

Beyond the Known: Looking for the Root Causes of Health Disparities

By Kelly Mills



Poor people have higher rates of heart disease, diabetes, and a number of other chronic diseases than the wealthy. People from ethnic minority groups have worse health outcomes than whites. If asked why such disparities exist, one might hazard that lack of access to quality health care is the likeliest culprit. One might also point to behavioral risk factors, such as smoking and poor nutrition and suppose these unhealthy behaviors were practiced at higher rates in low-income groups.

Health care access, quality of care, and behaviors that increase disease risk do play a part in health disparities. But how do we account for the fact that African American women have higher rates of preterm births than whites even after adjusting for income? Or that Latina immigrants from Mexico have better health than whites at the same income—but that this health gain drops precipitously for these immigrants the longer they spend in the United States, and that their children and grandchildren will have health outcomes below that of whites? Or that low-income workers have greater rates of chronic heart disease than people in high-stress, high-income jobs, even after adjusting for risk behaviors such as smoking?

When we talk about higher rates of diseases in certain groups, we are simply looking at the tail end of a complex process of intertwining factors that affect and alter our bodies. Inequities in income, housing, social status, social support, and more result in inequities in health. But while we know that environments have a profound effect on our biological functions, researchers at the School are still attempting to identify and isolate the physical and social factors that spell out a shorter lifespan for some of us, and a longer lifespan for others.

Stress and the Social World

Two kindergarteners race for one ball and reach it at the same time. One child asserts his claim on the ball, and the other child briefly complains, then shuffles quietly away. Can we predict which child will have more health problems based on interactions like this?

In the past 20 years, research has increasingly examined the strong links between factors such as social status and support, the body's ability to respond to stress, and health problems such as heart disease. In particular,

“People are often surprised that hierarchies exist in kindergarten classes, but they certainly do.”

researchers have focused on the neuroendocrine system and a hormone called cortisol. When a person is confronted with a stressful situation, cortisol levels spike, and then return to normal as the stressor is removed. However, when a person is exposed to chronic stress, this hormone takes a toll on a number of systems in the body. Some investigators have tied long-term exposure to stress with a “hypoactive” stress response, when the body maintains an elevated level of cortisol, but ceases to spike when confronted with a stressful situation. Elevated but static cortisol levels effect the functioning of a range of physiological systems and have been connected to inhibited cognitive function, suppressed immune system, high blood pressure, blood sugar imbalances, and more.

W. Thomas Boyce, M.D., professor of community health and human development, is currently investigating if and how children's positions in a kindergarten class hierarchy influence health outcomes. Investigators with the Peers and Wellness Study have spent three years observing 300 children in kindergarten classes. They observed the children learning, playing, and communicating, and documented the hierarchy of the classroom. The children were ranked on a spectrum of dominant to subordinate based on social interactions. “People are often surprised,” says Boyce, “that hierarchies exist in kindergarten classes, but they certainly do.”

Once students were ranked, the researchers evaluated the children's health in a number of areas, from respiratory

function to dental health. Boyce and his team found that children in subordinate positions showed higher rates of stress reactivity, and also seemed to have more instances of injuries, respiratory problems, poor dental health, and pre-syndromal psychopathology than dominant children. At least some of these differences are likely linked to the release of stress hormones such as cortisol.

Examining health outcomes in children provides valuable information for understanding health disparities in communities. “Research over the last twenty years has shown that experiences in childhood and health in childhood are predictors of health in adulthood,” says Boyce. “This means that whatever disparities we are creating with children have implications not just for children's health, but for the health of adult society as well.”

Boyce is also studying the relationships between language, neurological development, and socioeconomic status. Previous studies have established that children from lower-status households are spoken to less often and with less complexity of vocabulary and grammar at home than children at higher economic levels. Boyce is piloting the Wellness in Kids Study to determine whether these language differences affect brain development. The researchers bring dinner to the home of a participating family, then set up and leave a video camera to unobtrusively record dinner-time conversations. They plan to identify children from the collected footage in order to study development of the prefrontal cortex. This area of the brain is crucial for what are known as executive functions, a complex combination of

continued on page 4

Beyond the Known..., continued

cognitive activities such as the ability to plan and to focus on stimuli.

Race Matters Too

While many health disparity studies have focused on income levels, status and opportunity in our society are influenced by more than how much money one has.

Amani Nuru-Jeter, Ph.D., M.P.H., assistant professor in the Divisions of Community Health & Human Development and Epidemiology, wants to better understand the impact of another key social stressor: racism. She has conducted extensive focus groups of African American women in the Bay Area in order to create a diagnostic tool to quantify the experience of racism throughout the lifecourse. Rather than focusing on

specific areas of discrimination, this tool would capture racism as a pervasive and chronic social stressor. Nuru-Jeter hopes to correlate the focus group responses with pregnancy and birth outcomes. African American women have the highest rate of preterm birth and low-birth-weight babies of any ethnic group.

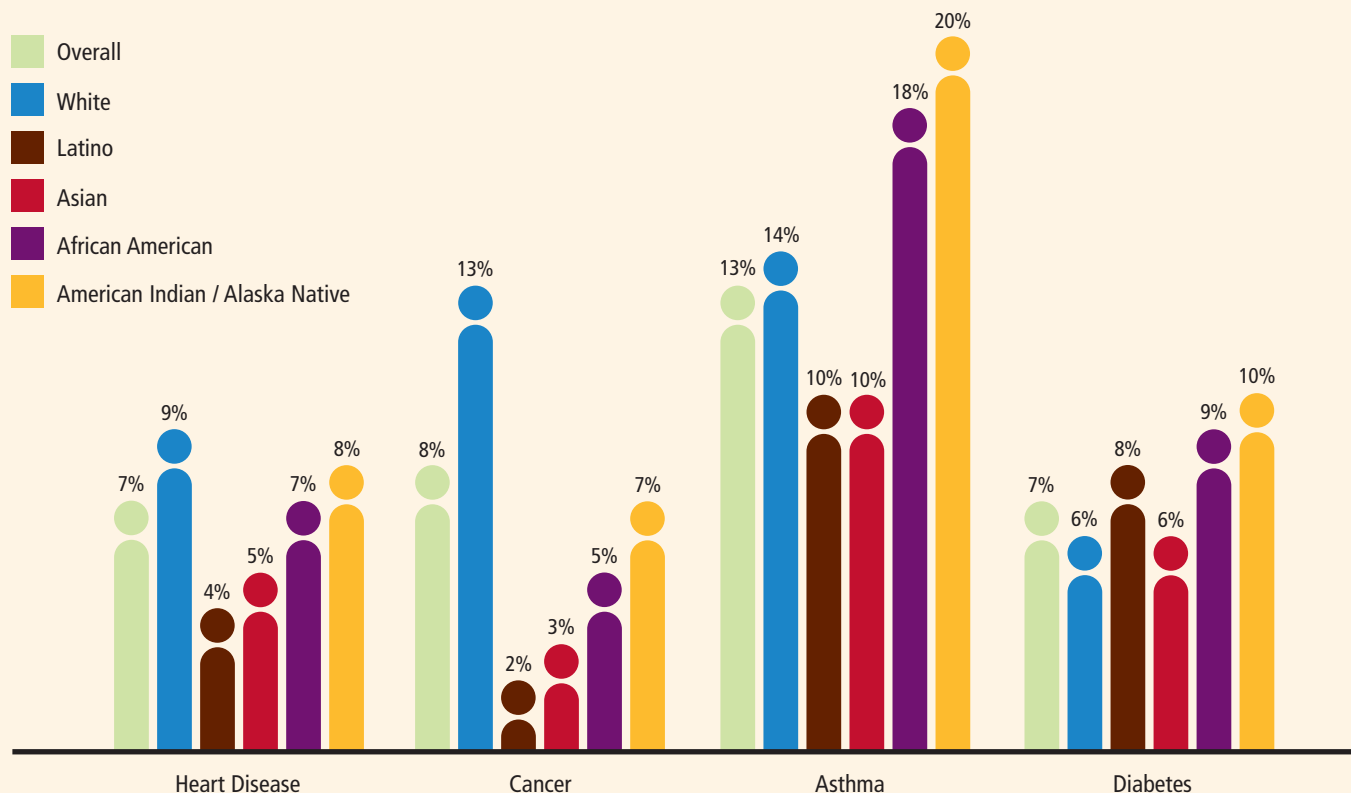
“We hope to better understand how exposure to social stressors such as racism impacts health and well-being. How does racism operate in the lives of these women? Of women like me? What are the likely avenues for intervention, whether through policies, programs, neighborhood investment, or some other strategy?” asks Nuru-Jeter. Her focus group research is an interdis-

ciplinary project based out of the Center on Social Disparities and Health at UC San Francisco. This research is part of a growing focus on the effects of racism, stress, and a range of health problems such as diabetes, hypertension, and chronic heart disease.

The Outcomes of Depression

Research into health disparities has not been limited to the United States. Over 60 percent of impoverished mothers in rural Mexico have the symptoms of depression. This was what **Lia Fernald, Ph.D.**, assistant professor of public health nutrition, found when she surveyed mothers in a sample region, many of whom had the blunted cortisol response typical of chronic stress. The high rates

Health Conditions by Race/Ethnicity in California, 2003



Source: California Health Interview survey, UCLA Center for Health Policy Research, available at www.askchis.com.

of depression can be attributed, at least in part, to poverty. “Imagine the mom, living on less than two dollars a day, who has to support four kids. She has to figure out if it is more important that she buys shoes, or food, or a school uniform... Since the mothers are doing the day-to-day budgeting, they have a lot of worries and stress,” offers Fernald.

Fernald was also interested in how maternal depression would impact the children’s health and development in these homes. She studied the cortisol levels, heart rate, and blood pressure of both mothers and children. As it turns out, the children had corresponding rates of hypoactive stress response.

The studies were conducted as part of an intervention program in Mexico called *Programa de Educación, Salud y Alimentación* (PROGRESA). The program, which aims to improve the health of children, gives poor families a cash supplement they can spend any way they like, rather than subsidizing health care or nutritious foods. The only condition for families is that parents must take their children to a health clinic at least four times per year, and they must give children micronutrient supplements if deemed necessary. So far the program has been highly successful in improving children’s health and nutrition, and many other countries are attempting to launch similar programs.

“PROGRESA is based on the hypothesis that low socioeconomic status is connected to health,” says Fernald. “So if we increase income, that ought to improve health.” The good news is that she found children participating in the program returned to a more normal stress response, and that hypoactivity was decreased. This could be due to the effects of improved nutrition on the

continued on page 6

Trailblazer



As a young physician in the public health program at Berkeley, **Sir Michael Marmot, Ph.D. '75, M.P.H. '72**, admits he was surprised to hear Professor Leonard Syme tell his class that doctors have no special insight on the causes of ill health. Syme’s point—that social factors play as much of a role in the health of populations as biological factors, and therefore an understanding of society is necessary to epidemiology—was a vital lesson for Marmot. After receiving his graduate degrees from the School, he went

on to conduct pioneering research into health disparities. Marmot remains at the forefront of the movement to understand the relationship between the social environment and disease.

As principal investigator of the Whitehall II study, an examination of the health of British civil servants, Marmot found that social status was correlated with cardiovascular disease. Those with the lowest social status had the highest rates of disease, while those with the highest status had the lowest rates of disease. This inverse gradient was linked to the amount of control and autonomy a person had at work, so that lower status workers with little control were more likely to develop cardiovascular disease than higher status workers who might have “stressful” jobs but more control. Marmot also studied the health of immigrants and found that duration of time in a new country could be tied to rates of diseases that shift to resemble those typical for natives of the new country. In his research he has produced evidence of biological mechanisms related to increased risk for disease and demonstrated the psychosocial pathways by which these mechanisms are activated.

Marmot is currently the chairman of the World Health Organization Commission on Social Determinants of Health and the director of the University College of London International Institute of Society and Health. In 2000 he was knighted for his services to epidemiology and in understanding health inequalities. [↪](#)

— Kelly Mills

Beyond the Known..., continued

development of the neuroendocrine system, or a reduction in maternal depression, or both.

She also points out that since program participants have spending discretion, they are able to make physical improvements to their homes that positively impact health. For example, a dirt floor might be replaced with wood, increasing the cleanliness and hygiene of the home, and reducing exposure to worms and other pests that spread disease.

Hazardous Homes

Researchers with the Center for the Assessment of Mothers and Children in Salinas (CHAMACOS) were also interested in the connections between housing quality and health, and reported dire findings for farmworkers, other low-income residents, and their families in California's Salinas Valley. The investigators surveyed 644 homes in the

“People don't want to build affordable housing for low-income families, but the farmworkers and many other rural workers don't make enough money to afford housing.”

predominantly agricultural area, and found that the majority of the homes had significant disrepair, including peeling paint, mold, and water damage. Many of the homes also had pest infestations, such as cockroaches and rodents. This also led in many cases to increased pesticide use in the home. Poor housing conditions have been linked to an increased risk for injuries and respiratory disease.

Researchers also found that overcrowding was a major issue, with a prevalence about 20 times higher than the national average. Overcrowding increases the spread of infectious diseases.

“Housing quality is a key issue for low-income residents in rural California,” says **Asa Bradman, Ph.D. '97**, associate director of CHAMACOS. Bradman and other investigators at CHAMACOS have been researching how a range of environmental factors, including toxin exposure, impact the health of primarily Hispanic low-income mothers and children. While there has been significant research in the health problems associated with urban housing, this study was one of the few to examine similar problems in a rural area.

“There are social and economic issues here,” states Bradman. “People don't want to build affordable housing for low-income families, but the farmworkers and many other rural workers don't make enough money to afford housing.” While environmental conditions create acute health hazards for families, the children who live in these conditions can also develop long-term health problems due to toxin exposures. Researchers at CHAMACOS will continue to examine the effects of this impoverished agricultural environment on the development and health of children. 🌀

