Chapter 6
Wealth Creation, Establishing Genome Sequencing Centers, and the Thematic Units in the Developing Nations and the Potential Medical, Public Health, and Economic Implications

ABSTRACT

In this chapter, a detailed account of the overwhelming success attributed to the Human Genome Sequencing Project was examined. Comparison was made of the quality of life indicators between the G8 nations and the other progressive developing nations, identifying the challenges involved in establishing viable genomic centers. Data for the scientific workforce in Brazil, China, and India and the frequencies of their information technology and bioengineering graduates will outpace those of G8 nations in the next few years. This trend could leapfrog some of the developing nations into the status of highly industrialized countries.

PART I: CHALLENGES AND SUCCESSES OF HUMAN GENOME SEQUENCING PROJECT IN THE REALM OF G8 NATIONS: A STUDY OF BRAZILIAN, CHINESE, AND INDIAN TECHNOLOGY

Wealth Creation from Genomics

We must reiterate how the sequencing of the human genome sequencing has become the largest single undertaking in the history of biological science. Besides, for the first time, the eclectic nature of this scientific endeavor has attracted in no small measure, numerous other discipline to facilitate the full-fledge sequencing and application of genomics sciences not only in medicine, public health, and asso-

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ciated disciplines but also has demonstrated empirically the genomic applications which have created an unimaginable return on investment to the surprise of our hitherto distractors. To a large extent what the public has observed involves sequencing the human genome, determining the complete sequencing of the 3 billion DNA base pairs and identifying each human gene, demanded advanced technological development which until now may not exist in the BRICS (Brazil, Russia, India, China, and South Africa) nations. The assembly of a multidisciplinary team of experts in biology, physics, chemistry, computer science, mathematics, and engineering from several parts of the G8 and developing nations has led to accomplishment of this unimaginable feat.

The comprehensive amount of data derived from genomic sequencing as international gesture of goodwill is under public domain. The successful application of the data gleaned from genomics is dependent on the existence technological advancement of scientists either in the G8 nations or among the BRICS

To a large measure, data derived from reference genome, and the knowledge of genome structure and the requisite data emanating from the human genome sequencing serve as the springboard for innovative advancement in medicine and public health. Today, this emanating knowledge has enhanced the ability of public health scientist to prevent the onset of deadly pathogens, diagnose and treat hitherto life-threatening diseases. The knowledge and advancement gleaned from the human genome sequencing (HGS) provided clues about sequencing model organisms. Current knowledge and advancements from these eclectic sciences have ushered in the "genomic revolution" has created that momentum with waves which cannot be impeded.

The Battelle Technology Partnership Team (Tripp & Grueber, 2011) has emphasized how the resulting "genomic revolution" is influencing renewable energy development, industrial biotechnology, agricultural biosciences, veterinary sciences environmental science, forensic science public health, homeland security and advanced studies in zoology, ecology sociology, anthropology and related disciplines.

The tantalizing challenge is the creation of "genomic revolution" at a time when global peace has become an unimaginable luxury. The atmosphere of global peaceful coexistence can facilitate the disseminating of this scientific technology to the developing and least-developing parts of the world.

Inception of the Human Genome Project

In an effort to scientifically pinpoint the impact of radionucleotide on humans, after the use of atomic bomb by July 16, 1945 at Alamogordo, Mexico, Hiroshima and Nagasaki, Japan by August 1945; through the act of U.S. Congress, the U.S. Department of Energy (Genome.gov, 2003was asked to study and analyze the genomic structure, replication, damage and repairs, and the consequences of genetic mutation especially those caused by radiation and chemical byproducts of energy production. From the plethora of scientific studies emanating from this official investigation grew the recognition that the most ingenious way to study the effects of radioactive agents on humans was to analyze the entire human genome to enable scientists have access to a reference genome. Although planning began in 1986, regarding the Department of Energy's Human Genome Program, the National Institutes of Health (NIH) got involved in 1987. The joint initiative between the U.S. Department of Energy and NIH in the United States led to the Human Genome Project (HGP), formally began by October 1, 1990. The Memorandum of Understanding was signed after the first joint 5-year plan was documented between the two U.S. federal scientific organizations. The accomplishment of HGS, mapping and declassification is practically incomplete without the imaginative vision of the Nobel laureate, Dr. James D. Watson