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## Beyond Diversity — Time for New Models of Health

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Despite the ability to collect and analyze far richer health data than ever before, public health and medical experts have failed to use that information to develop new conceptual models for health. Although data from research inform clinical decision making, many possibilities suggested by health data are lost when we insist on fitting those data into our existing health constructs rather than building new constructs on their basis. The

challenge is to ensure that the full range of what we know — from genomics to the social determinants of health for each person — is available, valued, and understood, which may necessitate the development of new models of health and illness. But though the accumulation of new evidence may warrant a paradigm shift, the human tendency is to hold on to our familiar conceptual models even when new data urge us to develop alternative ones.

Health data for Hispanic or Latinx people, who account for nearly one fifth of the U.S. population, provide a platform for re-conceptualizing health and risk factors. Contrary to expectations, Hispanic people with many known health risk factors (low income, low educational levels, lack of health insurance, diabetes, and excess weight) live longer than non-Hispanic White people in the United States; have higher rates of diabetes but lower rates

of cardiovascular disease; and even with low incomes and lower-quality prenatal care, have infant mortality rates only slightly higher than those among their non-Hispanic White counterparts. The health profile of Hispanic Americans does not adhere to the paradigm in which minority ethnic or poverty status determines poor health outcomes.

Instead of using Hispanic Americans' health data to recalibrate or rethink existing models of health and risk factors, however, the U.S. health enterprise has typically diminished the importance of the data on longevity and good health outcomes. Some health experts began referring to these findings as “the Hispanic paradox”<sup>1</sup> — the exception to the rule. As data from other countries in the Americas were revealed as supporting U.S. observations regarding longevity among Hispanic people, researchers responded not by developing a new model but by expanding the Hispanic paradox into “the Latin American paradox.”<sup>2</sup> Other researchers developed various explanations for longevity in Hispanic populations: the “salmon bias,” according to which Hispanic Americans did not in fact live longer but rather, like salmon, returned to their location of birth to die and were thus excluded from U.S. mortality data<sup>3</sup>; the hypothesis that only relatively healthy people migrated from Latin American countries to the United States; or the possibility that death certificates were being filled out incorrectly. The first two explanations were rejected in 1999, and in 2010 researchers put the third to rest.<sup>4</sup> Yet even now, some observers dismiss the accuracy of outcome data for

Hispanic Americans, arguing that this population is too diverse to be analyzed as a single group — while overlooking the fact that non-Hispanic White Americans, Asian Americans, and African Americans are also ethnically diverse.

The opportunity that data for Hispanic populations presented for developing new models of health was ignored; analysts simply noted that the findings did not fit the prevailing conceptual framework for health, and there was no alternative model available to explain them. But unbiased analysis of data on the health of Hispanic and other communities can move us beyond existing conceptual frameworks and allow us to leverage modern science in elucidating mechanisms of health and disease. Achieving such progress will require several steps.

The first requirement is introspection and discernment. Data are neither collected nor analyzed in a vacuum. Though objectivity is assumed, what we measure is often affected by the prevailing culture. Cultural beliefs and values become lenses through which researchers and clinicians experience the world, and they often harden into biases that act as intellectual blinders. To look at information and data in a new way, researchers and clinicians need to acknowledge the influence of their own culture as well as their views of other cultures. Introspection is essential for identifying implicit beliefs and biases that become ingrained in research, models of care, and the artificial intelligence that increasingly both drives and undermines clinical decision making.

Second, we need to reconsider the value of decades-long trend

lines. If we focus only on areas of health in which we have sufficient data to produce trend lines spanning decades, we systematically omit substantial portions of the population whose data were not collected, and we remain wedded to health models that fail to reflect the realities of the current U.S. population. Though the national model death certificate includes the decedent's gender, race, and age, and has incorporated a Hispanic identifier since 1989, other sources of health information have included minimal Hispanic data (e.g., <6% in clinical trials, 3% in the Cancer Genome Atlas, and <1% in genome-wide association studies). The health data we are collecting — through the U.S. Census Bureau, Centers for Disease Control and Prevention, and Amazon — from the 24 million Asian Americans, 47 million African Americans, 62 million Hispanic Americans, and many other communities (American Indians, Alaska Natives, Native Hawaiians, Pacific Islanders, and others) no doubt carry important implications for future health and health care.

Third, it is important to collect data on multiple factors and to engage experts from varied disciplines — public health, medicine, economics, behavioral science — in analyzing those data. Building research enterprises (e.g., the National Institutes of Health “All of Us” research program) that aggregate multiple sources of data from varied disciplines, as well as using information gathered by commercial entities (from insurers to Meta [formerly Facebook]), can be part of the solution. These strategies can lead to new partner-

ships for the public health community and the availability of more data from diverse sources to help elucidate individual patients' health. Increased access to relevant data will allow for the aggregation (of data on everyone who identifies as Hispanic) and disaggregation (by specific ancestry) that can reveal the nuances of health risk factors in various racial, ethnic, or gender-based subgroups. Clustering diverse groups under a single category — “disadvantaged,” “minority,” “people of color,” “underrepresented minorities,” or “BIPOC” (Black, Indigenous, and people of color) — is not informative, since it homogenizes disparate health experiences. Moreover, other key aspects of human identity — such as gender, sexual orientation, religion, and disability status — also affect health. An appropriate model of health would include multiple factors in explaining, for example, why the leading causes of death among non-Hispanic Black Americans and non-

Hispanic White Americans are diseases of the heart, whereas those among Asian Americans and Hispanic Americans are malignant neoplasms.<sup>5</sup>

Fundamentally, it is not adequate to collect and analyze data from diverse people and sources. We must be willing to step back and look critically at what we think we know, reflect on the adequacy of current models, and pursue alternative models. The health effects of toxic substances in the environment, one's microbiome, and epigenetic factors can contribute to new paradigms. Researchers and clinicians who are open to more nuanced models that take into account multiple factors will be able to pursue an exciting new path.

Although many relevant fields are still in their infancy, in the future our understanding of health will be personalized and based on models that combine research findings in genomics and biology (the microbiome, immunology, and other areas) with compre-

hensive or integrative modeling built on public and private data sets. Without a fundamental shift in our conceptual models of health research and care, we will perpetuate the barriers we claim to want to dismantle and compromise the health of all communities.

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