In his landmark book titled *Strategy of Preventive Medicine*, Geoffrey Rose made a huge impact in the public health arena with his population-based strategy for prevention of disease. In his classic, Geoffrey Rose outlines the prevention paradox that led to a discussion of two main preventive approaches to a disease, the individual- and population-based. This commentary briefly provides historical perspectives and viewpoints on the message of fundamental importance that when the population moves as a whole, the relative differences are the characteristics of populations but not of individuals. The “population as a whole” has been adopted in the lexicon of public health, enriched by Hippocrates’ treatise on air, water, and places; Durkheim’s collective consciousness; Pickering’s continuous unimodal distribution; and Keys’ charts of contrasting distributions. These readings should provide the public health professionals with a critical understanding of prevention paradox when they tend to focus only on the expression of the root cause above ground but fail to at the roots beneath the ground.

**Keywords:** Population, prevention, prevention paradox, public health

**Abstract**

Rose’s *Strategy of Preventive Medicine* is critical reading for students and teachers in public health as well as practitioners of family and preventive medicine. In his classic, Geoffrey Rose outlines the prevention paradox that led to a discussion of two main preventive approaches to a disease, the individual- and population-based. This commentary briefly provides historical perspectives and viewpoints on the message of fundamental importance that when the population moves as a whole, the relative differences are the characteristics of populations but not of individuals. The “population as a whole” has been adopted in the lexicon of public health, enriched by Hippocrates’ treatise on air, water, and places; Durkheim’s collective consciousness; Pickering’s continuous unimodal distribution; and Keys’ charts of contrasting distributions. These readings should provide the public health professionals with a critical understanding of prevention paradox when they tend to focus only on the expression of the root cause above ground but fail to at the roots beneath the ground.

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In his landmark book titled *Strategy of Preventive Medicine*, Geoffrey Rose made a huge impact in the public health arena with his population-based strategy for prevention of disease.[1] His book has led to recognition of the “prevention paradox” where he demonstrated that prevention strategies offering large health benefits might realize fewer benefits at an “individual” level. In the chapter titled “Individuals and Populations,” he opined that variation at two different levels has major public health implications. This he explained through variation among “individuals” and “between populations” along with a historical perspective on sick and healthy populations. This book was an impetus from his previous article on “sick individuals and sick population” in 1985.[2]

Rose started out by discussing the individual variation where he states that humans do not conform to a uniform make-up in their overall structure but retain their distinctiveness that is common to the whole population. For example, some populations are built according to their environment but each individual in that population is different in terms of their personal attributes, such as their physical make-up, intelligence, energy intake, and behavior. Kalahari Bushmen and Eskimos are built according to different designs corresponding to the demands of their contrasting environments, but within themselves they differ much more. The survival value of short men versus tall men might not be the same, and this variability also suggests that there can be “equilibrium” for the population as a whole if not at an individual level. At the same time, there is a limit to the extent of variation in the “average” of the population. The variation at an individual level within a population might be inherent in genes, behavior, and social factors. The magnitude of this variation may or may not create a balance between the determinants of diversity and uniformity at genetic or social and behavioral level. In essence, the variation at an individual level is determined by factors favouring or limiting genetic heterogeneity as well as social norms. On the flip side, determinants at a population level such as the “prevalence” or “incidence rate” are not necessarily historical perspectives on prevention paradox: When the population moves as a whole. J Family Med Prim Care 2018;7:1163-5.
the same as the determinants at an individual level.[9] This has, therefore, led to two main preventive approaches to a disease, the individual- and population-based. The first, preventive strategy seeks to identify high-risk susceptible individuals and offer them some individual protection. In contrast, the “population strategy” seeks to control the determinants of incidence in the population as a whole.[9] For example, thinking in terms of individuals who have hypertension is quite different from populations who have hypertension, and this begs not only different kinds of studies with different answers but also different preventive strategies.

Rose communicated this message of fundamental importance for prevention by depicting Ancel Keys’ chart of contrasting distribution of cholesterol levels in Japan and Finland[6] but not before rightly acknowledging George Pickering’s line of thought, that is, variation in personal characteristics within a population tends to form a “continuous unimodal distribution” with degree of skewness indicating the amount of abnormality such as when blood pressure is skewed toward higher levels.[8,9] While Pickering, like most physicians of the time, was interested in individual variation within a population, it was Keys, a biologist with interest in fish physiology, who carried a revolutionary message that the differences in serum cholesterol levels involve the population as a whole. This became a central driving force in public health prevention strategies later on, which shifted the focus from clinical investigations to population-based strategies for which Rose was an ardent advocate. From the “Intersalt study,”[9] Rose was able to re-emphasize that the distribution of “risk factors/exposures” in population shifts as a “whole” and that the differences seem to be the characteristics of the population and not individuals. Another important message by Rose from Keys’ chart was the definition of “abnormal” by a “normal” majority when observing variation between populations, for example, a high cholesterol in Japan might be called a low cholesterol in Finland. The term “normal,” Rose observed, is usually confused with “healthy” rather than its connotation with “common.” Depending on the tradition or customs of the society, “common” can also be implied as “sick.” To make a favorable impact on risk factor/exposure distribution, preventive strategies can be geared toward changing the “majority” to define “normal” and “abnormal.”

Rose also emphasized his point on the population as a whole based on Durkheimian philosophy[3] that society is not only based on individual characteristics but also it is the expression of individual’s collective attributes within the societal norms that influence health. Here, it is also interesting to note the assertion made by Hippocrates in the fifth-century BC that healthiness is characteristic of a population as a whole based on air, places, and water supply. This Hippocratic assertion laid dormant for a very long time until it was revived by David Émile Durkheim, a French sociologist, when he introduced terms such as “collective consciousness” that were later adopted in the lexicon of preventive medicine such as “population as a whole.” Rose’s contention, therefore, is that the goal of prevention strategies should be bigger gains in “healthier population.”

The population-based strategy of Rose is indeed a major contribution for preventive medicine and public health. This approach according to him can achieve big gains in health-related fields, especially public health. The “population strategy” has therefore influenced a lot of people in the higher echelons of policymaking. However, this approach is not without issues as it has been pointed out by several critics and proponents of this approach.[8,9] One of the interesting aspects of this approach is the introduction of the term “prevention paradox” as well as the fact that large number of individuals with less exposure to a risk factor generally would create more cases in absolute terms than a small number of individuals with higher level of exposure. Hence, the emphasis should be on the majority rather than the minority. This has lead to the idea of considering the whole population as an individual patient and concentrating on shifting the distribution curve toward a favorable direction. As a fallout of this strategy, prevention strategies such as screening and targeting “high-risk” individuals go into jeopardy. The notion of “population strategy” in short is to bring in the whole population as “sick,” that is, only after labeling the population as sick, would one be interested in targeting it for prevention.

The main contention of Rose is that there should be a demarcation between “causes of cases” at an individual level and the “causes of incidence of disease” at a population level. However, the problem with this premise of thinking is the intuition that diseases do not have multiple causes which is not true. Diseases, in general, have multiple causes that are complex in nature involving several causal mechanisms at an individual level which is why it would be difficult for a public health person to direct all prevention strategies at the population level. The population approach would be effective if we are to look at “modifiable causes” such as high salt intake and elevated systolic blood pressure. Since the prevalence of these exposures in the general population could be high, the justification of using a population approach is reasonable. However, the role of causes acting at an individual level such as through viruses or bacteria cannot be ignored either. Variations at an individual level also make the dynamics of health status at an individual level more complex. Shifting of the distribution curve in favorable direction would require action at both levels and complementary approaches that could hasten the gains in public health. For example, Frohlich and Potvin[30] suggested the “vulnerable populations” approach as a complement to Rose’s population approach to mitigate the health disparities associated with the latter. However, they acknowledged it as less efficient regarding population health gains with a possibility of potential stigmatization.

There is an ethical dilemma with Rose’s prevention strategy as well, if one wants to achieve the broader objective of a healthier population at a bigger level. Prevention at an individual level provides autonomy to an individual to act on the advice that s/he sought, for example, from a primary care physician. However, there is no such voluntary agreement at a population level. It
would be the will of a higher agency that would impose moral values and principles to an unsuspecting stakeholder no matter how well-intentioned it might be. As per Charlton’s critique of Rose’s view,[8] labeling the whole population as sick means that none of the individuals in the population is recognized as healthy. This critique by Charlton is echoed by Skrabanek[11] in his book entitled *The Death of Humane Medicine* that the vision of a sick population leads to medicalization of human life in “totality” and the concept of “health” falls prone to such an unlimited expanse that it becomes meaningless and instead becomes an empty political rhetoric rather. Finally, the practice of preventive medicine necessitates an understanding of social factors as causes of ill health, in addition to the deeper understanding of the biology of the disease. However, it is important to note that the social factors are not the only causes of ill health, they are the complementary causes that are aided by disciplines that can determine the reliable cause of disease. Public health professionals and preventive medicine experts sometimes focus on something that is only the “expression” of the root cause, meaning that they try to explain the existence of “tree” above the ground and fail to recognize the “root” system beneath the ground.

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**Conflicts of interest**

There are no conflicts of interest.

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