How Healthy Are US Children?

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BY CONVENTIONAL MEASURES THAT FOCUS ON DISEASES, INJURIES, AND MORTALITY, CHILDREN IN THE UNITED STATES ARE HEALTHIER NOW THAN EVEN A FEW DECADES AGO. THEY ARE LESS LIKELY TO DIE IN CHILDHOOD AND MORE LIKELY TO BE PROTECTED BY IMMUNIZATIONS AGAINST SERIOUS INFECTIOUS DISEASES.1,2 RATES OF DEATH FROM INJURIES AND EXPOSURES TO SOME ENVIRONMENTAL HAZARDS HAVE DECREASED.3,4 THE INFANT MORTALITY RATE HAS DECLINED FROM 26 PER 1000 IN 1960 TO 7 PER 1000 IN 2003, WHILE THE MORTALITY RATE AMONG THOSE YOUNGER THAN 5 YEARS HAS DECLINED FROM 30 PER 1000 TO 8 PER 1000 DURING THESE YEARS.5

Should these facts be reassuring? Are correct measures being used to evaluate child health? If not, how should child health be assessed? In fact, by other standards, US children are not doing so well. International comparisons show a significant lag behind other industrial and even some transitional countries. In 1960, 11 nations had an infant mortality rate lower than the United States; in 2003, 40 had infant and child mortality rates lower than or equal to the United States.6 Of 187 countries, the United States ranks 68th for diphtheria-pertussis-tetanus, 89th for polio, and 84th for measles immunizations (all by age 1 year).7 Surveys of health behavior among teenagers in 28 countries show that US teens rank close to the bottom for most health-compromising behaviors and only 16th in reports of their health.7

Child and adolescent obesity has more than doubled in the past 30 years in the United States,8,9 and asthma is at an all-time high.10 More than 1 in 10 children and youth have mental health problems including attention-deficit/hyperactivity disorder, anxiety, and depression,11 and many others experience school failure and dropout of the educational system because of learning or other difficulties.12 Thus, an increasing proportion of children will be ill-prepared to compete in a highly technology-dependent society and are at longer-term risks as adults.

Clear evidence shows that events in early life, such as birth asphyxia and exposure to chemicals and radiation, can cause long-term morbidity and premature death. Recent research demonstrates the long reach of more subtle, less direct insults occurring in infancy and childhood and the ways that they are connected to chronic conditions of adulthood.13 For example, infants with reduced birth weights are at substantially increased risk of adult hypertension and heart disease compared with normal-birth-weight infants.14 Other evidence is accumulating about a wide range of causes of adult morbidity, such as childhood sun exposure predisposing to adult skin cancer and early eating patterns contributing to adult obesity and osteoporosis.15,16 Thus, the primary contributors to current childhood morbidity are from more complex interactions across the variety of biological, behavioral, environmental, and social influences.

The growing evidence that major health problems among adults may be preventable or greatly diminished by early interventions provides important additional reasons to think more creatively about measuring children’s health, understanding the major pathways that shape health, and opportunities to intervene early in life. Child health is important both in its own right and because it has such profound effects on the health of the adults that children will become.

Current measures to assess child health are not the correct ones. The combination of apparently good health by adult standards and high predispositions to ill health raises questions about the adequacy of current conceptualizations and measures. Conceptualizations that focus on the absence of disease or premature mortality as measures of health are inadequate for children. Assessment of child health requires a developmental perspective with attendant implications for health in subsequent stages of life. It demands measurement systems that pay attention to the developmental process and to the biological, environmental, social, and policy pathways that interact and are critical to the health of young children. This means understanding the trajectories of health patterns in children over time—a process that does not fit well with current mechanisms of data collection that focus on cross-sectional data.

A recent report of the Board on Children, Youth, and Families of the National Research Council and the Institute of Medicine reviewed some of these issues and proposed a new definition and model of health designed to address these shortcomings.17 Building on the 1986 definition of the Ott-system because of learning or other difficulties.13 Thus, an increasing proportion of children will be ill-prepared to compete in a highly technology-dependent society and are at longer-term risks as adults.

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tawa Charter, the definition states that child health is “the extent to which individual children or groups of children are able or enabled to: a) develop and realize their potential; b) satisfy their needs; and c) develop the capacities that allow them to interact successfully with their biological, physical, and social environments.” This broader definition emphasizes the importance of measuring not only health conditions but also functioning and health potential—2 dimensions that are currently neglected. It also emphasizes the significance of measuring factors that scientific evidence shows are key influences on child health.

Prevalent models of disease, such as reflected in Healthy People 2010, assume a direct cause and effect. They are more consistent with infectious disease models of illness than with the more complex pathways of influences that characterize today’s morbidity. The new definition is more consistent with a new model built on the notion that different domains interact dynamically to affect children’s health over time. Previous influences provide the pattern on which current influences have their effects. Thus, later influences have impacts that are not random but are determined in large part by the preceding pattern. The model also emphasizes the importance of complex interactions within and between the types of influences, including the child’s biology, behavior, and social and physical environments, and the broad range of services and policies that affect children’s lives, such as those that affect the environment (eg, highway safety and air pollution, nutrition, and standards for the built environment).

A dynamic view of children’s health and development has implications for how child health information should be collected and analyzed. It requires measures of both health and influences on health in populations and subpopulations, simultaneously and over time. This contrasts with the current focus on individual health conditions one at a time, usually in cross-sectional samples. Broader and longitudinal perspectives are needed to understand the mechanisms by which health evolves.

The implications extend to existing data systems. Data on individuals must be linkable across data sets. This requires unique and protected linkages across multiple data sources that are not currently used together. This is possible with current technologies, but such technologies present a major challenge to maintaining privacy, confidentiality, and security. Aspects of health not now included (such as developmental status at all ages) must be added using a longitudinal perspective to learn whether exposures and vulnerabilities at one point in time persist or have persistent effects.

Data on individuals should also be linked to information on environmental influences that reflect exposure to physical and chemical agents and to local and regional environment, and social and medical support systems. This requires geocoding of residential addresses and linkages to census-based and other neighborhood and community data in ways that preserve privacy and ensure confidentiality. All surveys should contain individual-level standardized data on racial, ethnic, immigration, and socioeconomic characteristics that can be linked to community characteristics to understand the extent to which they heighten vulnerability or, conversely, promote good health. Because of vast differences in environmental exposures of different racial, ethnic, and socioeconomic subpopulations, oversampling will enhance the value of data sets for understanding the genesis of children’s health and monitoring it.

Together these approaches (measurement of a broader construct of health and health influences, trajectories over time, linkages at the individual level, and use of community and environmental data sets linked to individuals) would enable the identification of groups of children with particular clusters of compromised or, conversely, excellent health and would increase understanding of patterns of risk and resilience. Although there are many current, and often duplicating, sources of data on child health, it is not now possible to combine these data because of different ways of asking questions, different response categories and coding rules, limitations on the availability of data across administrative units, and lack of reliable identifiers in many available data sets.

The obstacles to obtaining and organizing data to understand how health is produced and maintained are not technical. Mechanisms to do this now exist. Applying them would enhance progress toward understanding the basis for different levels of health in population subgroups and to providing needed services of various kinds and intensities.

New technologies in the biological and social sciences provide exciting opportunities to understand the dynamic interaction of biology and environments and how they interact to produce health. Moreover, there is enormous new capacity to deal with complex information. Both of these expanding areas provide unparalleled capacity to track child health and to add new understanding of the ways in which health evolves. The challenge is to find and build on the will to improve children’s health, both for its own sake and for what it bodes for health later in life.

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REFERENCES
Confronting Genetic Testing Disparities
Knowledge Is Power

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Nam et ipsa scientia potestas est, “For knowledge itself is power,” he could never have imagined its current applicability to reducing disparities in cancer care and prevention in the United States. The landmark Institute of Medicine report Unequal Treatment: Understanding Racial and Ethnic Disparities in Health Care revealed that racial- and ethnic-minority patients receive inferior health care compared with white Americans, even when income and insurance inequalities are leveled. The promise of early cancer detection and prevention is within reach as newer technologies become incorporated into medical practice. Unfortunately, new technologies are likely to increase health care disparities further even as they widen the gap between those who already receive the best care and those who do not.

Specifically, the use of genetic counseling and testing for primary cancer prevention is yet another area of medicine in which disparities may be predicted to increase. Referral for counseling is often initiated by a primary care physician, an individual luxury more common among insured patients. Referral also involves a careful review of family cancer history, the completeness of which may be inhibited by race- and ethnicity-specific practices and beliefs. Economic constraints secondary to the high cost of genetic testing and fears of discrimination (genetic, insurance, or otherwise) may also contribute to race/ethnicity-related disparities.

Despite having a lower incidence of breast cancer, African American women have a higher breast cancer mortality rate than white women, due in part to diagnosis of the disease at a more advanced and less curable stage. In this issue of JAMA, Armstrong et al explore racial disparities in utilization of genetic counseling for primary prevention of breast or ovarian cancer in the University of Pennsylvania Health System. Their findings are revealing: among African Americans, the unadjusted odds ratio (OR) of undergoing genetic counseling was 0.22 (95% confidence interval [CI], 0.12-0.40). When potential confounding factors including probability of carrying a BRCA1/2 mutation (Frank model), socioeconomic factors (ie, age, marital status, educational attainment, annual household income, and health insurance), and psychological factors (risk perception and cancer worry) were added to the model, the resultant OR was attenuated at 0.40 (95% CI, 0.14-1.08) and no longer significant. However, when additional attitudinal factors and primary care physician factors were included, the OR was again strengthened with a final adjusted value of 0.28 (95% CI, 0.09-0.89). The authors conclude that African American women are much less likely to undergo genetic coun-

See also p 1729.