

منتدى  
جدة  
الاقتصادي



JEDDAH  
ECONOMIC  
FORUM



## Jeddah Economic Forum 2010 The Global Economy 2020



INFLUENCING THE ECONOMICS OF HEALTH CARE IN THE FUTURE

E. Wayne Holden, Thomas Hoerger, Michael Trisolini,  
Doris Rouse & Scott Wetterhall

February 13-16, 2010  
Jeddah, Kingdom of Saudi Arabia



مركز الخليج للأبحاث  
Gulf Research Center



الرفة التجارية الصناعية بجدة  
JEDDAH CHAMBER OF COMMERCE & INDUSTRY

# INFLUENCING THE ECONOMICS OF HEALTH CARE IN THE FUTURE

*E. WAYNE HOLDEN, THOMAS HOERGER, MICHAEL TRISOLINI,  
DORIS ROUSE & SCOTT WETTERHALL*

*Social, Statistical and Environmental Sciences - RTI International*

The provision of adequate and affordable health care to the world's population of almost 6.8 billion is one of the most pressing economic issues affecting our collective futures. Maintaining population health is an important and central goal for any country. It is essential to ensuring the capacity for the productivity and innovation necessary to address other societal problems and to concomitantly support as well as enhance future economic activity. Given the importance of the population's health to the future, it comes as no surprise that it is intimately interwoven into the other major issues at play on the world stage – climate change, resource scarcity, global aging, continued widespread poverty, racial and ethnic disparities, and conflict. The rapid pace of globalization and accompanying economic development over the last several decades have only served to further enhance the complex and interconnected nature of health care as a fundamental societal good.

Within the developed world where resources to support health care systems are relatively abundant, similarities in health care challenges for the future are apparent. In the developing world, where resources are often limited to nonexistent, associated health care challenges are more variable across countries and can be close to overwhelming. Inequities in access to primary health care across the world's populations continue to be a pervasive and vexing problem that threatens the ability to measurably improve health on a global level.<sup>1</sup>

Rapid advances in the science and technology of health care over the last several decades have placed the health care arena in a unique position to improve health status as we move into the future, but only if coordinated and comprehensive health care policies can be implemented. These policies will vary depending upon the levels of economic and health care systems development in any one setting. Maintaining an appropriate balance between supporting the development and use of expensive cutting edge technology and investing in expanding less expensive, but proven primary care strategies will be a key factor for maximizing the value of health care investments. It is the tenet of this paper that capitalizing on science and technology to improve decision making, comprehensively addressing risk factor reduction and health promotion, and implementing coordinated health care policies will have a positive impact on containing health care costs and expenditures increases in the future.

## World Health Trends and the Global Health Economy

In 2007, the World Health Organization (WHO) provided mortality projections at the global level to the year 2030.<sup>2</sup> These projections indicated a significant change in the distribution of diseases contributing to mortality and a shift in the burden of death from younger to older age groups. These projections are primarily driven by an increase in the prevalence of noninfectious chronic diseases. This report underscored three important trends over the next two decades:

1. Significant increases in deaths due to cancer, ischemic heart disease, and stroke;
2. Significant decreases in deaths due to all infectious diseases except HIV/AIDS; and
3. Mild increases in deaths due to motor vehicle accidents.

According to these statistics, by the year 2030, 70 percent of all worldwide deaths will be attributable to non-communicable chronic diseases that are, in part, related to lifestyle and environmental factors. These epidemiological changes in diseases contributing to mortality reflect an aging population that has benefitted from the major public health advances of the last century that have controlled and, in many cases, eradicated communicable infectious diseases. Because of advances in maternal and child health care over a 30-year period, childhood mortality on a worldwide basis has decreased 40 percent from expected projections.<sup>3</sup>

However, maternal and child mortality continues to be above acceptable levels in many countries because of the inability to implement proven and cost-efficient prevention

and primary care strategies.<sup>4</sup> Enhanced childhood survival also reflects worldwide economic growth that has lifted large populations out of extreme poverty, resulting in longer life spans. Economic growth, however, is a double-edged sword that has contributed to the spread of tobacco use, the development of obesity, and other health risk behaviors for chronic diseases. Primarily because of these latter factors, it has been projected that by 2015 chronic diseases will be the leading cause of death in developing countries.<sup>5</sup>

During the time that these changes have occurred, acceleration in health care costs worldwide has been significant. For example, the global health economy as a share of gross domestic product (GDP) grew from 8 percent to 8.6 percent between 2000 and 2005. After adjusting for inflation, this represents a 35 percent growth rate worldwide in health care expenditures within a very short five-year time period.<sup>6</sup> On a more country-specific level, Table 1 provides information on the percentage of GDP devoted to health care costs for selected Organisation for Economic Cooperation and Development (OECD) countries for a 10-year time period from 1996 to 2006. Regardless of the country or type of health care delivery model, higher percentages of GDP were devoted to health care near the end of this period as opposed to the beginning of this period. Table 2 provides similar information for selected Gulf region countries over the same time period. Approximately 50 percent of these countries experienced increases in the percentage of GDP devoted to health care expenditures, while the other half experienced decreases. Overall, the percentage of GDP devoted to health care was lower for the Gulf region

countries when compared to the selected OECD countries.

**Table 1. Growth in Health Care Expenditures as a Percentage of GDP for Selected OECD Countries**

Country	%1996	%2001	%2006
Australia	7.6	8.4	8.8
Canada	8.8	9.3	10.0
Denmark	8.2	8.6	9.6
Finland	8.0	7.4	8.3
France	10.4	10.2	11.0
Germany	10.4	10.4	10.5
Italy	7.4	8.2	9.0
Japan	7.0	7.9	8.1
Mexico	4.7	5.4	5.8
Spain	7.5	7.2	8.4
Sweden	8.2	9.0	9.1
United Kingdom	6.8	7.3	8.5
USA	13.5	14.3	15.8

Source: [www.who.org](http://www.who.org)

Increases in health care expenditures are due to multiple factors, including aging populations that require more care, expanded and improved access to services, and accelerating costs of advanced technologies (e.g., imaging, chemotherapy, pharmaceuticals and surgical services). Some would argue that increases in health care expenditures worldwide are positive, given the clear need for expanded services in most countries. However, the economic issues for the future that these data raise are (1) the overall affordability of health care costs for individual countries and the worldwide economy in the upcoming decades and (2) the relative value that should be placed on health care within any country's portfolio of expenditures needed to support other sectors.

**Table 2. Growth in Health Care Expenditures as a Percentage of GDP for Selected Gulf Region Countries**

Country	%1995	%2000	%2005
Bahrain	4.7	4.3	3.8
Egypt	5.1	6.0	6.3
Jordan	8.7	9.6	9.9
Kuwait	3.6	3.5	2.2
Lebanon	11.6	10.7	8.9
Morocco	4.3	4.9	5.1
Oman	3.2	3.0	2.3
Qatar	3.6	2.7	4.3
Saudi Arabia	2.7	4.2	3.4
UAE	3.9	3.7	2.6
Yemen	4.2	5.0	4.6

Source: [www.who.org](http://www.who.org)

It is unclear whether we can sustain this level of increases indefinitely without major reforms that produce the highest levels of return on health care expenditures. Sustaining and improving quality of health care will greatly depend on our abilities to capitalize on new scientific developments to reduce health care costs or to focus on scientific developments that provide significant value in improving health status and complementing primary health care. We also need to enhance health promotion and prevention, effectively use information technology (IT), and implement effective and sustainable public policies.

### **Capitalizing on the Scientific Foundations of Health Care Decision Making**

The completion of the human genome project and the resulting revolution in genomics, metabolomics, and proteomics has just begun to penetrate into the clinical aspects of health care.

Technological advances have allowed the systematic and comprehensive collection of biological data heretofore impossible to obtain in a cost-efficient fashion. As gene sequencing becomes increasingly affordable in the near future, the promise of personalized medicine should become an everyday reality, where individual genetic makeup plays an increasingly important role in determining decisions regarding vulnerabilities, diagnoses, as well as types and levels of treatment options. Some advances have already been apparent in pharmacogenomics<sup>7</sup> where, for example, genetic testing is used as a marker for determining the levels of treatment with the blood thinner warfarin.<sup>8</sup> Further evolution in the area of genomics will help target interventions more efficiently, thus improving efficiency and reducing unnecessary costs once chronic diseases are clinically manifest. In the longer term future, these advances will have direct implications for the differential application of screening and prevention strategies. This is one example of a new technology that could reduce health care costs overall and free up more economic resources for investment in low-tech primary care interventions that have been proven to provide good value for improving health status.

Evidence-based decision making in health care has also emerged as an important topic influencing the direction of service provision.<sup>9</sup> It is likely that this trend will continue to exert substantial influence over the next decade and further enhance the development of personalized medicine, where individual differences in the development of disease and responses to interventions are increasingly considered. The initial focus in evidence-based medicine was on underscoring the importance of the

clinical trials literature as a basis for decision making in health care settings. Decision making based on the best possible science should result in the most appropriate application of diagnostic and intervention strategies. It has become commonplace to conduct comprehensive reviews of the evidence-based literature using methodologies developed and refined by organizations such as the Cochran and Campbell collaboratives.<sup>10</sup> Both payors and policy makers have adopted standards promulgated by these evidence-based reviews. This provides the best applications of science to practice in the medical arena as exemplified by the recommendations of such organizations as the National Institute for Health and Clinical Effectiveness (NICE) in the United Kingdom ([www.nice.org.uk](http://www.nice.org.uk)).

Comparative effectiveness is a more recent variant of evidence-based decision making that focuses on considering a much broader range of evidence (going well beyond the relatively circumscribed clinical trials literature) to determine the real-world effectiveness of medical interventions.<sup>11</sup> Comparative effectiveness focuses on examining the multitude of factors that determine effectiveness of health care interventions with the ultimate goal of informing public policy regarding the types of interventions that should be supported in health care delivery. Even more importantly, comparative effectiveness research determines the health care interventions that are ineffective in practice and should not be supported by health care financing mechanisms. A recent increased focus on comparative effectiveness in the United States may result in the development of methodologies for systematically reviewing and critiquing

the accumulated effectiveness evidence in any one area and making evidence-based recommendations regarding the most effective interventions to pursue. Applied in the international and global health arena, these methodological approaches may ultimately assist with the understanding of the effectiveness of interventions in different health care delivery contexts and cultures. These data should help optimize the design of effective health care delivery systems that provide equitable and effective care.

### Key Health Promotion and Prevention Targets

The rising prevalence of chronic diseases and emerging concerns regarding chronic disease management have expanded the focus of public health worldwide. Health promotion and prevention have become topics of substantial importance, with an accompanying emphasis on risk factor reduction for chronic diseases as we move further into the 21st century. Notwithstanding, a continuing emphasis is also being placed on infectious disease as represented, for example, in the ongoing focus and attention devoted to the HIV/AIDS epidemic<sup>12</sup> and global surveillance systems that have developed to monitor the emergence of influenza pandemics.<sup>13</sup>

Systems for monitoring the outbreak and spread of infectious disease on a global basis have improved markedly with SARS, the ongoing threat of an avian influenza pandemic, and the recent H1N1 influenza pandemic. It is now possible to monitor and track the spread of these diseases across national boundaries in near real time. These internationally connected information systems represent a good model of how surveillance can be

used in the future to track the worldwide distribution of chronic disease burden in populations. Hopefully, these systems will be enhanced to improve the accuracy of surveillance to facilitate international cooperation and efforts for combating emerging diseases. In conjunction with enhanced surveillance systems, two major risk factor reduction issues (i.e., tobacco control and obesity) will be extremely important to reducing the burden of chronic diseases (and concomitant costs) in the future.

Reduction of tobacco use is perhaps the single most important chronic disease control strategy that can be implemented on a worldwide level.<sup>14</sup> Smoking is the single largest cause of preventable death in the world and as a pathogen has negative effects on nearly every system in the body. More importantly, nearly 50 percent of individuals who become regular smokers will suffer and eventually die from smoking-related disease. Increases in cardiovascular disease and cancer in emerging economies can be partially attributed to substantial increases in smoking among the population. On a worldwide basis, smoking resulted in 100 million deaths in the 20th century with the current annual death toll over 5 million per year; at projected use rates, almost one billion accumulated deaths are estimated during the 21st century.<sup>15</sup>

Smoking has become an extremely important issue in rapidly developing economies where rates of use and concomitant addiction to nicotine have escalated markedly. For example, in China over two-thirds of the male population are regular smokers, portending a significant emerging disease burden in the future. Similarly, rates of tobacco use are significantly higher among males

than females in eastern Mediterranean countries, but far from the overall levels currently reported for China. According to recent survey results, however, tobacco use among youth in Gulf region countries has increased,<sup>16</sup> suggesting that adult prevalence of tobacco use for both males and females may increase in the future.

Efforts by the WHO in conjunction with the Bloomberg Foundation and the Centers for Disease Control and Prevention in the United States have accelerated the process of systematically addressing the use of tobacco on a worldwide level.<sup>17</sup> A comprehensive model termed MPOWER has been developed for promoting cessation and preventing the onset of smoking among younger populations. Within the context of this approach, six important strategies, if implemented effectively and comprehensively, could substantially curb the worldwide tobacco epidemic: (1) monitoring tobacco use and prevention policies; (2) protecting people from exposure to smoke; (3) offering help to quit tobacco use; (4) warning about the dangers of tobacco use; (5) enforcing bans on tobacco advertising, promotion, and sponsorship; and (6) ensuring taxes on tobacco. Initial efforts have been made to expand US-based tobacco survey methods to create a more valid and representative surveillance system for establishing worldwide systematic monitoring for tobacco use. The ability of the MPOWER effort to expand substantially in the upcoming decades to address the epidemic of tobacco use will be important to curbing tobacco use and subsequent disease, thereby containing health care costs. A number of efforts are underway across the Gulf region countries to address policy tenets of the MPOWER program with a high level of monitoring

activities, a moderate level of advertising bans, and some taxation.

Obesity is the second most significant preventable risk factor affecting escalating rates of chronic disease and propelling worldwide health care costs in the future. Obesity is a multifaceted condition with a complex interaction of genomic, environmental, and lifestyle risk factors contributing to its increased worldwide prevalence.<sup>18</sup> WHO estimates indicate that approximately 2.3 billion adults will be overweight and 700 million will be obese by 2015. Prevalence of overweight and obesity is increasing in the Gulf countries and has been linked to levels of diabetes and hypertension.<sup>19</sup>

It has been increasingly recognized that a global obesity epidemic is underway with the United States at the leading edge of increased prevalence rates. The health care cost consequences of obesity can be quite significant. Recent analyses of the US health care system suggest that approximately 9 percent, or \$147 billion per year, of health care costs can be attributed to overweight and obesity.<sup>20</sup> In addition, research has documented that significant health care costs due to overweight and obesity escalate with increasing age of the individual and that severe obesity markedly shortens life spans.<sup>21</sup> Obesity contributes most directly to the development of diabetes and cardiovascular disease, and it contributes indirectly to a host of other diseases, including some cancers.

A wide range of economic factors have contributed to the current obesity epidemic in the United States and the growing epidemic internationally, including the following: (1) high-fat, non-nutritious foods have become much less expensive and more abundant, promoting

consumption; (2) maintaining a healthy lifestyle through exercise and proper nutrition has become harder and more expensive; and (3) pharmaceuticals and other interventions for treating the health effects of obesity are more widely available and increasingly less expensive.<sup>22</sup> The interrelated issues of poor dietary/nutrition intake and low levels of exercise/physical activity have contributed substantially to escalating levels of overweight and obesity. Recently, studies have systematically measured and addressed<sup>23</sup> activity levels across countries to determine the impact on the obesity epidemic.

Although rates of obesity are linked to economic development, obesity has increased in both the developed and developing worlds. The number of overweight people worldwide currently rivals the number of underweight people, setting an important historical precedent.<sup>24</sup> The WHO has increased efforts to monitor the obesity epidemic and has offered technical assistance in developing country-specific programs. A worldwide comprehensive and coordinated control effort, such as the MPOWER program for tobacco control, however, has not been mounted. As in the area of smoking, youth are a particularly vulnerable population to focus on in combating the obesity epidemic. In developed countries worldwide, obesity is now the most common disease of childhood and adolescence.<sup>25</sup> Comprehensive and systematic health promotion and prevention efforts are needed to stem the tide of the obesity epidemic among youth.

Another important tact to addressing the emerging cardiovascular disease burden associated with the above risk factors is implementing policies and

systems to promote early diagnosis and management, that is, selected and indicated prevention. In the area of cardiovascular disease, for example, screening and management guidelines for early identification and reduction of disease progression have been widely available but have been incompletely implemented.<sup>26</sup> Secondary prevention strategies such as the use of beta blockers and angiotensin converting enzyme inhibitors for controlling hypertension, statins for cholesterol control, and glycemic agents for blood sugar control can be effective in slowing disease progression, if implemented consistently and early. Comprehensive health IT and health communication-based approaches are effective in improving the rates at which these conditions are identified and interventions are implemented and sustained.<sup>27</sup> Changes in practice patterns have markedly improved the quality of care that is rendered and reduced mortality from major cardiovascular events. Broader implementation of these guidelines on a worldwide scale holds the possibility of slowing disease progression and decreasing morbidity.

### **The Role of Information Technology**

The IT revolution has had a significant impact on research and development in health care but, with some exceptions to date, has had a less substantial impact on improving service delivery. This has particularly been the case in complex, mixed systems where both private, commercial entities and the public sector share the responsibility for providing and coordinating care. Comprehensive health IT systems are a necessary component to understanding comparative effectiveness of service delivery interventions as well as

supporting public health surveillance of emerging infectious disease pandemics and the distribution of chronic diseases within populations. Improvements in health care IT hold substantial promise for enhancing the efficiency of service delivery and helping to contain costs.

For example, in Taiwan, a relatively small developed country, a comprehensive IT approach within a national public health system that provides universal coverage has been instituted (Huang, 2009).<sup>28</sup> Each citizen receives an identification card that links directly to a database containing all historical health care information for the individual. Through government-provided hardware, each provider can access the system when interacting with patients and is only reimbursed for services when information regarding the most recent encounter has been entered into the database. Regulatory policy also mandates the reporting by providers of health care conditions and services that are being tracked at the population level (e.g., infectious diseases). The government has made extensive investments in supporting the implementation and use of the hardware and software necessary to support the system, especially in remote rural areas of the country. This system has improved access to care, improved population-based surveillance, and provided data for assessing the comparative effectiveness of service delivery approaches. These data are used in real time to monitor, inform, and shape health policy and to provide an open and transparent platform for addressing financing issues.

Major changes in technology such as the widespread use of personal computers and the proliferation of wireless networks offer opportunities for improving health communications

and disease management. Mobile networks now cover nearly 90 percent of the world's population with more than 60 percent of all mobile telephone users found in the developing world.<sup>29</sup> The development and implementation of wireless technology holds promise for improving the technological infrastructure for health care communication and provision. Mobile telephones have already been used in rural areas for collecting ongoing health information. In some cases, this has involved providing health education and monitoring the ongoing implementation of health care interventions. These preliminary proof-of-concept projects are now undergoing more rigorous testing to determine their value for improving health care outcomes. Wireless sensors that passively transmit health care data will become more widely available and used in the next decade. These sensors will allow real-time monitoring of health status through the wireless system and eventually provide the ability to conduct diagnostic and monitoring locally with direct transmission of results to health care providers.

### **Health Policy and the Future of Health Care**

Health care expenditures will continue to be a significant component of the world's economy. Whether financed through public or private funds, health care resources are a critical "public good" in any country. If invested appropriately with an eye toward creating efficiency and value, health care expenditures can improve overall productivity and contribute to the innovation necessary to address other societal problems. Focusing health care resources on the emerging chronic disease epidemic and

associated risk factors will likely produce long-term value, while we simultaneously continue to address infectious diseases and promote maternal and child health. Evidence-based approaches and personalized medicine hold substantial promise for improving the targeting and resulting outcomes from health promotion and care activities. Addressing tobacco control, obesity, and chronic disease management through health promotion and prevention strategies are essential to achieving cost containment and enhanced return on investment of health care expenditures.

The health of the world's populations and the provision of health care are obviously contextualized within the major problems currently confronting our future. Addressing these problems effectively, primarily in the areas of environment, energy, and education, will have a positive impact on overall health status. For example, a number of direct and indirect health impacts will occur as a function of climate change.<sup>30</sup> An effective response to slowing global warming could help reduce long-term health care costs. Even more importantly, our ability to solve other societal problems can reduce overall public and private expenditures, freeing up needed resources to invest in health. Improving primary education and literacy are

particular areas where social investments can help improve health status and promote economic development at the same time.

A recent framework published by the WHO<sup>31</sup> underscored a renewed interest in developing primary health care as the path forward for improving health worldwide. Significant reforms are needed to accomplish this goal, including (1) universal coverage to improve health equity, (2) leadership changes to improve the reliability of health authorities, (3) service delivery reforms to make health systems and health care delivery more people centered, and (4) public policy reforms to improve health promotion and prevention. The level of complexity of these reforms requires a whole-government approach where all relevant policies that bear on health across sectors are coordinated comprehensively. Segmenting countries based on their health care expenditures into high-expenditure health economies, rapid-growth health economies and low-expenditure, low-growth economies is an important step to understanding the policy reforms that will need to be implemented to achieve the goals of primary health care. Different realities in different countries and economies will need to be addressed within the context of global cooperation to maximize the impact of our collective efforts in the future.

## Endnotes

1. World Health Organization, *The World Health Report: Primary Health Care: Now More than Ever*, (Geneva, Switzerland: WHO, 2008).
2. World Health Organization, *World Health Statistics 2007*, [www.who.org](http://www.who.org) (Geneva, Switzerland: WHO, 2007).
3. World Health Organization, *The World Health Report: Primary Health Care: Now More than Ever*, op.cit.

4. Z.A. Bhutta, A. Belgaumi, M.A. Rab, Z. Karrar, M. Khashaba and N. Mouane, "Child Health and Survival in the Eastern Mediterranean Region," *British Medical Journal* 333 (2006): 839-842.
5. "The Maladies of Affluence," *The Economist*, August 11, 2007, 49-50.
6. World Health Organization, *The World Health Report: Primary Health Care: Now More than Ever*, op. cit.
7. W.H. Dere and T.S. Suto, "The Role of Pharmacogenetics and Pharmacogenomics in Improving Translational Medicine," *Clinical Cases in Mineral and Bone Metabolism* 6 (2009): 3-16.
8. A.K. Daly, "Pharmacogenomics of Anticoagulants: Steps toward Personal Dosage," *Genome Medicine* 1, 10. doi: 10.1186/gm10, 2009.
9. Institute of Medicine (IOM), *Knowing what Works in Health Care: A Roadmap for the Nation* (Washington, DC: The National Academies Press, 2008).
10. M. Sweet and R. Moynihan, *Improving Population Health: The Use of Systematic Reviews* (New York: Milbank Memorial Fund, 2007); World Health Organization, *The World Health Report: Primary Health Care: Now More than Ever*, op. cit.
11. Institute of Medicine (IOM), *Knowing what Works in Health Care: A Roadmap for the Nation*, op.cit.
12. D. Yu, Y. Souteyrand, M.A. Banda, J. Kaufman, and J.H. Perriens, "Investment in HIV/AIDS Programs: Does it Help Strengthen Health Systems in Developing Countries," *Globalization and Health* 4 (2008): 1-10.
13. C.K. Cheng, E.H. Lau, D.K. Ip, A.S. Yeung, L.M. Ho, and B.J. Cowling, "A Profile of the Online Dissemination of National Influenza Surveillance Data," *BMC Public Health* 9 (2009):1-7.
14. World Health Organization, *WHO Report on the Global Tobacco Epidemic, 2008: The MPOWER Package* (Geneva, Switzerland: WHO, 2008).
15. Ibid.
16. Ibid.
17. Ibid.
18. A. Newell, A. Zlot, K. Silvey and K. Ariall, "Addressing the Obesity Epidemic: A Genomics Perspective," *Preventing Chronic Disease: Public Health Research, Practice and Policy* 4, (2007): 1-6.
19. M.A. Abolfotouh, L.A. Soliman, E. Mansour, M. Fargahy, & A.A. El Dawaiaty, "Central Obesity among Adults in Egypt: Prevalence and Associated Morbidity," *Eastern Mediterranean Health Journal*, 14 (2008): 57-68; A.I. Al-Othaimeen, M. Al-Nohza, and A.K. Osman, "Obesity: An Emerging Problem in Saudi Arabia. An Analysis of Data from the National Nutrition Survey," *Eastern Mediterranean Health Journal* 13 (2007): 441-448.
20. E.A. Finkelstein, J.G. Trogon, J.W. Cohen and W.H. Dietz, "Annual Medical Spending Attributable to Obesity: Payer and service specific estimates," *Health Affairs*, 28, (2009): 808-817.
21. E.A. Finkelstein, J. G. Trogon, D.S. Brown, B.T. Allaire, P. Dellea, and S. Kamal-Bahl, "The Lifetime Medical Cost Burden of Overweight and Obesity:

- Implications for Obesity Prevention," *Obesity* 16 (2008): 1843-1848.
22. E. Finkelstein and L. Zuckerman, *The Fattening of America: How the Economy Makes Us Fat, if It Matters, and What To Do About it* (Hoboken, NJ: Wiley, 2008).
  23. A. Bauman, F. Bull, T. Chey, C.L. Craig, B.E. Ainsworth, J.F. Sallis, H.R. Bowles, M Hagstromer, M. Sjostrom, M. Pratt, & the IPS group, "The International Prevalence Study on Physical Activity: Results from 20 Countries," *International Journal of Behavioral Nutrition and Physical Activity* 6 (2009): 2-11.
  24. "Number of People Overweight or with Obesity Rivals the World's Hungry," *Global Issues* (2009), [www.globalissues.org](http://www.globalissues.org).
  25. J.J. Reilly, "Obesity in Childhood and Adolescence: Evidence based Clinical and Public Health Perspectives," *Postgraduate Medical Journal* 82, (2006): 429-437.
  26. K.A. Labresh and P.A. Tyler, "A Collaborative Model for Hospital-based Cardiovascular Secondary Prevention," *Quality Management in Health Care*, 12 (2003): 20-27.
  27. K.A. Labresh, R. Gliklich, J. Liljestrand, R. Peto and A.G. Ellrodt, "Using 'Get With The Guidelines' to Improve Cardiovascular Secondary Prevention," *Joint Commission Journal on Quality and Safety* 29 (2003): 539-550; K.A. Labresh, M.J. Reeves, M. R. Frankel, D. Albright, and L. H. Schwamm, "Hospital Treatment of Patients with Ischemic Stroke or Transient Ischemic Attack Using 'Get With The Guidelines' Program," *Archives of Internal Medicine* 168 (2008): 411-417; P.A. Heidenreich, W.R. Lewis, K.A. Labresh, L.H. Schwamm and G.C. Fonarow, "Hospital Performance Recognition with the Get With The Guidelines Program and Mortality for Acute Myocardial Infarction and Heart Failure," *American Heart Journal* 158 (2009): 546-553.
  28. K.C. Huang, "Entering the Era of Intelligent Medical Services," *Taiwan Health in the Globe* 5 (2009): 11.
  29. United Nations Department of Economic and Social Affairs Division for Public Administration and Development Management, *Compendium of ICT Applications on Electronic Government*, v 1, *Mobile Applications on Health and Learning*, New York, 2007.
  30. H. Frumkin, J. Hess, G. Luber, J. Malilay and M. McGeehin, "Climate Change: The Public Health Response," *American Journal of Public Health* 98 (2008): 534-445.
  31. World Health Organization, *The World Health Report: Primary Health Care: Now More than Ever*, *op. cit.*

