ScienceNews

Teacher Background Sheet: Understanding Vaccine Inequity

This activity relies heavily on students understanding concepts of equity, information and data literacy and demographics. Use this background sheet to introduce and discuss these concepts with your students.

Equity

The *Science News* article proposes that inequities in vaccine access may affect global recovery from the COVID-19 pandemic. In this context, equity is "the quality of being fair and impartial." Students may not understand the difference between things being *equal* and things being *equitable*. *Equality* means that everyone is given or has access to the exact same resources. *Equity* means that resources are distributed based on the needs of people receiving the resources.

Equal access to vaccines would mean that every nation could acquire the same number of vaccines, regardless of income or population. But not all nations have the same population; some nations need more vaccines and some need fewer. In addition, not all nations have the same gross domestic product, or GDP. GDP is a measure of a nation's wealth. Inequities began to appear in the COVID-19 vaccine market when wealthy nations began purchasing more vaccines than they needed, or more than their fair share. This left poorer nations unable to reserve enough vaccines for their citizens.

Inequity in vaccine access has more layers than simply who can afford to buy more doses. Most vaccines require refrigeration, and some need below-freezing temperatures. That's the case for the Pfizer/BioNTech vaccine, the earliest vaccine to receive widespread approval for emergency use. Many low-income nations do not have the infrastructure, such as reliable electrical grids, necessary to permit storage and distribution of these vaccines.

In addition, many people in these nations live far from cities and might not have reliable transportation to reach vaccine distribution centers. Delivery of vaccines into rugged rural areas is also difficult.

Thus, the design of the vaccines in themselves may be considered a barrier to equity, as the vaccines simply cannot be used everywhere on Earth. Even if those doses become available for purchase by poorer nations, and those nations could afford to purchase them, many nations could not store, distribute or administer the doses.

Information and data literacy

As students prepare to gather and analyze data, they should be cautioned to be careful about how they approach data and conclusions presented by different sources. You might wish to review how to identify bias and the difference between correlation and causation with students before they read the *Science News* article and begin to analyze the graph in it. Students should be encouraged to ask questions about what the data mean and what position the article's author might be taking.

For example, the article reports that wealthy nations, such as the United States, Canada and the United Kingdom, "reserved," "purchased" or "secured" enough excess doses of the COVID-19 vaccine to vaccinate their entire populations many times over. This statement may cause a visceral reaction in students, in which students think that there are stockpiles of vaccines being hoarded by wealthy nations. In fact, the situation is a bit more complex.

The number of vaccine doses "reserved," "purchased" or "secured" in advance represent the number of vaccines nations made agreements to purchase, but they do not represent the actual number of doses that have been manufactured and delivered. In fact, many of the doses "reserved" by those nations are purely hypothetical. At the time they were "reserved," the vaccines had not been created, tested or approved for use, let alone manufactured and delivered to the nations for administration.

Early in the pandemic, around May 2020, many higher-income nations gambled on which companies they thought were most likely to develop and produce effective vaccines for the novel coronavirus. These nations "hedged their bets" by advance purchasing enough doses from each of these potential supplies to vaccinate their entire nation. At the time, they had no assurances that any of the companies would deliver an effective vaccine at all, and the timeline for potential delivery was unclear. The companies put the money from those advance purchases into the research necessary to develop and test vaccine candidates to find an effective vaccine. Some of those investments paid off, and those reserved doses of vaccine are now flowing to the nations that purchased them beforehand. Some of those gambles have not yet paid off, and those doses remain hypothetical.

Inequities in vaccine access partly stem from the wealthy nations being able to afford to spend money to reserve these hypothetical doses before they exist. Poorer nations do not have the money to risk on vaccine ventures that might fail, which means these nations can't reserve vaccines. These nations must wait until approved vaccine doses actually become available to purchase. And by then, they are at the end of the waitlist and are subject to the effects of both supply and demand for both availability and price.

Demographics

Simply stated, *demographics* are statistical data about the characteristics of a population. Demographic analysis of populations is based on factors such as age, sex or gender, race or ethnicity, employment, income, health status, education, marital status, birth and death rates and more. Demographic data can be used to evaluate the strengths and weaknesses of public programs and to plan health and public health interventions. For example, early in the pandemic, scientists and healthcare providers were able to identify that severe COVID-19 disproportionately affected people over the age of 65 and people with certain pre-existing conditions. This allowed governments and health agencies to adapt their guidelines and procedures to better protect those vulnerable populations. Similarly, demographic analyses of how vaccines are distributed and administered can help scientists and policy makers allocate resources in ways that best benefit the public.