ What counts as a population intervention for them, however, is left unproblematized. The authors seem to share in a common misinterpretation of the population approach, which considers it simply to mean programmes or policies having an impact on a large number of people. This perspective, although intending to differ from approaches that focus on just one person or a few, continues to rely heavily on individual-level thinking in which whole community or system-level change is conceived simply as a matter of 'aggregating up'.⁴ This thinking is congruent with what have been called 'downstream' interventions, or those that focus on individual factors such as health knowledge.⁵ Population-level interventions viewed in this way involve changes in the individual attributes of lots of people. So for instance, for Yang *et al.* the PROBIT trial, their breastfeeding promotion intervention, involved the training of obstetricians and paediatricians in an 18-h lactation management training course to improve breastfeeding support for new mothers in Belarus hospitals. Lactating women were given support to help with the positioning of the baby when nursing, taught how to resolve common problems when breastfeeding, etc.⁶

Although hugely important as both a public health issue and an intervention, PROBIT-like programmes are not what Geoffrey Rose meant by population-based interventions. Indeed, Rose's thinking was more in line with what Lorenc *et al.* refer to as 'upstream' interventions, or those that focus on social or policy-level determinants. Examples include smoking bans in public places to reduce population levels of smoking, water fluoridation to reduce population levels of caries and mandatory folate fortification policies to reduce population prevalence of neural tube defects. As Rose argued, these population-based interventions intend to change the underlying socio-cultural and environmental conditions of risk for the entire population, not just conditions for those directly targeted by the intervention, such as the present case of the PROBIT breastfeeding intervention.

When turning to population-based interventions, Rose's original idea, the 'treatments' of the intervention should be provided to a group as a whole; the intervention affects individuals, their interrelationships and their context. Treatments in population-health interventions should attempt, through programmes and policies, to change the social context that influences health risk.⁷ Randomized controlled trials have been criticized as being unable to take into account the role of the context X intervention interaction, and for only being able to focus on the individual. Randomized controlled trials are therefore considered by some to be an inappropriate tool for evaluating the effectiveness of population-health interventions. The cluster-randomized controlled trial, on the other hand, is seen by some to be a solution to this problem. By focusing on groups (clusters) as the unit of randomization and analysis, the cluster-randomized controlled trial has gained attention and favour in population-health intervention research because it maintains randomization and overcomes some of the limits of the randomized controlled trial.⁸

However, limited discussion has focused on the continuing problem of the interaction between treatment and social context in the cluster-randomized controlled trial, coincidentally precisely what Geoffrey Rose was concerned about. Even in the case of cluster-randomized controlled trials, the clusters are embedded in the history of their cluster (the context), and this cannot be controlled independently of the intervention. I would argue, as others have, that a population-based intervention should be conceptualized as more than just a 'treatment' that comes from outside and which can be isolated using randomization.⁷ In population-health interventions there are myriad individual, group and social phenomena at play, which make the constant effect assumption less plausible. Treatments in population-health interventions should therefore be conceptualized as attempts to change the social context that influences health. This was not the case with PROBIT. The change expected as a result of this trial was at the level of individual women, not the social context. I would propose, as have others, that researchers using cluster-randomized controlled trials to study population-health interventions examine the interaction between treatment and social phenomena, i.e. context.⁹ In the end, the treatment X context interaction may also help explain where the resulting inequalities in outcomes come from.

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