

## **Change Drivers and Trends Driving the Profession: A Prelude to the Visioning Report**

**2017**

### Authors:

Visioning Process Workgroup Members: Jana Kicklighter, PhD, RDN, LD, FAND; Becky Dorner, RDN, LD, FAND; Anne Marie Hunter, PhD, RDN,LD, FADA, FAND; Marcy Kyle, RDN, LD, CDE, FAND; Melissa Pflugh Prescott, PhD, RDN; Susan Roberts, MS, RDN, LD,CNSC; Bonnie Spear, PhD, RDN, FAND

Staff Support: Harold Holler, RDN, LDN, Marsha Schofield, MS, RD, LD, FAND and Cecily Byrne, MS, RDN, LDN

### Council on Future Practice, 2015-2016:

Melissa Pflugh Prescott, PhD, RDN, Chair; Susan R. Roberts, MS, RDN, LD,CNSC, Vice-Chair; Feon Cheng, MPH, RD; Beverly L. Girard, PhD, MBA, RD; Barbara Grant, MS, RDN, CSO, FAND; Ruth E Johnston MS RD LD; Marcia A. Kyle, RDN, LD, CDE, FAND; Sharon Schwartz, MS, RD, LDN; Elise A. Smith, MA, RDN, FAND, LD; Jamie S Stang, PhD, MPH, RD, LN

## Table of Contents

Introduction.....	3
Aging Population Dramatically Impacts Society .....	7
Embracing America’s Diversity.....	12
Consumer Awareness of Food Choice Ramifications Increases.....	17
Tailored Health Care to Fit My “Genes” .....	22
Accountability and Outcomes Documentation Become the Norm .....	26
Population Health and Health Promotion Become Priorities.....	31
Creating Collaborative-Ready Health Professionals.....	36
Food Becomes Medicine in the Continuum of Health.....	41
Technological Obsolescence is Accelerating.....	45
Simulations Stimulate Strong Skills .....	51
Glossary .....	<b>Error! Bookmark not defined.</b>
Reference List .....	63

## Introduction

The Council on Future Practice (CFP) was created as a permanent organized body within the Academy responsible for formalizing an ongoing visioning process to define future nutrition and dietetic practice at all levels and to identify educational and credentialing needs required for future practitioners and their development.

The CFP is an Academy committee that collaborates with the Accreditation Council for Education in Nutrition and Dietetics (ACEND), the Commission on Dietetic Registration (CDR), and the Nutrition and Dietetics Educators and Preceptors (NDEP) to project future practice needs for the profession of nutrition and dietetics. Future practice, accreditation, credentialing and education represent the four critical organizational units and segments necessary to produce new practitioners and assist experienced practitioners in advancing their careers.

One of the functions of the CFP is to ensure the viability and relevance of the profession of nutrition and dietetics by engaging in a visioning process to identify the preferred future of the profession. The Council developed a standardized process and guidelines for visioning and futures thinking in 2014, based on a workshop conducted for members of the CFP by futurist Marsha Rhea from Signature i, LLC.<sup>1</sup> The current visioning process focuses on a 3-year program of work (2014-2017) and began with the use of a scanning framework comprised of 16 categories reflective of society's and the profession's future needs and changes. In July of 2014, the CFP utilized the scanning framework to identify and prioritize the following five categories for the 2014-2017 visioning cycle:

- Translating Evidence-Based Research into Practice and Policy
- Food and Nutrition Systems and Sustainability
- Workforce Projections

- Education/Professional Development
- Economics/Market Forces

A Visioning Process Workgroup of the CFP was appointed in 2014. The Workgroup identified a preliminary list of change drivers and trends, related to the five prioritized scanning framework categories, based on CDR's Workforce Demand Study, *Future changes driving dietetics workforce supply and demand: Future scan 2012-2022*<sup>2</sup> and ACEND's *Expanded Standards Committee Background Report*.<sup>3(p88-92)</sup> Other Academy units conducting their own visioning also shared their reference lists with the Workgroup, including the Foundation's Future of Food Initiative<sup>4</sup> and ACEND's Rationale for Future Education Preparation of Nutrition and Dietetics Practitioners.<sup>3</sup> These lists were reviewed for pertinent references. Also, a systematic review of resources published since 2010 was conducted by the Academy's Knowledge Center based on the five priority categories. Five databases, including Science Direct, Taylor, Cochrane, Ovid and Web of Science, were searched using general key words and phrases (e.g., wellness and health promotion and registered dietitians; employment trends and registered dietitians; trends in population health and agriculture and registered dietitians) to identify references pertaining to the five prioritized scanning framework categories. Additional references were identified by reviewing the reference lists of pertinent articles and resources resulting from the systematic review. Finally, the Workgroup reviewed resources available through the World Future Society (WFS) and selected several references related to the priority categories for review. All of these combined search strategies resulted in a total of 357 references both internal and external to the profession of nutrition and dietetics. References identified as pertinent to the five prioritized scanning framework categories by the Visioning Process Workgroup were reviewed and analyzed by Workgroup members and analysts from the Academy's Evidence

Analysis Library. Reviewers identified if each reference supported any of the change drivers and trends and noted any new change drivers and trends related to the five priority categories not previously identified. Of the 357 references reviewed, 218 references were used in the development of the *Change Drivers and Trends Driving the Profession: A Prelude to the Visioning Report 2017*.

Based on the Council's standardized process and guidelines for visioning and futures thinking, the Workgroup surveyed members of the CFP's Think Tank (n=49) and individuals representing external Academy alliance organizations (n=15) in February, 2015 to seek their input on priority categories and trends. Individuals identified the top five categories from the 16 scanning framework categories, and related trends they believed would have the most impact on the future of the nutrition and dietetics profession in 10-15 years. A total of 44 responses were received (69% response rate). The results from this survey provided support for and helped validate the five categories previously identified as priorities by the Council.

The most common techniques used in futuring include historical analysis, scanning for trends, trend analysis, brainstorming, visioning and consulting others, according to the WFS.<sup>5</sup> Furthermore, the WFS states that most futurist methods strive for objectivity but rely heavily on subjective human judgment. The following ten priority change drivers, their associated trends, rationale and implications are based on the search strategies and input outlined above and the Workgroup's analysis, synthesis and evaluation of all sources of information, as well as its collective judgment. In addition, the change drivers, trends and implications were informed by input from Academy members, CDR credentialed practitioners, Academy organizational units, CFP think tank members and Academy external organization liaisons. Because there is considerable overlap among many of the categories in the scanning framework, several of the

change drivers and trends also overlap and interact – for example, technology is a separate change driver but it also impacts the genomics and simulations change drivers.

The change drivers, their trends and implications, supported by the CFP, Board of Directors Executive Committee, and the House of Delegates Leadership Team, are listed in no particular order and are all important forces impacting the profession of nutrition and dietetics. The change drivers and trends can help the Academy and its organizational units envision a desirable future for the profession and implement specific initiatives to move towards the desired future over the next 10-15 years.

## **Change Driver: Aging Population Dramatically Impacts Society**

**Exponential growth of the aging population has dramatic and wide-ranging ramifications and economic impacts on government, businesses, families, and health care and support services.**

### **Rationale:**

Since 2011, when the first baby boomers turned 65, approximately 10,000 Americans turn 65 each day.<sup>6</sup> From 2010 to 2030 the 65 and older population in the US will swell from 13% to > 20% as life expectancies, especially at the older ages, continue to increase.<sup>7</sup> These population trends are projected to escalate the prevalence of chronic disease<sup>8</sup>, functional and cognitive challenges and create a health care cost crisis. A substantial increase in age distributions, racial and ethnic diversity of the older population will also create major changes between now and 2050.<sup>7</sup> All developing nations are experiencing similar population aging trends, although the US has the largest number of older adults<sup>7</sup> and the global implications are yet to be determined.

**Trend 1: Increasing rates of obesity and chronic diseases among older adults dramatically impact the health care system and the economic burden of disease.**

- The risk of preventable chronic diseases and disability dramatically increases with aging.<sup>2</sup>
- Almost 3 out of 4 older adults<sup>9</sup> and 2 out of 3 Medicare beneficiaries have multiple chronic conditions.<sup>10</sup>
- Treatment for Americans with one or more chronic conditions consumes 86% of health care spending.<sup>11</sup>
- One quarter of 2006 Medicare dollars went to end of life care in the last year of life.<sup>12</sup>

**Trend 2: Demand for health care services is increasing dramatically<sup>14</sup> although fewer funds are available to cover the cost.**

- “Roughly 70% of those who turn age sixty-five will have long-term care needs at some point during their lives...<sup>13(p 98)</sup> impacting the utilization of hospitals, nursing homes and home care services.<sup>2,8</sup>
- “The demand for long-term services and supports (LTSS) will outpace the US economy’s growth rate over the next decade and drive significant growth in Medicaid spending.”<sup>14(p7)</sup>
- Older Americans used more health care per capita than any other age group in 2011; individuals  $\geq 80$  consumed the largest percentage of Medicare dollars (33% versus 15% for 65-69 year olds).<sup>15</sup>
- The number of nursing home residents has declined while the number of those receiving care at home has increased during the last decade.<sup>16</sup>

**Trend 3: Disease prevention and health maintenance for the aging population are increasingly the focus to improve quality of life and care and contain costs.**

- Better nutrition, physical and mental activity can prevent many chronic diseases<sup>2</sup>; smoking, midlife obesity and physical inactivity, all modifiable risk factors, attribute to approximately 1/3<sup>rd</sup> of Alzheimer’s disease cases worldwide.<sup>17</sup>
- Many older adults are food insecure; 83% do not consume a good quality diet<sup>18</sup>; < 1/3<sup>rd</sup> of those in need, who typically have 2-3 chronic health problems, are served by the Older Americans Nutrition Program.<sup>18</sup>



- 159 subjects, aged 65 and older, who participated in  $\geq 3$  community-based nutrition counseling sessions which included immediate feedback on their blood work, had significant improvements in BMI, cholesterol, glucose and blood pressure.<sup>19</sup>
- Up to 71% of elderly hospitalized patients are at nutritional risk or malnourished upon admission.<sup>20</sup> Treatment of both over- and under nutrition reduces mortality and costs by decreasing hospital length of stay and probability of readmissions.<sup>21,22,23</sup>
- Early nutritional supplementation in acutely ill older adults in combination with a rehab program improved calorie/protein intake, slowed the loss of muscle mass and self-sufficiency, supported a better quality of life and saved subsequent medical and social care costs.<sup>24</sup>
- Medicare began reimbursing for outpatient diabetes self-management training (DSMT) in 2000, but only 5% of newly diagnosed Medicare beneficiaries utilize DSMT services due to disparities in access.<sup>25</sup>
- The Improving Medicare Post-Acute Care Transformation (IMPACT) Act of 2014 links payment to quality of health care with goals to improve quality, provide outcome information, and control costs.<sup>26,27</sup>
- “The cost of 1 day in a hospital equals the cost of 1 year of Older Americans Act Nutrition Program meals...the cost of 1 month in a nursing home equals that of providing mid-day meals 5 days a week for about 7 years.”<sup>18(p464)</sup>

#### **Trend 4: An aging workforce impacts the economy, businesses, families and health professions.**

- The ratio of working-age (18-64) people to retirees will decrease dramatically and strain national resources.<sup>6</sup> Currently, 100 working people support every 19 people aged 65-84, but this ratio will change to 100:30 by 2028; 33 working age people currently support each person >85 compared to 13:1 in 2046.<sup>7</sup> Families will assume much of the burden for older adults' care<sup>28</sup> as health-related finances are reduced.
- Businesses and health professions will be impacted dramatically as older adults retire or alter their work lives.<sup>2</sup>
- The profession is continuing to age (2015: median age of 49 years; 35% are 55 or older;<sup>29</sup> 2005: median age of 44 years; 15% 55 or older)<sup>30</sup>, and the anticipated attrition rate of 2 to 5% will impact the future supply of nutrition and dietetics practitioners.<sup>2</sup>

#### **Implications:**

- The movement from costly acute and nursing facility settings to home and community based services will continue.<sup>18</sup>
- Sustained engagement in advocacy and public policy is essential for adequate funding and reimbursement of food and nutrition-related programs and services to ensure healthful aging.<sup>18</sup>
- Demonstration of the value/cost effectiveness of evidence-based nutrition care in the prevention, treatment and management of malnutrition and chronic disease in older populations is essential.<sup>3,8,18</sup>

- Training in geriatric nutrition and a variety of geriatric care specialties to support optimal health and improve health outcomes for a diverse aging population in a variety of settings is needed.<sup>2</sup>
- As the ratio of working-age people to retirees decreases, the resources of the country may shift from education to health and caregiving to meet the needs of the older adult population.<sup>6</sup>
- An adequate supply of RDNs and NDTRs is needed to address the impact of an older workforce and anticipated rate of attrition including retirement.<sup>2</sup>

## **Change Driver: Embracing America's Diversity**

**Increasing racial and ethnic diversity of the U.S. population requires innovative solutions to improve health equity, health literacy, cultural competency and the diversity of nutrition and dietetics practitioners.**

### **Rationale:**

The racial and ethnic background of the U.S. population has shifted dramatically over the past one and one-half decades and continues to undergo a transformation.<sup>31</sup> Hispanic and Asian populations have experienced the most significant growth and this trend is expected to continue through 2060.<sup>31,32,33</sup> By 2044, over 50% of the U.S. population is expected to belong to a minority group.<sup>31</sup> Racial and ethnic minorities have low health literacy and experience suboptimal health care.<sup>34</sup> Although scientific advances have improved U.S. life expectancy and quality of life, these benefits have not translated into equal gains across all racial and ethnic groups. Differences in social determinants of health, such as poverty, access to health care, and socioeconomic status, exist across racial and ethnic groups and contribute to poor health outcomes.<sup>35</sup> Minorities experience higher rates of disease and bear the greatest morbidity burden for the same diseases.<sup>36</sup> Inadequate data on race, ethnicity, and language lowers the likelihood of effective actions to address health disparities<sup>34</sup>; however, policy, systems, and environmental interventions show promise in the promotion of health equity and reduction of health disparities.<sup>37</sup> Given the current and projected increases in diversity of the U.S. population, health care workforce diversity is also essential in addressing patient-centered care and health disparities.<sup>34</sup>

**Trend 1: Community health workers and other lay educators will continue to be used to reduce health disparities and as a solution to the lack of diversity in the health care workforce.**

- Under-represented groups are more likely to access nutrition and other health care services from professionals who they perceive to be similar to themselves.<sup>8</sup>
- Community health workers can provide education about high-risk behaviors and the self-management of chronic conditions, assist clients in applying for food assistance and other social services, and conduct home-based environmental assessments.<sup>38</sup>
- Shrinking health care dollars and the bifurcation of the health care workforce promote the increased use of community health care workers<sup>8</sup> who can now receive Medicaid reimbursement for preventive services recommended by a physician or other licensed provider.<sup>39</sup>
- The percentage of RDNs who are men, black, Asian, or Hispanic changed very little from 2002 to 2011, including the most recent registrants (first five years).<sup>40</sup>

**Trend 2: As the U.S. population grows more diverse, stark differences between what health providers intend to convey in written and oral communications and what patients understand may increase and further exacerbate health disparities.<sup>41</sup>**

- Almost nine out of ten adults are not health literate; those with poor health literacy are more likely to report poor health and utilize more health care resources to treat versus prevent diseases.<sup>42</sup>
- Low health literacy is more prevalent in the elderly, minority populations and those with less education and income.<sup>42</sup>

- Elderly patients with cardiovascular disease and higher literacy levels are at lower risk for hospitalization, institutionalization and mortality.<sup>43</sup>
- Research on specific ways in which health literacy can be used to create positive patient outcomes is lacking.<sup>44</sup>
- The Patient Protection and Affordable Care Act (ACA) directly and indirectly addresses health literacy.<sup>41</sup>

**Trend 3: Health equity is an increasingly important public health priority because of evolving U.S. racial and ethnic demographics.**

- Health disparities continue to exist and some have even widened among certain population groups despite decades of work to eliminate them.<sup>37</sup>
- The quality of care received by racial and ethnic minorities continues to be suboptimal. Interventions that remove barriers to timeliness, emphasize patient centered care, and promote equitable use of evidence-based guidelines may promote health equity gains.<sup>34</sup>
- Disparities in disease risk factors, such as fruit and vegetable consumption, are major obstacles to achieving health equity in the U.S.<sup>45</sup>
- The ACA aims to advance health equity by reducing health insurance disparities, improving access to providers, promoting increased workforce diversity and cultural competence, and ensuring that limited English proficiency individuals receive resources to communicate more effectively with health care providers.<sup>35, 46</sup>
- Hospitals that demonstrate a higher level of cultural competency appear to improve communication between patients and physicians and other hospital staff.<sup>47</sup>

- Compliance to medication and medical nutrition therapy is higher when cultural competence and language are matched between health care provider and patient.<sup>48</sup>

### **Implications:**

- Health practitioners must engage the community, identify needs, develop partnerships and assess and increase capacity at individual, organizational, and community levels to promote intervention success and health equity.<sup>37,49</sup>
- Principles of social justice, human rights, and social capital, in addition to economic and social barriers that limit the procurement, preparation, and consumption of healthy foods should be addressed in environmental and policy interventions.<sup>8</sup>
- RDNs and NDTRs need community organizing and other capacity building skills to implement sustainable interventions in underserved communities.
- All institutional policies and key practices should include a health impact assessment to determine unintentional variations in health impacts across ethnic and racial groups.
- Comprehensive assessments of health literacy that go beyond readability and numeracy are needed.<sup>50</sup>
- More research is needed to understand the moderating and mediating roles of an individual's health literacy status on nutrition outcomes<sup>50</sup> and the relationship between health care providers' increased knowledge of diverse cultures and better patient outcomes.<sup>51,52</sup>
- The growth of community health workers presents an opportunity for RDNs and NDTRs to supervise and educate these practitioners.

- RDNs and NDTRs should be culturally competent to interact effectively and appropriately in the workplace with patients/clients, peers, managers and subordinates from different ethnic and racial groups.
- RDNs and NDTRs need to utilize federal agencies' minimum standard categories for racial and ethnic data collection to track and address disparities in health outcomes.<sup>35</sup>
- New and innovative ways to recruit and retain minority and underrepresented students in nutrition and dietetics programs are needed.<sup>53,54</sup>
- There is a need for increased language skills among RDNs and NDTRs, with fluency in Spanish, French and Cantonese being sought most frequently.<sup>40</sup>



## **Change Driver: Consumer Awareness of Food Choice Ramifications Increases**

**The public seeks more information about their food across the entire supply chain and has increased awareness of the global ramifications of their food choices.**

### **Rationale:**

A growing social movement is underway where consumers desire an increased connection to food and nature.<sup>2,3(p92-97),55,56</sup> Today's consumers seek transparency on how, where and by whom their food is grown, processed, packaged, and distributed, and how revenues from their purchases are allocated.<sup>57,58</sup> Recent studies indicate public support, including support among racial minority and lower-income groups, for organic, local, non-genetically modified, and non-processed food.<sup>59,60</sup> Local food sales have increased from \$5 billion in 2008 to \$11.7 billion in 2014<sup>61</sup> and are expected to outpace total food and beverage retail sales over the next five years to reach \$20 billion in 2019.<sup>62</sup> Increased public interest in the U.S. food supply is accompanied by global concerns over the world's growing population which is slated to reach 9 billion by 2050.<sup>63,64</sup> Concurrently, the risk of climate change, high amounts of food waste, and high yield gaps underscore the need to produce more food using the same amount of land and fewer inputs.<sup>64,65,66</sup> Greater urbanization,<sup>64,67</sup> growing international trade,<sup>68</sup> and planet-wide ramifications of poor environmental stewardship require a global approach to food and agricultural systems.<sup>67,69,70</sup> Agriculture is a major contributor to greenhouse gas emissions<sup>65,71,72</sup> and water constraints.<sup>65,73</sup> If current dietary trends hold, they are projected to create an 80% increase in global greenhouse gas emissions and global land clearing, while simultaneously contributing to high rates of chronic disease.<sup>74</sup> Globally, about 70% of the total water that is withdrawn from surface water and groundwater is used for irrigation,<sup>75</sup> and there are growing concerns about agricultural pesticides and herbicides

contaminating the water supply through leaching, runoff, and spray drift.<sup>58,76,77</sup> In response, increasing numbers of consumers are likely to adopt sustainable diets.<sup>78</sup>

**Trend 1: Agricultural challenges and rapidly changing technology present entrepreneurial opportunities as food companies seek innovative ways to meet consumer demand for healthy foods and demonstrate their social responsibility.**<sup>79</sup>

- Driverless cars,<sup>80</sup> drones,<sup>81</sup> 3D food printers,<sup>80</sup> and fully automated restaurants<sup>82</sup> are changing food delivery systems.
- To meet increased demand for local foods, continued growth of food hubs, mobile and shared processing facilities, and other food system innovations are required to scale up and aggregate the yields of local farmers and ranchers.<sup>56,79</sup>
- Food companies are expected to launch sustainability campaigns, pursue novel methods to reduce their carbon footprint, and seek partners to promote widespread adoption of sustainable diets.<sup>64</sup>

**Trend 2: Siloed approaches to agriculture, health, sustainability, and economics are being abandoned for transdisciplinary solutions to reduce hunger, poverty, disease, and environmental destruction.**<sup>67</sup>

- Meat and dairy make the greatest dietary contribution to greenhouse gas emissions.<sup>70,72,78,83,84</sup> In addition, meat and dairy products feed humans with a substantial loss of caloric efficiency since they require the growth of crops to feed livestock.<sup>65,66</sup> Mediterranean, pescatarian, and vegetarian diets have the potential to reduce chronic disease rates, global greenhouse gas emissions, and land clearing.<sup>66,74,85</sup>

- About 1/3 of the food produced globally is lost or wasted, and about half of these losses could be mitigated with a more efficient supply chain.<sup>65,86,87</sup>
- The world food supply relies upon very few crops<sup>84</sup>; agricultural biodiversity is vital to improve crop productivity, increase soil fertility, and promote a varied diet.<sup>88</sup>
- Agricultural policies need to shift from their focus on feeding people to also encompass health and environmental sustainability.<sup>70</sup>
- The urban population has exceeded that of rural areas<sup>64</sup>; growth of urban agriculture and local farming can help create urban-rural links to promote nutrition security and drive economic opportunities.<sup>55,57,67</sup>

**Trend 3: There is a growing interdependence of countries around the world in sustaining the planet's national resources.**<sup>86</sup>

- The global population continues to live longer, requiring more food<sup>64</sup>; as global food production and consumption increase, so will the subsequent environmental impacts.<sup>70</sup>
- The developed world is responsible for the highest rates of meat consumption, and livestock are the largest single contributor to greenhouse gas emissions globally.<sup>72,84</sup>
- The recommendation for fish consumption (2 servings of fish per week) cannot be met by the fish caught in U.S. waters.<sup>83,84</sup>

**Trend 4: Consumers demand increasing levels of food transparency to meet their health, social justice, and environmental stewardship aspirations.**<sup>89</sup>

- The number of consumers who used food label ingredient lists to make purchasing decisions increased by 13% between 2006 and 2014.<sup>89</sup> Customers seek information on

how their food is grown and processed, in addition to nutrition information.<sup>59,89,90</sup>

Transparency in the use of animal antibiotics, growth hormones, pasteurization, food packaging leaching, pesticides, and genetically modified organisms is desired.<sup>58,91</sup>

- Consumers are increasingly aware of the environmental consequences of protein overconsumption.<sup>70</sup> Yet, confusion exists among consumers about the sustainability of fish consumption, despite sustainability labeling of fish.<sup>83</sup>
- Future food transparency efforts that focus on the overall public benefit of foods may yield a new healthy eating index,<sup>85</sup> requiring industry to reformulate foods to improve nutrition,<sup>92</sup> and promote social justice and environmental stewardship.

### **Implications:**

- Future – focused dietary interventions will encompass ways to improve the health of the planet, including food waste reduction and consumption of foods that minimize greenhouse gas emissions and promote water conservation.<sup>73,83,85</sup>
- RDNs and NDTRs need education on food systems production practices and policies and should play a key role in educating the public about the relationships among diet, environment, and public health.<sup>93</sup>
- Food sector jobs across all parts of the supply chain will increase, creating opportunities for food business entrepreneurs to utilize their education and leadership skills to create high paying jobs.<sup>79</sup>
- To capitalize on jobs created by the local food movement, RDNs and NDTRs need to understand agricultural systems and how diet choices influence local economies.

- Involvement in Food Policy Councils and other social justice advocacy initiatives enhance RDNs and NDTRs' opportunities to promote better access to healthy foods, minimize food waste, and further local economic development.

## **Change Driver: Tailored Healthcare to Fit My Genes**

**Continuing research and advances in genetics and nutritional genomics, with their ability to predict, prevent and/or delay illnesses and chronic diseases, will become the mainstay of health care in the future.**

### **Rationale:**

Genetics research continues to accelerate resulting in exponential advances in medicine and medical knowledge.<sup>6</sup> Ray Kurzweil, a technology specialist, predicts that the future holds the promise of routinely adding genes which are protective and disabling genes that promote diseases and aging.<sup>94</sup> Genetic testing for diseases for which tests are not currently available will become more readily available, making predictive, preventive, early detection and personalized interventions, including personalized nutrition and lifestyle interventions, possible.<sup>2</sup> RDNs can assume an increasingly important role in the emerging health care system which focuses on a genetic predisposition model of health and disease,<sup>95</sup> disease prevention, and integrative health care<sup>3</sup> with the possibility of receiving reimbursement for lifestyle and nutrition interventions and counseling.<sup>2</sup>

### **Trend 1: Advances in research and increased demand for personalized health and nutrition result in increased availability and decreased costs of genetic testing.**

- Since the completion of the human genome project, there have only been 100 cases where genomics have been used for personalized medicine to provide customized therapies and dosages. As technology continues to advance, there will be more and more opportunities for DNA analysis at the patient's bedside. DNA analysis "should be a must-have before actually prescribing drugs."<sup>96(p34)</sup>

- Direct to Consumers (DTC) genetic testing via the internet or other marketing venues has become increasingly available. The global DTC genetic testing market is projected to reach \$233.7 million by 2018.<sup>97</sup> Eventually, some 4,000 hereditary diseases may be prevented or cured through genetic intervention.<sup>6</sup>
- Consumers want to learn about their individual risks for future illnesses to promote their health and prevent disease. Consumers look to DTC genetic testing as a means of predicting risk of disease.<sup>98</sup>
- Costs of genetic testing for consumers have decreased and improved testing technologies are available. “Scientists are approaching the ability to sequence a human genome for \$1,000, perhaps in 2020.”<sup>99(p28)</sup>
- Genetic tests available to consumers generally predict risk of developing complex diseases such as diabetes and cardiovascular disease.<sup>100</sup> In the future, patients will be able to sequence genomes at home resulting in earlier detection of diseases, simpler and more effective interventions, and reduced risk of developing serious, debilitating, and life-threatening disabilities.<sup>96</sup>

**Trend 2: Health professionals increasingly manage patient care using genetic profiles but the science of genetics must continue to advance to inform practice.**

- Epigenetic changes (chemical changes in DNA) can be reversed with lifestyle changes, which can impact obesity.<sup>101</sup>
- Genetic-based nutrition advice may result in behavior change and impact intake of some dietary components, such as sodium.<sup>102</sup> Personalized nutrition could potentially motivate

individuals to make positive food choices to a greater degree than population-based dietary recommendations.

- Genotyping alone will not be sufficient to personalize diet for improved health.<sup>103</sup> The interaction of specific genetic variations with environmental factors can modify genetic outcomes.<sup>95</sup> Environmental factors, which include nutrients and other bioactive components in foods, play a key role in health.
- Genetics offers much promise in the field of medicine where medical researchers are using variations within genes as biomarkers for diseases, personalized treatments, and drug responses.<sup>99</sup>
- Investment in basic research is yielding a better understanding of gene transcription and the influence of genetic mutations on the development and progression of diseases. The ultimate goal is to identify better approaches to manage the care of individual patients based on their unique genetic profile.<sup>104</sup>

### **Implications:**

- Consumers are savvy and want to be in charge of their health care. Consumers can readily access DTC genetic testing to learn their risk of chronic diseases, with the goal of preventing disease. Genetic testing has the potential to affect consumer behavior change, and therefore, can ultimately impact health care costs.
- Medicine is moving towards tailoring treatments to individual genetic, environmental and behavioral characteristics to improve patient responses. Advances in nutritional genomics offer the promise of personalized nutrition and unprecedented opportunities for the RDN, including reimbursement for nutrition and lifestyle interventions.



- The emerging genetic predisposition model of health and disease can position the RDN as a major force in health care.<sup>95</sup> Designing nutrition interventions that incorporate a patient/client's genetic profile is a task appropriate for specialists and advanced practice RDNs.<sup>105</sup>
- The discipline of nutritional genomics is especially promising for the future when additional research is available to support evidence-based practice.<sup>100</sup>
- RDNs working in the area of nutritional genomics and within interprofessional teams will need the scientific knowledge and technical skills to interpret genetic testing and to provide personalized nutrition advice that prevents or modifies disease risk. Specialized and advanced knowledge and skills are needed for RDNs to work in the area of nutritional genomics.<sup>2,95,100,105</sup>
- RDNs function within and collaborate with interprofessional teams<sup>106</sup> to interpret genetic testing results and develop personalized nutrition care plans.<sup>100</sup> RDNs may assume primary management of patients when food and nutrition are the primary intervention.<sup>107</sup>

## **Change Driver: Accountability and Outcomes Documentation Become the Norm**

**Increased emphasis on evidence-based practice and accountability for documenting beneficial and cost-effective outcomes become the norm in health care.**

**Rationale:** Health care costs in the United States, which are approximately twice that of other developed countries,<sup>108</sup> have been rising in part due to the aging of the population and prevalence of chronic disease.<sup>109,110</sup> According to the Institute of Medicine (IOM), health care is “one of the most complex sectors of the U.S. economy.”<sup>111(p1)</sup> This complexity creates a greater “need for evidence about what works best for whom in order to inform decisions that lead to safe, efficient, effective, and affordable care.”<sup>111(p1)</sup> The IOM has set a goal that by “...2020, 90 percent of clinical decisions will be supported by accurate, timely, and up-to-date clinical information and will reflect the best evidence.”<sup>111(p 8)</sup> Additionally, current and emerging health care delivery models are driving the demand for utilization of research as the basis for policy development.<sup>38, 111,112,113,114</sup> Additional emphasis on evidence-based policies help inform<sup>115,116,117,118</sup> practices that increase hospital revenue or lead to cost savings.<sup>108, 119, 120</sup> Hospitals are interested in generating revenue or gaining cost savings due to reductions in Medicare payments. Some hospitals experienced Medicare reimbursement losses as much as 2% in 2012 for excessive readmissions with the potential to lose 5% by 2017.<sup>108</sup> Health care providers must demonstrate to internal stakeholders, as well as external stakeholders, such as the Centers for Medicare and Medicaid Services (CMS), other payers and those granting funding, that the care provided and the outcomes achieved meet or exceed targets. Demonstration of an intervention’s efficacy and/or benefits, such as reduced costs, complications, and readmissions is essential in garnering organizational and third party payment for interventions in the future.

**Trend 1: Health care evolutions necessitate increased research and quality improvement activities.**

- The ACA aims to rein in health care costs and improve quality of care as well as outcomes. Several strategies are imbedded in the ACA to achieve these goals, including Accountable Care Organizations (ACOs), Patient Centered Medical Homes (PCMHs), Value Based Purchasing (VBP), CMS financial penalties for hospitals with high readmission rates and no payment for “never events”, such as hospital acquired pressure ulcers.<sup>108</sup>
- Mega-hospital systems are becoming more prevalent as hospital systems merge to gain market share, reduce operating and capital expenditures and improve patient outcomes. Hospital system mergers may or may not be beneficial for the organizations and patients. Successful mergers require careful planning and tough decisions to achieve the projected efficiencies and improved outcomes.<sup>121</sup>
- Malnutrition is present in 30 to 50% of hospitalized patients and necessitates attention due to its negative impact on quality of life, complications, hospital length of stay, costs and mortality.<sup>108,122</sup>
- Quality improvement initiatives, research and tracking outcomes, which may have been “nice to have” in the past, are now essential and indeed mandatory activities in many settings in order to survive and thrive under the current health care financial reimbursement environment.<sup>111,112,113,123</sup>

**Trend 2: The application of informatics facilitates and optimizes the retrieval, organization, storage and use of data and information for decision-making.**

- The use of electronic health records in health care facilities and physician offices has exploded over the past decade.<sup>124</sup> Other electronic sources of data include claims data used for billing and patient portals. These data offer the opportunity to generate evidence for the best interventions based on actual practice, decreasing the time and expense associated with clinical research.<sup>111</sup>
- Technology, including electronic health records and other large databases, can be used to improve productivity and efficiently extract information to establish the link between interventions and outcomes.<sup>113,124,125,126, 127</sup>

**Trend 3: Practicing RDNs do not regularly evaluate and conduct research or access evidence-based resources for guidance in clinical practice.**<sup>128,129</sup>

- Health care decisions and funding are increasingly driven by the conduct and analysis of research, dissemination of research results, and implementation of evidence-based practices.<sup>111</sup>
- RDNs understand the importance of research but have limited involvement in research activities. Perceived barriers to research are numerous and include lack of confidence, expertise, skills, time, funding and administrative support.<sup>129</sup>
- Approximately 50% of RDNs consult evidence-based resources and read professional journals less than once a month.<sup>128</sup>
- RDNs are more likely to engage in research activities when they are knowledgeable about evidence-based practice, possess a higher level of education, have taken a research course and frequently read research articles.<sup>129</sup>

- Additional emphasis on research, combined with education and mentoring, are necessary to enhance the involvement of RDNs in research.

### **Implications:**

- Organizations increasingly rely on data and outcomes to drive decisions about priorities, including how and where their limited resources are utilized.
- RDNs require the necessary skills to read, interpret and apply research in their practice settings, conduct outcomes research and utilize informatics to enhance their ability to show positive outcomes. Outcomes research is especially vital for the survival and advancement of the nutrition and dietetics profession and should be routinely conducted by RDNs.<sup>129</sup>
- RDNs must promote their unique role in the identification, promotion and documentation of how nutrition interventions are cost effective, lead to cost reductions/savings, and improve outcomes (clinical and patient-centered) to facilitate adoption of effective interventions into institutional and/or public policies.<sup>20,24,130,131</sup>
- RDNs must be adept at identifying, treating and documenting malnutrition to ensure positive patient outcomes and reimbursement for health care facilities to cover the costs of caring for malnourished patients.
- RDNs need to be proficient in the facilitation of behavior change and improve their behavioral counseling skills to address the increasing incidence and cost of caring for people with chronic diseases. These skills can enhance the management and positive outcomes of those with one or more chronic diseases and potentially prevent diseases in those who are at risk.

- Organizations and RDNs with data and outcomes to support their interventions and validate their professional contributions are more likely to receive reimbursement and other funding in the current and future environment of limited health care dollars.
- RDNs and NDTRs who are unable to illustrate their worth through improved outcomes or other cost-benefit analyses may be replaced by other professionals.

## **Change Driver: Population Health and Health Promotion Become Priorities**

**Health care in the U.S. increasingly focuses on population health to improve effectiveness and reach and slow the growth of health care costs.**

### **Rationale:**

Transformative change to improve the health of populations and reduce health care costs is underway in the U.S.<sup>132</sup> Forces converging to bring a national focus to population health include the ACA, aging of the U.S. population, and surge in nutrition-related chronic conditions.<sup>132,133</sup>

The ACA promotes population health by its focus on better care, better health and lower costs.<sup>8,132</sup> A culture change is revolutionizing institutions as they move beyond wellness programs to engage people at every level of their organizations in shifting their focus towards health promotion and disease prevention and creating a culture of health as part of their daily practices.<sup>118</sup> Hospitals are playing a central role in creating a culture of health.<sup>118,132</sup> Even the institutional kitchen is now at the forefront of an institution's wellness mission.<sup>134</sup> People spend time in schools, workplaces, food outlets, neighborhoods and communities which are all important targets for policy, systems and environmental level interventions as part of a social ecological, comprehensive population health approach.<sup>8,135</sup>

**Trend 1: Evidence-based and multifactorial interventions that access levels of influence at the policy, systems and environmental level of the social ecological framework are essential to address population health priorities.**

- Health behaviors are complex and influenced by physical and social environments and must address both individual and environmental determinants of health and disease.<sup>136</sup>

- The social ecological model utilizes a multifactorial “systems perspective” and addresses individual and environmental factors as well as their interactions.<sup>8,136</sup>
- A review of food environment interventions targeting young adults’ dietary behavior in university settings revealed that 13 out of 15 studies showed positive improvements in outcome measures; useful intervention strategies included the use of nutrition messages/nutrient labeling; increased availability of healthy options; and portion size control of unhealthy foods.<sup>137</sup>

**Trend 2: Institutions, organizations and governments are increasingly striving for policy changes that are informed by research, help create a culture of health, and make healthy choices the easy choices.**

- The Robert Wood Johnson Foundation’s vision is to build a culture of health to enable our nation’s diverse society to lead healthier lives now and for generations to come.<sup>138</sup>
- United Healthcare, a major insurer, is piloting a Healthy Savings Card which helps members save money when they purchase healthy foods at the grocery store.<sup>139</sup>
- Institutional kitchens and menus are playing central roles in health promotion by bringing together culinary arts, foodservice expertise and evidence-based principles of Food as Medicine; based on signage and health messages, customers can select foods that provide the health benefits that meet their individual nutrition and health needs.<sup>134</sup>
- Policies based on fiscal measures, such as taxes, subsidies and vouchers, and standards for foods available for consumption, may be more effective at changing behavior than nutrition labeling efforts.<sup>140</sup>



- Multicomponent interventions in religious organizations that include policy change, religious organizational involvement and community health workers have improved eating behaviors.<sup>141</sup>

**Trend 3: The ACA paves the way for tremendous growth and unprecedented opportunities in workplace health promotion and disease prevention interventions.<sup>115</sup>**

- As of September 2015, nearly 149 million adults are employed full time<sup>142</sup> and spend an average of 7.8 hours/day at the workplace.<sup>143</sup>
- Employee workplace wellness programs offer a positive return on investment by positively impacting employees' health; increasing employee retention; reducing insurance premiums and worker's compensations claims; decreasing absenteeism and increasing productivity.<sup>116,118</sup>
- 74% of employers surveyed offer wellness programs, while another survey reports that employers expect their investment in these programs to grow.<sup>115</sup>
- Workplaces are ideal settings for health promotion programs targeting young adults; approximately 70% of young adults, aged 18-34, are employed in the U.S. workforce.<sup>144</sup>
- Workplaces that encourage healthy lifestyle practices are associated with fewer obese employees among millennials; adjusted rates of obesity were 24% and 17% among those reporting low ( $\leq 1$  characteristic) versus high ( $\geq 3$  characteristics) exposure to healthful food environments, respectively.<sup>135</sup>
- Workplace organizational policies can address healthy food procurement, vending choices and foods served at meetings, physical activity and alternative transportation options, and incentives for disease management.<sup>145</sup>

- A multicomponent workplace lifestyle intervention that focused on changing dietary intake and eating behavior patterns for weight loss in obese and overweight employees resulted in clinically important reductions in body weight ( $- 8.0 \pm 0.7$  kg in intervention subjects versus  $+ 0.9 \pm 0.5$  kg in control subjects) and improved cardiometabolic risk factors.<sup>146</sup>

**Trend 4: Hospitals redefine their roles in the continuum of health care services and become immersed in the daily culture of the communities they serve.**

- Non-profit hospitals must conduct a community health needs assessment at least every 3 years and adopt an implementation strategy to meet identified community needs and address social determinants of health based on ACA requirements.<sup>132</sup>
- Hospitals are natural leaders for workplace and community wide health promotion interventions due to their mission, reach and influence; hospitals can adopt model policies and practices that promote the health of both their employees and patrons.<sup>118</sup>
- Some hospitals serve between several thousand and up to one million meals/year to employees, patients and visitors, with each meal representing an opportunity to promote a healthy choice.<sup>118</sup>

**Implications:**

- Scientific evidence to inform interventions and shape nutrition-related policies that offer sustainable solutions to population health problems is imperative.<sup>8,89</sup>

- More RDNs and NDTRs must position themselves for new and expanded practice roles to address policy, systems and environmental level interventions based on the social ecological model.<sup>8</sup>
- The profession should adjust training models to reflect emerging areas of practice in health promotion in community settings where people live, work and play.<sup>147,148</sup>
- RDNs need skills to track effects of and evaluate policy change initiatives designed to address the underlying causes of environments that foster poor dietary intake.<sup>118,136</sup>
- Sustained engagement in advocacy and public policy is essential to champion RDNs as qualified providers of population health interventions.<sup>89,149</sup>
- Nutrition is a key component of workplace health promotion; RDNs and NDTRs have unique qualifications to practice in these settings.<sup>8,115,117</sup>

## **Change Driver: Creating Collaborative-Ready Health Professionals**

**Transdisciplinary professionalism and interprofessional education are the cornerstones of patient/client centered care to help solve problems, improve safety and quality, and drive innovation.**

### **Rationale:**

In the late 1990s, the IOM reported that as many as 98,000 deaths occurred in U.S. hospitals each year.<sup>150</sup> The IOM has published three seminal publications beginning in 1999 that focused on health care quality, patient safety and their relationship to health professions education.<sup>150,151,152</sup> These publications, along with the Institute for Healthcare Improvement (IHI) 2008 “Triple Aim” of better care, better health and lower costs<sup>153</sup> provided a major impetus and urgency for rethinking team-based care and interprofessional relationships and restructuring health professions education.<sup>154</sup> The ACA reflects the “Triple Aim” and is responsible for the resurgence of interprofessional education (IPE).<sup>152</sup> IPE and collaborative practice are keys to transitioning a fragmented health system to one capable of improved health outcomes.<sup>155</sup> IPE informs a pedagogy and curricula redesign for preparing a new health care workforce capable of optimizing health system performance in a collaborative-ready, shared decision making model.<sup>156</sup> All health professions should integrate IPE into their curricula to prepare practitioners for interprofessional practice (IPP) with the knowledge and skills to be effective 21<sup>st</sup> century members of the health care team. Professions that remain uninformed, outdated and static are at-risk of being left behind. IPE offers RDNs a significant advantage in securing a place at the “health care table.”

**Trend 1: Transdisciplinary professionalism is becoming an essential ideology for a 21<sup>st</sup> century health care system.**

- Successful transdisciplinary collaboration requires a critical point where society demands reform in health care practice and education of the health care workforce.<sup>157</sup>
- Transdisciplinary professionalism requires the flattening of hierarchies to adopt a more collaborative environment and break down professional “silos” and “turf battles.”<sup>157</sup>

**Trend 2: IPE is an increasingly essential strategy for preparing the health care workforce for a patient-centered, coordinated and effective health care system.**

- IPE goals are to deliver patient-centered care that is safe, timely, efficient, effective and equitable.<sup>158</sup>
- IPE helps develop the knowledge, skills and attitudes for a reformed, “collaboration-ready” health workforce.<sup>155,156</sup>
- “Interprofessional health care teams understand how to optimize the skills of their members, share case management, and provide better health services to patients...”<sup>155(p196)</sup>
- For health care professionals to work interprofessionally, they must be educated interprofessionally.<sup>155</sup>
- A systematic review of six studies on IPE found the vast majority reported positive learner-focused outcomes, i.e. changes in attitudes, knowledge, skills and perceptions of other professionals; a small number reported positive changes in organizational practices, such as referrals, documentation and working patterns; a smaller number addressed

changes to patient care delivery, including changes in clinical outcomes (i.e. infection rates, error rates, and length of stay).<sup>159</sup>

- Students completing the IPE curriculum at St. Louis University report that it breaks down negative stereotypes, improves their confidence in communicating across professions, and positively influences their willingness to continue learning together.<sup>160</sup>

**Trend 3: A resurgence of interest in IPE has occurred with the goal of team-based care becoming the norm in health care.**

- The Interprofessional Education Collaborative was formed in 2012 to improve collaboration and patient-centered care skills among nursing, medicine, pharmacy, dentistry, public health and other health professions.<sup>161</sup>
- The American Association of Medical Colleges released a set of IPE competencies in 2013 for medical students which can also be used by all health professions.<sup>162</sup>
- St. Louis University has integrated IPE into the curricula of 9 health profession programs; expectations are that IPE training facilitates patient-centered care, reduces fragmentation of care and medical errors, and optimizes health outcomes.<sup>160,163</sup>
- Students completing the integrated St. Louis University IPE curriculum receive a Certificate in Interprofessional Practice and the innovative program has been instrumental in recruiting students and faculty.<sup>160</sup>
- The Accreditation Council for Education in Nutrition and Dietetics (ACEND) recognizes the growing importance for health professionals to be educated interprofessionally and work more interprofessionally.<sup>3</sup>

**Trend 4: Many difficulties and challenges exist to the successful implementation of IPE but innovative approaches can help overcome some of the challenges.**

- Challenges to IPE success include costs, creating a cultural shift and dealing with the logistics of a prescribed, overloaded curricula, limited flexibility and room for expansion in the curricula, and creating common blocks of time <sup>160,164,165</sup>
- Success of IPE programs is based on the level of investment by administration, commitment and buy-in of faculty, and support from students. <sup>160,164</sup>
- Students attending an Australian University were overwhelmingly positive about their experiences with an online, web-based module to facilitate IPE; students increased their understanding of health professions' roles and observed patient-centered care delivery across different professions which they were unable to experience in their clinical placements. <sup>165</sup>
- Dietetics students want to learn about the roles and responsibilities of and interact with other health professions but dietetics education programs are participating in IPE in limited ways. <sup>166</sup>

**Implications:**

- The profession should collaborate with other health profession accreditation bodies to establish core educational requirements and shared competencies; accreditation agencies can provide an impetus by requiring an IPE dimension in their guidelines. <sup>164</sup>
- The profession should consider including core and outcome IPE competencies as a standard for licensure and certification.

- Dietetics educators can adopt relevant IPE competencies for their programs from the Association of American Medical Colleges.<sup>166</sup>
- Nutrition and dietetics practitioners need sufficient IPE literacy and leadership skills to join and lead teams where nutrition plays an important role.<sup>2</sup>
- Dietetics educators can increase opportunities for students to learn from and with other health professions students by building on existing community-based events (e.g. health fairs and student run clinics).<sup>166</sup>
- Dietetics educators should embrace innovative ways to incorporate IPE into their programs (e.g. simulations and web-based resources).<sup>166</sup>
- Engaging in IPE is an opportunity to actively promote a broader understanding and appreciation of the RDNs' role and how it differs from someone providing general nutrition advice; RDNs need to be “at the table” now to be recognized and included as an essential interprofessional health team member, particularly as one payment for services continues to be the direction of future reimbursement.<sup>112</sup>
- Well-designed studies to determine how IPE affects patients, populations and health system outcomes are needed.<sup>166,167</sup>



## **Change Driver: Food Becomes Medicine in the Continuum of Health**

**Nutrition and medical nutrition therapy (MNT) become even more critical in current and future emerging health care models for their pivotal roles in wellness, health promotion, disease prevention and disease management.**

### **Rationale:**

Once relegated to conversations among “health nuts” nutrition is now a mainstream topic of conversation. From 1991 to 2011, based on The Nutrition and You: Trends 2011 survey, the percentage of men and women who responded that "diet and nutrition are very important to me personally" increased from 42% to 67%.<sup>168</sup> The public’s explosion of interest in nutrition and wellness is transforming food retailers who are positioning themselves as health care destinations.<sup>169</sup> As health care is disrupted and transitions from the medical model to one of prevention and wellness, nutrition is poised to take center stage in health promotion and disease prevention programs in worksites and other community-based settings.<sup>8,117,136</sup> The following forces are converging to position nutrition and MNT as indispensable to health and well-being: the prevalence of obesity and its comorbidities, especially among younger adults; the large human and financial burdens and costs of diseases associated with obesity and an aging population; and the recent revelation that poor diet is the biggest contributor to early death globally.<sup>170</sup>

**Trend 1: Innovations by food and nutrition-related industries are capitalizing on consumers' growing passion for nutrition and health.**

- Consumers are actively using foods as medicine, including functional and fortified foods, to address their health concerns and medical conditions.<sup>89</sup>
- Food industries are overhauling products to cater to consumers' desires for safe and healthy foods;<sup>147</sup> Campbell Soup is removing all artificial flavors and ingredients from its products in North America by 2018.<sup>171</sup>
- Food retailers are increasingly investing in health and wellness; 70% of those surveyed perceive health and wellness programs as a significant growth opportunity and envision pharmacists and dietitians as taking the lead.<sup>169</sup>
- Supermarket dietitians are increasing in numbers and can impact public health by reaching millions of shoppers;<sup>172</sup> 95% of supermarkets hire dietitians at the corporate, regional and store levels.<sup>169</sup>

**Trend 2: Unprecedented opportunities to lead preventive aspects of health arise from health care reform and emerging models of health care.**

- Nationally, the percentage of people without health insurance coverage decreased sharply between 2013 (41.8 million or 13.3%) and 2014 (33 million or 10.4%), when many of the provisions of the Patient Protection and Affordable Care Act (ACA) took effect.<sup>173</sup>
- A transformation in health care is underway, with primary care leading the way and the concepts of prevention, wellness and public health growing in popularity.<sup>117</sup>
- The locus of control for obesity is increasingly shifting from clinical settings into the communities where people live, work and play.<sup>147</sup>

- Lifestyle risk factor modification and weight management are essential components of health promotion and disease prevention programs in worksites, schools, community clinics, health clubs, social service programs and other community settings.<sup>8</sup>
- The emerging PCMH model of care includes acute and chronic care and preventive nutrition-related services, but few RDNs are integrated into and valued members of the PCMH team.<sup>114</sup>

**Trend 3: Nutrition and MNT are poised for primetime with the high prevalence of obesity and its related diseases.**

- Obesity prevalence remains high; >1/3<sup>rd</sup> (34.9% or 78.6 million) of U.S. adults are obese and approximately 17% (or 12.7 million) of children and adolescents 2-19 years are obese.<sup>174</sup>
- Obesity-related conditions, including heart disease, stroke, type 2 diabetes and certain types of cancer, are some of the leading causes of preventable death.<sup>175</sup>
- Health care costs could be dramatically reduced by reductions in obesity and related risk factors; the estimated annual medical cost of obesity in the U.S. was \$147 billion in 2008; the medical costs for obese individuals were \$1,429 (or approximately 42%) higher than for those of normal weight.<sup>176</sup>
- Obesity-related medical costs could drop by \$84.9 billion ( $\pm$  9.3 billion) by 2030 with only a 1% decline from anticipated obesity trajectories.<sup>177</sup>
- Increased body weight is associated with early development of disease; the effects of excess weight on years of life lost is greatest for younger individuals; estimates indicate obese men and women, aged 20-30, lost 5.9 and 5.6 years of life, respectively.<sup>178</sup>

- Poor diet and high blood pressure are the top two contributors to early death globally based on an assessment of 79 behavioral, environmental, occupational and metabolic risks in 188 countries, between 1990 and 2013.<sup>170</sup>
- MNT is the cornerstone of prevention and treatment for overweight, obesity and most obesity-related conditions, including diabetes, hypertension and cardiovascular disease.<sup>8,114</sup>
- Demand for medically-tailored, home-delivered meals for managing critical and chronic illnesses has surged 20-45% in some U.S. cities.<sup>179</sup>

### **Implications:**

- Food sector jobs may increase in food and nutrition-related industries to support the public's interest in nutrition and healthier lifestyles and meet the ACA mandates for nutrition labeling on restaurant menus and vending machines.<sup>2,8</sup>
- RDNs must be proactive in promoting nutrition and positioning themselves as an essential and valued part of PCMHs and other emerging models of health care
- Increased encroachment and competition in the areas of wellness, health promotion and disease prevention may occur due to explosion in the number of nutrition-related credentials and lack of regulatory standards.<sup>180</sup>
- Adjustments in educational models and credentials to reflect emerging areas of practice, such as wellness and health promotion, may be necessary to remain competitive in the changing health care environment.<sup>147</sup>
- The prevention and wellness movement will continue to accelerate and diet, fitness and wellness programs will prosper.<sup>6</sup>

## **Change Driver: Technological Obsolescence is Accelerating**

**Advances in technologies are having dramatic impacts on health care, education, employment and food systems.**

### **Rationale:**

Twenty years into the technology revolution, the acceptance and spread of digital products and services have been historically unparalleled.<sup>181</sup> In 1997, only 18% of U.S. households had access to the Internet; 74% had Internet access and 63% had smartphones in 2013.<sup>182,183</sup> In 2014, 4 in 10 U.S. households had cell phones only which is double the number from 2009.<sup>184</sup> Technology is transforming the way we learn, work and live. Our lives now revolve around access to worlds of information, instant communication and online shopping.<sup>181</sup> The “perfect storm” has arrived in health care as digital technologies and online platforms emerge.<sup>96</sup> Patients can get a secure video doctor consultation via their smartphones for \$30-40.<sup>185</sup> Telehealth enables society to address health care workforce shortages in rural America as never before.<sup>186</sup> Consumers will become “CEOs of their own health” in the future, as biometric sensors monitor their health status and provide warnings to stop disease before it happens.<sup>187,188</sup> Higher education’s foundation is shifting and it must reinvent itself as demand increases for personalized learning and online courses and programs.<sup>189</sup> Robots will perform most physical tasks in the future, creating challenges for society to upgrade its workforce to match the demands of the digital era.<sup>80</sup> Our food system landscape is also changing, with “perfect” foods from 3-D printers<sup>80</sup> and fully automated restaurants.<sup>82</sup> As digital citizens, we should value and appreciate the many benefits of technological innovations, but we must also understand the many implications and unanticipated consequences to shape the technological future we desire.<sup>181</sup>

**Trend 1: Innovative digital technologies personalize, revolutionize and increase access to health care.**

- Expanded electronic medical records and virtual health care teams result in fewer emergency department visits, more satisfied patients and increased RDN referrals.<sup>119,190</sup>
- Video consultations by RDNs can potentially reduce barriers to implementation of best practices for obesity management.<sup>183</sup>
- Interactive and self-navigated online web-based educational interventions can produce changes in patients' self-care behaviors.<sup>191</sup>
- Telemedicine interventions are as good as or better than traditional approaches to care.<sup>192</sup>
- A teledietetics model is more cost effective than a face-to-face model for long term weight reduction.<sup>193</sup>
- Health and fitness apps are the fastest growing category with an estimated worth of \$4 billion in 2014, likely to increase to \$26 billion by 2017.<sup>194</sup>
- Nutrition apps, mostly geared to weight loss, support adherence to diet monitoring.<sup>195</sup>
- Future medicalized smartphones<sup>185</sup> and doctor designed, patient customized mobile apps<sup>96</sup> can potentially decrease the use of doctors and health care costs, reduce the need for expensive clinical trials,<sup>80</sup> speed up care and increase patients' control over their own care.<sup>185</sup>
- Future digestible, embedded, and wearable technological sensors will monitor vital signs and health parameters 24 hours a day; then transmit data to the cloud and send alerts to medical systems in real time.<sup>95,96,185,187,188</sup>
- Robot assistants in health care facilities will perform many routine tasks like moving patients and drawing blood.<sup>96</sup>

- More objects will be printed with 3-D printers, including drugs, cells, organs, and living tissues.<sup>96</sup>

**Trend 2: Technological applications, economics and student demands disrupt traditional educational institutions.**

- Given more choices in educational delivery modes, students increasingly “buy” education on their own terms, based on timeliness, availability on demand, affordability, and relevance to their needs.<sup>80,189</sup>
- Education in the U.S. is moving rapidly to the Internet<sup>6</sup>; many institutions are making online courses available for free, shifting the role of faculty from teachers to course designers.<sup>80,189</sup>
- Massive open online courses (MOOCs) have soaring enrollments. The first MOOC offered in 2011 had an enrollment of 160,000; however, MOOCs have low completion rates (rarely >15%).<sup>196</sup>
- For-profit learning institutions are capitalizing on on-line academic curricula.<sup>189</sup>
- Fifty percent of all traditional colleges are projected to collapse by 2030, paving the way for a new, lean educational model of personalized learning; micro-colleges, which require < 6 months of training and apprenticeship to switch professions, may emerge.<sup>80,94</sup>
- Despite growth in online education, many traditional college age students’ desire to have a “college experience” and their parents’ need to send them “off to college” remain strong.<sup>189</sup>

- Universities are challenged to keep pace with new information technology increasingly being used to manage courses, student enrollments, student records, and campus communications.<sup>189</sup>

**Trend 3: Technological advances impact work settings and change how, when and where people work.**

- Telecommuting is growing rapidly; about 80% of companies worldwide have employees who work at home, up from 54% in 2003.<sup>6</sup>
- Robots will take over more and more jobs that are routine, remote, or risky.<sup>6</sup>
- Artificial intelligence, data mining, and virtual reality will help industries and governments assimilate data and solve problems beyond the capability of today's computers.<sup>6</sup>
- The Internet is fostering a new generation of entrepreneurs by making it easier and cheaper to establish a profitable business.<sup>6</sup>
- Basic computer programming will become a core skill, required in > 20% of all jobs by 2030.<sup>80</sup>

**Trend 4: The digital age is transforming next generation food systems.**

- Robotic farming equipment will fertilize, plow and harvest future crops.<sup>187</sup>
- Humanoid robots that operate 24/7 will eventually replace migrant workers.<sup>187</sup>
- Vertical, urban farming will use robots and sensors to provide ideal light, pH and nutrients to maximize crop yields; the miles food travels from farm to fork will decrease dramatically.<sup>187</sup>



- Supermarkets will provide individuals and families with foods tailored to their specific lifestyle and health needs.<sup>197</sup>
- On-line grocery sales will be \$18 billion by 2018 and may account for 50% of US grocery sales by 2030.<sup>198,199</sup>
- Automation allows restaurant customers to order, pay for and receive their food without ever interacting with a person, which decreases labor cost and increases speed.<sup>82</sup>
- Next generation foods may come from 3-D printers capable of printing perfect, personalized foods in terms of size, color, texture, taste, aroma and health properties.<sup>80</sup>

### **Implications:**

- RDNs should shift to higher level skills and services that cannot be automated or programmed into expert systems.<sup>2</sup>
- RDNs and NDTRs can become leaders in mobile app development and research, focusing on their ability to produce dietary behavior change.<sup>184,195</sup>
- RDNs and NDTRs who can develop technological innovations will be in demand.<sup>2</sup>
- Digital literacy should be a part of the official curriculum to prepare all health care professionals for digital health care technologies.<sup>96</sup>
- Barriers to utilizing teledietetics need to be addressed in order for RDNs to embrace this technology.<sup>183,184,186</sup>
- To remain competitive, universities must develop high quality online courses and programs, but faculty require additional resources and support staff.<sup>196</sup>

- Massive data collected through health information systems represent an untapped resource to improve nutrition and health care outcomes; RDNs and NDTRs should be proficient in data management and utilization skills.<sup>111</sup>

## **Change Driver: Simulations Stimulate Strong Skills**

**The use of simulation as an instructional methodology and the amount of research focused on simulations in health care education has become increasingly popular in the last few decades.**

### **Rationale:**

Simulations have been traditionally applied in fields where significant risk is associated with the activities being practiced, including the military, law enforcement, and aviation.<sup>200,201</sup> The use of simulation in health care education is now also growing substantially. Simulation experts project that simulation programs in health care must grow at least 100% over the next five years to reach the level of programs in other fields.<sup>200,201</sup> By simulating actual work settings,<sup>200</sup> simulations play a vital role in training prior to employment, as well as updating skills of current practicing professionals.<sup>202</sup> In the health care area, simulation has historically been implemented in medical and nursing education and has more recently gained popularity in health professions curricular, with educators noting many advantages associated with the use of simulations. When compared with clinical experience, research has shown similar or improved learner attainment of knowledge and skills from simulation.<sup>203</sup> Although limited in number, research studies have also shown favorable outcomes of using simulations in nutrition and dietetics.<sup>204</sup> The use of simulations in dietetics education will continue to expand because they are effective pedagogical tools, consistent with competency-based education and have the potential for cross-discipline competency development.<sup>201</sup>

**Trend 1: Simulations help address increased complexity of health care, higher patient acuity levels and patient safety.**

- Consistency in students' simulated experiences can enhance the quality of patient care.<sup>203,204,205</sup>
- Learners can make mistakes in simulated scenarios, learn from their mistakes and rehearse clinical behaviors in a low-risk environment, thus decreasing harm to patients.<sup>201,202,203,205,206</sup>
- Simulations that promote team settings, where professionals learn from, with and about each other can improve patient safety and outcomes.<sup>201,202,205</sup>
- Learners can practice with complex situations in a safe, simulated environment before experiencing similar cases in real practice, which results in increased learner skills, confidence and potential for employment.<sup>200,203,204,205,206</sup>
- Simulations used for continuing professional education help maintain high standards of care that regulatory bodies, professions and the public demand better than traditional education strategies.<sup>202</sup>

**Trend 2: Accountability of care, pay for performance and financial penalties for provider errors spur interest in simulations.**

- Team-based simulations can promote interprofessional communication skills which can result in better patient outcomes.<sup>201,202,205</sup>
- A meta-analysis on simulation based medical education revealed superior results to traditional methods of medical education in terms of learning and patient outcomes.<sup>207</sup>

**Trend 3: The use of simulations increases in response to cost-cutting in higher education and reduction in the availability of clinical placements for students.**

- A severe shortage of supervised practice sites for clinical placements for students remains a challenge for dietetic education programs that are under pressure to recruit and maintain preceptors.<sup>205</sup>
- By decreasing the amount of time learners must spend in facilities and relieving some of the pressure on supervised practice sites, simulations can optimize scarce clinical education resources.<sup>205</sup>
- Simulations can address the unequal quality of various practice sites and the inconsistent experiences students obtain during clinical placements.<sup>205</sup>
- In 2012 and 2013, the Academy of Nutrition and Dietetics' Foundation offered up to \$200,000 in grant funding for the development of simulations in dietetics to address the Accreditation Council for Education in Nutrition and Dietetics' (ACEND) required supervised practice competencies and the shortage and quality of clinical placement sites.<sup>205</sup>

**Trend 4: The desire to improve critical thinking skills of learners drives the development and use of simulations.**

- Simulations based on best education practices can achieve optimal learning outcomes in an organized fashion by facilitating the progression of learning from simpler to more complex skills and helping learners connect new learning with previous learning.
- Simulations can improve documentation of student achievement and outcomes in education.<sup>200,201,205,206</sup>

- Critical thinking skills and desired learning outcomes are possible through simulations delivered in a variety of methods, including computer-based, peer to peer, and unfolding case studies.<sup>201,205</sup>

### **Implications:**

- Accreditation and licensing bodies and educational and health care authorities should support the integration of simulation into the education of all health provider groups.
- Adequate resources are needed for the development of standardized, high quality simulations which can provide consistency across health care professional training programs, including simulations that facilitate demonstration of ACEND - required nutrition and dietetics competencies.<sup>200,201,205</sup>
- Resources focused on low fidelity simulations can provide a higher return on investment because the number of education programs with access to a high fidelity simulation lab may be small.
- Simulations should be gradually implemented and integrated into existing curricular structures with deliberation and adequate evaluation to ensure program quality; research and evaluation should focus on the optimal method and frequency of exposure, quality of assessment tools, and impact on individual learners and patient care.<sup>205</sup>
- Adequate time and resources are needed for training dietetics educators in simulation methodology and use.<sup>205</sup>
- Simulations in dietetics education have the potential to decrease the number of required hours in actual practice settings (e.g. clinical, management, community), improve

preparation for supervised practice and improve critical thinking skills, but simulations cannot and should not be used to replace supervised practice experiences.<sup>201,205,206</sup>

- Simulations designed for use in dietetics education programs could also be used to re-train and update the skills of experienced RDNs and NDTRs.<sup>202</sup>
- Collaboration should be encouraged among dietetics educators with respect to the development of simulation topics, design of simulations based on best education practices, and simulation evaluation data.<sup>200,201,205</sup>
- Collaboration with other health professional education programs experienced in simulations should be encouraged, especially nursing which addresses a number of competencies also used in nutrition and dietetics practice.<sup>200,201,205</sup>

## Glossary

**Accountable Care Organization:** a model of health care in which groups of physicians, health care providers and hospitals align to provide coordinated, high quality care to their patients both inside and outside of the hospital.<sup>108</sup>

**Advanced practice:** the practitioner demonstrates a high level of skills, knowledge and behaviors. The individual exhibits a set of characteristics that include leadership and vision and demonstrates effectiveness in planning, evaluating and communicating targeted outcomes.<sup>209</sup>

**Brainstorming:** the generation of new ideas among members of a small group gathered to think creatively about a topic; useful in identifying possibilities, opportunities, and risks.<sup>5</sup>

**Capacity building skills:** methods for sharing knowledge, developing skills, and creating institutional systems and capacity among a target population, such as training, technical consultation, information packaging and dissemination, and technology transfer activities.<sup>210</sup>

**Change drivers:** issues, events, developments and trends coming together as a major force of change.<sup>1</sup>

**Community health care worker:** a frontline public health worker who is a trusted member of and/or has an especially close understanding of the community being served that allows them to serve as a liaison between health, social services, and the community to improve the quality and cultural competency of service delivery.<sup>211</sup>

**Community organizing:** a process through which communities are helped to identify common goals or problems, mobilize resources, and develop and implement strategies for reaching their established goals.<sup>212</sup>

**Consulting others:** asking other people - often experts - for their opinions about the future.<sup>5</sup>



**Cultural competence:** the ability of health organizations and practitioners to recognize the cultural beliefs, values, attitudes, traditions, language preferences, and health practices of diverse populations, and to apply that knowledge to produce a positive health outcome. Additionally, competency includes communicating in a way that is linguistically and culturally appropriate.<sup>42</sup>

**Culture of health:** the result of what happens when an organization moves beyond wellness programs and undergoes “a fundamental shift toward health promotion as part of the daily practice of the organization and engages people at every level”<sup>118(p8)</sup>

**Evidence-based practice:** an approach to health care wherein health practitioners use the best evidence possible, i.e., the most appropriate information available, to make decisions for individuals, groups and populations.<sup>209</sup>

**Food as medicine:** a proactive and preventive approach to health where consumers actively choose foods and ingredients, based on how they function in the body, to address health issues and medical conditions.<sup>8,134</sup>

**Food hub:** a centrally located business-type facility that facilitates the aggregation, storage, processing, distribution and/or marketing of locally and regionally produced food products.<sup>63</sup>

**Food Policy Council:** collaborations between stakeholders representing various segments of a local food system; typically composed of citizens and government officials who study the operation of a local food system and make recommendations for improvement through public policy change; provides a voice for groups who have been historically underserved or underrepresented by agricultural institutions.<sup>63</sup>

**Health disparity:** a type of difference in health that is closely linked with social or economic disadvantage. Health disparities negatively affect groups of people who have systematically experienced greater social or economic barriers to health.<sup>213</sup>

**Health equity:** the attainment of the highest possible level of health for all people, which requires that all persons are valued equally with focused and ongoing societal efforts to eliminate disparities.<sup>37</sup>

**Health literacy:** the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.<sup>42</sup>

**Historical analysis:** the study of historical events to anticipate the outcome of current developments.<sup>5</sup>

**Humanoid robots:** robots built to resemble the shape of the human body.<sup>96</sup>

**Integrative health care:** health care that is person-centered, oriented to healing, and uses both conventional and complementary therapies; represents a broader paradigm than traditional health care.<sup>214</sup>

**Interprofessional education:** “occurs when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes.”

155(p196)

**Long term services and supports (LTSS):** a broad range of health-related and social services that assist individuals who have limitations in their ability to perform self-care due to physical, cognitive, developmental or other chronic health conditions that is expected to continue for an extended period of time.<sup>14</sup>

**Massive open online courses (MOOCs):** free, large-scale open access courses on the Internet that are asynchronous, use interactive user forums, and provide an opportunity to earn a document of completion or achievement.<sup>196</sup>

**Medical nutrition therapy (MNT):** an evidence-based application of the Nutrition Care Process. The provision of MNT (to a patient/client) may include one or more of the following: nutrition assessment/ re-assessment, nutrition diagnosis, nutrition intervention and nutrition monitoring and evaluation that typically results in the prevention, delay or management of diseases and/or conditions.<sup>209</sup>

**Micro-colleges:** “any form of concentrated post-secondary education oriented around the minimum entry point into a particular profession.”<sup>80(p15)</sup>

**Nutritional genomics:** broad term encompassing nutrigenetics, nutrigenomics, and nutritional epigenomics, all of which involve how nutrients and genes interact and are expressed to reveal phenotypic outcomes, including disease risk.<sup>100</sup>

**Nutrition informatics:** the effective retrieval, organization, storage and optimum use of information, data and knowledge for food and nutrition related problem solving and decision making. Informatics is supported by the use of information standards, processes and technology.<sup>209</sup>

**Older adult:** chronological age of 65 years or greater.<sup>215</sup>

**Patient Centered Medical Home (PCMH):** a model of the organization of primary care that delivers the following five core functions of primary health care: comprehensive care; patient-centered care; coordinated care; accessible services; and quality and safety.<sup>216</sup>

**Population health:** “the health outcomes of a group of individuals, including the distribution of such outcomes within the group.”<sup>217(p380)</sup> Population health also addresses determinants of

health, such as medical care, public health programs, social factors, physical environment, personal behavior, and genetics. Examples of populations include geographic regions, ethnic groups, employees, patients in a health care setting, or groups sharing other common characteristics, such as disabled persons or prisoners.

**Scanning:** an ongoing effort to identify significant changes in the world beyond the group doing the scanning; typically based on a systematic survey of resources for indication of changes likely to have future importance.<sup>5</sup>

**Simulation:** "...a technique used to replace or amplify real experiences with guided experiences that evoke or replace substantial aspects of the real world in a fully interactive manner."<sup>208(pe58)</sup>

**Social ecological framework:** a conceptualization of intervention targets and levels of influence on behavior and behavior change, including: the individual level includes people's knowledge, skills and attitudes; the interpersonal level includes social and peer influences; the institutional/organization level includes changes in organizational policies, practices and environments; the community level includes neighborhoods and community environments; and policy and systems levels include changes in policies and social structures and systems through policy advocacy and political actions.<sup>8</sup>

**Social justice:** a fair disbursement of common advantages and the sharing of common burdens.<sup>218</sup>

**Sustainable diets:** diets with low environmental impacts that are economically fair and affordable and contribute to food and nutrition security and healthy lives for present and future generations.<sup>78</sup>

**Team-based learning:** "... an instructional approach aimed at preparing students for effective, collaborative work within a cohesive group."<sup>2(pS16)</sup>

**Telehealth:** “the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration. Telehealth will include both the use of interactive, specialized equipment, for such purposes as health promotion, disease prevention, diagnosis, consultation, therapy, and/or nutrition intervention/plan of care, and non-interactive (or passive) communications, over the Internet, video-conferencing, e-mail or fax lines, and other methods of distance communications, for communication of broad-based nutrition information.”<sup>209(p31)</sup>

**Telemedicine:** “applicable to physicians and other practitioners, and is the use of medical information exchanged from one site to another via electronic information and telecommunications technologies to improve patients' health status, to engage in the diagnosis and treatment of medical conditions, to support clinical care, or to provide health services or aid health care personnel at distant sites.”<sup>209(p31)</sup>

**Telenutrition:** “involves the interactive use, by a Registered Dietitian or Registered Dietitian Nutritionist, of electronic information and telecommunications technologies to implement the Nutrition Care Process (nutrition assessment, nutrition diagnosis, nutrition intervention/plan of care, and nutrition monitoring and evaluation) with patients or clients at a remote location, within the provisions of their state licensure as applicable.”<sup>209(p32)</sup>

**3 D printer:** “an object creation technology where the shape of the objects are formed through a process of building up layers of material until all of the details are in place; a relatively slow process requiring several hours to complete.”<sup>80(p4)</sup>

**Transdisciplinary professionalism:** An approach to creating and carrying out a shared social contract that ensures multiple health disciplines/professions, working in concert, are worthy of the trust of patients and the public.<sup>157</sup>

**Trend analysis:** examination of a trend to identify its nature, causes, speed of development and potential impacts.<sup>5</sup>

**Trends:** a string of issues, events or developments that build momentum; a direction of change, usually a long-term development, that usually influences society, systems, organizations, institutions and sometimes nations and the world.<sup>1</sup>

**Value based purchasing:** “...a financial plan that links provider payment to improved performance by the health care provider.”<sup>108</sup>

**Visioning:** a process in which a group describes the future it wants; visioning creates a picture of the desired future status, affirms the best of what could be, visualizes what excellence looks like, and shows the best scenario for the time; it illustrates how an organization or profession wants to “look” to insiders and outsiders and some say the vision is what you would describe if you had an overnight epiphany that illustrates the perfect position for an organization or profession.<sup>1</sup>

**World Future Society:** a chartered nonprofit educational and scientific organization founded in 1966 in Washington, DC; it is an association of people interested in how social and technological developments are changing the future; serves as a neutral clearinghouse for ideas about the future, including forecasts, recommendations, and alternative scenarios, that help people anticipate what might happen in the next five, 10 or more years ahead.<sup>5</sup>

**Yield gap:** the difference between the actual and the attainable crop yield.<sup>87</sup>

## Reference List

1. Academy of Nutrition and Dietetics Council on Future Practice. *Futures Thinking, Visioning and Change Leadership Process of the Council on Future Practice*. Academy of Nutrition and Dietetics Council on Future Practice Visioning Process Website. [www.eatrightpro.org/visioning](http://www.eatrightpro.org/visioning). Published April, 2014. Accessed October 29, 2015.
2. Rhea M, Bettles C. Future changes driving dietetics workforce supply and demand: Future scan 2012-2022. *J Acad Nutr. Diet.* 2012; 112 (suppl 1): S10 – S24.
3. Accreditation Council for Education in Nutrition and Dietetics. *Rationale for Future Education Preparation of Nutrition and Dietetics Practitioners*. ACEND Website. [www.eatrightacend.org/ACEND/content.aspx?id=6442485290](http://www.eatrightacend.org/ACEND/content.aspx?id=6442485290). Published February, 2015. Updated July, 2015. Updated August, 2015. Accessed August 25, 2015.
4. Academy of Nutrition and Dietetics Foundation. Future of Food. Academy of Nutrition and Dietetics Website. [www.eatrightpro.org/resource/about-us/alliances-and-collaborations/foundation-initiatives/future-of-food](http://www.eatrightpro.org/resource/about-us/alliances-and-collaborations/foundation-initiatives/future-of-food). Published 2013. Accessed April 17, 2015.
5. World Future Society. The art of foresight. Preparing for a changing world: A special report from the World Future Society. *World Future Society* Website. [www.wfs.org/specialreports](http://www.wfs.org/specialreports). Published 2009. Accessed May 4, 2015.
6. Cetron M, Davies O. 52 Trends Shaping Tomorrow's World. World Future Society Website. [www.wfs.org/specialreports](http://www.wfs.org/specialreports). Published 2010. Accessed August 28, 2015.
7. Ortman J, Velkoff V, Hogan H. *An Aging Nation: The Older Population in the United States. Population Estimates and Projections*. United States Census Bureau. May 2014;

Report Number: P25-1140. [www.census.gov/library/publications/2014/demo/p25-1140.html](http://www.census.gov/library/publications/2014/demo/p25-1140.html). Updated July 17, 2014. Accessed December 14, 2014.

8. Haughton B, Stang J. Population risk factors and trends in health care and public policy. *J Acad Nutr Diet*. 2012; 112 (suppl 1): S35-S46.
9. Anderson G. *Chronic Care: Making the Case for Ongoing Care*. Princeton, NJ: Robert Wood Johnson Foundation; 2010. [www.rwjf.org/pr/product.jsp?id=50968](http://www.rwjf.org/pr/product.jsp?id=50968). Accessed October 29, 2015.
10. Centers for Medicare & Medicaid Services. *Chronic Conditions among Medicare Beneficiaries, Chart Book*. Baltimore, MD. 2011.
11. Gerteis J, Izrael D, Deitz D, et al. *Multiple Chronic Conditions Chartbook: 2010 Medical Expenditure Panel Survey Data*. AHRQ Publications No, Q14-0038. Rockville, MD: Agency for Healthcare Research and Quality. April 2014.
12. Riley G, Lubitz J. Long-term trends in Medicare payments in the last year of life. *Health Services Research*. April 2010; 45(2): 565-576.
13. Stevenson DG, Cohen MA, Tell EJ, Burwell B. The complementarity of public and private long-term care coverage. *Health Affairs*. 2010 Jan-Feb; 29(1):96–101.
14. Bipartisan Policy Center. *America's Long-Term Care Crisis: Challenges in Financing and Delivery*. <http://bipartisanpolicy.org/library/americas-long-term-care-crisis/>. Published April 7, 2014. Accessed January 14, 2015.
15. Neuman P, Cubanski J, Damico A. The rising cost of living longer: Analysis of Medicare spending by age for beneficiaries in traditional Medicare. *Health Aff*. February 2015; 34(2):335-339.



16. Centers for Medicare & Medicaid Services. *Nursing Home Data Compendium 2013 Edition*. Department of Health and Human Services. 2013.  
[www.cms.gov/medicare/provider-enrollment-and-certification/certificationandcompliance/nhs.html](http://www.cms.gov/medicare/provider-enrollment-and-certification/certificationandcompliance/nhs.html). Accessed October 7, 2015.
17. Norton, S., Matthews, F. E., Barnes, D.E., Yaffe, K. and Brayne, C. Potential for primary prevention for Alzheimer's disease: an analysis of population-based data. *The Lancet*. 2014; 13:788–794.
18. Position of the American Dietetic Association, American Society for Nutrition, and Society for Nutrition Education: Food and nutrition programs for community-residing older adults. *J Am Diet Assoc*. 2010;110(3):463-472.
19. Walker M, Murimi M, Kim Y, Hunt A, Erickson D, Strimbu B. Multiple point-of-testing nutrition counseling sessions reduce risk factors for chronic disease among older adults. *J. Nutr in Gerontology and Geriatrics*. 2012; 31:146-157.
20. Feldblum I, German L, Castel H, Harman-Boehm I, Shahar DR. Individualized Nutritional Intervention During and After Hospitalization: The nutrition intervention study clinical trial. *JAGS*. 2011; 59:10-17
21. Alliance to Advance Patient Nutrition. *Alleviating Hospital-based Malnutrition: A Baseline Progress Report*. Alliance to Advance Patient Nutrition website.  
<http://malnutrition.com/progressreport>. Published 2014. Accessed November 9, 2015.
22. White J, Guenter P, Jensen G, Malone A, Schofield M. Consensus statement of the Academy of Nutrition and Dietetics/American Society of Parenteral and Enteral Nutrition: Characteristics recommended for the identification and documentation of adult malnutrition (undernutrition). *J Acad Nutr Diet*. 2012;112(5):730-738.

23. Steiber A, Hegazi R, Herrera M, et al. Spotlight on global malnutrition: A continuing challenge in the 21<sup>st</sup> century. *J Acad Nutr Diet*. 2015;115(8):1335-1341.
24. Hegerova P, Dedkova Z, Sovotka L. Early nutritional support and physiotherapy improved long-term self-sufficiency in acutely ill older patients. *Nutrition*. 2014; 31(2015): 166-177.
25. Strawbridge L, Lloyd J, Meadow A, Riley G, Howell B. Use of Medicare's diabetes self-management training benefit. *Health Education & Behavior*. 2015; 1-9.
26. Centers for Medicare & Medicaid Services. Impact Act of 2014 and Cross Setting Measures. <https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Post-Acute-Care-Quality-Initiatives/IMPACT-Act-of-2014-and-Cross-Setting-Measures.html>. Updated October 28, 2015. Accessed October 30, 2015.
27. American Health Care Association and National Center for Assisted Living. Improving Medicare Post-Acute Transformation (IMPACT) Act of 2014. <http://www.ahcancal.org/Pages/Default.aspx>. Published October 14, 2014. Accessed October 29, 2015.
28. Reinhard AH, Feinberg L, Choula R, Houser A. Valuing the Invaluable: 2015 Update. AARP Public Policy Institute. [www.aarp.org/content/dam/aarp/ppi/2015/valuing-the-invaluable-2015-update-new.pdf](http://www.aarp.org/content/dam/aarp/ppi/2015/valuing-the-invaluable-2015-update-new.pdf). Published July 2015. Accessed October 30, 2015.
29. Rogers D. Compensation and Benefits Survey 2015. *J Acad Nutr Diet*. 2016; 116(3): 370-388.
30. Academy of Nutrition and Dietetics compensation and benefits survey of the dietetics profession. Chicago, IL: Academy of Nutrition and Dietetics; 2013:1-225.

31. Colby SL, Ortman JM. *Projections of the Size and Composition of the U.S. Population: 2014 to 2060*. Current Population Reports, P25-1143. Washington, DC: U.S. Census Bureau; 2014.  
<http://www.census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf>. Accessed November 3, 2015.
32. Ennis S, Rios-Vargas M, Albert N. *The Hispanic Population: 2010*. US Census Bureau. Published May 2011. [www.census.gov/prod/cen2010/briefs/c2010br-04.pdf](http://www.census.gov/prod/cen2010/briefs/c2010br-04.pdf). Accessed October 23, 2015.
33. Hoeffel E, Rastogi S, Ouk Kim M, Shahid H. *The Asian Population: 2010*. US Census Bureau. Published March 2012. [www.census.gov/prod/cen2010/briefs/c2010br-11.pdf](http://www.census.gov/prod/cen2010/briefs/c2010br-11.pdf). Accessed October 23, 2015.
34. Department of Health and Human Services. *HHS Action Plan to Reduce Racial and Ethnic Health Disparities. A Nation Free of Disparities in Health and Health Care*. Washington, D.C.: U.S. Department of Health and Human Services. April 2011.
35. United States Department of Health and Human Services. *HHS Takes Next Step in Advancing Health Equity through the Affordable Care Act*.  
<http://www.hhs.gov/about/news/2015/09/03/hhs-takes-next-step-advancing-health-equity-through-affordable-care-act.html>. Published September 3, 2015. Accessed October 23, 2015.
36. Johnson-Askew W, Gordon L, Sockalingam S. Practice paper of the American Dietetic Association: Addressing racial and ethnic health disparities. *J Am Diet Assoc*. 2011; 111: 446-456.

37. Centers for Disease Control and Prevention – Division of Community Health. *A Practitioner's Guide for Advancing Health Equity: Community Strategies for Preventing Chronic Disease*. Atlanta, GA: US Department of Health and Human Services; 2013.
38. Kessler W, Tomoyasu N, Conway P. Beyond a traditional payer—CMS's role in improving population health. *N Eng J Med*. 2015; 372 (2): 109-111.
39. Phalen J and Paradis R. How Community Health Workers Can Reinvent Health Care Delivery in the US. *Health Affairs Blog*. Published January 16, 2015. Accessed October 15, 2015.
40. Gaba A, Srivastava A, Amadi C, Joshi A, The nutrition and dietetics workforce needs skills and expertise in the New York metropolitan area. *Global Journal of Health Science*. 2015; 8 (6); 14-24.
41. Koh H, Berwick D, Clancy C, et al. At the intersection of health, health care and policy. *Health Affairs*. 2012; 31(2): 434-443.
42. United States Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Quick Guide to Health Literacy Fact Sheet. <http://health.gov/communication/literacy/quickguide/factsbasic.htm>. Accessed October 15, 2015.
43. Bell SP, Schnelle J, Nwosu SK. Development of a multivariable model to predict vulnerability in older American patients hospitalised with cardiovascular disease. *BMJ Open*. 2015; 5(e008122):1-8.
44. Weiss BD. Health literacy research: isn't there something better we could be doing? *Health Commun*. 2015;30(12):1173-1175.

45. Larson N, Story M. Barriers to equity in nutritional health for U.S. children and adolescents: A review of the literature. *Curr Nutr Rep.* 2015;4:102–110.
46. Kaiser Family Foundation. Disparities in Health and Health Care: Five Key Questions and Answers. <http://kff.org/disparities-policy/issue-brief/disparities-in-health-and-health-care-five-key-questions-and-answers/>. Published November 30, 2012. Accessed October 15, 2015.
47. Weech-Maldonado R, Elliott MN, Pradhan R, Schiller C, Hall A, Hays RD. Can hospital cultural competency reduce disparities in patient experiences with care? *Med Care.* 2012 November; 50(0): S48–S55.
48. Heiss CJ, Rengers B, Fajardo-Lira C, Henley SM, Bizeau M, Dormer Gillette C. Preparing dietetics practitioners to effectively serve the Hispanic population. *J Am Diet Assoc.* 2011;111(3):359-364.
49. Mueller M, Purnell T, Mensah G, Cooper L. Reducing racial and ethnic disparities in hypertension prevention and control: What will it take to translate research into practice and policy? *American Journal of Hypertension.* 2014.
50. Carbone E, Zoellner J. Nutrition and health literacy: A systematic review to inform nutrition research and practice. *J Acad Nutr Diet.* 2012; 112(2): 254-265.
51. Renhazo AMN, Romios P, Crock C, Sonderlund AL. The effectiveness of cultural competence programs in ethnic minority patient centered health care—a systematic review of the literature. *International Journal for Quality in Health Care.* 2013; 25(3):261–269.

52. Lie DA, Lee-Ray E, Gomez A, Bereknyei S, Braddock CH. Does cultural competency training of health professionals improve patient outcomes? A systematic review and proposed algorithm for future research. *J Gen Intern Med.* 2010; 26(3):317–25.
53. Besnilian A, Goldenberg A, Plunkett S. Promoting diversity within the dietetics profession through a peer mentorship program. 2015. doi: 10.1016/j.jand.2015.07.018.
54. Stein K. The educational pipeline and diversity in dietetics. *J Acad Nutr Diet.* 2012; 112(6):791-800.
55. Mok HF, Williamson VG, Grove JR, Burry K, Barker SF, Hamilton AJ. Strawberry fields forever? Urban agriculture in developed countries: A review. *Agron. Sustain. Dev.* 2014; 34: 21-43. doi: 10.1007/s13593-013-0156-7
56. United States Department of Agriculture. *Know Your Farmer Know Your Food.* [www.usda.gov/wps/portal/usda/usdahome?navid=KYF\\_COMPASS](http://www.usda.gov/wps/portal/usda/usdahome?navid=KYF_COMPASS) Updated May 11, 2015. Accessed June 19, 2015.
57. Feldmann C, Hamm U. Consumers' perceptions and preferences for local food: A review. *Food Quality and Preference.* October 2014; 40(2015): 152-164.
58. Robinson-O'Brien R, Gerald BL. Practice paper of the Academy of Nutrition and Dietetics: Promoting ecological sustainability with the food system. Abstract in *J Acad Nutr Diet.* 2013;113:464. Full article found at: [www.eatrightpro.org/resources/practice/position-and-practice-papers/practice-papers](http://www.eatrightpro.org/resources/practice/position-and-practice-papers/practice-papers).
59. Pelletier J, MPH, Laska M, Neumark-Sztainer D, Story M. Positive attitudes toward organic, local, and sustainable foods are associated with higher dietary quality among young adults. *J Acad Nutr Diet.* 2013;113:127-132.

60. Nie C, Zepeda L. Lifestyle segmentation of US food shoppers to examine organic and local food consumption. *Appetite*. April 2011; 57(2011): 28-37.
61. United States Department of Agriculture. Local and Regional Food Systems. [www.usda.gov/wps/portal/usda/usdahome?contentid=usda-results-local.html](http://www.usda.gov/wps/portal/usda/usdahome?contentid=usda-results-local.html). Last Modified June 24, 2015. Accessed September 29, 2015.
62. Watrous M. Is Local the New Organic? Food Business News Website. [www.foodbusinessnews.net](http://www.foodbusinessnews.net). Published January 28, 2015. Accessed August 3, 2015.
63. Tagtow A, Robien K, Bergquist E, et al. Academy of Nutrition and Dietetics: Standards of professional performance for registered dietitian nutritionists (competent, proficient, and expert) in sustainable, resilient, and healthy food and water systems. *J Acad Nutr Diet*. 2014;114(3):475-488.
64. Buttriss J. Food reformulation: The challenges to the food industry. *Proceedings of the Nutrition Society*. 2013;72:61-69.
65. West PC, Gerber JS, Engstrom PM, et al. Leverage points for improving global food security and the environment. *AAAS*. 2014;345 (6194):325-328.
66. Bajzeli B, Richards K, Allwood J, et al. Importance of food-demand management for climate mitigation. *Nature Climate Change*. 2014;4:924-929.
67. Dube L, Pingali P, Webb P. Paths of convergence for agriculture, health, and wealth. *PNAS*. 2012;109(31):12294-12301.
68. Lubroth J. FAO and the one health approach. *Current Topics in Microbiology and Immunology*. 2012 (2013);366:65-72.

69. Wu SH, Ho CT, Nah SL, Chau CF. Global hunger: A challenge to agricultural, food, and nutritional sciences. *Critical Reviews in Food Science and Nutrition*. 2014;54 (2): 151-162.
70. Aiking H. Protein production: planet, profit, plus people? *Am J Clin Nutr*. 2014; 100 (suppl): 483S-489S.
71. Vermeulen SJ, Campbell BM, Ingram JSI. Climate change and food systems. *Annu Rev Environ Resour*. 2012;37:195-222.
72. Raphaely T, Marinova D. Flexitarianism: Decarbonising through flexible vegetarianism. *Renewable Energy*. 2014;67:90-96.
73. Colpaart A. Water use and shortages: The environmental impact and how RDs can help. *Today's Dietitian*. 2015; 17 (7): 46-51.
74. Tilman D, Clark M. Global diets link environmental sustainability and human health. *Nature*. 2014;000:1-5.
75. Gleick PH, Cooley H, Morikawa M. *The World's Water 2008-2009: The Biennial Report on Freshwater Resources*. Washington, DC: Island Press; 2009.
76. Thorburn PJ, Wilkinson SN, Silburn DM. Water quality in agricultural lands draining to the Great Barrier Reef: A review of causes, management and priorities. *Agriculture, Ecosystems & Environment*. 2013; 180(1): 4-20.
77. Coupe RH, Kalkhoff SJ, Capel PD, Gregoire C. Fate and transport of glyphosate and aminomethylphosphonic acid in surface waters of agricultural basins. *Pest. Manag. Sci*. 2012; 68:16-30.



78. Macdiarmid J, Kyle J, Horgan GW, et al. Sustainable diets for the future: Can we contribute to reducing greenhouse gas emissions by eating a healthy diet? *Am J Clin Nutr.* 2012;96:632-639.
79. Pansing C, Wasserman A, Fisk J, Muldoon M, Kiraly S, Benjamin T. *North American Food Sector, Part One: Program Scan and Literature Review.* Arlington, VA: Wallace Center at Winrock International; 2013.
80. Frey T. 33 Dramatic Predictions for 2030. Futurist Speaker Website. [www.futuristspeaker.com](http://www.futuristspeaker.com). Published December, 2013. Accessed February 13, 2015.
81. McFarland M. Drones Delivering Drinks in a Crowded Restaurant? It's Not as Crazy as it Sounds. *Washington Post.* February 13, 2015. [www.washingtonpost.com/news/innovations/wp/2015/02/13/drones-delivering-drinks-in-a-crowded-restaurant-its-not-as-crazy-as-it-sounds](http://www.washingtonpost.com/news/innovations/wp/2015/02/13/drones-delivering-drinks-in-a-crowded-restaurant-its-not-as-crazy-as-it-sounds). Accessed September 29, 2015.
82. Miller CC. Restaurant of the Future? Service with an Impersonal Touch. *New York Times.* September 8, 2015. [www.nytimes.com/2015/09/09/upshot/restaurant-of-the-future-service-with-an-impersonal-touch.html?\\_r=0](http://www.nytimes.com/2015/09/09/upshot/restaurant-of-the-future-service-with-an-impersonal-touch.html?_r=0). Accessed September 9, 2015.
83. Macdiarmid JI. Conference on 'Future Food and Health' symposium I: Sustainability and food security. Is a healthy diet an environmentally sustainable diet? *Proceedings of the Nutrition Society.* 2013;72:13–20.
84. Institute of Medicine. *Sustainable diets: Food for healthy people and a healthy planet: Workshop summary.* Washington, DC: The National Academies Press; 2014.
85. Foley J. Can we feed the world & sustain the planet? *Scientific American.* 2011; 3015(5): 60-65.

86. Kummu M, de Moel H, Porkka M, Siebert S, Varis O, Ward PJ. Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use. *Science of the Total Environment*. 2012;438:477-489.
87. Pinstrup-Anderson P. Can agriculture meet future nutrition challenges? *European Journal of Development Research*. 2013;25:5-12.
88. Frison E, Cherfas J, Hodgkin T. Agricultural biodiversity is essential for a sustainable improvement in food and nutrition security. *Sustainability*. 2011; 3:238-253.
89. Frey S, French S. Health & Wellness in America. The Nielsen Company and Natural Marketing Institute. [www.nielson.com](http://www.nielson.com). Published August 2014.
90. Shanker D. When it Comes to Food in the US, “Local” is the new “Organic”. Quartz Website. [www.qz.com](http://www.qz.com). Published July 16, 2015. Accessed July 21, 2015.
91. Cody MM, Stretch T. Position of the Academy of Nutrition and Dietetics: Food and water safety. *J Acad Nutr Diet*. 2014;114(11):1819-1829.
92. Bleich S, Wolfson J, Jarlenski M. Calorie changes in chain restaurant menu items. *Am J Prev Med*. 2015;48(1):70-75.
93. Vogliano C, Stieber A, Brown K. Linking agriculture, nutrition, and health: The role of the registered dietitian. *J Acad Nutr Diet*. 2015;115(10):1710-1714.
94. Wilms T. The World in 2033: Big Thinkers and Futurists Share Their Thoughts. Forbes Website. [www.forbes.com/sites/sap/2013/02/08/the-world-in-2033-big-thinkers-and-futurists-share-their-thoughts/](http://www.forbes.com/sites/sap/2013/02/08/the-world-in-2033-big-thinkers-and-futurists-share-their-thoughts/). Published February 8, 2013. Accessed February 13, 2015.
95. DeBusk R. Diet-related disease, nutritional genomics, and food and nutrition professionals. *J Am Diet Assoc*. 2009;109(3):410-413.

96. Mesko B. Rx disruption: Technology trends in medicine and health care. *The Futurist*. 2014; 48(3):31-38.
97. Global Industry Analysts. Future of Direct-to-Consumer (DTC) Genetic Testing Market Remains Fraught with Challenges, According to New Report by Global Industry Analysts, Inc. Global Industry Analysts Website  
[www.prweb.com/releases/DTC\\_genetic\\_testing/direct\\_to\\_consumer\\_tests/prweb9780295.htm](http://www.prweb.com/releases/DTC_genetic_testing/direct_to_consumer_tests/prweb9780295.htm) Published August 8, 2012. Accessed August 28, 2015.
98. Wheelwright V. Adventures in personal genomics. *The Futurist*. 2014; 48(3):43-45.
99. Mayes R. Where will the century of biology lead us? *The Futurist*. 2014; 48(3):26-30.
100. Camp K, Trujillo E. Position of the Academy of Nutrition and Dietetics: Nutritional genomics. *J Acad Nutr Diet*. 2014;114(2):299-312.
101. van Dijk SJ, Molloy PL, Varinli H, et al. Epigenetics and human obesity. *International Journal of Obesity*. 2015;39:85-97.
102. Nielsen DE, El-Sohehy A. Disclosure of genetic information and change in dietary intake: A randomized controlled trial. *PLoS ONE*. 9(11):e112665.
103. German JB, Zivkovic AM, Dallas DC, Smilowitz JT. Nutrigenomics and personalized diets: What will they mean for food? *Annu Rev Food Sci Technol*. 2011;2:97-123.
104. National Institute of Diabetes & Digestive & Kidney Diseases. Recent Advances & Emerging Opportunities. National Institute of Health. United States Department of Health and Human Services. [www.niddk.nih.gov](http://www.niddk.nih.gov). Published January 2015. Accessed February 12, 2015.

105. Mueller C, Rogers D, Brody RA, Chaffee CL, Touger-Decker R. Report from the advanced-level clinical practice audit task force of the Commission on Dietetic Registration: Results of the 2013 advanced-level clinical practice audit. *J Acad Nutr Diet.* 2015;114(4):624-634.
106. Singh RH, Kaczmarczyk MM. Standards of professional practice for genetic metabolic dietitians. *Genet Med.* 2008;10(4):290–293.
107. Camp K, Robr F. Advanced practitioners and what they do that is different. Roles in genetics. *Top Clin Nutr.* 2009; 24(3):219-230.
108. Rosen B, Maddox P, Ray N. A Position paper on how cost and quality reforms are changing healthcare in America: Focus on nutrition. *J Parenter Enteral Nutr.* 2013;37(6): 796-801.
109. Centers for Disease Control and Prevention. Chronic Diseases: The Leading Cause of Death and Disability in the United States. <http://www.cdc.gov/chronicdisease/overview/>. Published 2014. Updated August 26, 2015. Accessed October 23, 2015.
110. Centers for Disease Control and Prevention. *The State of Aging and Health in America 2013*. Atlanta, GA: Centers for Disease Control and Prevention, United States Department of Health and Human Services; 2013.
111. Institute of Medicine. *Integrating Research and Practice: Health System Leaders Working Toward High-Value Care: Workshop Summary*. Washington, DC: The National Academies Press; 2014.
112. Boyce B. Paradigm shift in health care reimbursement: A look at ACOs and bundled service payments. *J Acad Nutr Diet.* 2012; 112(7):974-979.

113. Jacobson DM, Teutsch S. *An Environmental Scan of Integrated Approaches for Defining and Measuring Total Population Health by the Clinical Care System, the Government Public Health System, and Stakeholder Organizations*. National Quality Forum.  
[www.qualityforum.org/Publications/2012/06/An\\_Environmental\\_Scan\\_of\\_Integrated\\_Approaches\\_for\\_Defining\\_and\\_Measuring\\_Total\\_Population\\_Health.aspx](http://www.qualityforum.org/Publications/2012/06/An_Environmental_Scan_of_Integrated_Approaches_for_Defining_and_Measuring_Total_Population_Health.aspx). Published June 2012. Accessed March 19, 2015.
114. Jortberg BT, Fleming MO. Registered dietitian nutritionists bring value to emerging health care delivery models. *J Acad Nutr Diet*. 2014; 114(12):2017-2022.
115. Watkins C, English G. Moving the worksite health promotion profession forward: Is the time right for requiring standards? A review of the literature. *Health Promotion Practice*. 2015;16(1):20-27.
116. Centers for Disease Control and Prevention. Workplace Health Promotion. Making a Business Case. <http://www.cdc.gov/workplacehealthpromotion/businesscase/>. Published October 23, 2013. Accessed August 12, 2015.
117. Mincher J, Leson S. Worksite wellness: An ideal career option for nutrition and dietetics practitioners. *J Acad Nutr Diet*. 2014; 114(12):1895-1901.
118. Wiseman A, Boothe A, Reynolds M, Belay B. *Healthy Hospital Choices: Recommendations and Approaches from an Expert Panel*. Atlanta, GA: Centers for Disease Control and Prevention; 2010.
119. Rothschild S, Lapidus S. Virtual Teams that Coordinate Care for Chronically Ill Geriatric Patients Reduce Emergency Department Visits and Improve Medication Compliance, Referral Patterns, and Patient Outcomes. AHRQ Health Care Innovations

Exchange. <https://innovations.ahrq.gov/profiles/virtual-teams-coordinate-care-chronically-ill-geriatric-patients-reduce-emergency>. Published November 25, 2009.

Updated November 6, 2013. Accessed August 12, 2015.

120. Bennet J. Mobile Clinic Delivers Culturally Competent Services to Underserved Neighborhoods, Leading to Identification of Untreated Chronic Conditions, Better Blood Pressure Control, and Significant Return on Investment. AHRQ Health Care Innovations Exchange. <https://innovations.ahrq.gov/profiles/mobile-clinic-delivers-culturally-competent-services-underserved-neighborhoods-leading>. Published April 23, 2014.

Updated August 13, 2014. Accessed August 12, 2015.

121. Dafny LS, Lee TH. The good merger. *N Engl J Med*. 2015; 372(22):2077-2079.

122. Tappenden K, Quatrara B, Parkhurst M, Malone A, Fanjiang G, Ziegler T.

Critical role of nutrition in improving quality of care: An interdisciplinary call to action to address adult hospital malnutrition. *J Acad Nutr Diet*. 2013; 113:1219-1237.

123. Price JA, Kent S, Cox SA, McCauley SM, Parekh J, Klein CJ. Using Academy standards of excellence in nutrition and dietetics for organization self-assessment and quality improvement. *J Acad Nutr Diet*. 2014; 114(8):1277-1292.

124. Remington P, Wadland W. Connecting the dots: Bridging patient and population health data systems. *Am J Prev Med*. 2015; 48(2):213-214.

125. Aase S. You, Improved: Understanding the promises and challenges nutrition informatics poses for dietetics careers. *J Am Diet Assoc*. 2010; 110(12):1794-1798.

126. Ayres EJ, Hogle LB. 2011 Nutrition informatics member survey. *J Acad Nutr Diet*. 2012; 112(3): 360-367.

127. Charney P. Practice paper of the Academy of Nutrition and Dietetics: Nutrition informatics. Abstract in *J Acad Nutr Diet*. 2012; 112(11):1859. Full article found at: [www.eatrightpro.org/resources/practice/position-and-practice-papers/practice-papers](http://www.eatrightpro.org/resources/practice/position-and-practice-papers/practice-papers).
128. Vogt EAM, Byham-Gray L, Touger-Decker R. Perceptions, attitudes, knowledge, and clinical use of evidence-based practice among US registered dietitians: A prospective descriptive pilot study. *Top Clin Nutr*. 2013;28 (3):283-294.
129. King C, Byham-Gray L, O'Sullivan Maillet J, Scott Parrott J, Splett P, Roberts M. Dietitians and research: Facilitating involvement. History of dietitian involvement in dietetics research in the U.S. *Top Clin Nutr*. 2014; 29(3):227-238.
130. Lammers M, Kok L. Cost-Benefit Analysis of Dietary Treatment. 22<sup>nd</sup> Version. Amsterdam: SEO Economic Research; 2012.
131. Harvey E. Standardized Ordering and Administration of Total Parenteral Nutrition Reduced Errors in Children's Hospital. AHRQ Health Care Innovations Exchange. <https://innovations.ahrq.gov/profiles/standardized-ordering-and-administration-total-parenteral-nutrition-reduces-errors>. Published March 2, 2009. Updated July 30, 2014. Accessed August 12, 2015.
132. Woodcock CH, Nelson GD. Hospital Community Benefits after the ACA: Leveraging Hospital Community Benefit Policy to Improve Community Health. *Hospital Community Benefit Program*. Baltimore, MD: The Hilltop Institute; June 2015.
133. Academy of Nutrition and Dietetics. Committee for Public Health/Community Nutrition established within the Academy of Nutrition and Dietetics. *J Acad Nutr Diet*. 2015; 115(9):1499.

134. Begun R. Food(service) as Medicine. *Discussing Diets and Nutrition Blog*.  
Published August 18, 2015. Accessed August 21, 2015.
135. Watts AW, Laska MN, Larson NI, Neumark-Sztainer DR. Millennials at work: Workplace environments of young adults and associations with weight-related health. [published online ahead of print August 11, 2015]. *J Epidemiol Community Health*. 2015; 1–7. doi:10.1136/jech-2015-205782
136. Academy of Nutrition and Dietetics. Position of the Academy of Nutrition and Dietetics: The role of nutrition in health promotion and chronic disease prevention. *J Acad Nutr Diet*. 2013; 113(7):972-979.
137. Roy R, Kelly B, Rangan A, Allman-Farinelli M. Food environment interventions to improve the dietary behavior of young adults in tertiary education settings: A systematic literature review. *J Acad Nutr Diet*. 2015; 115(10):1647-1681.
138. Lavizzo-Mourey R. Building a Culture of Health: 2014 President’s Message. Robert Wood Johnson Foundation. [www.rwjf.org/en/library/annual-reports/presidents-message-2014.html](http://www.rwjf.org/en/library/annual-reports/presidents-message-2014.html). Accessed November 2, 2015.
139. Sachdev A. United Healthcare Offers Savings for Shopping Healthy at the Grocery. *Chicago Tribune*. [www.chicagotribute.com](http://www.chicagotribute.com). Published July 30, 2015. Accessed August 3, 2015.
140. Brambila-Macias J, Shankar B, Capacci S, et al. Policy Interventions to Promote Healthy Eating: A Review of What Works, What Does Not, and What is Promising. *Food and Nutrition Bulletin*. The United Nations University; 2011;32(4):365-375.



141. Bowen DJ, Barrington WE, Beresford S. Identifying the effects of environmental and policy change interventions on healthy eating. *Annu. Rev. Public Health*. 2015;36:289–306.
142. United States Bureau of Labor Statistics. Table A-1. Employment Status of the Civilian Population by Sex and Age. <http://data.bls.gov/cgi-bin/print.pl/news.release/empstat.t01.htm>. Updated October 2, 2015. Accessed October 28, 2015.
143. United States Department of Labor. Bureau of Labor Statistics. Table 4. Employed Persons Working and Time Spent Working on Days Worked by Full and Part-Time Status and Sex, Jobholding Status, Educational Attainment, and Day of Week, 2014 Annual Averages. <http://data.bls.gov/cgi-bin/print.pl/news.release/empstat.t01.htm>. Updated June 24, 2015. Accessed October 28, 2015.
144. United States Department of Labor. Bureau of Labor Statistics. Labor Force Statistics from the Current Population Survey. Employment status of the civilian noninstitutionalized population by age, sex and race. <http://data.bls.gov/cgi-bin/print.pl/news.release/empstat.t01.htm>. Updated February 12, 2015. Accessed September 26, 2015.
145. Lankford T, Lang J, Bowden B, Baun W. Workplace health: Engaging business leaders to combat obesity. *Journal of Law, Medicine & Ethics*. Winter 2013;40-45.
146. Salinardi TC, Batra P, Roberts SB, et al. Lifestyle intervention reduces body weight and improves cardiometabolic risk factors in worksites. *Am J Clin Nutr*. 2013 Apr; 97(4):667-676.

147. Olstad DL, Raine KD, McCargar LJ. The role of registered dietitians in health promotion. *Can J Diet Pract Res*. 2013;74(2):80-83.
148. Davis AM, Affenito SG. Nutrition and public health: Preparing registered dietitian nutritionists for marketplace demands. *J Acad Nutr Diet*. 2014; 114(5):695-699.
149. Ayala GX, Ibarra L, Binggeli-Vallarta A, et al. Our choice/nuestra opción: The Imperial County, California, childhood obesity research demonstration study (CA-CORD). *Childhood Obesity*. February 2015; 11(1):37-47.
150. Institute of Medicine. *To Err is Human*. Washington, DC: The National Academies Press; 1999.
151. Institute of Medicine. *Crossing the Quality Chasm. A New Health System for the 21st Century*. Washington, DC: The National Academies Press; 2001
152. Institute of Medicine. *Health Professions Education: A Bridge to Quality*. Washington, DC: The National Academies Pres; 2003.
153. Berwick DM, Nolan TW, Whittington J. The triple aim: Care, health, and cost. *Health Affairs*. 2008; 27(3): 759-769.
154. Blue A, Brandt BF, Schmitt MH. American Interprofessional Health Collaborative: Historical roots and organizational beginnings. *J Allied Health*. 2010; 39(3 pt 2):204–209.
155. Gilbert JHV, Yan J, Hoffman SJ. A WHO Report: Framework for action on interprofessional education and collaborative practice. *J Allied Health*. Fall 2010; 39(3Pt 2): 196-197.
156. Institute of Medicine. *Interprofessional Education for Collaboration: Learning How to Improve Health from Interprofessional Models Across the Continuum of*

- Education to Practice: Workshop Summary*. Washington, DC: The National Academies Press; 2013.
157. Institute of Medicine. *Establishing Transdisciplinary Professionalism for Improving Health Outcomes: Workshop Summary*. Washington, DC: The National Academies Press; 2014.
158. Interprofessional Education Collaborative Expert Panel (IPEC). *Core Competencies for Interprofessional Collaborative Practice: Report of an Expert Panel*. Washington D.C.; IPEC; 2011.
159. Reeves S, Goldman J, Burton A, Sawatzky-Girling B. Synthesis of systematic review evidence of interprofessional education. *J Allied Health*. Fall 2010; 39(3 Pt 2): 198-203.
160. Breitbach AP, Sargeant DM, Gettemeier PR, et al. From buy-in to integration: Melding an interprofessional initiative into academic programs in the health professions. *J Allied Health*. Fall 2013;42(3):e67-e73.
161. Interprofessional Education Collaborative. Six Leading Health Education Associations Unite to Form a New Organization Focused on Interprofessional Education and Practice. <https://ipecollaborative.org/uploads/IPEC-PR-2-14-12-Updated-Version.pdf>. Published February 14, 2012. Accessed October 24, 2015.
162. Englander R, Cameron T, Ballard AJ, Dodge J, Bull J, Aschenbrener CA. Toward a common taxonomy of competency domains for the health professions and competencies for physicians. *Academic Medicine*. 2013; 88(8):1088-1094.
163. Ruebling I, Royeen C. Saint Louis University interprofessional education program. *J Allied Health*. Fall 2010; 39(3 Pt 2):e123-e124.

164. Graybeal C, Long R, Scalise-Smith D, Zeibig E. The art and science of interprofessional education. *J Allied Health*. Fall 2010; 39(3 Pt 2):232-237.
165. McKenna L, Boyle M, Palermo C, Molloy E, Williams B, Brown T. Promoting interprofessional understandings through online learning: A qualitative examination. *Nursing and Health Sciences*. 2014; 16:321–326.
166. Eliot KA, Kolasa KM. The value in interprofessional, collaborative-ready nutrition and dietetics practitioners. *J Acad Nutr Diet*. 2015; 115(10):1578-1588.
167. Institute of Medicine. *Measuring the Impact of Interprofessional Education on Collaborative Practice and Patient Outcomes*. Washington, DC: The National Academies Press; 2015.
168. Nutrition and You: Trends 2011. Academy of Nutrition and Dietetics website. <http://www.eatrightpro.org/resources/media/trends-and-reviews/trends-survey>. Published 2011. Accessed October 29, 2015.
169. Food Marketing Institute. New Survey: Food Retailers Identified as Wellness Destination. [/www.fmi.org/news-room/latest-news/view/2015/03/10/new-survey-food-retailers-identified-as-wellness-destination](http://www.fmi.org/news-room/latest-news/view/2015/03/10/new-survey-food-retailers-identified-as-wellness-destination). Published March 10, 2015. Accessed September 11, 2015.
170. Murray CJ, Forouzanfar M Alexander L, et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990-2013: A systematic analysis for the global burden of disease study 2013. *The Lancet* [published online ahead of print on September 11, 2015]. [http://dx.doi.org/10.1016/S0140-6736\(15\)00128-2](http://dx.doi.org/10.1016/S0140-6736(15)00128-2)

171. Atlanta Journal Constitution. Campbell Soup Makes “Extreme Makeover”.  
Published July 25, 2015.
172. Webb D. Retail RDs’ Impact on Public Health. *Today’s Dietitian*. March 2015;  
17(3):40-43.
173. Smith JC, Medalia JC. *Health Insurance Coverage in the United States: 2014*.  
Current Population Reports, P60-253. U.S. Census Bureau. U.S. Government Printing  
Office: Washington, DC; 2015.
174. Ogden C, Carroll M, Kit B, Flegal K. Prevalence of childhood and adult obesity  
in the United States, 2011-2012. *JAMA*. 2014; 311(8):806-814.
175. Centers for Disease Control and Prevention. Adult Obesity Facts.  
<http://www.cdc.gov/obesity/data/adult.html>. Page reviewed and updated September 21,  
2015. Accessed November 3, 2015.
176. Finkelstein EA, Trogon JG, Cohen JW, Dietz W. Annual medical spending  
attributable to obesity: Payer- and service-specific estimates. *Health Affairs*. 2009; 28(5):  
w822-w831.
177. Finkelstein E, Khavjou O, Thompson H, et al. Obesity and severe obesity  
Forecasts through 2030. *Am J Prev Med*. 2012; 42(6):563-570.
178. Grover S, Kaouache M, Rempel P, et al. Years of life lost and healthy life-years  
lost from diabetes and cardiovascular disease in overweight and obese people: A  
modelling study. *Lancet Diabetes Endocrinol* [published online December 5, 2014].  
[http://dx.doi.org/10.1016/S2213-8587\(14\)70229-3](http://dx.doi.org/10.1016/S2213-8587(14)70229-3)
179. Project Angel Heart. Demand for Medically Tailored, Home Delivered Meals on  
the Rise in Cities across the Nation. <https://www.projectangelheart.org/demand->

medically-tailored-home-delivered-meals-rise-cities-across-nation. Published December 10, 2014. Accessed February 13, 2015.

180. Tuma P. An overview of the intentions of health care reform. *J Acad Nutr Diet.* 2012; 112(suppl 1):S56-S63.
181. Albrecht K. The information revolution's broken promises. *The Futurist.* 2014; 48(2):22-28.
182. File T, Ryan C. *Computer and Internet Use in the United States: 2013 American Community Survey Reports.* United States Census Bureau. [www.census.gov](http://www.census.gov). Published November 2014. Accessed October 23, 2015.
183. Rollo ME, Hutchesson MJ, Burrows TL, et al. Video consultations and virtual nutrition care for weight management. *J Acad Nutr Diet.* 2015; 115(8):1213-1225.
184. Stein K. Remote nutrition counseling: Considerations in a new channel for client communication. *J Acad Nutr Diet.* 2015; 115(10):1561-1576.
185. Topol E. The Future of Medicine is in your Smartphone: New Tools are Tilting Health-care Control from Doctors to Patients. *Wall Street Journal.* [www.wsj.com/articles/the-future-of-medicine-is-in-your-smartphone-1420828632](http://www.wsj.com/articles/the-future-of-medicine-is-in-your-smartphone-1420828632). Published January 9, 2015. Accessed November 3, 2015.
186. Institute of Medicine. *The Role of Telehealth in an Evolving Health Care Environment: Workshop Summary.* National Academy of Sciences; 2012.
187. Diamandis P. Ripe for Disruption. Transportation. Agriculture. Healthcare and Eldercare. <http://diamandis.com/blog/ripe-for-disruption-part-3>. Published September 20, 2015. Accessed September 22, 2015.

188. Diamandis P. Healthcare, Finance and Insurance. [www.diamandis.com/blog/ripe-for-disruption-part-1](http://www.diamandis.com/blog/ripe-for-disruption-part-1). Published September 6, 2015. Accessed September 22, 2015.
189. Dew J. The future of American higher education. *World Future Review*. Winter 2012; 7-13.
190. Hansen T, Onders R. Rural Practice Redesigns Care Processes to Allow Multidisciplinary Teams to Leverage Electronic Health Record, Leading to Better Screening of Medically Underserved. AHRQ Health Care Innovations Exchange. <https://innovations.ahrq.gov/profiles/rural-practice-redesigns-care-processes-allow-multidisciplinary-teams-leverage-electronic>. Published May 22, 2013. Updated June 6, 2015. Accessed August 12, 2015.
191. Fredericks S, Martorella G, Catallo C. A systematic review of web-based educational interventions. *Clinical Nursing Research*. 2015; 24(1):91-113.
192. Wootton R. Twenty years of telemedicine in chronic disease management- An evidence synthesis. *Journal of Telemedicine and Telecare*. 2012; 18(4):211-220.
193. Chung LMY, Law QPS, Fong SSM, Chung JWY, Yuen PP. A cost-effectiveness analysis of teledietetics in short-, intermediate-, and long-term weight reduction. *Journal of Telemedicine and Telecare*. 2015; 21(5):268-275.
194. Boxall A. 2015 Is the Year of Health and Fitness Apps, Says Google. *Digital Trends Website*. [www.digitaltrends.com/mobile/google-play-store-2014-most-downloaded-apps/](http://www.digitaltrends.com/mobile/google-play-store-2014-most-downloaded-apps/). Published December 11, 2014. Accessed December 12, 2014.
195. DiFilippo K, Huang WH, Andrade J, Chapman-Novakofski K. The use of mobile apps to improve nutrition outcomes: A systematic literature review. *Journal of Telemedicine and Telecare*. 2015; 21(5):243-253.

196. Stark C, Pope J. Massive open online courses: How registered dietitians use MOOCs for nutrition education. *J Acad Nutr Diet.* 2014; 114(8):1147-1155.
197. Ackerman J. The Future of Supermarkets. *Wall Street Journal.* [www.wsj.com/articles/the-future-of-supermarkets-1430105166](http://www.wsj.com/articles/the-future-of-supermarkets-1430105166). Published April 26, 2015. Accessed August 26, 2015.
198. Springer J. SN Digital Top 10 List of Online Grocery Store Leaders. *Supermarket News.* <http://supermarketnews.com/sn-research/sn-digital-top-10-list-online-grocery-sales-leaders>. Published May 21, 2015. Accessed October 17, 2015.
199. Zwiebach E. Online Selling is ‘How, Not If’ Proposition, Study Says. *Supermarket News.* <http://supermarketnews.com/online-retail/online-selling-how-not-if-proposition-study-says>. Published October 7, 2015. Accessed October 17, 2015.
200. Qayumi K, Pachev G, Zheng B, et al. Status of simulation in health care education: An international survey. *Advances in Medical Education and Practice.* 2014; 5:457-467.
201. Damassa D, Sitko T. Simulation Technologies in Higher Education: Uses, Trends, and Implications. *ECAR Research Bulletin 3.* Boulder, CO: Educause; 2010.
202. Khanduja PK, Bould MD, Naik VN, Hladkowicz E, Boet S. The role of simulation in continuing medical education for acute care physicians: A systematic review. *CCM Journal.* 2015; 43(1):186-193.
203. Liaw SY, Palham S, Wai-Chan S, Wong LF, Lim FP. Using simulation learning through academic-practice partnership to promote transition to clinical practice: A qualitative evaluation. *JAN.* 2014. doi: 10.1111/jan.12585.



204. Lewis S, Brezina A. Enteral nutrition simulation-based training and competency assessment. *J Acad Nutr Diet*. 2014; 114(9, Suppl 2): A-67.
205. Thompson K, Gutschall M. The time is now: A blueprint for simulation in dietetics education. *J Acad Nutr Diet*. 2015; 115(2):183-194.
206. Akroyd M, Jordan G, Rowlands P. Interprofessional, simulation-based technology-enhanced learning to improve physical healthcare in psychiatry: The RAMPPS course. *Health Informatics Journal*. 2014. doi: 10.1177/1460458214562287.
207. McGaghie W, Issenberg SB, Cohen E, Barsuk JH, Wayne DB. Does simulation-based medical education with deliberate practice yield better results than traditional clinical education? A meta-analytic comparative review of the evidence. *Acad Med*. 2011; 86(6):706-711.
208. Levett-Jones T, Lapkin S. A systematic review of the effectiveness of simulation debriefing in health professional education. *Nurse Education Today*. 2014; 34(6):1-6.
209. Academy of Nutrition and Dietetics. Definition of Terms: [www.eatrightpro.org/resources/practice/quality-management/scope-of-practice](http://www.eatrightpro.org/resources/practice/quality-management/scope-of-practice). Updated January 2015. Accessed September 25, 2015.
210. Centers for Disease Control and Prevention. Building Capacity of the Public Health System to Improve Population Health through National, Nonprofit Organizations. [www.cdc.gov/stltpublichealth/funding/rfaot13.html](http://www.cdc.gov/stltpublichealth/funding/rfaot13.html). Last reviewed and updated March 31, 2015. Accessed October 23, 2015.
211. American Public Health Association. Community Health Workers. [www.apha.org/apha-communities/member-sections/community-health-workers](http://www.apha.org/apha-communities/member-sections/community-health-workers). Accessed October 23, 2015.

212. Minkler, M., and Wallerstein, N. Improving Health through Community Organizing and Community Building: A Health Education Perspective. In: M. Minkler, ed. *Community Organizing and Community Building for Health, 2nd ed.* New Brunswick, NJ: Rutgers University Press; 2005.
213. Centers for Disease Control and Prevention. Definitions. [www.cdc.gov/nchhstp/socialdeterminants/definitions.html](http://www.cdc.gov/nchhstp/socialdeterminants/definitions.html). Updated March 21, 2014. Accessed October 23, 2015.
214. Ford D, Raj S, Batheja R, et al. American Dietetic Association: Standards of practice and standards of professional performance for registered dietitians (competent, proficient, and expert) in integrative and functional medicine. *J Am Diet Assoc.* 2011; 111(6):902-913e23.
215. World Health Organization. Definition of an older or elderly person. World Health Organization website. <http://www.who.int/healthinfo/survey/ageingdefnolder/en/> 2015; Accessed October 7, 2015.
216. Agency for Healthcare Research and Quality. Defining the PCMH. US Department of Health and Human Services. Patient Centered Medical Home Resource Center. <https://www.pcmh.ahrq.gov/page/defining-pcmh>. Accessed November 3, 2015.
217. Kindig D, Stoddart G. What is population health? *Am J Public Health.* 2003 March; 93(3):380–383.
218. Gostin L, Powers M. What does social justice require for the public’s health? Public health ethics and policy imperatives. *Health Affairs.* 2006;25(4):1053-1060.