



Future Changes Driving Dietetics Workforce Supply and Demand: Future Scan 2012-2022

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EXECUTIVE SUMMARY

The dietetics profession faces many workforce challenges and opportunities to ensure that registered dietitians (RDs) and dietetic technicians, registered (DTRs) are at the forefront of health and nutrition. The profession must prepare for new public priorities, changes in population, and the restructuring of how people learn and work, as well as new advances in science and technology. In September 2010, the Dietetics Workforce Demand Task Force, in consultation with a panel of thought leaders, identified 10 change drivers that affect dietetics workforce supply and demand. This future scan report provides an overview of eight of these drivers. Two change drivers—health care reform and population risk factors/nutrition initiatives—are addressed in separate technical articles. A change matrix has been included at the end of this executive summary. The matrix contains a summary of each change driver and its expected impact and is designed to present the drivers in the context of a larger, dynamic system of change in the dietetics profession. The impact of any of these change drivers individually and collectively in a dynamic system is uncertain. The outcome of any change driver is also uncertain. The dietetics profession faces many choices within each change driver to meet the workforce challenges and seize the opportunities for leadership and growth.

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THE DIETETICS WORKFORCE Demand Study Task Force commissioned this future scan, as well as a series of technical articles to inform its workforce projections. Signature i, LLC—with assistance from Trend Spot Consulting—designed and facilitated a 1-day workshop on September 27, 2010, with 14 thought leaders offering diverse perspectives on the future of the field. Through analysis and prioritization, the thought leaders (Textbox) narrowed the possible trends and issues shaping the profession to 10 change drivers. After facilitating this session, futurists Marsha Rhea from Signature i, LLC and Craig Bettles from Trend Spot Consulting researched eight of the change drivers. This futures scan is the synthesis of a wide-ranging literature scan using futurist methodologies to

identify and analyze changes and their implications.

HOW TO READ THIS FUTURES SCAN

This futures scan has been designed to serve two purposes: to help the profession explore the future, and to support the Dietetics Workforce Demand Task Force in creating scenarios to use in modeling workforce supply and demand projections. Each change driver opens with a narrative image of the future that comes from the futures scan research and meets the standards of plausibility and probability. However, it is not intended to present a view of the expected future, but rather to demonstrate implications for workforce supply and demand.

Each section presents a Figure that contains a summary statement of that change driver, lists some of the workforce challenges and opportunities, and then closes with a statement assessing the impact on the dietetics workforce. How much of an impact each change driver will have on supply and demand is indexed as low, middle, or high. This is a subjective index that is a first step toward a quantitative estimate of the relative influence each change driver should have in modeling dietetics workforce supply and demand.

A future research directions section follows for each change driver. These short summaries explain key or provocative findings from the futures scan. Selected references are included for those who want to read more about these trends, issues, and developments.

Change Drivers Matrix

The change driver matrix (Figure 1) offers an at-a-glance view of the change drivers

and makes it easier to consider how they might interact with one another in a scenario view of workforce supply and demand.

Aging Population Drives Opportunities and Challenges

Figure 2 summarizes the dietetics workforce implications of an aging population.

The US Census Bureau has projected that the elderly population, those aged 65 years and older, will grow by >36% between 2000 and 2020. Keeping this growing population healthy and involved in and contributing to society is a key challenge for the future and an opportunity for the dietetics profession.

The “Baby Boomers”—a generation whose 65th birthday celebrations started in 2011—are the leading edge of a rapidly aging America. The Boomers are not only the largest generation to enter retirement, they are also the most educated, wealthiest, and most diverse generation to enter retirement. For both personal and financial reasons, many members of this generation will remain active in the workforce and their communities after retirement.

Keeping elderly workers engaged is also a priority for many organizations. Older workers have valuable skills and experience but are looking for more flexibility in work arrangements as they get older. This desire will lead to expansions of flex-scheduling, phased retirement, mentorship programs, and company wellness programs.

Keeping the Boomers active and involved will require better health and wellness programs. Aging dramatically increases the risk of preventable chronic diseases and disability. Much of this can be prevented with better nutrition combined with physical and mental activity.

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Change Driver	Summary	Impact	Change Index
Aging population drives opportunities and challenges	Aging of the US population will usher in widespread changes in US communities and workforce and health care systems.	An aging population will create opportunities for registered dietitians and dietetic technicians, registered in institutionalized care settings as well as in private health and wellness programs. However, replacing an aging population of dietitians and finding dietitians willing and able to serve the growing geriatric population will prove challenging.	H^a
Population and workforce diversity challenges professions to change	The dietetics profession needs to develop cross-cultural skills and knowledge of other cultures to grow in a more diverse country.	Growing diversity in the United States will drive demand for community food programs and nutrition counseling. However, dietetics practitioners are not well-placed in culturally diverse communities to seize these opportunities.	M^b
Workforce education meets job market demands	A more diverse student population seeks flexibility, convenience, and affordability in education to prepare for and maintain employability.	While many more students will need postsecondary education to get a job, they will want more assurance that dietetics education leads to immediate and sustained employment.	H
Interdisciplinary teaming drives innovation	Interdisciplinary teams will drive innovation and solve problems in all kinds of arenas where nutrition matters.	The profession will have to be assertive and opportunistic to secure positions in a world where competencies and credentials are less important than teaming and problem-solving.	H
Generalists gain edge on specialists	Dietetics practitioners can thrive as adaptable generalists if they cultivate an interdisciplinary perspective and leadership qualities that employers value.	Without career adaptability, there could be too many dietetics practitioners for declining fields and too few for emerging opportunities.	M
Technology transforms nutrition counseling	Technologies will empower customers, clients, and patients to manage their own diet.	Dietetics practitioners who can develop these technologies will be in demand. Others will need to shift to higher-value services that cannot be programmed into expert systems.	M
Personalized nutrition evolves	New personal health testing and monitoring technologies will create opportunities for dietetics practitioners.	Dietetics practitioners are well-placed for a shift to a health care system that focuses on predicting and preventing disease. However, the scientific knowledge and technical skill needed could create a split between general practitioners and those with advanced training until the technology matures.	H
Food industry transforms for public priorities	The food industry responds to public priorities to transform the current food supply chain into a more healthful, safer and more sustainable system.	Without a systematic pipeline for feeding qualified candidates into these opportunities, the dietetics profession could easily lose out to others in this job market.	L^c
Health care reform boosts access to dietetics services	Dietetics practitioners are valued members of coordinated care teams and deliver consistent nutrition therapies to people with chronic diseases.	The law creates the conditions to prove the value of dietetics practitioners in promoting health; it does not ensure that dietetics practitioners will be the only ones to provide these services.	M
Population risk factors and nutrition initiatives increase demand	Widespread chronic disease, obesity, and socioeconomic challenges make nutrition initiatives and life-course interventions a public priority.	Public support and funding for population health initiatives and prevention strategies are very uncertain. While the opportunities for dietetics practitioners to intervene across the life-course are extensive and exciting, more dietetics practitioners will need to shift into these new practice roles.	H

Figure 1. Change drivers matrix. ^aH=high; ^bM=medium; ^cL=low.

The aging of the US population will usher in widespread changes in US communities, the workforce, and the health care system.

Workforce Challenges

- Dietetics will experience an attrition rate of 2% to 5%
- Not enough RDs^a and DTRs^b are going into geriatric care
- Less than 5% of health care spending is spent on prevention

Workforce Opportunities

- Increased demand for geriatric care, especially in institutional settings
- Older career changers may consider nutrition careers
- Businesses offering wellness programs for senior workers

Workforce Impact

An aging population will create opportunities for RDs and DTRs in institutionalized care settings as well as in private health and wellness programs. However, replacing an aging population of dietitians and finding dietitians willing and able to serve the growing geriatric population will prove challenging.

Change Index: High

Figure 2. Aging population implications. ^aRD=registered dietitian; DTR=dietetic technician, registered.

The growth of Boomers, combined with the need to keep them active and involved, will create opportunities for a range of geriatric care specialties focused on prevention.

Future Directions Research

The Aging of America. The aging of America is rapidly forcing industries across the country to develop new ways to keep older Americans in good health as they volunteer in the community and are involved in the workforce. The US Census Bureau projects that the elderly population, those aged 65 years and older, will grow by an estimated 120% by 2050. The majority of those individuals will be interested in leaving the workforce or altering their work lives, prompting organizations across the country to develop new ways to keep talented and knowledgeable older workers on their payrolls (1). The problem is most acute in the health professions, where a rapidly aging workforce is encountering increased demand from an aging population. In the dietetics profession, based on historical workforce data, dietetics expects to experience a rate of attrition (dietetics practitioners who leave the workforce for reasons of emigration, extended leave, retirement, or death) of 2% to 5%, which will have an impact on supply (2). Some of the methods used by businesses to keep older Americans engaged in the workforce include flex-scheduling, phased retirement, tailored benefit packages, mentorship programs, support services for elderly workers, and wellness programs (2).

The “New Older” American. Greater resources and higher educational attainment throughout their lifetimes will likely mean that retiring Baby Boomers will be in better overall health, will work or volunteer in their communities longer, and will demand better geriatric care in their retirement. In 2011, the first of the Baby Boomers (those born be-

tween 1946 and 1964) will turn 65 and begin to leave the workforce. The Baby Boomers, particularly those born earlier, were the most educated generation in American history. According to Census Bureau data, 43% of men and 40% of women aged 55 to 64 years have attained some type of college degree. Correspondingly, the Baby Boomers are also one of the wealthiest generations to enter retirement. However, Baby Boomers also have a smaller pool of potential family caregivers than current older people because of smaller family sizes and higher divorce rates (3).

The Needs of the “Oldest Old.” Greater longevity because of better nutrition, safety, and medical care means that the “oldest old”—those aged 85 years and older—have become the fastest growing cohort among age groups. According to Census Bureau projections, the population of this group is expected to grow by 377% by the year 2050. These individuals are the most frequent per-capita users of health care services. They often suffer from multiple chronic diseases and receive aggressive end-of-life care (4-6).

Healthy Aging. Keeping the growing generation of elderly people healthy and involved is vital to adapting to the aging of America. Older people are at higher risk for a variety of preventable chronic health problems, including certain types of cancer, cardiovascular disease, diabetes, and osteoporosis. According to research published in the *New England Journal of Medicine*, almost 75% of elderly people have at least one chronic illness, and roughly 50% have at least two chronic illnesses. Even more alarming is the rise in disability. Recent research conducted by The Rand Corporation shows substantial increases in disability among those aged 50 to 64 years. Increases in the disability of the population will likely lead to higher levels of unemployment, underem-

ployment, and need for home care in the future (7).

Registered dietitians (RDs) can play a vital role in preventing chronic disease and disability in elderly patients and clients by providing good nutrition counseling as part of a comprehensive health and wellness program. Such programs, focused on improving diet and increasing mental and physical activity, can greatly lower the incidence of chronic disease and disability. Unfortunately, the US health care system is primarily focused on treating disease rather than preventing it. The Centers for Disease Control and Prevention estimates that 75% of the nation’s health care spending—approximately \$5,300 per person in the United States each year—is spent on chronic disease. Only approximately 3% is spent on public health and primary prevention activities, compared with approximately 84% allocated to some form of care from physician services to hospital care to prescription drugs, according to the Kaiser Family Foundation (8).

Population and Workforce Diversity Challenges Profession to Change

Figure 3 summarizes the dietetics workforce implications of population and workforce diversity.

Global migration is reshaping the future of America. High rates of immigration during the last 20 years have led to vibrant immigrant communities across the United States. Although the bleak US job market has slowed down immigration in the last 2 years, these communities remain some of the fastest growing in the United States, and children of recent immigrants are the fastest growing segment of the US population.

However, many of these growing communities suffer from poor health related to diet, exercise, and social and environmental conditions. These groups need programs that target behavior change in schools, universities, and community centers. Good government- and foundation-sponsored programs that target these points of interaction exist, but their reach is limited. Many of these programs, particularly school and college foodservice and food programs, need to be overhauled to improve nutrition and provide more nutrition counseling to improve eating habits.

Creating meaningful change in communities of color requires a high level of cultural competence. Meals are a chance for family and friends to come together, share stories, and build bonds of identity and meaning, and every community has its own cultural approaches to food and nutrition. Professions that wish to make a meaningful impact in culturally diverse communities will need to embrace diversity at all levels (including racial, ethnic, and sex). For many professions, this will require improving cultural competency, raising awareness, and actively recruiting new members from these communities.



Figure 3. Population and workforce diversity implications.

Future Directions Research

America Becoming More Diverse. The US Census Bureau forecasts that by 2050, minority populations will outnumber non-Hispanic whites because of a combination of population growth and immigration. The Urban Institute observes that children in immigrant families (87% of whom are US citizens) are the fastest growing segment of the nation's youth population. An analysis of black and Hispanic households performed by the US Department of Agriculture between 1999 and 2005 showed that these households experienced food insecurity at far higher rates than the national average and food insecurity impacts children in these households the hardest. Hunger is linked to decreased school performance and behavioral problems. These problems can persist later in life, leading to decreased economic production and a lower quality of life. Community- and school-based food programs, which are an important area of growth for RDs, are a vital component of health and nutrition in underserved communities, especially in culturally diverse communities (9).

Inequity and Impact of the Obesity Epidemic. Obesity is growing across the United States, but it is impacting communities of color the hardest. The Brookings Institute recently estimated that obesity cost the US economy >\$215 billion annually in premature death, medical costs, and lost productivity. Even more alarming is the growing trend of obesity among children. The number of adolescents who are overweight has tripled since 1980 and is disproportionately impacting communities of color. According to the US Department of Health and Human Services,

roughly 16% of all adolescents aged 6 to 19 years are overweight, compared to 22% of Mexican-American children and 20% of African-American children (10).

Community Assistance Nutrition Programs Vital. The prolonged economic recession has increased the importance of nutrition assistance programs administered by the federal government. The Supplemental Nutrition Assistance Program, also known as the Food Stamp Program, now serves more than 1 in 8 Americans. In 2008, according to the Food and Nutrition Service, the number of people eligible for, and the number of participants in, the Supplemental Nutrition Assistance Program increased by 5% and 7%, respectively. Increases in participation rates have been driven by increased outreach to low-income families and engagement of community partners by state agencies. Unfortunately, many of these outreach programs are endangered by recent state budget shortfalls and the end of federal economic stimulus funds (11-13).

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides supplemental foods, nutrition education, and health care referrals to low-income women, infants, and children up to 5 years of age who are at nutritional risk. The WIC program has experienced considerable growth in participation: In 2010, according to the Food and Nutrition Service, the average monthly participation in the WIC program comprised 9.1 million individuals. Like the Supplemental Nutrition Assistance Program, the WIC program is vulnerable to budget reductions as the federal fiscal

year 2012 and future year's budgets are debated in the US Congress (11-13).

There has also been growth in the need for the National School Lunch Program, the National School Breakfast Program, and other food programs for children. National School Lunch Program provides one third of the energy a child needs during the day and, according to the US Department of Agriculture, is often the most nutritious meal of the day for the 19 million children who receive free or reduced-price lunches. Both the participation rate of the program and the number of children receiving free lunches have increased steadily in the last decade, particularly among minority students (11-13).

Dietetics Practitioner Diversity Gap.

The growing diversity of the nation is not matched by diversity in the dietetics profession and this can affect quality of care. Recent data obtained by Readex Research estimate that 84% of RDs and 81% of DTRs are non-Hispanic white, compared with 74% of the entire US population. There is also a considerable sex gap in the profession. Within the profession, 96% of RDs and 95% of DTRs are women. Population diversity at the student level largely mirrors the larger body of the profession, with slight increases in Hispanic students (2). Numerous studies have shown a correlation between increased diversity and quality of care in culturally diverse communities.

Workforce Education Meets Job Market Demands

Figure 4 summarizes the dietetics workforce implications of workforce education.

More diverse and older students are more likely to opt for professional and career education that fast-tracks them into employment. Institutions and alternative education providers that can meet the needs of these nontraditional students are thriving. They are using online education and creative scheduling to make learning more convenient and flexible.

Continuing education now supports people as they pursue serial careers. "Earn while you learn" takes on new meaning, as most people will have to study for their next occupation even as they pursue their current career. Companies that can provide diverse, cutting-edge training will have a strong recruiting advantage over competitors that offer fewer opportunities to improve their workers' skills and knowledge.

In the health care professions, students are migrating to either 2-year programs or advanced degrees to prepare for employment opportunities. Interprofessional learning is gaining momentum as institutions change to educate health care professions to work as a team. Students in many fields are interested in interdisciplinary learning to improve their employ-

A more diverse student population seeks flexibility, convenience, and affordability in education to prepare for and maintain employability.

Workforce Challenges

- Dietetics education may have low visibility as an option for the growing number of nontraditional students
- Dietetics education will have to meet student demand for flexibility and outcomes
- Professional preparation and continuing education need to be more seamless and adaptable

Workforce Opportunities

- Interprofessional learning could expand the number of dietetics and nutrition specialists
- Health care career opportunities are growing and are perceived as more secure

Workforce Impact

While many more students will need postsecondary education to get a job, they will want more assurance that dietetics education leads to immediate and sustained employment.

Change Index: High

Figure 4. Workforce education implications.

ability in a fast-changing, team-oriented world.

Colleges and universities are adjusting to new standards and measures for outcomes assessment. Accountability for results comes through accreditation, student financial aid requirements, and third-party rating sources. After a decade of public and personal austerity and job insecurity, students will demand a proven return on their financial investment in postsecondary education.

Future Directions Research

Older and More Diverse Student Population. In 2007, the percentage of American college students who were minorities was 32%. The National Center for Education Statistics estimates that by 2020, the resident population will be 64% non-Hispanic white, 13% black, 17% Hispanic, and <6% Asian/Pacific Islanders. By 2050, the US Census Bureau says <53% will be non-Hispanic white; 16% will be black; 23% will be Hispanic origin; 10% will be Asian and Pacific Islander; and about 1% will be American Indian, Eskimo, and Aleut (14,15).

A Chronicle Research Service survey of college and universities found only approximately half of the 121 responding institutions believe that in 2020 their enrollments will be primarily made up of traditional-age, full-time students. The enrollment of nontraditional-age students in postsecondary education in 2007-2008 (the last data available at the time of publication) was 19.1% students between the ages of 25 and 39 years and 4.7% students between 40 and 64 years (16). Student population trends indicate an increasing number of low-income high school graduates who will need financial assistance or have to combine college education with employment (17).

College Affordability Critical to Students. Any workforce initiative to entice more students into a particular career must factor in what it could cost to secure education for that field. According to the College Board, most undergraduates enroll at institutions where tuition and fees are relatively low. Of all degree-seeking undergraduates in the academic year 2008-2009, more than 41% are seeking associate degrees in public community colleges, where tuition and fees averaged \$2,713 in the 2010-2011 academic year. An additional 36% are enrolled at in-state, public, 4-year institutions, where tuition and fees averaged \$7,605 in 2010-2011. On average, full-time students who enrolled in public 4-year colleges and universities received approximately \$6,100 and students in 2-year public colleges received \$3,400 in grants from all sources and tax benefits in 2010-2011 (18).

Rapid Growth of Online Education. In 2007, roughly 1 million students in grades 9 through 12 were enrolled in online courses—a number 22 times greater than in 2000, but still representing only approximately 1% percent of all education courses nationally. Christensen and Horn (19) suggest that in approximately 6 years, 10% of all courses will be computer-based, and by 2019, approximately 50% of courses will be delivered online. The shift to online education is growing not only in the formal education system, but also in professional development and continuing education required for certification. Approximately 1.8 million students are enrolled in degree and certificate programs in for-profit colleges that rely extensively on online learning (19).

Students Want à la Carte Convenience. More students will attend classes online,

study part-time, take courses from multiple universities, and stop and start their college education. Students will demand more options for taking courses to make it easier for them to do what they want when they want to do it (17).

Bifurcation of Health Care Professions. Analysis of National Center for Education Statistics and American Medical Association data show a small increase in associates of the arts degrees for allied health professions and a large increase in master- and doctoral-level degrees. This bifurcation may be occurring because the job market favors specialized skills at lower costs, while the professions seek more advanced degrees to boost salaries and prestige. Collier found that advanced degrees do not deter student interest in a health professions career (20).

Transformative Learning for Health Care. The Commission on Education of Health Professionals for the 21st Century calls for a new century of transformative professional education involving three fundamental shifts, that is, from seeking professional credentials to seeking core competencies for effective teamwork in health systems; from institutions adopting their own educational models to creative adaptation of global resources to address local priorities; and from isolated to collaborative education and health systems throughout the world. The Commission on Education of Health Professionals for the 21st Century proposes these core competencies for all health professions: patient-centered care, interdisciplinary teams, evidence-based practice, continuous quality improvement, use of new informatics, and integration of public health.

In fact, the Commission on Education of Health Professionals for the 21st Century posits that these core competencies can become objective criteria for reclassifying the role and scope of health professionals. Instruction should be reformed to promote interprofessional and transprofessional education that breaks down silos and enhances collaborative learning and teaming. Educational institutions should exploit the power of information technology for instruction reform, faculty development, and access to global resources through networks, alliances, and consortia (21).

Incorporating team-based learning across the disciplines into education for health professions has long been viewed as desirable, although widespread implementation has not become a reality (22). The Institute of Medicine in 2009 called for redesigning continuing education for the health professions to bring health professionals from different disciplines together in carefully tailored learning environments. This change would align learning with team-based health care de-

Interdisciplinary teams will drive innovation and solve problems in all kinds of arenas where nutrition matters.

Workforce Challenges

- Emotional intelligence and leadership are as critical as intellect and technical skills
- Registered dietitians will have to shed self-limiting views of their identity to seize new opportunities
- Work scopes and core competencies will be blurred and redefined

Workforce Opportunities

- Nutrition is central to health and critical to solving many health-related challenges
- Registered dietitians can assume new roles as team leaders and coordinators
- Teaming could bring together the three primary sectors of dietetics: clinical, health promotion/prevention, and food production and foodservice

Workforce Impact

The profession will have to be assertive and opportunistic to secure positions in a world where competencies and credentials are less important than teaming and problem-solving.

Change Index: High

Figure 5. Interdisciplinary team implications.

livery. Continuing professional development would stretch beyond the classroom to the point of care (23).

Outcomes Assessment and Accountability. Assessment of learning outcomes provides external accountability and fosters internal efforts to improve. Accreditation agencies, certification organizations, and licensing boards spur most assessment of learning outcomes now, although the federal government is taking a greater interest as its financial role in higher education increases. Some students may use third-party assessments in choosing a school, but other factors like accessibility and cost are more important to students (24).

Interdisciplinary Teaming Drives Innovation

Figure 5 summarizes the dietetics workforce implications of interdisciplinary teaming.

The innovators in health care, science, business, and government programs are using interdisciplinary teams to manage complexity and solve tough challenges. Dietetics practitioners will have many more opportunities to have their knowledge and skills become part of the solution in health care, public health, research, and industry.

Many professions will find it increasingly difficult to draw hard lines around their work scope and competencies to exclude others. Instead, they will be asked to accept a more fluid and collaborative environment that relies on and rewards successful teaming.

Health care is reorganizing around the concept of high-functioning teams to address problems. The medical home and chronic care models depend on coordinated care teams. Health promotion and prevention initiatives rely on interdisci-

plinary strategies to create healthy communities and individuals.

Interdisciplinary teams are essential to scientific research and product development. Corporations are trading their cross-functional teams for more ad-hoc connections to expertise inside and outside their enterprise that can swarm to problems, solve them, and quickly disband.

Dietetics practitioners with sufficient interdisciplinary literacy and leadership skills are joining and leading teams where nutrition plays an integral role. They are on the frontlines of chronic-disease management. They are helping food research and development teams reformulate more healthful products and are planning efforts to organize communities for active living and healthful eating.

Future Directions Research

Team-Based Care Vital in Complex Situations. Teams already dominate actual practice in increasingly complex health settings. A study in 12 Pennsylvania hospitals found that a multidisciplinary team could get results similar to those of specially trained physicians for patients in intensive care units. The researchers speculated this outcome is possible because multidisciplinary teams facilitate the implementation of best practices, including the application of evidence-based treatments, potentially adverse drug indications identified by pharmacists, and application of respiratory therapy and nurse-driven protocols to reduce ventilation time and shorten the length of intensive care unit stay (25).

Medical Homes Coordinate Patient-Centered Care. The health care reform law includes a number of provisions promoting the use of “patient-centered med-

ical homes,” a concept strongly endorsed by the Institute of Medicine and several physician groups. A medical home coordinates “caring and continuous healing relationships centered around patient needs and values.” Medical homes will dramatically improve care for people with one or more chronic diseases and are an important element in a related care model called the “chronic care model.” Under these approaches, each patient has an ongoing relationship with a personal physician who leads a team of patient care providers responsible for providing all the patient’s health care needs and, when necessary, arranging for appropriate care with other qualified physicians. Nutrition therapy and counseling could be an important aspect of the medical home and chronic care models (26).

The US Department of Veterans Affairs (VA) is undertaking a transformation to have at least 80% of its clinics using the medical home model by 2012. Among the core features of the VA transformation are team-based care that emphasizes continuity; a bigger role for nurses in coordinating care; e-mail, secure messaging, and other alternative forms of contact with patients; and more attention on behavioral health issues. The VA follows several smaller-scale efforts by systems such as Kaiser Permanente and Group Health Cooperative. The VA’s nationwide experiment is viewed as a critical test of how to adapt the concept in diverse settings. RDs are expected to have a key role on these teams (27).

The Centers for Medicare and Medicaid (CMS) has established a new innovation center to provide a seamless care experience, better health, and lower costs. CMS is undertaking demonstration projects of the medical home concept for primary care in eight states, an initiative to provide more coordination of care in health clinics, and a new state plan option that coordinates care for patients with at least two chronic conditions (28).

Accountable Care Organizations Represent Another Reform Innovation. Under the health care reform law, CMS will authorize accountable care organizations in 2012. Accountable care organizations are networks of physicians and other providers who work together to improve the quality of health care services and reduce costs for a defined patient population. Although reimbursement will still be managed on a fee-for-service basis, accountable care organizations will receive part of any savings as an incentive to deliver integrated care. Kaiser Permanente, Mayo Clinic, and the Cleveland Clinic are trailblazers in accountable care. CMS hopes to expand the concept beyond hospitals to physician networks (29).

Task Competencies Blur Roles and Scopes. The Commission on Education of Health Professionals for the 21st Century observed that “the walls between task competencies for different professions are porous, allowing for task shifting and task sharing to produce practical health outputs that would not be possible with sealed competencies.” Health care professional education needs to do a better job in both team-based learning and interprofessional education. Team-based learning is an instructional approach aimed at preparing students for effective, collaborative work within a cohesive group. Interprofessional education involves students of two or more professions learning together—especially about each other’s roles—by interacting with each other within a common educational agenda (21).

Community-Based Health Requires Collaborative Teams. Engaging the community to change health behaviors requires collaboration with health departments, employers, community leaders, and medical care providers. This team can include nonphysician clinicians—including dietetics practitioners, pharmacists, social workers, case workers, and occupational or physical therapists—to help patients focus on exercise and healthful eating habits beyond the clinical setting. Potential care for people with chronic diseases could include reimbursed group visits, patient-directed self-management teaching, case management, and educational home visits (30).

RDs Contribute to Interdisciplinary Research. Major health issues and scientific challenges often require interdisciplinary teams. The National Institutes of Health has an interdisciplinary research program as part of its current roadmap to build bridges between the biological sciences and the behavioral and social sciences. Three of the new multidisciplinary research programs—at the University of North Carolina at Chapel Hill, the University of Texas Southwestern Medical Center in Dallas, and the University of Washington—are bringing together investigators to address the nation’s obesity epidemic. These research efforts span nutrition, biomedicine, genetics, psychology, epidemiology, health behavior, public health, urban planning, economics, and public policy (31).

In clinical care, nutrition clinical scientists and RDs with research training can lead and play a key role in these teams and help accelerate knowledge translation and transfer to practice. These interdisciplinary research teams are also working in the food and pharmaceutical industries. RDs play an important role in reviewing and translating the science for policy and marketing purposes. By participating in these research teams, RDs contribute their expertise, and develop the knowledge to ensure nutrition has a recognized role in creating and maintaining health

Registered dietitians (RDs) can thrive as adaptable generalists if they cultivate the interdisciplinary perspective and leadership qualities future employers will value.

Workforce Challenges

- Most health care professions are developing advanced and specialty practice
- Career mobility requires continuing education and training as well as personal risk-taking and openness to new opportunities
- Business and leadership knowledge and skills may not be a priority in academic preparation

Workforce Opportunities

- RDs can migrate with health care out of the clinical setting
- RDs may be a step ahead in adopting the skills to lead interdisciplinary teams
- Management opportunities offer better compensation and career growth

Workforce Impact

Without career adaptability, there could be too many RDs for declining fields and too few for emerging opportunities.

Change Index: Medium

Figure 6. Generalist and specialist career path implications.

(32). Although doctoral-level researchers and scientists are currently more likely to participate in these interdisciplinary research teams, all dietetics practitioners have the potential to make important contributions to this continuous flow of learning between research and practice.

Swarming Teams for Chaotic Environments. Gartner says that by 2020, a new form of teaming, called “swarming” will help organizations adapt to work that is less routine and characterized by increased volatility and hyperconnectedness. Gartner defines swarming as “a work style characterized by a flurry of collective activity by anyone and everyone conceivably available and able to add value. Swarms form quickly, attacking a problem or opportunity and then quickly dissipating. Swarming is an agile response to an observed increase in ad-hoc action requirements, as ad-hoc activities continue to displace structured, bureaucratic situations.” For example, in the future, dietetics practitioners might be part of swarms of experts targeting specific public health challenges or trying to improve a hospital’s outcomes for a particular patient segment or innovating on a new product line for the food industry. Individuals in a swarm may only know one another through weak links. People will navigate their personal, professional, and social networks to survive and exploit swarms for business benefit. Hyperconnectedness will lead to a push for more work to occur in both formal and informal relationships across enterprise boundaries (33).

Generalists Gain an Edge on Specialists

Figure 6 summarizes the dietetics workforce implications of generalist and specialist career paths.

Career security and growth depends most on continued learning and a willingness to help organizations adapt and change. New entrants to the dietetics profession will need to be broadly educated for careers that will morph many times to meet new demands for food and nutrition expertise.

Employers of all types want to hire potential leaders who can innovate, solve problems, and organize diverse individuals into results-oriented teams. People with a career portfolio of different work experiences and project knowledge are more attractive candidates to prospective employers than those who have followed a defined career pathway. With old roles and boundary lines blurring in every field, organizations need people who have proven they can learn deeply and quickly and become specialists and change agents for the moment in the latest opportunity.

Core knowledge and skills are still necessary to enter the dietetics profession. RDs with the business acumen to develop and improve programs and services and lead teams of people are the ones who ascend the career ladder. They serve in executive and director positions and assume major responsibility for the success of their organizations.

A small number of specialists do thrive as on-call experts and researchers. They deliver their advanced knowledge to other practitioners and organizations through such channels as consultancies, centers of excellence, expert systems, and telemedicine.

Future Directions Research

Experience and Increased Responsibility Valued More than Specialization. The Academy illustrates dietetics education and career progression in its career development “double helix” diagram guide (34) as moving through stages from novice to beginner, competent, proficient,

advanced practice, and expert. This double helix diagram affirms that as dietetics practitioners gain knowledge and skills, they advance in their career. The Academy's compensation data suggest that pursuing a focus area as a specialization is not a proven path to financial success. Specialization is not common among RDs and is rarely rewarded by increased compensation. In 2009, only 19% of RDs specialized in focus areas. Only a few of those employed in these focus areas earned substantially more than a general practitioner. For example, a clinical RD specializing in cardiac nutrition earned \$21.11/h, less than the generalist clinical RD who earned \$21.75/h. RDs specializing in oncology did only slightly better at \$21.91/h. The best-paid focus area was the pediatric/neonatal RD at \$22.85/h. However, the best-paid RD was a generalist working as an outpatient RD at \$23.72/h (2).

As with most professions, the most highly paid RDs are executives and directors managing large budgets and supervising many employees. Wages are trending upward for RDs with a professional focus in weight management, diabetes, and pediatrics. However, the greatest wage growth is in research, sales, and public relations and marketing; the latter two occupations are likely generalists in dietetics who have honed very specialized business skills through practice (2).

Uncertain Value of Advanced Degrees.

Advanced degrees or training in other health care professions appear to expand graduates' job scope or functions beyond that of entry-level professionals and increase their level of practice autonomy. Advanced practice nurses earn higher salaries than registered nurses. However, RDs who completed entry-level or postprofessional masters' degrees did not report greater marketability for more positions. Health care professionals with advanced degrees tend to have higher self-esteem and attain a higher profile within the profession as writers, researchers, and leaders (35).

Employers Value Generalist Skills.

Workforce skills surveys routinely report that employers want a variety of basic skills, such as reading and writing, critical thinking, problem-solving, teamwork, professionalism, and leadership. Employers are adding emerging priorities to their wish list, such as innovation and creativity, cultural competency, and digital literacy (36,37). The Commission on Dietetic Registration has conducted employer surveys that also attest to a preference for professionalism, management, and leadership skills.

Broad Education Increases Career Flexibility.

Career counselors advise young people to become broadly educated and versatile to keep their career options open in a fast-changing world. Workforce projections are unreliable; tomorrow's high-demand occupations can quickly become

oversupplied or out of date. The most useful skill is to know how to learn for the multiple careers people are likely to have in a lifetime. The more broadly educated people are, the more options they will have when it comes to choosing and changing careers. The best career strategy is to choose employers who offer substantial education benefits and professional development (38).

Multidisciplinary and Multidimensional Jobs Grow.

Some employers search for people with hybrid careers who have combined the expertise of two distinct careers to address new challenges. They provide a multidisciplinary outlook in such fields as consulting, technology development, and research and development (39). Winterfeldt and colleagues (40) sum up future demand for multidisciplinary knowledge in dietetics nicely as follows:

Dietetic jobs will evolve from being narrowly defined and task-oriented to more multidisciplinary and multidimensional roles; nothing will be permanent Members of the profession will have to bring a generalist mindset to the practice area. Job flexibility will be a reality as professionals move in and out of careers and organizations many times throughout their lives.

[Dietetics is a] generalist profession with the capability of easily moving into multidisciplinary and multifunctional careers The new healthcare environment will see dietetic professionals managing multiple departments or providing transdisciplinary health services, in which nutrition is only part of the practice role. In the future, it will not be uncommon to see food and nutrition experts earn dual degrees in medicine, pharmacy, nursing, physical therapy, law or hotel and restaurant management.

Change Agent Skills for Health Systems.

Commission on Education of Health Professionals for the 21st Century recommends health professionals strive to acquire competencies and undertake functions beyond their purely technical tasks—such as teamwork, ethical conduct, critical analysis, coping with uncertainty, scientific inquiry, anticipating and planning for the future, and most importantly leadership of effective health systems. The commission advocates for transformative learning that develops leadership attributes and produces “enlightened change agents” who can address local challenges and innovate with their colleagues and communities to achieve health and well-being (21).

Technology Transforms Nutrition Counseling

Figure 7 summarizes the dietetics workforce implications of technology transformations.

A radically different landscape for the delivery of nutrition information and counseling is technologically feasible in fewer than 10 years.

The technology will exist to wirelessly capture nutrition and physical activity data in health records contained on smartphones. Customers at restaurants could electronically access a full range of nutrition information, and food products could contain radiofrequency identification tags that can be easily scanned to input nutrition information. Unobtrusive armbands will be available to capture daily activity and energy expenditures and customers will have access to software that uses expert systems to help them develop and adhere to their own health and nutrition goals.

What is not clear is whether people will embrace these new technologies, abandon privacy concerns to gain these benefits, or adopt the lifestyle changes they will encourage.

Researchers will also be able to aggregate health data to develop nutrition information and recommendations for entire communities. To address privacy concerns, nutrition data collected by customers from their wireless devices could be stripped of any personal identifiers and combined with health data from personal health records. The results could be linked to changes in public policy or the physical environment, such as the addition of new bike lanes in a community.

New methods of delivery, from social media to virtual worlds, will allow health care providers to reach and interact with patients in different cities or even countries. Health providers will interact with patients on multiple levels, from simple “tweets” to online videos.

Future Directions Research

Future Role of Health and Nutrition Information.

Proactive patients are currently using the Internet to access information about health and nutrition and using that information to make better decisions about their health. Missing from this vast array of Web resources are expert systems that deliver health information directly to patients when and where they need it—but this is changing. Software companies are working on new tools designed to capture real-time information and refining it based on the profiles of individual users. These systems could easily merge with existing expert systems that mimic expert knowledge and judgment, creating systems that bridge the health knowledge and literacy gap between patients and health care providers. Increasingly, this information will be available at a moment's notice on the In-

Technologies will empower customers, clients, and patients to manage their own diet.

Workforce Challenges

- Improved automation and delivery of nutrition information will provide competition for low-value services
- New software could provide a low-cost, personalized way to deliver nutrition counseling
- New technologies will require continuous learning
- Fragmentation of the health care system will delay the deployment of new technologies

Workforce Opportunities

- Demand for nutrition information in food systems will increase
- Expert systems can improve patient care and free time for dietitians to provide higher-value services
- Virtual worlds will provide more avenues to reach and influence patients
- Advanced modeling and simulation technology will allow greater personalization of diet plans

Workforce Impact

Dietetics practitioners who can develop these technologies, and the nutrition information that supports them, will be in demand. Others will need to shift to higher-value services that cannot be easily replicated by expert systems.

Change Index: Medium

Figure 7. Technology transformations implications.

ternet and on mobile devices like smartphones (41,42).

The Evolution of a Virtual Nutrition Coach. One deterrent to using online tools for tracking nutrition and physical activity is that they rely heavily on users to input data. These systems appeal to highly motivated users, such as professional athletes or those suffering severe health problems. However, studies of average users have shown poor adherence and not much linkage between the use of the tools and changes in physical activity or diet.

That outcome may change as physical hyperlinks make it easier for anyone to capture real-time information in any eating situation (43). For example, a smartphone could use global positioning systems, a type of physical hyperlink, to access nutritional information on menu items when a customer steps into a store. When the customer makes a purchase, the phone could automatically track the nutritional value of purchased items using credit card data. Consumers could then run applications on their smartphones to track this information in comparison with personal health goals.

Eventually, a virtual nutrition coach that provides real-time nutrition counseling could emerge. The coach would draw on the patient's health information as well as nutrition information about foods consumed—all accessed through physical hyperlinks. Expert systems inside the virtual nutrition coach would mimic the knowledge base of health care providers

to provide nutrition counseling and life coaching.

Government Support for Informatics. Many experts are counting on the broader implementation of informatics to reduce medical errors, reduce health expenses, and improve food safety and nutrition. The 2009 American Recovery and Reinvestment Act included \$30 billion in funding and incentives to encourage the adoption of health information systems. The food safety bill that was signed into law by President Obama in January 2011 beefs up regulations for food safety, provides more funding for enforcement, and speedier surveillance of potential outbreaks. Improved informatics systems for food producers and regulators will be needed to meet many of the food safety and record-keeping requirements established in the bill (44).

Informatics can also be used in public health to detect and intervene to create healthy communities. One of the immediate goals of the government is to develop an interoperable national health information infrastructure. Information captured from patients could then be used to conduct long-range outcomes research on patients from the community level to the national level (45). In the future, information on diet, exercise, and health from personal and home health monitoring will be included in these records. (More information on health monitoring is presented in the section of this article about the evolution of personalized nutrition). RDs could use this information to evaluate

the impact of new public health policies and changes in the physical environment of a community.

Delivering Care through Virtual Worlds and Social Media. Virtual worlds and social media may soon become another avenue in which dietetics practitioners interact and provide nutrition counseling to patients. Currently, virtual worlds such as Second Life are mostly used for entertainment, but some large companies have begun to invest time and money in utilizing virtual worlds in how they conduct business. For example, IBM (Armonk, NY) is heavily invested in such programs, putting more than \$10 million into virtual worlds to reach customers and even conduct virtual meetings. Virtual worlds are just one part of a larger expansion of social media that can be used to reach customers and encourage behavior change. Leading businesses and health care providers are using online Web portals to set up visits and track data. Video visits and online chats can be captured and recorded for future reference. Instant messaging or tweets can be used to give reminders about healthful eating. Patients can join patient groups that provide knowledge, support, and encouragement for participants. All of these tools help provide a web of support to improve health and encourage behavior change (46).

Personalized Nutrition Evolves

Figure 8 summarizes the dietetics workforce implications of personalized nutrition.

Advances in science and technology are transforming health care from a system focused on the treatment of disease to a system that stresses prediction and prevention. Nutrition counseling will be a key component of this shift, opening new opportunities for dietetics practitioners. RDs with expertise in preventing life-threatening genetic metabolic disorders through nutrition intervention and counseling will lead the way.

The human genome project has opened up new fields of medicine devoted to predicting and preventing disease. However, this progress is likely just the early stages in a long discovery process, as researchers continue to explore the molecular pathways inside the cell. Researchers are also developing a more holistic understanding of biological systems through the field of systems biology that should lead to more effective tests and treatments for disease.

Patients and health care providers will also have the ability to monitor health both in the home and in the community. There are already wireless devices, placed in the home, that are able to track weight loss, energy expenditure, and a wide range of molecules in the blood, such as blood sugar. Future devices will be able to wirelessly monitor a wider range of health indicators and track this information in a personal health record.

New personal health testing and monitoring technologies will create opportunities for dietetics practitioners.

Workforce Challenges

- New testing and monitoring technologies will demand specialized knowledge and/or experience
- Reimbursement will lag behind the adoption of new technology
- Outcomes research will determine relative value of dietetics practitioners services

Workforce Opportunities

- Early testing will identify the best candidates for nutrition intervention and counseling, thereby expanding reimbursement for these services
- Better outcomes research will shift funds to prevention rather than treatment, creating more demand for nutrition counseling and intervention
- Opportunities for dietetics practitioners will appear first in sports nutrition and geriatric care.

Workforce Impact

Dietitians are well-placed for a shift to a health care system that focuses on predicting and preventing disease. However, the scientific knowledge and technical skill needed could create a split between general practitioners and those with advanced training until the technology matures.

Change Index: High

Figure 8. Personalized nutrition implications.

Wireless home and community monitoring, combined with privacy protections, will build a strong scientific base for conducting outcomes research. Better outcomes data should shift the focus of health care reimbursement to prevention, including lifestyle and nutrition counseling.

Future Directions Research

Emerging Health Monitoring Technology. New health monitoring technologies will improve outcomes research and could illuminate the value of preventive care and nutrition counseling, opening up reimbursement for these services. A number of technologies for monitoring health from sophisticated blood glucose monitors to the humble bathroom scale already exist in the home. Technology developers are using recent advances in wireless networking and computing power to create newer, smarter versions of these old devices. They are also expanding the ability to collect health data with new devices such as floors that monitor for falls, mattress pads that monitor sleep patterns, and air monitors that check for pollutants, among many others.

Health-monitoring technology will likely move slowly into specific populations at high risk for expensive diet- and lifestyle-related illnesses mainly due to the limitations of current health-monitoring technology. First, many of these technologies are new and expensive. Second, collecting and monitoring the data requires a large time commitment from both the patient and the health provider. Third, there are legitimate concerns about data privacy. Technology developers are well aware of these concerns and are

working to develop solutions, such as technology that is easier to use, better protocols, and data security and collection programs that automatically use the data to spot concerning health problems (47).

Evolution of Genomics in Dietetics. In the near future, it will be commonplace for patients to be fully screened for a range of genetic disorders, creating new demand for advanced practice RDs. Advances in genetic testing have led to the early diagnosis of numerous nutrition-related disorders, creating a unique and rapidly growing group of advanced practice RDs. These RDs use genetic testing, usually of newborns, to identify serious genetic metabolic disorders, such as phenylketonuria. Early testing combined with nutrition intervention and counseling can prevent serious, debilitating, and life-threatening disability. However, several hundred genetic metabolic disorders remain for which screening tests do not currently exist. Testing for these disorders is likely to expand as the price of genome sequencing falls. Cheaper sequencing will lead to a wider range of testing for genetic disorders and a broader range of knowledge that can be used to develop new tests and therapies (48).

New Opportunities Created by Systems Biology. Systems biology will create new opportunities for dietetics practitioners. Systems biology is an emerging field that draws heavily on the advances of computer technology and what are loosely termed the *-omic* sciences, such as genomics, proteomics, transcriptomics, glycomics, and metabolomics. Systems

biology seeks to create a more holistic understanding of biological processes, which will lead to rich, complex understanding of the emergent properties of biological systems (49). The *-omic* sciences are related fields of study that look at the role of molecules and molecular mechanisms inside and outside the cell. Understanding the emergent properties of biological systems will create a better understanding of the environment's role in the creation of disease and help researchers develop new tests for metabolic disorders as well as new options for treatment (50). Many of these treatments will require intensive nutrition counseling, creating new opportunities for RDs and potentially new fields of advanced practice dietetics (51).

Personalized Health and Nutrition Outcomes. Researchers, with appropriate safeguards for privacy and data security, can use data collected from genetic testing and health-monitoring technology to identify new ways to prevent disease, provide new interventions, and monitor patient outcomes. In many cases, these researchers are finding the best way to prevent disease is through nutrition intervention combined with lifestyle changes. This is hardly news for many patients or health providers, but the ability to identify high-risk groups early combined with the ability to collect data for outcomes research could dramatically alter the way the health care system works. Treatment plans, including nutrition and lifestyle changes, can be personalized to the individual patient, leading to less waste in the system, fewer dangerous and unnecessary procedures, and fewer complications from inappropriate medications. Better outcomes research will also open up reimbursement for lifestyle and nutrition counseling to prevent expensive chronic diseases. In this new health care system, the focus will shift from the often expensive tasks of treating disease to predicting and preventing disease before it happens (52).

Food Industry Transforms for Public Priorities

Figure 9 summarizes the dietetics workforce implications of food industry priorities.

More consumers are interested in healthful and ethical eating. They expect to know where their food comes from, the route it took to get it to their table, and what it will do for their health. Food companies from production to consumption must now answer to consumer preferences and government demands to support public health and environmental priorities.

Companies are reworking and repositioning their food products and services to meet these new demands. They are working to build public trust and competitive advantage through the nutritional value and environmental impact of their prod-

The food industry is responding to public priorities to transform the current food supply chain into a more healthful, safer, and more sustainable system.

Workforce Challenges

- Widespread consumer acceptance of more healthful, more sustainable diets is uncertain
- Competitors are better placed in the foodservice industry to seize future opportunities
- The public associates registered dietitians with health care rather than foodservice

Workforce Opportunities

- Entrepreneurial niches will open up for risk-takers
- These career opportunities might make the dietetics profession attractive to people with business and environmental interests
- Food is a necessity and jobs will always exist for those who provide it

Workforce Demand Impact

Without a systematic pipeline for feeding qualified candidates into these opportunities, the dietetics profession could easily lose out to others in this job market.

Change Index: Low

Figure 9. Food industry priorities implications.

ucts. Price, convenience, and marketing still make or break food businesses, but consumers are less willing to give up these advantages at the expense of health, safety, and sustainability.

People are still living hectic lives but they have different expectations even of what fast food should be. Once engaged in asking the right questions about their relationship with food, more consumers are interested in the source, quality, and variety of the food they eat.

Food is recognized as a key indicator of quality of life and consumed as a celebration of health and good living. People are becoming fascinated by the culinary arts and seek more knowledge and experience in nutrition planning and food preparation. This rediscovery of the joy of cooking is happening in homes, restaurants, and other dining experiences.

Future Directions Research

RDs Better Compensated in Foodservice and Manufacturing.

Only approximately 1 in 5 RDs is working in foodservice management, business, or consulting, according to an analysis of surveys (2). The best-paid RDs are executives in any field; in 2009, among the subsequent top nine positions with regard to salary, six were in non-clinical care positions, such as public relations and marketing, research and development, director of food and nutrition services, sales representative, school foodservice, and manager of nutrition communications. The best wages are found in pharmaceutical and food manufacturing, distributing and retailing, and contract food management (2).

Long-Term Eating Preferences Difficult to Forecast.

Estimating demand for dietetics practitioners requires a good understanding of future patterns in food consumption. Demographics and economic studies can provide some clues to what future eating preferences might be. However, these studies assume future seniors will eat like today's seniors do and ethnic populations will retain cultural traditions in future generations.

However, there are some changes in eating patterns that can be expected, creating opportunities for dietetics practitioners. An aging population is more likely to eat at home, driving demand for in-home delivery of prepared foods. Growth in per-capita income and education levels will drive demand for quality and diversity over quantity. Higher education levels, higher income levels, and trend toward healthy aging could lead to a growing preference for varied diets featuring more fruits, vegetables, and fish. All of these changes in eating patterns are likely to shift the food system to become more service-oriented, creating opportunities for dietitians working in the foodservice industry (53).

Multinational Food Companies Adopt Public Health Priorities.

Major multinational food companies are signing onto global compacts to address obesity, diabetes, and chronic diseases. For example, PepsiCo (Purchase, NY) is reformulating and revising its products to encourage healthful eating. Leading companies are also realizing the importance of collaboration with their consumers and public groups to prevent chronic disease (54). The Dow Jones Sustainability Index and the Global Reporting Initiative provide independent monitoring and incentives to urge food manufacturers, distributors,

and retailers to participate in socially responsible practices.

Food Safety, Quality, and Sustainability Linked.

Ensuring food safety and quality and reducing environmental impacts are all related operational challenges for food producers, processors, distributors, and retailers. The food service sector is lagging behind the food retail sector in operations research to achieve food safety, quality, and sustainability. Hazardous analysis critical control point systems provide a structured way to identify food-safety risks. This system has been adapted to include nutritional control points to protect product quality. More research is needed in the dynamic process of quality change and nutritional values. Any assessment of sustainability in the food industry must consider life-cycle assessments across the entire supply chain from product development to consumption (55).

Job Opportunities from Food Labeling Law.

A new requirement in the health care reform law mandates restaurants post kilocalorie counts for menu items. A number of prominent US cities such as New York, NY; San Francisco, CA; Seattle, WA; Philadelphia, PA; and Portland, OR, have already mandated menu labeling in fast-food restaurants; however, the federal mandate is meant to override the patchwork of varying laws in municipalities across the country. This could be a near-term employment boost for RDs skilled in nutrient analysis and may, over time, encourage more restaurant owners and chefs to partner with RDs skilled in the culinary arts (56).

Industrialized Food System Backlash.

A series of recent popular books and documentaries have warned consumers about large-scale agricultural and food corporations. They argue that US corn subsidies have contributed to poor diets and that concentrated animal feeding operations threaten food safety and the environment. Many consumers and food businesses are rejecting the industrial way of producing food and transitioning to local and regional producers for better-quality food. Restaurants and catering services, including some fast-food restaurants, have been instrumental in the local food movement (57).

Global Challenge of Food Security and Sustainability.

Food prices are climbing globally, threatening the food security of even prosperous nations. Food consumption in the developing world is growing. Rising oil and energy prices make food more expensive to produce and process. Farmland is being converted to house growing populations in residential communities and support economic development. Climate change is expected to disrupt growing seasons. Global water shortages threaten the food supply. Fisheries are declining and collapsing (58).

Future Scan Meeting Participants

The Commission on Dietetic Registration and the Dietetics Workforce Demand Study Task Force expresses gratitude to these individuals who contributed their time and expertise in developing this future scan.

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Linking food recommendations to environmental and health outcomes will be required to ensure food security for the future. However, corporate decision makers and makers of public policy are involved in a vigorous debate as to what truly sustainable food recommendations should include (58). Does a sustainable diet minimize water, energy, pesticides, and carbon emission? Should it also promote humane treatment of animals and economic opportunity for poor farmers?

Europe is currently leading the movement to incorporate environmental sustainability into food policies. For example, the Barilla Center for Food and Nutrition in Italy has proposed a double food pyramid for the European Union that illustrates that foods with higher recommended consumption levels also have a lower environmental impact (59).

CONCLUSIONS

Future scanning is a systematic approach to identifying and analyzing change, which is inherently never static. The eight change drivers in this future scan report are an assessment of how the world is changing in ways that could influence dietetics workforce supply and demand. Another group of experts making a similar assessment at a future date may choose an entirely different set of change drivers, and their assessment could lead to different insights, scenarios, and assumptions about workforce supply and demand. Future scanning should be a continuous study of key trends and issues to discover the change drivers that could have the greatest impact on the future. The most valuable outcome of future scanning, however, is not scoring the likely impact of different trends and issues; it is anticipating the future challenges and opportunities that arise from these changes.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST:

Author C. Bettles: C. Bettles, co-author, is president of Trend Spot Consulting. Trend Spot Consulting provides scanning research, facilitation, and consulting services to organizations to help them better understand and respond to future challenges and opportunities. This article drew on knowledge and learning gained through work with other clients including: American Association of Medical Society Executives, Commission on Dietetic Registration, American Dental Hygienists' Association, American Society of Mechanical Engineers, Association for Professionals in Infection Control and Epidemiology, the Institute for Alternative Futures and One Economy.

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