



The long-term health, technologic, and economic well-being of the United States is contingent upon the development of an appropriate, talented scientific, technologic, and engineering workforce.

A Challenge for the New Millennium: Eliminating Health Disparities and Achieving Educational and Workforce Diversity

The new millennium was ushered in by the release of two documents that stand to have dramatic impact on the scientific research and training agenda in the United States. The first is the U.S. Surgeon General's Report *Healthy People 2010 (1)*, and the second is a report released by the National Science and Technology Council (NSTC) titled *Ensuring a Strong U.S. Scientific, Technical, and Engineering Workforce in the 21st Century (2)*. The two overarching goals of Healthy People 2010 are to increase years and quality of life and to eliminate racial and ethnic disparities in health. In a preamble to this document, Donna E. Shalala, Secretary of Health and Human Services, notes that "...we must make certain that all Americans benefit from advancements in quality of life, regardless of their race, ethnicity, gender, disability status, income or educational level." The goals of Healthy People 2010 are reinforced by President Clinton's National Institutes of Health (NIH) budget presentation to Congress. The president acknowledged that in fiscal year (FY) 1999 and FY 2000 Congress increased the NIH budget dramatically, boosting the agency's power to transform laboratory and clinical research into effective treatments and new approaches to the prevention of our most deadly diseases. The generous budget increases have enabled the NIH to launch many new initiatives, which will continue in FY 2001. In addition, the president targeted four areas with "outstanding scientific opportunities that have the promise to yield enormous benefits in the future in the form of new knowledge and treatment and prevention strategies." The four areas are *a*) Genetic Medicine; *b*) Clinical Research: Bridging Basic Discoveries to Tomorrow's New Treatments; *c*) Fostering Interdisciplinary Research; and *d*) Eliminating Health Disparities. The Health Disparities issue derives from an initiative of the Department of Health and Human Services aimed at eliminating domestic health disparities, particularly between minority and majority populations. The NIH is a major participant in this initiative and is committed to the development of a trans-NIH strategic plan to eliminate domestic health disparities by 2010. A central component of this plan focuses on medical research and research training. Moreover, each institute and center of the NIH has been directed to enlist the aid of its advisory councils and constituency groups to develop its own Health Disparities Strategic Plan. The trans-NIH plan will increase support for biomedical, behavioral, and social science research on health disparities, and for effective communication of research results to health professionals, communities, and others. It will also address the need to expand the size and diversity of the scientific workforce committed to reducing health disparities.

The NSTC report examines what must be done to ensure an adequate science, technology, and engineering (STE) workforce in the twenty-first century. The NSTC report resulted from a 2-year study designed to assess whether the United States is on a path that



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will ensure the vitality and strength of the talent pool for the STE workforce. The report noted that the rapid growth of STE jobs and very low unemployment in science and engineering occupations reflect a trend that, if unabated, will severely threaten the strong economy and the high quality of life to which we are accustomed. In 1997 non-Hispanic white males (65%) and females (18%) dominated the STE workforce. Thus, non-Hispanic whites accounted for 83% of the STE workforce and represent approximately 75% of the population in the age range of 18–64 years. In marked contrast, black males, 18–64 years of age, represented 5.7% of the population but only 2.1% of the STE workforce. A Bureau of the Census projection cited in the NSTC report (2) predicts that from 1995 to 2050, minorities will increase from 25% of the population of 18–64 years of age (the workforce) to nearly half (48%). The report contains four recommendations, two of which focused on the enlargement and diversification of the talent pool.

The NSTC report (2) concludes that, owing to a global shift from an industrial base to knowledge-based enterprises, the United States must take steps to ensure that it is maximally developing its human resource pool. We must seek talent in groups currently underrepresented in the scientific, technical, and engineering workforce. The executive summary of this report (2) states that

We look to science, technology, and engineering to increase the nation's productivity and economic well-being, advance healthcare, improve the environment, help ensure national security, and educate our youth.

The report acknowledges that

the increasing economic role of science, technology, and engineering has, in time, increased demand for all types of scientific, technical and engineering workers, from technicians to Ph.D. research scientist[s] and engineers.

The report (2) notes the essential nature of the STE workforce to both the private and public sectors. In the private sector, the STE workforce propels the economy and provides such valuable services as health care. The STE workforce is vital to the public sector in the support of essential federal missions including the maintenance of a strong U.S. science and engineering enterprise that advances biomedical research, national defense, environmental protection, energy conversion efficiency, food supply safety, and space exploration.

What are the specific inferences for environmental health? Numerous studies demonstrate that minority and low-income Americans are disproportionately exposed to adverse health and environmental insults from pollutants (3–5). This disparity was targeted by Executive Order #12898 on Environmental Justice, which

President Clinton signed in 1994. The order requires all federal agencies to incorporate the precepts of environmental justice into their mission and to develop their own environmental justice strategies. The executive order requires these strategies to include a consideration of enforcement of statutes in localities impacting minority populations and low-income populations, solicitation of greater public participation, improvement of research, and identification of differential patterns of subsistence use of natural resources. The executive order required that agencies conduct, in a nondiscriminatory manner, all activities that substantially affect human health or the environment. Finally, the executive order required better data collection and research. In addition, whenever practicable and appropriate, future human health research must study diverse segments of the population and identify multiple and cumulative exposures.

The message is clear: The long-term health, technologic, and economic well-being of the United States is contingent upon the development of an appropriate, talented STE workforce. The projections of an ever-increasingly diverse population of workforce-age individuals appear to dictate that this workforce will be considerably more diverse than the current workforce. The key to achieving a diverse workforce is the development of a talent pool rich in diversity. However, current trends provide little evidence that we are on a course to develop such a talent pool. In 1998, U.S. universities awarded 15,297 doctorates in the sciences; underrepresented minorities were the recipients of 999 (6.5%) of the total. Similarly in 1998, underrepresented minorities accounted for 6.8% of the engineering doctorates. The statistics in environmental science subdisciplines are equally dour. In a recent edition of *Doctorate Recipients from United State Universities: Summary Report 1998* (6), of 156 doctorates awarded in toxicology, only 4 (2.6%) were awarded to underrepresented ethnic minorities; 3.2% were in environmental health engineering, and 4.1% were in environmental science.

If the United States is to develop an STE workforce by 2050 that reflects the diversity of the population, we must dramatically alter the current trend. This challenge deserves our best effort and requires an immediate commitment. The NSTC report (2) recommends guidelines that will hold all federal agencies accountable for progress in achieving diversity in the programs that they support. However, the approach to solving the problem is not as straightforward as merely increasing the percentage of underrepresented minorities who receive degrees in these critical areas. The commitment to educational diversity must be shared by a broad spectrum of universities. The relegation of this responsibility to a restricted group of universities would diminish the pedagogical impact of diversity on the greater community of universities. The American Council on Education posits that diversity enhances the educational experience for all (7). A recent publication (8) stated that

We learn from those whose experiences, beliefs, and perspectives are different from our own, and these lessons can be taught best in a richly diverse intellectual and social environment.

A survey from this same publication (8) indicated a major percentage of faculty members believe that, in diverse classes, students are able to develop useful academic skills such as willingness to examine individual perspective, leadership capacity, and critical thinking. There is also evidence that a diverse educational environment sensitizes and alters attitudes and insights of nonminority participants (9). The challenge to commit to this level of diversity is great and perhaps even more daunting now than ever, given the current atmosphere of increasing legal challenges to diversity. In contrast, failing to achieve diversity in the U.S. STE workforce may contribute to *a*) compromises in the high standard of living in the United States that we have grown to accept as a right; *b*) erosion of the United States' leadership position among the nations of the world; and *c*) increasing social unrest that might weaken the bonds which unify the "melting pot" that is America.

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