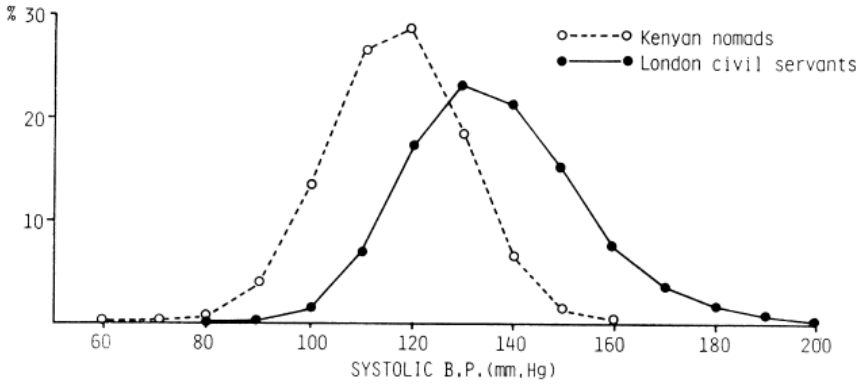
ONLINE MATERIAL THAT ACCOMPANIES CHAPTER 2

Box 1. Geoffrey Rose: sick individuals and sick populations

Geoffrey Rose (b. 1926, d. 1993) was an influential physician and epidemiologist, credited with advancing our notion of community medicine and explicating concepts of population health to a generation of physicians and epidemiologists. This is exemplified in his seminal 1985 paper, "Sick Individuals and Sick Populations."

Among the many insights in "Sick Individuals and Sick Populations," we focus on Rose's description of the distinction between causes of cases and causes of incidence. Rose's classic example focused on the distribution of blood pressure in two populations, Kenyan nomads and London civil servants (see Box 1, Figure 1).

Box 1, Figure 1. Distributions of systolic blood pressure in middle aged men in two populations (reprinted from Rose, 1985)



First, let us focus on the black solid line, the distribution of systolic blood pressure in London civil servants. We see that about 25% of the population has a systolic blood pressure of approximately 138 mm/Hg and that a smaller proportion of the population has systolic blood pressure at higher and lower levels. The shape of the distribution is relatively symmetrical around this point at approximately 138 mm/Hg. Next, let us focus on the dotted line. Approximately 30% of the population of Kenyan nomads has a systolic blood pressure of approximately 120 mm/Hg and a smaller proportion of the population has systolic blood pressure at higher and lower levels. Note that the shape of the distribution is, similar to the London civil servants, relatively symmetrical. There are two important points about this graph: first, the shape of the distribution is very similar between Kenyan nomads and London civil servants; second, the peak of the distribution is at a lower blood pressure level in the Kenyan nomads than in the London civil servants (approximately 120 versus 138 mm/Hg, respectively).

Rose suggested that many scientific investigations focus on a single population, such as Kenyan nomads or London civil servants, but not both. We might ask why, among London civil servants, for example, some individuals have higher blood pressure than others.

To quote Rose (1985, page 428):

> We might achieve a complete understanding of why individuals vary, and yet quite miss the most important public health question, namely, "Why is hypertension absent in the Kenyans and common in London?" The answer to that question has to do with the determinants of the population mean; for what distinguishes the two groups is nothing to do with the characteristics of individuals, it is rather a shift of the whole distribution – a mass influence acting on the population as a whole. To find the determinants of prevalence and incidence rates we need to study characteristics of populations, not characteristics of individuals."

Rose posited that factors that are associated with increased blood pressure within each population do not explain why the two populations have such different peaks in the overall distribution of blood pressure. For example, within each population, why Person X developed higher blood pressure than Person Y likely has to do with some combination of genetic factors, diet, and exercise. But across the populations, we have to identify and examine the characteristics of the whole population that may differ in order to isolate why London civil servants have, on average, much higher blood pressures than Kenyan nomads.

Ultimately, as we described in Chapter 2, individuals - not populations - become diseased. Population health is ultimately measured by the aggregation of individual disease and health states. However, a focus on individual cases may render the scientist unable to identify and prevent the causes of disease that are most important in terms of health of the entire population. Epidemiologists and other public health practitioners are often utilitarian in our approach to population health by asking what causes we can intervene upon to produce the best health for the greatest number of people in the population. To do so requires studying not individuals with good or poor health, but rather the overall incidence and prevalence of health indicators across groups, asking why poor health is more common in some groups than in others. Thus, a central principle in epidemiology, and the first step in our epidemiologic rubric, is to define a population or group of scientific or public health interest.

Citations

Rose, G. (1985). "Sick individuals and sick populations." Int J Epidemiol 14(1): 32-38.

Box 2. Dynamic versus stationary populations

		Entry into the eligible population	
		Dynamic	Stationary
Exit from the eligible population	Dynamic	Population eligibility defined by time period and/or age - individuals become eligible over time and lose eligibility over time	Population eligibility bound to a set number of individuals; those individuals can leave the study or die, but no new individuals enter
	Stationary	Population eligibility defined by entry that is dynamic across time and space but in which individuals cannot leave the population once they have entered. Few examples of this type of population eligibility in epidemiology	Population eligibility focused on short duration studies in enclosed groups (e.g., food-borne illness at a church picnic); few deaths from other causes during the time period of interest