



Dietitians of Canada
Les diététistes du Canada

Moving Forward

Role of the Registered Dietitian in Primary Health Care – A NATIONAL PERSPECTIVE



July 2009

Acknowledgements

Authors

Dawna Royall, MSc, RD (Nutrition Research Consulting, Fergus, ON)

Paula Brauer, PhD, RD, FDC (Associate Professor, University of Guelph, Guelph, ON)

Reviewers

We would like to acknowledge the many members who provided input on the changes required to the 2001 role paper and to the following for their contributions to the review process for the 2009 role paper:

Marg Alfieri, RD (Centre for Family Medicine, Assistant Clinical Professor - Health Sciences, McMaster University)

Beverly Bacon, RD (Co-Chair DC Home Care Network)

Kim Barro, Pdt, MHSc (Public Health Services, Capital Health Nova Scotia)

Jane Bellman, MEd, RD (Public Health Dietitian, Wellington Dufferin Guelph Public Health)

Lynda Corby, MSc, MEd, RD, FDC (Director Public Affairs, Dietitians of Canada)

Elsie De Roose, BSc, HEC (Territorial Nutritionist, Dept. Health and Social Services, GNWT)

Linda Dietrich, MEd, RD (Dietitians of Canada, Regional Executive Director, Central and Southern Ontario)

Mary Flesher, RD, BSN (Nursing), MA (Vancouver Coastal Health (Richmond Health Services)

Aisha Khedheri, MEd, RD (Saint John Public Health)

Terry Koivula, RD (Clinical Dietitian, St. Joseph's Health Centre, Thunder Bay, ON)

Barb Leslie, RD (Director, Dietitian Services at HealthLinkBC)

Krystyna Lewicki, MHSc, RD (Community Dietitian, The Four Villages Community Health Centre, Toronto)

Jennifer Maki, MS, RD (Jennifer Maki Nutrition Consulting)

Heather Mathur, RD, BSc (Community Nutritionist, Alberta Health Services)

Marni McFadden, RD, CDE (Clinical Dietitian; Education; Winnipeg Regional Health Authority)

Shelley Murphy, RD (Community Dietitian, Guelph Community Health Centre)

Darlene Ravensdale, MSc, RD (Consulting Dietitian, B.C.)

Rosemarie Renwick, RD (Population Health Department, Alberta Health Services, Lethbridge Community Health Site)

Janet Stadnyk, RD (Nutrition Service Manager, Primary Care Regional Nutrition and Food Services, Alberta Health Services - Capital Health)

Michelle Turnbull, MScCH, RD, CDE (Regional Program Director Healthy Living, Regional Healthy Authority - Central Manitoba Inc)

Joy Walker, RD, BASc (Guelph Community Health Centre)

Executive Summary

Primary health care¹ (PHC) has been described as “the foundation of the health care system” providing the first point of contact people have with the health care system and ensuring continuity of care across the system (Health Council of Canada (HCC), 2005). Primary health care is key to maintaining and improving Canadians’ health, and to the quality and sustainability of the health care system. Registered Dietitians² play an important role in PHC in Canada as integral members of the inter-professional team.

Building on an earlier role paper (Dietitians of Canada, 2001), this document describes the range and types of services Registered Dietitians provide in PHC.

Canada’s nutrition issues are linked to the major chronic diseases, which in turn are often worsened by Canada’s very high obesity rates. These conditions can be prevented with lifestyle changes, including diet changes. Once these conditions develop, they can also be better managed with lifestyle interventions, reducing (and sometimes eliminating) the need for medications.

Canadian Registered Dietitians are health professionals who are uniquely trained to advise on diet, food and nutrition, across all health sectors. Registered Dietitians provide leadership in team efforts to support the nutritional health of the population through health promotion, disease prevention, treatment, support and rehabilitation.

“Registered Dietitians play an important role in PHC in Canada as integral members of the inter-professional team.”

¹ Although a number of definitions of PHC exist, probably the best recognized is that of the World Health Organization in the 1978 Alma Ata Declaration: “Primary Health Care is essential health care made universally accessible to individuals and families in the community by means acceptable to them, through their full participation and at a cost that the community and country can afford. It forms an integral part, both of the country’s health care system, of which it is the nucleus, and of the overall social and economic development of the community...It is the first level of contact of individuals, the family and community with the national health care system, bringing health care as close as possible to where people live and work and constitutes the first element of a continuing health care process...Primary Health Care addresses the main health problems in the community, providing promotive, preventive, curative, supportive and rehabilitative services accordingly (WHO, 1978).”

² Registered dietitians have differing professional designations in some provinces. The term “Dietitian” or “Registered Dietitian” is used throughout this document for consistency. In some settings, other position titles may be utilized (i.e. Public Health Nutritionist, Community Dietitian, Community Health Nutritionist, etc.). While acknowledging the integral role of Registered Dietitians in secondary and tertiary health care, and recognizing that there may be overlap with dietitians’ roles in primary health care, those facets of dietetic practice are beyond the scope of this document.

Adequate numbers of Registered Dietitians in PHC (public health and primary care) settings are required to ensure the health of Canadians.

Depending on the practice setting, Registered Dietitians may be responsible for a wide range of services:

- Registered Dietitians working in public health, practice population health planning, health promotion and disease prevention. These public health dietitians provide reliable nutrition information to the public, educators, health professionals, policy makers, and the mass media.
- Registered Dietitians working in community health centres, physician led teams, and other similar primary care settings practice individual and group nutrition therapy and counselling, health promotion and disease prevention.

Organization of PHC services varies widely in communities across Canada, with limited or no access to specialist nutrition services in many PHC settings. Adequate numbers of Registered Dietitians in PHC (public health and primary care) settings are required to ensure the health of Canadians.

Dietitians of Canada recommends that provincial and federal policy decision-makers:

- Develop and apply appropriate population needs-based funding mechanisms to support PHC nutrition services within their jurisdictions
- Establish effective systems to integrate nutrition services into all models of PHC
- Support systems for effective monitoring and ongoing evaluation of PHC nutrition services to ensure effectiveness and efficiency

Dietitians of Canada further recommends that professionals involved in implementation and evaluation of health services:

- Establish long-range plans that ensure nutrition services match PHC needs of communities
- Implement appropriate population needs-based funding mechanisms to support PHC nutrition services within their jurisdictions
- Integrate nutrition services in all areas of PHC, including public health, telehealth, and other approaches to promote nutritional well-being
- Monitor and evaluate PHC nutrition services to ensure effectiveness and efficiency

Dietitians of Canada further recommends that professional associations, educators, researchers, practitioners and others involved in PHC development:

- Promote strong inter-professional collaborative education and practice, including the expertise of Registered Dietitians as integral members of PHC teams
- Continue to develop and evaluate new models for inter-professional PHC nutrition practice, with a particular focus on prevention and treatment of Canada's major chronic diseases

Dietitians of Canada, through its membership, remains committed to the ongoing development of a strong reformed PHC system, where every Canadian has access to the appropriate nutrition services needed to support health.

Table of Contents

Acknowledgements	
Executive Summary	i
Introduction	1
Key Concepts	2
Major Nutrition-Related Population Health Issues in Canada	4
Canada's Health System	9
Expertise Registered Dietitians Bring to Primary Health Care	10
Progress on Key Elements of Primary Health Care	13
Primary Health Care Reform since 2001	13
Application of the population health approach	15
Access to comprehensive services by the most appropriate provider	17
The inter-professional team	21
Coordination and continuity of care	24
Affordability and cost-effectiveness	27
Conclusions and Recommendations	30
Figures	
Figure 1 - The Expanded Chronic Care Model: Integrating Population Health Promotion	15
Figure 2 - Determinants of Health	16
Tables	
Table 1 - Work Settings of Canadian PHC Registered Dietitians (May 2009)	21
Table 2 - Dietetics Practice: A Complementary Network of Services Relative to Key Elements of Primary Health Care	25
Table 3 - The Practice of Registered Dietitians in Primary Health Care	41
References	32
Appendix A: The Practice of Registered Dietitians in Primary Health Care	41



Introduction

Registered Dietitians play an important role in primary health care (PHC) in Canada as integral members of the inter-professional team. This role paper describes the range and types of services Registered Dietitians provide, building on an earlier document (Dietitians of Canada, 2001). Perspectives from all areas of PHC dietetics across Canada have been incorporated as much as possible. Work on this present paper was initiated in 2007, with the assistance of a steering committee and contract writer. There were multiple opportunities for input and review by both front-line dietetics practitioners and opinion leaders within dietetics. The paper will be useful to multiple groups interested in the Registered Dietitian perspective on nutrition issues and services in PHC settings. Recommendations are directed to:

- Decision makers involved in further PHC and health system design and reform
- Professionals involved in implementation, quality improvement, program planning and evaluation of health services
- Professional associations and others involved in inter-professional education and practice development of current PHC providers
- Leaders and educators in academia and training programs
- Primary health care researchers
- Practitioners in PHC settings

The document will describe:

- Key concepts of PHC
- Major nutrition-related population health issues in Canada
- Canada's health system issues impacting on practice
- Expertise Registered Dietitians bring to PHC
- Progress on key elements of primary health care
 - Overview of progress since 2001
 - Application of the population health approach
 - Access to comprehensive services by the most appropriate provider
 - The inter-professional team
 - Coordination and continuity of care
 - Affordability and cost-effectiveness
- Activities illustrating Registered Dietitians' roles in various PHC settings

The paper will be useful to multiple groups interested in the Registered Dietitian perspective on nutrition issues and services in PHC settings.

Key Concepts

“A strong primary health care system is essential to the health of Canadians as well as to the quality and sustainability of the health care system.”

Primary health care has been described

as “the foundation of the health care system” providing the first point of contact people have with the health care system and ensuring continuity of care across the system (Health Council of Canada (HCC), 2005). Most definitions of PHC also include health promotion, disease prevention, the importance of the broader range of factors and conditions that influence health and strategies to advance individual and population health (Health Canada, 2006; Kirby, 2002; Mable and Marriott, 2002; Naylor, 2003; Romanow, 2002). Primary health care includes relevant services that may be provided by public health departments as well as services associated with ambulatory or primary care, often provided by family physicians or general practitioners (Health Canada, 2006).

Primary health care is key to maintaining and improving Canadians’ health, and to the quality and sustainability of the health care system. In Canada it is widely recognized that a strong PHC system is needed to address the changing population demographics and the challenges of increasing numbers of people with chronic diseases and complex co-morbidities. Nutrition is an acknowledged factor in promoting and maintaining health (Health Canada, 2008; Stitzel, 2006; WHO, 2004) and in disease prevention and management (CDA, 2006; CDA, 2008; Khan et al, 2008; McPherson et al, 2006; Obesity Canada, 2007; SOGC, 2006; WCRF/AICR, 2007).

Developments in Canada parallel world-wide development and reform of PHC systems. Current thinking on reform efforts was distilled in the 2008 WHO Health Report, *Primary Health Care – Now More Than Ever* (WHO, 2008). This latest report focuses on four main structural and management reforms to further develop and maintain sustainable PHC systems:

- Universal coverage reforms to ensure universal access and social health protection
- Service delivery reforms that are responsive to changing needs while producing better outcomes
- Public policy reforms that integrate public health with primary care
- Leadership reforms to improve system management

In summary, the premise of PHC is that responsibility for the health of the community and its members is shared among society, communities, citizens and providers. Primary health care may include a range of health promotion approaches and programs, a range of clinical services and structural and systemic arrangements that facilitate community participation in health. The thread which knits all these services, programs, initiatives, and supports together is a common focus on health as a capacity rather than a state, which recognizes the range of factors / determinants that contribute to health (PHAC, 2002b).



Major Nutrition-Related Population Health Issues in Canada



Limited or no access to specialist dietitian services occur in many primary health care settings. Currently there is a patchwork of services and programs that vary by province and community.

As a developed country, Canadians enjoy generally good health overall, with a life expectancy of approximately 81 years. To maintain population health and the health system, the country faces several challenges. The population is aging (22% currently >60 years of age) and the prevalence of chronic diseases is increasing (PAHO, 2006). The fertility rate is currently 1.5 children per woman, and recent population increases have been associated with increased immigration. The resulting increased cultural diversity requires that Canada's health care system be more diverse. Organization of services varies widely in communities across Canada, with better developed services in urban areas where 80% of the population resides. Access to health promotion, prevention and treatment services by rural and remote populations is a significant problem. Aboriginals in Canada face particular health challenges and their health is currently poorer than other Canadians (life-expectancy ~73 years) (PAHO, 2006).

Chronic diseases are responsible for the majority of total direct costs in healthcare. Currently about 27% of 33.2 million Canadians indicate that they have been diagnosed with a chronic health condition (including joint problems, heart disease and cancer) and it has been estimated that this costs the Canadian economy \$80 billion/year (Health Council of Canada (HCC), 2007a). The high prevalence of chronic diseases is particularly notable among the growing population of seniors, as 81% of older adults living in the community have at least one chronic condition and 33% have three or more chronic conditions (Gilmour et al, 2006; F/P/T, 2006). In 2003, seniors' health care needs accounted for more than 44% of all provincial government spending in addition to 90% of expenditures in long-term care facilities (CIHI, 2005). These costs can be controlled when older adults remain healthy enough to live in the community in a variety of supportive living arrangements and when chronic disease and injuries can be prevented or delayed until the end of life (PHAC, 2005).

Among chronic diseases, cardiovascular diseases (CVD) remain the most prominent causes of death. In 2004, 2.8 million Canadians were hospitalized for CVD (Heart and Stroke Foundation, 2008) and the treatment costs for CVD are estimated at \$18 billion every year in physician services, hospital costs, lost wages and decreased productivity (PHAC 2002a). Major risk factors for CVD include smoking, hypertension, diabetes and dyslipidemia. Prevalence of these risk factors has increased in the past few years, with the notable exception of smoking, currently at 22% prevalence (age 12+; Stats Canada, 2006). According to self-report, 4.1 million Canadians (15%) have high blood pressure compared to 2.1 million (9%) in the 1990s. At least 1.3 million Canadians (~5% of the population) have diabetes, compared with 3% of the population a decade ago and the number of Canadians with diabetes is expected to almost double by 2016 (HCC, 2007b). Prevalence of dyslipidemia has not been tracked nationally, but is currently estimated to be about 17%.

A substantial proportion of hypertension, diabetes and dyslipidemia can be prevented with lifestyle changes, including diet changes (WHO, 2003). Once these conditions develop, they can also be better managed with lifestyle interventions, reducing (and sometimes eliminating) the need for medications. Current Canadian clinical practice guidelines for medical management of all three conditions recognize the potential role of diet in prevention and management. In diabetes, clinical diet interventions are a cornerstone of treatment, both to manage glucose levels in the short-term and to decrease risk for CVD (CDA, 2008). Evidence for the efficacy and effectiveness of diet and physical activity strategies in prevention is especially strong in diabetes (CDA, 2008). Current guidelines for the treatment of hypertension recommend decreasing body weight if elevated, reduced saturated fat and sodium intake, increased fruit, vegetable and dairy intake, along with increased physical activity, smoking cessation, stress management and limitations on alcohol intake (CHEP, 2008). Dyslipidemia treatment guidelines promote a low saturated fat, high fibre diet, body weight reduction where needed, and increased physical activity (McPherson et al, 2006).





Chronic diseases are responsible for the majority of total direct costs in healthcare.

Among the other chronic diseases, cancer is another leading cause of premature death in Canada, and based on current statistics, almost one in four Canadians will die from cancer. About 40% of women and 45% of men will develop cancer in their lifetime (CCS, 2008). In 2004, the lifetime costs of cancer care for lung, breast and colon cancer were estimated to be \$25,000 - \$30,000 per patient and are largely influenced by length of hospital stay and whether chemotherapy and radiotherapy are used (PHAC, 2004). Additional cost considerations include lost productivity. Obesity, low physical activity, high meat and low plant food diets, high sodium intake and low breastfeeding rates are the main nutrition related factors that contribute to cancer development (WCRF/AICR, 2007). Once cancer develops, nutrition issues arise frequently, especially when weight loss occurs, the immune system is impaired or when ability to eat typical foods is affected.

Mental illness is another common chronic illness with substantial costs to the system. About 5% of the population aged 12+ rated themselves as having poor or fair mental health in the 2005 Canadian Community Health Survey (CCHS) (Stats Canada, 2007). In 2004 the indirect and direct costs of schizophrenia alone were estimated at \$6.85 billion (Goeree et al, 2005). While diet has not been shown to affect risk for developing mental illnesses, individuals with eating disorders, mood disorders, schizophrenia-like syndromes, substance abuse disorders, attention deficit-hyperactivity disorder, autism or dementia are often at increased nutritional risk due to weight fluctuations, potential nutrient deficiencies, feeding issues and medication side-effects (Davison, 2006). For example, many of the medications used to treat the most serious mental illnesses, such as schizophrenia, cause substantial weight gain and increase risk for CVD.

Rising obesity rates are cited as a major factor behind the growing prevalence of chronic diseases, increasing the burden on the health system beyond the effects of an aging population, especially as a risk factor for CVD, some cancers, diabetes, musculo-skeletal conditions, etc. Particularly problematic are increases in the deposition of excess visceral abdominal fat, a marker of the presence of the metabolic syndrome, which doubles CVD risk, compared to obesity without metabolic syndrome. Obesity prevalence has increased dramatically in Canada and is currently 23% among adults, the fourth highest prevalence in the world, after the US (32%), Mexico (31%), and the UK (23%).

More worrying, the prevalence of overweight and obesity among children is also increasing and 26.2% of Canadian children (2-17 years of age) are now considered to be overweight or obese, based on measured height and weight in the 2004 CCHS, using the classification scheme developed by Cole et al. (Stats Can, 2005). Current obesity practice guidelines promote best practices in prevention and treatment, recognizing that overall efficacy of any treatment is currently modest, because of the difficulty in losing excess weight once gained (Lau et al, 2007). Prevention has greater potential to reverse current trends, if the relevant stakeholders in Canada can act.

Among other nutrition related health conditions most impacted by nutrition intervention is the reduction in low birth weight (LBW) resulting from low gestational weight gain. Low weight gain is a particular issue in Canada among some women living in poverty and/or at high risk because of their age, smoking habits or because of other problems such as addictions (CIHI, 2007).

Food insecurity is a problem in Canada and does not just affect birth weight. The extent and complexity of the problem has only recently been appreciated. The 2004 CCHS survey found that 9% of the population lives in food insecure households, mostly low-income and many single-parent families (Health Canada, 2007b). Among the developed countries, Canada has a highly decentralized social assistance system, with no separate provision of funding for food, other than for special diets related to chronic diseases and disabilities. Programs vary by province. The basic allowances for food, clothing and shelter seem to be based on historic or politically determined norms, rather than an evidence-based costing approach. Public health departments track the costs of a nutritious diet in communities across the country. While social assistance policy is outside the health sector, because food is basic to life, and because many people with chronic illnesses are dependent on the social assistance system, it is a major nutrition issue that impacts on provision of health care.

Encouragement of breastfeeding is another well established nutrition intervention relevant to population health (BCC, 2002a and 2002b; Health Canada, 2004b; INFACT Canada, 2006). In 2001 it was estimated that a minimum of \$3.6 billion U.S. could be saved through a 50% reduction in hospital admissions, physician visits and prescriptions for medications to treat illnesses such as otitis media and gastroenteritis (BCC, 2002a).



Furthermore, breastfeeding benefits both children and mothers, with reduced incidence of type 1 and type 2 diabetes and leukemia among children and reduced incidence of type 2 diabetes and breast and ovarian cancer among mothers (Ip et al, 2007). Although somewhat conflicting, evidence also suggests that breastfeeding is associated with reduced rates of obesity among children (Horta et al, 2007; Ip et al, 2007; Kramer et al, 2007). The true benefits of breastfeeding as part of early healthy development cannot be measured in dollars and cents. There are profound societal benefits from a population of healthy, well-nourished children who have enhanced competency and coping skills, thus reducing the need for social support programs.

Like many developed countries Canada saw a decline in breastfeeding rates with the introduction of improved infant formulas and movement of women into the work force in the 1960s to 80s. According to the most recent national data (2003 CCHS), 85% of women aged 15 to 55 who had a baby in the last 5 years initiated breastfeeding, while 39% continued to breastfeed to at least 6 months, and 19% exclusively breastfed to 6 months. These positive trends are the result of the many programs and policies to support breastfeeding initiation and duration (CPS, 2005).



Canada's Health System

Canada's health system is highly decentralized, with an interlocking set of 10 provincial and 3 territorial publicly funded and administered health insurance plans. All provinces/territories have now developed some form of regional health planning, which varies by jurisdiction. Provinces and territories are responsible for delivery of health services, including public health, primary care, acute care, home-care, mental health services and long-term care. The extent to which public health departments collaborate with other health care services, including primary care, mainly provided by family physicians, varies widely (Martin-Misener and Valaitis, 2008). Within provinces/territories, the organization of primary care services also varies: from fee-for-service physicians working in solo practices, nurse practitioner stations, physician group practice with only nursing support to large inter-professional team practices. For example, in Ontario alone, 11 different types of primary care organizations exist. Each province/territory is in the process of reforming their primary health care system.

Historically, Health Canada has been the main federal department responsible for providing guidance on nutrition-related health issues. Other newer national institutions supporting the health system include the Canadian Institute of Health Information (CIHI), established in 1994, the Health Council of Canada (HCC) established in 2003, and the Public Health Agency of Canada (PHAC), established in 2004. CIHI is responsible for population health surveillance in conjunction with Statistics Canada. Canada's First Ministers established the HCC, to monitor and report to Canadians on health care renewal progress and system performance and to identify strategies for improved health for Canadians (Health Canada, 2004a). The Public Health Agency of Canada's mandate is to provide federal leadership and collaboration with provinces and territories on efforts to renew the public health system in Canada and support a sustainable health care system (Marchildon, 2005).

Each province/territory is in the process of reforming their primary health care system.

Expertise Registered Dietitians Bring to Primary Health Care

Canadian Registered Dietitians are health professionals who are uniquely trained to advise on diet, food and nutrition, across all health sectors.

Canadian Registered Dietitians are health professionals who are uniquely trained to advise on diet, food and nutrition, across all health sectors. Dietitians translate the science of nutrition into practical information that supports people in making healthy food choices throughout the lifecycle and across health states. For any nutrition-related health issue there is a spectrum of actions that dietitians can take to address the problem – health promotion and disease prevention strategies (targeting populations, groups and individuals), as well as specialized nutrition therapy and rehabilitation / support strategies to address specific nutrition-related conditions.

Registered Dietitians use a number of approaches to address nutrition needs, ranging from clinical nutrition counselling (individual or group) for individuals who are at risk or who already have health issues, to administration of food services in institutions, to community- and population-based methods such as social marketing, community development and self-help. Some Registered Dietitians are involved in national guidance systems and policy development, such as development of nutrient recommendations, food guidance such as Canada's Food Guide, food labelling and food safety. Registered Dietitians adhere to nationally established standards of practice, monitored by provincial regulatory bodies. Through their comprehensive knowledge of nutrition, food science and management of nutrition programs and services, Registered Dietitians bring the following perspectives and skills to PHC (Chenhall, 2006; Dietitians of Canada (DC), 2001; DC, 2004; DC, 2006a; IHHRD, 1996):

- Apply evidence-based decision-making to their practice to promote health and treat a broad range of nutrition-related conditions
- Work with communities to enhance capacities, raise community awareness, and facilitate community skill-building, health advocacy and social action
- Reinforce community action and development by building partnerships and applying strong communication, negotiation and problem-solving skills to address nutrition and health-related issues

- Apply their knowledge of health determinants, working with communities, groups and individual clients to plan, implement and evaluate programs and approaches to overcome barriers to health
- Collaborate with clients, caregivers, and other health and social services professionals
- Develop and implement plans for individuals, groups and communities based on a comprehensive needs assessment; monitor progress of the intervention, provide the needed ongoing supports and evaluate outcomes
- Promote client independence and autonomy in decision-making and help build capacity for the client to achieve health or to manage a chronic disease
- Use psychosocial counselling to promote individual behaviour change relative to food choices, eating behaviour and preparation methods to optimize health or treat chronic disease
- Coordinate care for clients in managing their disease condition and navigating the health care system
- Educate the public, other educators, community leaders, policy makers and the mass media relative to healthy and affordable food choices and healthy public policy
- Mentor health professionals regarding nutrition and health promotion
- Research and develop a knowledge base necessary for defining community health indicators
- Conduct or participate in research to evaluate the impact of PHC interventions
- Demonstrate and apply effective leadership, team building, empathy and group facilitation skills to achieve health of the community and its members



Depending on the practice setting, Registered Dietitians may be responsible for a wide range of services:

Registered Dietitians working in public health practice population health planning, health promotion and disease prevention.

Activities include surveillance of health trends, utilization of these data to implement and evaluate practice, and advocacy and policy development affecting food and nutrition at all levels of organizations and government. Public health dietitians provide reliable nutrition information to the public, educators, health professionals, policy makers, and the mass media. They plan, coordinate, deliver, and evaluate education and skill-building nutrition programs and design, implement and evaluate programs and policies that will promote health in communities and with specific sub-groups of the population.

Registered Dietitians working in community health centres, physician led teams, and other similar primary care settings practice individual and group nutrition therapy and counselling, health promotion and disease prevention.

Activities include assessment of nutritional status, planning, implementing interventions and evaluating and monitoring response to treatment to support improved outcomes for individual clients with a broad range of medical disorders. Advocacy and policy development affecting food and nutrition in the community are also integral to practice. Registered Dietitians working in settings such as home care or diabetes education centres may have a specific focus of responsibility in providing nutrition therapy to individual clients. An important aspect of the dietitians' expertise in the care of individuals is the ability to integrate objective components of medical and nutrition assessment, such as anthropometrics and laboratory evaluations, with the psychosocial aspects to promote behaviour change.

Appendix A – The Practice of Registered Dietitians in Primary Health Care – provides more illustrative examples of how dietitians in the PHC context employ strategies that affect the entire population as well as strategies that impact on individuals who have health problems or are at risk of developing them.

Progress on Key Elements of Primary Health Care

Primary Health Care Reform Since 2001

Since the publication of the 2001 Dietitians of Canada Role Paper, a number of initiatives have occurred to accelerate PHC reform across Canada. In 2000, the government of Canada established the \$800 million Primary Health Care Transition Fund (PHCTF) to support costs of initiatives to reform the delivery of PHC as well as various collaborative and national efforts to support PHC renewal (Health Canada, 2007a). The PHCTF completed its work in 2006. A summary of the many projects is located at: Primary Health Transition Fund: Summary of Initiatives: Final Edition, March 2007 <http://www.hc-sc.gc.ca/hcs-sss/pubs/prim/2007-initiatives/index-eng.php>. Several initiatives of the PHCTF involved Registered Dietitians including:

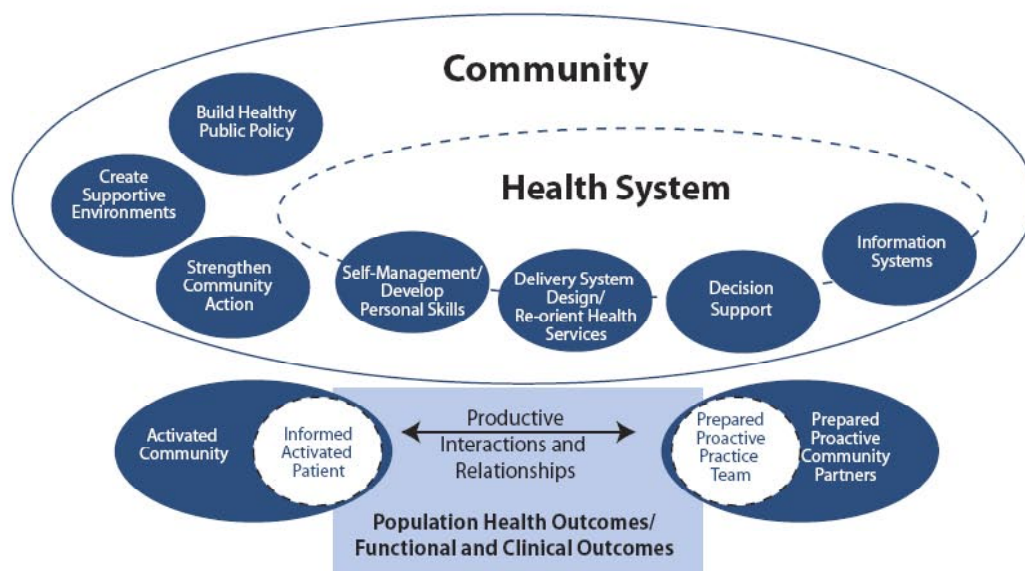
- Integrating Registered Dietitians into family medical practices (Interdisciplinary Nutrition Services in Family Health Networks/ Primary Care Model Sites- A Demonstration Project http://www.dietitians.ca/news/pdf/PHC_Outline_2004.pdf)
- Developing strategies for enhancing collaborative care for Registered Dietitians in mental health (Collaborative Care Mental Health Initiative (CCMHI), undated; <http://www.ccmhi.ca>)
- Promoting and facilitating interdisciplinary collaboration in PHC settings (Enhancing Interdisciplinary Collaboration in Primary Health Care (EICP) initiative (EICP, undated; <http://www.eicp.ca/en/>)
- Developing diabetes resources for aboriginal communities including the provision of regular Registered Dietitian services (Northern and Aboriginal Population Health and Wellness Institute <http://www.thompson.ca/dbs/naphwi/>)
- Participation in consultation processes, focus groups and workshops for various other initiatives and projects, including the PHC Indicators project of CIHI and cost-effectiveness analysis framework development by the Association of Ontario Health Centres and a national arthritis project. Individual Registered Dietitians were also involved in various projects across the country.

“Since the publication of the 2001 Dietitians of Canada Role Paper, a number of initiatives have occurred to accelerate PHC reform across Canada.”

Over the same period, various groups of Registered Dietitians continued to share resources and advocate for their services in differing PHC models. In Ontario, the Central and Southern Ontario Primary Health Care Action Group advocated for Registered Dietitians in all models of PHC. They undertook various activities, including a visioning exercise. This vision was nationally reviewed, and promoted access by all Canadians to a Registered Dietitian as part of an interdisciplinary PHC team (Cantwell, 2006). The Registered Dietitian in PHC “will provide nutrition expertise to individuals, the community, and health professionals related to health promotion, disease prevention and treatment, practice-based research, and advocacy” (Cantwell et al., 2006 p. S57).

Also relevant to dietetic practice was the development of the expanded Chronic Care Model by a group in British Columbia. The original Chronic Care Model (CCM) identified the essential elements of a health care system that encourages high-quality chronic disease care (Wagner et al, 1996). The Expanded Chronic Care Model integrates aspects of the 1986 Ottawa Charter for Health Promotion (WHO 1986) with the CCM model (Barr et al, 2003) (Figure 1). The original CCM has been influential because of evidence of improved clinical outcomes in the primary care context. For example, one meta-analysis identified that interventions which incorporated one or more elements of the CCM had beneficial effects on clinical outcomes and processes of care for patients with asthma, congestive heart failure, depression and diabetes (Tsai et al, 2005). Interventions directed at diabetes care, for example, led to a 0.30%-0.47% reduction in Hemoglobin A1C. No single element dominated; all elements were needed. The Expanded model has not yet been similarly rigorously tested. The model provides a useful framework for thinking about organizing services to address the major nutrition issues in Canada. Work on approaches to effective public health and primary care collaborations will be needed to realize the vision (Martin-Misener R and Valaitis R, 2008).

FIGURE 1 - THE EXPANDED CHRONIC CARE MODEL: INTEGRATING POPULATION HEALTH PROMOTION



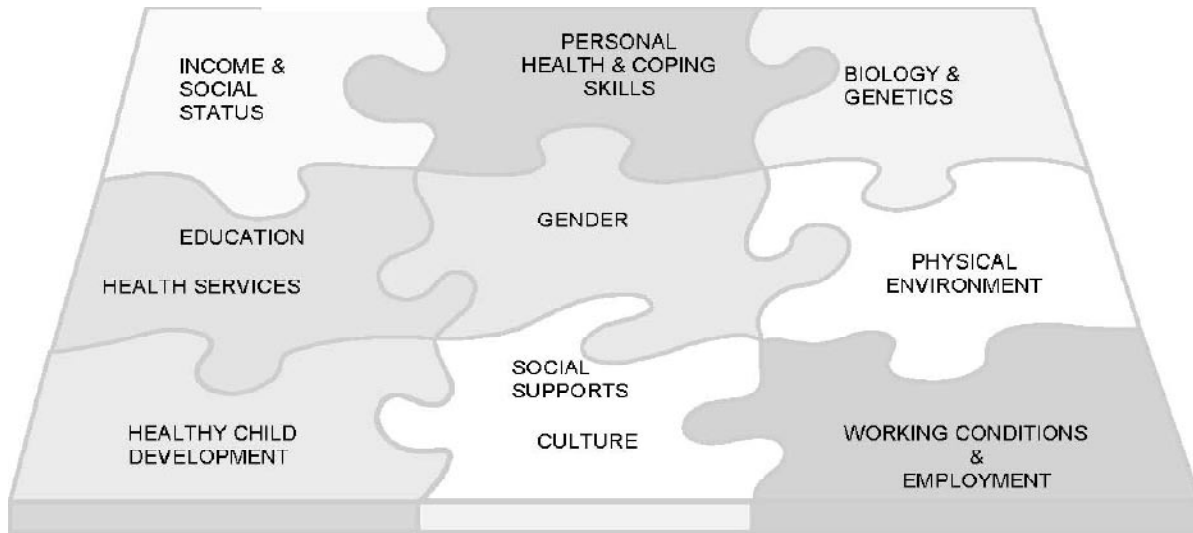
Created by: Victoria Barr, Sylvia Robinson, Brenda Marin-Link, Lisa Underhill, Anita Dotts & Darlene Ravensdale (2002)
 Adapted from Glasgow, R., Orleans, C., Wagner, E., Curry, S., Solberg, L. (2001). "Does the Chronic Care Model also serve as a template for improving prevention?" *The Milbank Quarterly*, 79(4), and World Health Organization, Health and Welfare Canada and Canadian Public Health Association.(1986). Ottawa Charter of Health Promotion. Reproduced with permission.

Progress on dietetic practice for PHC are briefly reviewed according to principles for reform previously articulated by other key organizations and reports (Health Canada, 2006; HCC 2005; HCC, 2008a; Kirby, 2002; Naylor, 2003; Romanow, 2002).

1. The application of a population health approach (PHAC, 2002b) that addresses the determinants of health

Application of a "population based approach" involves multiple strategies and approaches to achieve improved population health. At one level it is important to understand the role of health services among the determinants of health. Figure 2 illustrates that these determinants are inter-related. Their complex interactions have an even greater impact on health than any one factor alone. In addressing the determinants of health, PHC links with other relevant sectors such as schools, childcare facilities, seniors' facilities, justice, housing, private sector, recreation, environmental groups, family support services, churches and other non-government and volunteer organizations. Strategies are designed to affect the entire population or sub-population, as well as individuals who have, or are at risk for developing, health problems.

FIGURE 2 - DETERMINANTS OF HEALTH



According to the WHO, 80% of heart disease, stroke and type 2 diabetes and 40% of cancers globally could be prevented by lifestyle interventions: eating healthfully, getting more physically active and stopping smoking (WHO, 2005). Reducing and controlling the risk factors for CVD, through various combinations of population-based strategies and individual risk factor management could lower the demand for acute health care and save money. In a population health context, health services are only one among several societal forces, and to date efforts to control major risk factors have been variable. As noted in the WHO's *Global Strategy on Diet, Physical Activity and Health*, an integrative collaborative approach to chronic disease prevention is needed, and the responsibility for action to bring about changes in dietary habits and patterns of physical activity will rest with many stakeholders from public, private and civil society over several decades (WHO, 2004).

There has been progress in Canada. In 2005, Canada's Health Ministers endorsed a set of national healthy living targets, which over the next decade call for a 20% increase in the proportion of Canadians who are physically active, eat healthful food and are at healthy weights (Integrated Pan-Canadian Healthy Living strategy), calling for all sectors to demonstrate a coordinated effort through inter-sectoral working groups in the implementation of the Strategy (Secretariat for Inter-sectoral Healthy Living Network; 2005).

Several interesting initiatives have been developing over the past few years. For example, Health Canada has established a Sodium Reduction Working Group including Registered Dietitians and other key representatives from government, scientific and health-focused consumer groups and food manufacturing / food service groups (<http://www.hc-sc.gc.ca/fn-an/nutrition/sodium/sodium-memb-list-eng.php>) promoting industry-wide reduction of the sodium in processed foods. Multiple other national initiatives are ongoing with representation from Registered Dietitians, including the Chronic Disease Prevention Alliance of Canada (CDPAC; <http://www.cdpac.ca/>) and the Canadian Obesity Network (CON; <http://www.obesitynetwork.ca/>). These non-governmental initiatives provide forums and alliances for inter-sectoral action.

2. Access to a comprehensive scope of PHC services, through the most appropriate provider of those services

Population based planning also involves determining population needs for health services and providing services (funding and human resources) that meet those needs. The scope of PHC services includes health promotion, disease prevention, education and support for self-care, diagnostic services and treatment of episodic and chronic disease and injuries, primary reproductive care, palliative care, primary mental health care, coordination and provision of rehabilitation services, coordination of, and referral to other health care services, supportive care at home and in long-term care facilities. Access to PHC services by the most appropriately qualified health care professional requires an adequate supply of health human resources (Health Canada, 2006).

Timely and direct access to a comprehensive range of PHC services by the most appropriate provider are key elements of PHC.

Some progress has been made, mostly in analysis of physician and nursing services. Similar efforts are required to determine needs for other professions, including Registered Dietitians. For nutrition services, we have limited and incomplete information on how many Registered Dietitians are currently employed in the system, and even less idea what the appropriate number should be, the best mix of public health and primary care services and the provider groups who should be delivering the services. Substantial research in this area is needed.

Promotion of healthy eating and achievement and maintenance of healthy weight are the cornerstones of population health promotion / disease prevention strategies for chronic disease conditions.

Available data are presented below.

Inadequate Numbers of Registered Dietitians –

The number of Registered Dietitians required to address the unmet need for nutrition services in primary care can be roughly estimated from the prevalence of nutrition issues in primary care practices. Data from three studies with differing methods are remarkably consistent in suggesting that ~20% of primary care physician consultations with patients involve a nutrition issue. van Weel tracked the major reasons for visits and estimated that 1 in 6 (16.7%) consultations had diet as one main intervention (van Weel, 2003). Eaton et al., in an observational study where patient appointments were video-taped, found that 25% of all visits had a nutrition component (Eaton et al, 2002).

In Canada, physicians involved in a study in three Ontario Family Health Networks [FHNs] were surveyed regarding patients seen over a one week period, and reported that 17.5% had a contributing nutrition problem (Witt et al, 2006). Of the 17.5% of patients, 12% of all patients were directly advised by the physician, 1.3% were referred to a dietitian for individual counselling and 1.1% were referred to other community services (e.g. Diabetes Education Centre) (Witt et al, 2006). Because availability of nutrition programs varies considerably between communities, it was estimated that 1.3 to 2.4% of patients may require individual nutrition counselling by a Registered Dietitian in one year. This would translate to approximately one full-time Registered Dietitian per 15,800 to 29,000 patients (Witt et al, 2006), based on typical counselling patterns. This estimate is comparable to the estimate of one dietitian per 20,000 enrolled patients obtained from another primary care program in Ontario (Hamilton HSO Mental Health and Nutrition Program) (Crustolo et al, 2006; Gamblen et al, 2007). The primary emphasis in these practices is on individual behaviour change. These human resources estimates would not meet the needs of high-risk populations, such as those served by Ontario's Community Health Centres, and were not developed for remote or rural locations (Witt et al, 2006).

At the moment, some inter-professional primary care practices have access to Registered Dietitian services and some do not. Indirect evidence of the gap comes from the data in the 2007 National Physician Survey.

The number of Registered Dietitians required to address the unmet need for nutrition services in primary care can be roughly estimated from the prevalence of nutrition issues in primary care practices.

Only 14% of family physicians had a formal collaborative arrangement with a dietitian, and only 52% had regular collaboration with a dietitian (CFPC, 2007). A Health Council of Canada review of research on the quality of care for people with diabetes in Canada identified that close to 80% of family physicians advise patients with diabetes to eat better and be more active; however only about half refer their patients for more active support such as nutrition counselling (HCC, 2007b). Physicians cite the major obstacles to providing care for these patients as lack of time, lack of information and lack of access to appropriate services in the community. Given the high proportion of nutrition issues that arise in primary care, the gap in services is obvious and substantial.

While home-based nutrition services (nutrition assessment and therapy for clients living at home) may or may not be considered primary health care, an analysis of such services in British Columbia estimated that 50,500 to 54,000 people (adults and children) in that province were at nutrition risk with minimal or no home-based nutrition services available (Dietitians of Canada, 2008a). It was estimated that 250 or more full-time Registered Dietitians would be required to meet the identified needs of these individuals in BC alone.

It is a challenge to attract and retain health care staff in rural and remote areas of Canada and chronic shortages of dietitians working in Northern communities has been identified in workforce surveys done by Dietitians of Canada. The shortfall of primary care services cannot be accurately determined at this time (Dietitians of Canada, 2006b).

For public health nutrition positions, it has been recommended that population-health strategies require a minimum of one public health nutrition position per 50,000 population (Health Canada, 1990; Kaufman, 2007), far above the current complement. Additional work to evaluate the number of public health nutritionists/dietitians currently employed in Canada is needed. Work is also currently being completed to make recommendations on a definition of public health nutrition practice, competencies, and a leadership/organizational structure for public health dietitians/nutritionists in a project supported by the Public Health Agency of Canada that includes DC and other public health leaders on its Task Force (<http://www.dietitians.ca/resources/resourcesearch.asp?fn=view&contentid=8582>).





Adequate numbers of Registered Dietitians, working as members of the interdisciplinary PHC team and in public health positions, are needed to effectively implement healthy living strategies. The lack of population needs-based funding has created inequitable access to required nutrition services.

Funding –

In the absence of consistent funding mechanisms to support nutrition services in PHC, services have been developed in an ad hoc manner by various agencies with differing mandates. In some communities, previously available ambulatory care services operated through community hospitals have been closed, thereby eliminating access to nutrition services by primary care physicians. Other agencies may have been able to retain dietitian services, but in many cases the mandate of those dietitians is focused specifically on meeting the needs of those agencies, rather than promoting access to the community at large.

Across Canada, some provincial funding models support PHC team-based practices, resulting in new and emerging PHC teams (referred to in various provinces as collaborative practices, family health teams/networks, family medicine groups, physician integrated networks, primary care networks, PHC networks or PHC organizations); however the decision to fund a dietitian as part of the PHC team is most often at the discretion of the lead physician or administrative group. In the recent development of 150 Family Health Teams in Ontario, 75% of FHTs reported employing a Registered Dietitian (personal communication, P. Brauer, May 2009).

Some Registered Dietitians work in private practice, and provide services to support dietary change for those individuals with specific health risks. However such services are limited to individuals who have the financial resources to pay for services from their own pockets or with the support of supplementary health insurance. These services do not meet the needs.

According to the current skills and practice registry of Dietitians of Canada (DC) (May 2009), the voluntary national professional association, there are 3369 dietitians working in primary health care practice settings [see Table 1 below for an estimate of numbers in each work setting]. However since dietitians can choose to identify more than one practice environment, these numbers can represent double or triple counting of actual numbers. Since not all provinces collect detailed data on workplace, no statistics by province are available.

TABLE 1 - WORK SETTINGS OF CANADIAN PHC REGISTERED DIETITIANS (MAY 2009)

Work Setting of Current Members (n=3369)	(%)
Private practice / consulting	26
Diabetes education programs or ambulatory medical clinics	20
Community Health Centres (CHCs), Centre Local de Services Communautaires (CLSC), or Health Service Organizations (HSOs)	16
Public health	12
Primary health care / call centre	11
Home Care	8
Grocery store / pharmacy / retailers	6
Health Maintenance Organizations (HMOs)	<1

3. Interdisciplinary³, collaborative group practices comprised of a mix of health service providers (also referred to as inter-professional collaboration (Barrett et al, 2007)) based on community and individual patient needs

Team-based delivery of PHC provides integrated and comprehensive care to clients and ensures that each service is provided by the most appropriate provider. Inter-professional team-based care can strengthen providers’ ability to focus on prevention and efficiently coordinate care among different providers as providers work together to optimize health outcomes (HCC, 2008b). Inter-professional collaborative practice provides consumer and family centred care where clients are engaged in their care and are encouraged to participate in making decisions about their own health and identify the health needs of their community (Davis et al, 2005; Dietitians of Canada, 2006a). Evidence is accumulating to suggest that team-based care will provide more coordinated and cost-effective care and more opportunities to focus on wellness, prevention and patient education (Barrett et al, 2007; HCC, 2008a). Team-based care has also been identified as a challenge due to misgivings and misconceptions among different professions about one another’s roles and responsibilities in a team environment (Conference Board of Canada; 2007).

³ Interdisciplinary is also referred to as multidisciplinary. As described in the document, Working Together: Enhancing Multidisciplinary Primary Care in BC (BCMA, 2005): In multidisciplinary care, “the role of non-physician providers can generally take one, or a combination, of three forms: (1) supplementary, whereby the non-physician provider extends the efficiency of the physician by assuming part of the tasks, generally those that are technical in nature and usually under the direction of the physician; (2) complementary, whereby the non-physician provider extends the effectiveness of physicians by undertaking additional tasks for which they are uniquely qualified to perform; and(3) substitutive, whereby the non-physician provider replaces the role of the physician for a select type of services. Source: (Starfield, B. Primary Care: balancing Health Needs, Services, and Technology. Oxford University Press, New York:1998, p.91).”

Registered Dietitians have been, and are currently involved in, a range of “collaborative” initiatives across the country.

In the Health Council of Canada’s survey of people’s experiences with PHC, only 17% of Canadians reported that another health care professional such as a dietitian works with their family doctor and is involved in their care (HCC, 2008a). Of the higher proportion of physicians not working in multidisciplinary care, 67% would like to practice with a dietitian (BCMA, 2005).

Few interdisciplinary models providing nutrition services have been documented and formally evaluated in PHC settings. A consensus process was undertaken by dietitians that included 12 individuals from other health professions, to identify key features of interdisciplinary nutrition services in Ontario primary care settings, including provider roles and responsibilities (Brauer, et al, 2006). A service model was developed that placed the Registered Dietitian as the team member responsible for managing all aspects of nutrition services. This included: setting nutrition program goals, identifying gaps, supporting nutrition services of all providers and providing individual and group nutrition counselling. Given the amount of trust and credibility invested in physicians by the public, the dietary advice they give is potentially extremely important. The most effective role a general practitioner can play in nutrition education for their patients is the “legitimization and reinforcement of public health information by brief advice” (Mant, 1997). The consensus process identified that all other providers would support nutrition services by: identifying willing patients for nutrition counselling, reinforcing nutrition counselling goals with patients and providing general nutrition advice (e.g. Canada’s Food Guide information) to those waiting for counselling (Brauer et al, 2006).

The establishment of “collaboratives” is one approach to improving the performance of inter-professional teams in Canada that manage individuals with chronic health conditions (HCC, 2007b). Collaboratives are teams that bring health care system managers and health care providers together to plan how to do things differently, to study the impact of change and to act on that knowledge. By enabling health care providers to share experiences, accelerate change and spread best practices, this quality improvement strategy has been shown to be effective in increasing patient and provider satisfaction as well as health outcomes.

Registered Dietitians have been, and are currently involved in, a range of such initiatives across the country. Collaboratives are frequently applying a Model for Improvement that includes Plan-Do-Study-Act (PDSA) cycles to test the effect of change in their practices (Langley et al, 1996).

PDSA is a shortened way for testing a change in the real work setting – by planning it, trying it, observing the results, and acting on what is learned (IHI, undated). The PDSA cycle provides a method of testing whether a planned change will lead to improvement prior to implementing a change on a larger scale. Such approaches hold promise for development of collaborative care.

Another approach to improved collaborative care has been the development of inter-professional education (IPE). IPE uses shared interactive sessions to promote different professional groups' understanding of each other and working together to promote effective team-based practice. Team Objective Structured Clinical Examination (TOSCE) is a tool that is being used to help address competency in team collaboration (Symonds et al, 2003). Limited evaluation of dietitians/dietetic students in IPE has been done to date (Whelan et al, 2005).

Information technology can be a facilitating factor to achieve efficiency and effectiveness in accessing, sharing and coordinating health information with authorized providers of services. Information technology systems such as telehealth, electronic health records and wait-list management systems offer opportunities to advance quality of care, practice-based learning and quality improvement. Some Canadian facilities have adopted a “standardized nutrition language” developed in the U.S. to provide consistent documentation of nutrition diagnoses, interventions and outcomes that can be used for electronic health records (Jenkins et al, 2006).





An effective network of nutrition services for PHC requires sufficient human resources in each setting to deliver the level of care needed by the population to be served.

4. Coordination and continuity between providers, throughout the lifecycle and across all sectors that impact on health, including links to public health

With continuity and coordination of services as goals, not all nutrition services need to be provided to a community by the same dietitian working in the same practice setting as other PHC providers. An effective networking and referral system that links dietitians and other care providers, working in a variety of community-based settings, and from a variety of human services sectors, would substantially improve continuity of care for clients. Limitations in the practice of one practitioner can be offset through linkage with dietitians with different mandates. Information technology already exists to facilitate this, but leadership from government is required for funding, technical support and standardization of electronic systems.

Continuity in care can be achieved by creating an integrated system of service delivery, supported through collaborative planning processes. The required systems must include health providers, inter-agency and cross-sectoral partnerships and consultation with stakeholder groups (Howard Research, 2000).

Table 2 illustrates how an effective referral network of Registered Dietitians, from a variety of community-based settings, can provide complimentary services that “deliver” the key elements of PHC.

TABLE 2 - DIETETICS PRACTICE: A COMPLEMENTARY NETWORK OF SERVICES RELATIVE TO KEY ELEMENTS OF PRIMARY HEALTH CARE

DIETETIC PRACTICE SETTINGS ⁴	KEY ELEMENTS OF PRIMARY HEALTH CARE				
	Provides a Range of Comprehensive PHC Nutrition Services	Utilizes Population Health Strategies	Ensures Continuity & Coordination of Care Across the Lifecycle, Between Providers & Across All Sectors	Applies Interdisciplinary Practice & Team Relationships	Is Affordable & Cost Effective ⁵
Community Health Centre (CHC)	√	√	√	√	√
Primary health care clinic (e.g. family health team, family medicine group, physician integrated network, PHC network / organization, primary care network)	√	√	√	√	√
Public health	Focus is on population health promotion and disease prevention	√	√	√	√
Home care	Focus is on services for specific clients at risk or with existing medical conditions	Focus is on services for specific clients at risk or with existing medical conditions	√	√	√
Diabetes Education Centre / Ambulatory medical clinic (supporting family practice and specialty practice); Mental health clinic/ eating disorder program	Focus is on services for specific clients at risk or with existing medical conditions	Focus is on services for specific clients at risk or with existing medical conditions	√	√	√ Dependent upon funding models

⁴ While the range of services varies between individual practitioners, agencies and provinces/territories; information is based on the usual mandate for these practice settings.

⁵ The potential for savings relative to decreased hospitalization and long-term disability as a result of nutrition intervention has been well documented (Pavlovich et al, 2004).

TABLE 2 continued - DIETETICS PRACTICE: A COMPLEMENTARY NETWORK OF SERVICES RELATIVE TO KEY ELEMENTS OF PRIMARY HEALTH CARE

DIETETIC PRACTICE SETTINGS ⁴	KEY ELEMENTS OF PRIMARY HEALTH CARE				
	Provides a Range of Comprehensive PHC Nutrition Services	Utilizes Population Health Strategies	Ensures Continuity & Coordination of Care Across the Lifecycle, Between Providers & Across All Sectors	Applies Interdisciplinary Practice & Team Relationships	Is Affordable & Cost Effective ⁵
Consulting / Private Practice	√	Primary focus is on individuals and groups, rather than population	√ Dietitian maintains own client record and liaises with other care providers as needed	√	√ Fee for service is a barrier to some clients
Grocery store / pharmacy / retail	√	√	n/a	n/a	√
Dietitian Call Centre	√	√ Primary focus is on individuals but may extend/augment services to the population through a website	√	√	√
Other (including non-profit organization, school health, occupational health)	√	√	√	n/a	√

5. Affordability and cost-effectiveness⁶ – PHC services provide a culture of accountability, performance measurement and quality improvement (Health Canada, 2006)

Evaluation of outcomes and cost-effectiveness were key outcomes of the PHCTF initiatives (Health Canada, 2007a) and are necessary to evaluate the ongoing performance of PHC activities. Numerous examples of successful programs and approaches used by Registered Dietitians have been documented in a variety of best practices documents (e.g. Dietitians of Canada, 2009), Dietitians of Canada Practice-based Evidence in Nutrition (PEN) online knowledge translation tool (<http://www.dieteticsatwork.com/pen/>), and through the peer review literature, notably the Canadian Journal of Dietetic Practice and Research (www.dcjournal.ca). A few examples illustrate the range of studies and programs to date.

Prenatal nutrition programs that target high-risk pregnant women have been shown to improve long-term health outcomes in children, saving at least \$8 for each dollar invested in the program (Duquette et al, 2008). The Montreal Diet Dispensary, whose programs target low-income, pregnant mothers at risk, uses an individualized approach to dietary treatment that combines a dietitian risk assessment with a specific nutritional rehabilitation program (Higgins et al, 1989). This intervention has shown a reduction in LBW and preterm infants with an estimated savings of \$41 million annually in treatment (Dubois et al, 1997; Higgins et al, 1989). Today the Canada Prenatal Nutrition Program has demonstrated success in reducing the risk of LBW infants and increasing the proportion of mothers who breastfeed their infants (PHAC, 2007). A cost effectiveness evaluation of the Canada Prenatal Nutrition Program is underway [expected to be completed in 2010] (PHAC, 2008).

Nutrition screening, assessment and treatment are key factors to help maintain the health, independence and quality of life of Canadians and reduce costs of institutionalization. A screening initiative for seniors who were not already receiving diet services (Bringing Nutrition Screening to Seniors) showed that organizations serving seniors were able to identify individuals experiencing nutritional challenges, especially unintentional weight change, and link them with nutrition services in their community to improve nutritional health (DC, 2003).

Numerous examples of successful programs and approaches used by Registered Dietitians have been documented in a variety of best practices documents.

⁶ Cost-effectiveness is defined as better health at lower cost (Howard Research, 2000)

Population health promotion strategies that promote healthy eating and active living help to reduce the incidence of chronic disease. A systematic review that examined the effectiveness of nutrition interventions for the prevention or treatment of chronic disease in PHC practice settings identified a number of dietary interventions associated with positive health outcomes (Ciliska et al, 2006). Overall results support the benefits of more intensive interventions with specific guidance (such as specialized programs that would include a dietitian) rather than brief encounters with general advice.

Clinical practice guidelines establish a clear benefit for dietary interventions in the management of hypertension and dyslipidemia (Khan et al, 2008; McPherson et al, 2006). Multiple risk factor interventions (using combinations of diet, exercise, weight loss, and smoking cessation) have demonstrated reductions in cardiovascular risk factors (e.g. blood pressure, blood cholesterol) (Ciliska et al, 2006), along with medication therapy. Gaps in primary care treatment services for cardiovascular risk factors suggest potential for improvements. Data from an Ontario primary care cohort identified that 14% of individuals had dyslipidemia and 17% had hypertension, many of whom had other co-morbidities. About two-thirds of individuals were untreated and diet therapy was not mentioned in care (Petrella, 2007a and 2007b). In particular, effective strategies for achieving nutrition and lifestyle goals and subsequent risk factor reduction include personal or family counselling and behavioural modification techniques (e.g. goal-setting, self-monitoring) (Ebham et al, 2006; Gaede et al, 2003).

The Diabetes in Canada Evaluation (DICE) study examined the management of diabetes in the Canadian primary care setting and identified that many people with diabetes were inadequately controlled (49% of 2473 charts examined with A1C \geq 7.0%) and had high rates of co-morbidities (63% with hypertension, 59% with dyslipidemia) (Harris et al, 2005). Lifestyle interventions were identified by family physicians as the major strategy required for 79% of patients that were inadequately controlled.


Lifestyle interventions delivered by dietitians that support healthy eating, exercise and achieve weight loss have been shown to reduce the risk of developing diabetes by close to 60% in individuals at risk for diabetes (Tuomilehto et al, 2001) and continue to decrease diabetes risk even after the intervention stopped (Lindstrom et al, 2006; Li et al, 2008). Furthermore the costs of lifestyle interventions to prevent diabetes are lower than the cost of pharmaceutical interventions (Knowler et al, 2002; Herman et al, 2005).

To treat individuals with diabetes, programs that are tailored to the individual's needs and build an individual's capacity can improve outcomes. Diabetes self-management education (DSME) includes knowledge, diet and other lifestyle behaviours, development of skills to improve glycemic control and coping skills (Norris, 2001). DSME has been shown to be effective in improving quality of life outcomes and glycemic control when conducted in community settings (Ciliska et al, 2006). Utilizing the skills of dietitians to conduct DSME in PHC settings promotes self-care and reduces costs associated with diabetes complications. Nutrition interventions ranging from nutrition counselling by a Registered Dietitian targeted at high-risk groups to population-wide interventions targeting healthy eating behaviours have been demonstrated to improve health outcomes and be cost-effective (Dalziel et al, 2007; Pavlovich et al, 2004; Urbanski et al, 2008).

About one third of cancer cases could be reduced by healthy diet choices, being physically active and maintaining a healthy weight (WCRF/AICR, 2007). Population health strategies that promote an increased intake of vegetables, fruits and whole grain foods as well as encourage food choices and physical activity to promote a healthy weight are important in reducing cancer risk (WCRF/AICR, 2007). These population health strategies also apply to the prevention of heart disease and diabetes (ADA, 2008; AHA, 2006).

A large body of evidence indicates that interventions provided by dietitians working in collaborative PHC mental health programs can improve nutrition-related outcomes in individuals with mental health issues (Dietitians of Canada, 2006a).

Obesity prevention requires a multisector approach with efforts invested in all life cycle groups. For treatment of overweight and obese adults a comprehensive lifestyle intervention is recommended with dietary intervention provided by a dietitian designed to achieve weight loss and obesity-related symptoms (Obesity Canada, 2007). Individual and small group counselling is recommended for dietary interventions for obesity prevention in adults as lower intensity interventions (e.g. counselling by mail and financial incentives) have not been shown to be effective (Ciliska, 2006; Obesity Canada, 2007; Reeder et al, 2006). A recent evaluation of a dietitian-led intervention for adults with obesity and type 2 diabetes that consisted of individual and group education, support and referrals to community resources over one year, demonstrated that in comparison to usual care, the intervention led to modest reductions in health care costs resulting from fewer hospital admissions (Wolf et al, 2007).



Nutrition services are cost-effective. Population needs-based funding is required to establish and sustain nutrition services in PHC.

Conclusions and Recommendations

Registered Dietitians provide leadership in team efforts to support the nutritional health of the population through health promotion, disease prevention, treatment, support and rehabilitation.

Adequate nutrition services in PHC (public health and primary care) settings is required to ensure the health of Canadians. Registered Dietitians provide leadership in team efforts to support the nutritional health of the population through health promotion, disease prevention, treatment, support and rehabilitation. Substantial progress has been made to reform the PHC system across Canada. Much more remains to be done.

Dietitians of Canada recommends that provincial and federal policy decision-makers:

- Develop and apply appropriate population needs-based funding mechanisms to support PHC nutrition services within their jurisdictions
- Establish effective systems to integrate nutrition services into all models of PHC
- Support systems for effective monitoring and ongoing evaluation of PHC nutrition services to ensure effectiveness and efficiency

Dietitians of Canada further recommends that professionals involved in implementation and evaluation of health services:

- Establish long-range plans that ensure nutrition services match PHC needs of communities
- Implement appropriate population needs-based funding mechanisms to support PHC nutrition services within their jurisdictions
- Integrate nutrition services in all areas of PHC, including public health, telehealth, and other approaches to promote nutritional well-being
- Monitor and evaluate PHC nutrition services to ensure effectiveness and efficiency

Dietitians of Canada further recommends that professional associations, educators, researchers, practitioners and others involved in PHC development:

- Promote strong inter-professional collaborative education and practice, including the expertise of Registered Dietitians as integral members of PHC teams
- Continue to develop and evaluate new models for inter-professional PHC nutrition practice, with a particular focus on prevention and treatment of Canada's major chronic diseases

Dietitians of Canada, through its membership, remains committed to the ongoing development of a strong reformed PHC system, where every Canadian has access to the appropriate nutrition services needed to support health.

References

- American Diabetes Association (ADA) (2008), Bantle JP, Wylie-Rosett J, Albright AL, Apovian CM, Clark NG, Franz MJ, et al. Nutrition recommendations and interventions for diabetes: a position statement of the American Diabetes Association. *Diabetes Care*. 2008 Jan;31 Suppl 1:S61-78.
- American Heart Association (AHA) Nutrition Committee (2006); Lichtenstein AH, Appel LJ, Brands M, Carnethon M, Daniels S, Franch HA, et al. Diet and lifestyle recommendations revision 2006: a scientific statement from the American Heart Association Nutrition Committee. *Circulation*. 2006 Jul 4;114(1):82-96.
- Barr VJ, Robinson S, Marin-Link B, Underhill L, Dotts A, Ravensdale D, et al. (2003). The expanded Chronic Care Model: an integration of concepts and strategies from population health promotion and the Chronic Care Model. *Hosp Q*. 2003;7(1):73-82.
- Barrett J, Curran V, Glynn L, Godwin M (2007). CHSRF Synthesis: Interprofessional collaboration and quality primary healthcare; Dec., 2007. Ottawa: Canadian Health Services Research Foundation. Available from: <http://www.chsrf.ca>
- Brauer P, Dietrich L, Davidson B (2006). Nutrition in primary health care: using a Delphi process to design new interdisciplinary services. *Can J Diet Pract Res*. 2006 Autumn;Suppl:S14-29
- Breastfeeding Committee for Canada (BCC) (2002a). Affordable health care begins with breastfeeding support and the use of human milk; 2002. Available from: www.breastfeedingcanada.ca/pdf/webdoc47.pdf
- Breastfeeding Committee for Canada (BCC) (2002b). Breastfeeding statement of the Breastfeeding Committee for Canada; 2002. Available from: www.breastfeedingcanada.ca
- British Columbia Medical Association (BCMA) (2005). Working Together: enhancing multidisciplinary primary care in BC. Available from: http://www.bcma.org/files/MDC_Report.pdf
- Canadian Collaborative Mental Health Initiative (CCMHI) (undated) [website]. Available from: <http://www.ccmhi.ca>
- Canadian Cancer Society (CCS) / National Cancer Institute of Canada (2008). Canadian Cancer Statistics, 2008. Toronto, Canada. Available from: <http://www.cancer.ca>
- Canadian Diabetes Association (CDA) (2006), Dietitians of Canada, Diabète Québec, Order professionnel des diététistes du Québec. Recommendations for nutrition best practice in the management of gestational diabetes mellitus: executive summary. *Can J Diet Prac Res* 2006;67(4):206-8.
- Canadian Diabetes Association Clinical Practice Guidelines Expert Committee (2008). Canadian Diabetes Association 2008 clinical practice guidelines for the prevention and management of diabetes in Canada. *Can J Diabetes*. 2008;32(Suppl 1): S1-S201. Available from: <http://www.diabetes.ca/for-professionals/resources/2008-cpg/>

- Canadian Hypertension Education Program (CHEP) (2008). 2008 CHEP Recommendations for the Management of Hypertension. Available from: <http://www.hypertension.ca/chep/>
- Canadian Institute for Health Information (CIHI), Statistics Canada (2005). National Health Expenditure Trends, 1975-2005. Ottawa: CIHI. Available from: <http://www.cihi.ca>
- Canadian Institute for Health Information (CIHI) (2007). Giving Birth in Canada: Regional Trends From 2001-2002 to 2005-2006. Available from: <http://www.cihi.ca>
- Canadian Obesity Network. (undated) [website]. Available from: <http://www.obesitynetwork.ca/page.aspx?menu=35&app=162&cat1=419&tp=2&lk=no>
- Canadian Paediatric Society (CPS) (2005), Dietitians of Canada and Health Canada. Nutrition for Healthy Term Infants, Minister of Public Works and Government Services, Ottawa; 2005. Available from: http://www.hc-sc.gc.ca/fn-an/pubs/infant-nourrisson/nut_infant_nourrisson_term-eng.php
- Cantwell B, Clarke C, Bellman J (2006). Building a vision of dietitian services in primary health care. *Can J Diet Pract Res*. 2006 Autumn;Suppl:S54-7.
- Chenhall C for Dietitians of Canada in partnership with Public Health Agency of Canada (2006). Competencies for public health nutrition professionals: a review of the literature; September 2006. Available from: <http://www.dietitians.ca/resources/resourcesearch.asp?fn=view&contentid=8582>
- Ciliska D, Thomas H, Catallo C, Gauld M, Kingston D, Cantwell B, et al (2006). The effectiveness of nutrition interventions for prevention and treatment of chronic disease in primary care settings: a systematic literature review. Toronto (ON): Dietitians of Canada; 2006. Available from: <http://www.dietitians.ca/resources/resourcesearch.asp?fn=view&contentid=7279>
- College of Family Physicians of Canada (CFPC) (2007), Canadian Medical Association, The Royal College of Physicians and Surgeons of Canada. 2007 National Physician Survey; 2007. Available from: www.nationalphysiciansurvey.ca
- Conference Board of Canada (2007). Liability risks in interdisciplinary care: thinking outside the box. Ottawa: Conference Board; 2007. Available from: www.conferenceboard.ca
- Crustolo AM, Ackerman S, Kates N, Schamehorn S (2005). Integrating nutrition services into primary care: Experience in Hamilton, Ont. *Can Fam Physician*. 2005 Dec;51:1647-53. <http://www.cfp.ca/cgi/reprint/51/12/1647>
- Dalziel K, Segal L (2007). Time to give nutrition interventions a higher profile: cost-effectiveness of 10 nutrition interventions. *Health Promot Int*. 2007 Dec;22(4):271-83.
- Davis K, Schoenbaum SC, Audet AM (2005). A 2020 vision of patient-centered primary care. *J Gen Intern Med*. 2005 Oct;20(10):953-7.
- Davison K (2006). Primary health care, mental health, and the dietitian's role. *Can J Diet Pract Res*. 2006 Autumn;Suppl:S47-53.

Dietitians of Canada (DC) (2001). The role of the Registered Dietitian in primary health care – a national perspective. Toronto: Dietitians of Canada; May 2001.

Available from: http://www.dietitians.ca/news/pdf/Role_of_RD_in_PHC_2004.pdf

Dietitians of Canada (DC) (2003). Bringing Nutrition Screening to Seniors.

Available from: <http://www.dietitians.ca/seniors>

Dietitians of Canada (DC) (2004). Community Dietitians - Trusted Food and Nutrition Experts: Role Paper of the Dietitians of Canada Community Dietitians in Health Centres Network; March 2004 [cited 2008 11 Jul].

Available from: http://www.dietitians.ca/pdf/CDHC_role_paper_March2004.pdf

Dietitians of Canada (DC) (2006a). The role of dietitians in collaborative primary health care mental health programs; 2006. Available from: <http://www.ccmhi.ca/en/products/documents/ENDietitiansToolkit.pdf>

Dietitians of Canada (DC) (2006b). News release - Ontario dietitian workforce survey suggests looming crisis. Available from: <http://www.dietitians.ca/resources/resourcesearch.asp?fn=view&contentid=6466>

Dietitians of Canada (2008a). The need for a program of home-based nutrition services in British Columbia.

Available from: <http://www.dietitians.ca/resources/resourcesearch.asp?fn=view&contentid=11141>

Dietitians of Canada (2009). A systematic review of the effectiveness of nutrition counselling interventions by Dietitians in outpatient and in workplace settings.

Available from: <http://www.dietitians.ca/resources/resourcesearch.asp?fn=view&contentid=13320>

Dubois S, Coulombe C, Pencharz P, Pinsonneault O, Duquette MP (1997). Ability of the Higgins Nutrition Intervention Program to improve adolescent pregnancy outcome. *J Am Diet Assoc.* 1997 Aug;97(8):871-8.

Duquette MP, Payette H, Moutquin JM, Demmers T, Desrosiers-Choquette J (2008). Validation of a screening tool to identify the nutritionally at-risk pregnancy. *J Obstet Gynaecol Can.* 2008 Jan;30(1):29-37.

Eaton CB, Goodwin MA, Stange KC (2002). Direct observation of nutrition counseling in community family practice. *Am J Prev Med.* 2002 Oct;23(3):174-9.

Ebrahim S, Beswick A, Burke M, Davey Smith G (2006). Multiple risk factor interventions for primary prevention of coronary heart disease. *Cochrane Database Syst Rev.* 2006 Oct 18;(4):CD001561.

Enhancing Interdisciplinary Collaboration in Primary Health Care (EICP) Initiative (2006) [website].

Available from: <http://www.eicp.ca/en/>

Federal/Provincial/Territorial (F/P/T) Committee of Officials (Seniors) (2006). Healthy aging in Canada: a new vision, a vital investment from evidence to action.

Available from: http://www.phac-aspc.gc.ca/seniors-aines/pubs/haging_newvision/pdf/vision-rpt_e.pdf

Gaede P, Vedel P, Larsen N, Jensen GV, Parving HH, Pedersen O (2003). Multifactorial intervention and cardiovascular disease in patients with type 2 diabetes. *N Engl J Med.* 2003 Jan 30;348(5):383-93.

Gamblen W, Schamehorn S, Crustolo AM, Hussey T, Kates N, Ackerman S (2007). The registered dietitian in primary care: the Hamilton experience. *Can J Diet Pract Res.* 2007 Summer;68(2):81-5.

Gilmour H, Park W (2006). Dependency, chronic conditions and pain in seniors. Supplement to Health Reports Vo. 16. Statistics Canada Catalogue 82-003.

Goeree R, Farahati F, Burke N, Blackhouse G, O'Reilly D, Pyne J, et al (2005). The economic burden of schizophrenia in Canada in 2004. *Curr Med Res Opin.* 2005 Dec;21(12):2017-28.

Harris SB, Ekoé JM, Zdanowicz Y, Webster-Bogaert S (2005). Glycemic control and morbidity in the Canadian primary care setting (results of the diabetes in Canada evaluation study). *Diabetes Res Clin Pract.* 2005 Oct;70(1):90-7.

Health Canada (1990). Action Towards Healthy Eating - Canada's Guidelines for Healthy Eating and Recommended Strategies for Implementation. Available from: http://www.hc-sc.gc.ca/fn-an/nutrition/pol/action_healthy_eating_tc-action_saine_alimentation_tm-eng.php

Health Canada (2003). 2003 First Ministers' Accord on Health Care Renewal. Available from: <http://www.hc-sc.gc.ca/hcs-sss/delivery-prestation/fptcollab/2003accord/index-eng.php#notes>

Health Canada (2004a). First Minister's Meeting on the Future of Health Care 2004. A 10-year plan to strengthen health care. Available from: <http://www.hc-sc.gc.ca/hcs-sss/delivery-prestation/fptcollab/2004-fmm-rpm/index-eng.php>

Health Canada (2004b). Exclusive breastfeeding duration – 2004 Health Canada recommendation. Available from: http://www.hc-sc.gc.ca/fn-an/nutrition/child-enfant/infant-nourisson/excl_bf_dur-dur_am_excl-eng.php

Health Canada (2006). Health Care System – Primary health care; 2006 [web page]. Available from: <http://www.hc-sc.gc.ca/hcs-sss/prim/index-eng.php>

Health Canada (2007a). Primary Health Transition Fund: Summary of Initiatives: Final Edition; March 2007. Available from: <http://www.hc-sc.gc.ca/hcs-sss/pubs/prim/2007-initiatives/index-eng.php>

Health Canada (2007b). Canadian Community Health Survey Cycle 2.2, Nutrition (2004). Income-Related Household Food Security in Canada. Available from: http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/income_food_sec-sec_alim-eng.php

Health Canada (2008). Food and Nutrition [web page]. Available from: <http://www.hc-sc.gc.ca/fn-an/index-eng.php>

Health Council of Canada (2005). Health care renewal in Canada: Accelerating change. Toronto: Health Council; 2005. Available from: <http://www.healthcouncilcanada.ca>

Health Council of Canada (2007a). Why health care renewal matters: learning from Canadians with chronic health conditions; Toronto: Health Council; 2007. Available from: <http://www.healthcouncilcanada.ca>

Health Council of Canada (2007b). Why Health Care Renewal Matters: Lessons from Diabetes; Toronto: Health Council; March 2007. Available from: <http://www.healthcouncilcanada.ca>

Health Council of Canada (HCC) (2008a). Fixing the foundation: an update of primary health care and home care renewal in Canada. Toronto: Health Council; 2008. Available from: <http://www.healthcouncilcanada.ca>

Health Council of Canada (HCC) (2008b). Rekindling reform: health care renewal in Canada, 2003 – 2008. Toronto: Health Council; 2008. Available from: <http://www.healthcouncilcanada.ca>

Heart and Stroke Foundation (2008). Statistics. Available from: www.heartandstroke.ca

Herman WH, Hoerger TJ, Brandle M, Hicks K, Sorensen S, Zhang P, et al (2005). Diabetes Prevention Program Research Group. The cost-effectiveness of lifestyle modification or metformin in preventing type 2 diabetes in adults with impaired glucose tolerance. *Ann Intern Med* 2005 [cited 2006 28 July] Mar 1;142(5):323-32.

Higgins AC, Moxley JE, Pencharz PB, Mikolainis D, Dubois S (1989). Impact of the Higgins Nutrition Intervention Program on birth weight: a within-mother analysis. *J Am Diet Assoc.* 1989 Aug;89(8):1097-1103.

Horta B, Bahl R, Martines J, Vlcora C (2007). Evidence of the long-term effects of breastfeeding: Systematic reviews and meta-analyses. Geneva, Switzerland: Department of Child and Adolescent Health and Development, World Health Organization.
Available from: http://www.who.int/child_adolescent_health/documents/9241595230/en/index.html

Howard Research and Instructional Systems Inc. (2000). Alberta Health Care Project. Six National Dimensions of Inquiry. Monograph. Alberta Health; September 2000.

INFACT Canada (2006). The risks of formula feeding: a brief annotated bibliography; 2nd revision. Available from: www.infactcanada.ca

Integrated Health Human Resources Development (IHHRD) (1996). Competencies for Primary Health Care Practitioners in Canada. 1996.

Institute for Healthcare Improvement (IHI) (undated). Model for Improvement. Available from: www.ihl.org

Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, et al (2007). Breastfeeding and maternal and infant health outcomes in developed countries. *Evid Rep Technol Assess (Full Rep)*. 2007 Apr [cited 2008 18 Mar];(153):1-186.

Jenkins M, Myers E, Charney P, Escott-Stump S (2006). American Dietetic Association's Standardized Nutrition Language: Project logic model and current status. *Stud Health Technol Inform.* 2006;122:710-4.

Kaufman M (2007). Nutrition in promoting the public's health: strategies, principles and practices. Sudbury, MA: Jones & Bartlett Publishers.

Khan NA, Hemmelgarn B, Herman RJ, Rabkin SW, McAlister FA, Bell CM, et al (2008). Canadian Hypertension Education Program. The 2008 Canadian Hypertension Education Program recommendations for the management of hypertension: part 2 - therapy. *Can J Cardiol.* 2008 Jun; 24(6):465-75.

Kirby MJL (2002); The Standing Senate Committee on Social Affairs, Science and Technology. The Health of Canadians – The Federal Role. Final Report. Volume Six: Recommendations for Reform; October 2002 [cited 2008 4 Jul]. Available from: <http://www.parl.gc.ca/37/2/parlbus/commbus/senate/com-e/soci-e/rep-e/repoct02vol6-e.htm>

Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM, Walker EA, et al (2002). Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med.* 2002 Feb 7;346(6):393-403.

Kramer MS, Matush L, Vanilovich I, Platt RW, Bogdanovich N, Sevkovskaya Z, et al. (2007). Effects of prolonged and exclusive breastfeeding on child height, weight, adiposity, and blood pressure at age 6.5 y: evidence from a large randomized trial. *Am J Clin Nutr.* 2007;86:1717-21.

Langley GJ, Nolan KM, Nolan TW, Norman CL, Provost LP (1996). *The Improvement Guide: A practical approach to enhancing organizational performance.* New York: Jossey-Bass Inc.

Lau DC, Douketis JD, Morrison KM, Hramiak IM, Sharma AM, Ur E; Obesity Canada Clinical Practice Guidelines Expert Panel (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [summary]. *CMAJ.* 2007 Apr 10;176(8):S1-13.

Li G, Zhang P, Wang J, Gregg EW, Yang W, Gong Q, et al. (2008) The long-term effect of lifestyle interventions to prevent diabetes in the China Da Qing Diabetes Prevention Study: a 20-year follow-up study. *Lancet.* 2008 May 24;371(9626):1783-9.

Lindström J, Ilanne-Parikka P, Peltonen M, Aunola S, Eriksson JG, Hemiö K, et al; Finnish Diabetes Prevention Study Group (2006). Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. *Lancet.* 2006 Nov 11;368(9548):1673-9.

McPherson R, Frohlich J, Fodor G, Genest J, Canadian Cardiovascular Society (2006). Canadian Cardiovascular Society position statement--recommendations for the diagnosis and treatment of dyslipidemia and prevention of cardiovascular disease. *Can J Cardiol.* 2006 Sep;22(11):913-27

Mable AL, Marriott J (2002). *Sharing the Learning: Health Transition Fund: Synthesis Series - Primary Health Care*, June 2002. Available from: <http://www.hc-sc.gc.ca/hcs-sss/pubs/acces/2002-htf-fass-prim/index-eng.php>

Mant D (1997). Effectiveness of dietary intervention in general practice. *Am J Clin Nutr.* 1997;65 (Suppl):1933s-1938s.

Marchildon GP (2005). *Health Systems in Transition:Canada.* Copenhagen, WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies, 2005. Available from: <http://www.euro.who.int/document/e87954.pdf>

Martin-Misener R, Valaitis R (2008). *A scoping literature review of collaboration between primary care and public health. A report to the Canadian Health Services Research Foundation.* September 2008. Available from: <http://fhs.mcmaster.ca/nursing/docs/MartinMisener-Valaitis-Review.pdf>

Naylor D (2003). National Advisory Committee on SARS and Public Health. Learning from SARS - Renewal of Public Health in Canada; October 2003. Available from: <http://www.phac-aspc.gc.ca/publicat/sars-sras/naylor/>

Norris SL, Engelgau MM, Narayan KM (2001). Effectiveness of self-management training in type 2 diabetes: a systematic review of randomized controlled trials. *Diabetes Care*. 2001 Mar;24(3):561-87.

Lau DC, Obesity Canada Clinical Practice Guidelines Expert Panel (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children. *CMAJ*. 2007 [cited 2007 25 June];176(8 Suppl):Online-1-117. Available from: <http://www.cmaj.ca/cgi/data/176/8/S1/DC1/1>

Pan American Health Organization (PAHO), World Health Organization (2006). Health Statistics from the Americas – 2006 Edition. Washington: Pan American Health Organization, Regional Office of the World Health Organization. Available from: <http://www.paho.org/English/DD/AIS/HSA2006.htm>

Pavlovich WD, Waters H, Weller W, Bass EB (2004). Systematic review of literature on the cost-effectiveness of nutrition services. *J Am Diet Assoc*. 2004 Feb;104(2):226-32.

Petrella RJ, Merikle E, Jones J, (2007a). Prevalence and treatment of dyslipidemia in Canadian primary care: a retrospective cohort analysis. *Clin Ther*. Apr;29(4):742-50.

Petrella RJ, Merikle EP, Jones J, (2007b). Prevalence, treatment, and control of hypertension in primary care: gaps, trends, and opportunities. *J Clin Hypertens (Greenwich)*. 2007b Jan;9(1):28-35.

Public Health Agency of Canada (PHAC) (2002a). The Economic Burden of Illness in Canada, 1998. Available from: <http://www.phac-aspc.gc.ca/publicat/ebic-femc98/>

Public Health Agency of Canada (PHAC) (2002b). Population Health: What is the Population Health Approach [web page]; 2002 Available from: http://www.phac-aspc.gc.ca/ph-sp/approach-approche/appr_e.html#health

Public Health Agency of Canada (PHAC) (2004). Progress Report on Cancer Control in Canada. Available from: <http://www.phac-aspc.gc.ca/publicat/prccc-relccc/index-eng.php>

Public Health Agency of Canada (PHAC) (2005). Integrated approach to chronic disease. Centre for Chronic Disease Prevention and Control. Available from: <http://www.phac-aspc.gc.ca/ccdpc-cpcmc>

Public Health Agency of Canada (PHAC) (2007). The Canada Prenatal Nutrition Program – a decade of promoting the health of mothers, babies and communities. Available from: http://www.phac-aspc.gc.ca/dca-dea/publicatrons/pdf/mb_e.pdf

Public Health Agency of Canada (PHAC) (2008). Evaluation Plan 2008-2009 to 2012-2013. Available from: http://www.phac-aspc.gc.ca/about_apropos/evaluation_plan08-eng.php

Reeder BA, Katzmaryzk PT with Canadian Task Force on Preventive Health Care (2006). Prevention of weight gain and obesity in adults: a systematic review. Available from: http://www.ctfphc.org/Full_Text/PreventionOfWeightGainAndObesityInAdults.pdf

Romanow RJ (2002); Commission on the Future of Health Care in Canada. Building on values: The future of health care in Canada; 2002. Available from: http://www.cbc.ca/healthcare/final_report.pdf

Secretariat for the Intersectoral Healthy Living Network in partnership with the F/P/T Healthy Living Task Group and the F/P/T Advisory Committee on Population Health and Health Security (ACPHHS) (2005). The Integrated Pan-Canadian Healthy Living Strategy; 2005.

Available from: http://www.phac-aspc.gc.ca/hl-vs-strat/pdf/hls_e.pdf

Society of Obstetricians and Gynaecologists of Canada (SOGC) (2006). Canadian Consensus Conference on Osteoporosis, 2006 update; JOGC; 2006 Feb;176;S95:S112.

Available from: <http://www.sogc.org/guidelines/public/172E-CONS-February2006.pdf>

Statistics Canada (2005). Nutrition: Findings from the Canadian Community Health Survey (2004). Adult Obesity in Canada: Measured Height and Weight and Overweight Canadian children and adolescents.

Available from: <http://www.statcan.ca/english/research/82-620-MIE/82-620-MIE2005001.htm>

Statistics Canada (2007), Canadian Community Health Survey (CCHS 3.1), January to June 2005. Self-rated mental health, by age group and sex, household population aged 12 and over. Table 105-0321.

Available from: <http://cansim2.statcan.gc.ca/>

Statistics Canada (2006). Canadians Community Health Survey: New data on smoking and on diabetes; 2005. The Daily. 2006 June 13.

Available from: <http://www.statcan.gc.ca/daily-quotidien/060613/dq060613a-eng.htm>

Stitzel KF; American Dietetic Association (2006). Position of the American Dietetic Association: the roles of registered dietitians and dietetic technicians, registered in health promotion and disease prevention. J Am Diet Assoc. 2006 Nov;106(11):1875-84.

Symonds I, Cullen L, Fraser D (2003). Evaluation of a formative interprofessional team objective structured clinical examination (ITOSCE): a method of shared learning in maternity education. Med Teach. 2003 Jan;25(1):38-41.

Tuomilehto J, Lindström J, Eriksson JG, Valle TT, Hämäläinen H, Ilanne-Parikka P, et al; Finnish Diabetes Prevention Study Group (2001). Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med. 2001 May 3;344(18):1343-50.

Tsai AC, Morton SC, Mangione CM, Keeler EB. (2005) A meta-analysis of interventions to improve care for chronic illnesses. Am J Manag Care. 2005 Aug[cited 2006 15 Sept];11(8):478-88.

Urbanski P, Wolf A, Herman WH (2008). Cost-effectiveness of diabetes education. J Am Diet Assoc. 2008 Apr;108(4 Suppl 1):S6-11.

van Weel C (2003). Dietary advice in family medicine. Am J Clin Nutr. 2003 Apr;77(4 Suppl):1008S-1010S.

Wagner EH, Austin BT, Von Korff M (1996). Organizing care for patients with chronic illness. Milbank Q 1996;74:511-544.

Whelan K, Thomas JE, Cooper S, Hilton R, Jones SC, Newton T, O'Neill B, Gill EE (2005). Interprofessional education in undergraduate healthcare programmes: the reaction of student dietitians. *J Hum Nutr Diet*. 2005 Dec;18(6):461-6.

Witt J, Brauer P, Dietrich L, Davidson B (2006). Human resources and cost estimates of adding a Registered Dietitian to Ontario Family Health Networks. *Can J Diet Prac Res* 2006;67:S30-S38

Wolf AM, Siadaty M, Yaeger B, Conaway MR, Crowther JQ, Nadler JL, Bovbjerg VE (2007). Effects of lifestyle intervention on health care costs: Improving Control with Activity and Nutrition (ICAN). *J Am Diet Assoc*. 2007 Aug;107(8):1365-73.

World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) (2007). Food, nutrition, physical activity, and the prevention of cancer: a global perspective. Washington, D.C.: AICR; 2007. Available from: <http://www.dietandcancerreport.org>

World Health Organization (WHO) (1978). Alma-Ata Declaration. International Conference on Primary Health Care; 1978.

World Health Organization (WHO) (1986). The Ottawa Charter for Health Promotion; 1986. Available from: http://www.who.int/hpr/NPH/docs/ottaw_charter_hp.pdf

World Health Organization (WHO) (2003). Diet, nutrition and the prevention of chronic diseases: Report of the joint WHO/FAO expert . WHO Technical Report Series, No. 916 (TRS 916); 2003. Available from: <http://www.who.int/dietphysicalactivity/publications/trs916/download/en/index.html>

World Health Organization (WHO) (2004). Global strategy on diet, physical activity and health. Available from: <http://www.who.int/dietphysicalactivity/goals/en/index.html>

World Health Organization (2005). Preventing Chronic Diseases: A Vital Investment. Geneva: World Health Organization; 2005. Available from: http://www.who.int/chp/chronic_disease_report/en

World Health Organization (2008). The World Health Report 2008, Primary Health Care – Now More Than Ever. Geneva: World Health Organization; 2008. Available from: http://www.who.int/whr/2008/whr08_en.pdf

Appendix A: The Practice of Registered Dietitians in Primary Health Care

The following table provides illustrative examples of how dietitians in the PHC context employ strategies that affect the entire population as well as strategies that impact on individuals who have health problems or are at risk of developing them. These examples are not intended as an inclusive array of services, but are *illustrative* of the range of dietitians' services provided in PHC.

TABLE 3 - THE PRACTICE OF REGISTERED DIETITIANS IN PRIMARY HEALTH CARE

Strategies	Illustrative Examples of Action
<p>HEALTH PROMOTION</p> <p><i>Build healthy public policy</i> – health is on the agenda of policy makers in all sectors and at all levels influencing policy decisions that impact on health</p>	<ul style="list-style-type: none"> ● Work with community advisory boards to establish “healthy community” policies affecting a variety of sectors that impact on access to healthy food choices - e.g. community recreation centres; schools; workplaces ● Consult with government in setting food assistance rates to ensure those on social assistance have sufficient resources to purchase healthy food ● Conduct research on the nutritional intake of populations to inform policy development on food fortification and food guidance systems ● Provide consultation and feedback on revisions to the 2007 “Eating Well with Canada’s Food Guide” ● Participate on scientific committees to establish nutrient requirements of populations ● Work with government ministries to strengthen the nutrition component of the health curriculum in schools and create policies to support healthy school environments ● Work with community planners regarding the built environment, food, health and food secure communities ● Collaborate with organizations to establish nutrition practice guidelines for various sectors (e.g. guidelines for infant feeding, chronic disease prevention); establish nutrition practice guidelines for use by provincial telephone patient information call-in lines ● Establish nutrition practice guidelines for use by provincial tele-health patient information lines (e.g. EatRight Ontario, B.C. Dial-a-Dietitian)
<p><i>Create supportive environments</i> – work and leisure conditions support healthy choices</p>	<ul style="list-style-type: none"> ● Consult with workplace and educational institution food service to suggest healthy options on the menu ● Assist communities to establish community kitchens (including helping with the physical design of the community kitchen), buying clubs, community gardens, shopping and cooking skill programs to promote lower cost healthy eating, food safety and peer support for low income populations ● Consult with community-based congregate meal programs in seniors’ centres to ensure access to a variety of healthy choices ● Work with grocery retailers to develop “senior friendly” shopping facilities that help maintain the independence of seniors to do their own food purchasing
<p><i>Strengthen community action</i> – communities are supported with access to information, learning opportunities and funding</p>	<ul style="list-style-type: none"> ● Conduct food safety seminars with volunteer organizations that provide community catering, thereby reducing incidence of food-borne illness ● Work in partnership with Family Resource Centres and Early Years Centres to help build capacity of families and communities to address food security issues and support nutritional health of children ● Manage and train peer support workers in programs targeting vulnerable populations such as pregnant teens, First Nations people, seniors and in programs to promote safe food selection, preparation and storage (e.g. Community Food Advisor Program)

Strategies	Illustrative Examples of Action
<p>HEALTH PROMOTION - <i>continued</i></p> <p>Develop personal skills – opportunities are available to increase knowledge and skills that lead to health-enhancing choices</p>	<ul style="list-style-type: none"> ● Conduct supermarket tours on reading labels to teach shoppers how to make healthy choices at the point of purchase ● Provide basic skills training for independent living to group homes for the developmentally challenged ● Consult with new parents to address infant and toddler feeding, development and food/feeding-related concerns (e.g. provide parent education workshops on a wide range of topics including, “How to Make Your Own Baby Food” to “Letting Your Child Help Out in the Kitchen”.) ● Work with daycares and schools to promote healthy eating (e.g. Kids in the Kitchen) ● Work with seniors groups and individuals diagnosed with mental illness to support healthy eating ● Establish liaisons with a variety of local media to ensure they have timely access to a reliable source of sound nutrition information of interest to the public; work with media to promote healthy eating (e.g. food demonstrations, cooking shows) ● Develop social marketing campaigns to target health promoting behaviours (e.g. increased fruit and vegetable consumption and support for breastfeeding) ● Use self-management education strategies to increase knowledge and capacity among patients/clients
<p>Reorient health services – there is recognition and focus on enabling communities and citizens to take more control over their health</p>	<ul style="list-style-type: none"> ● Facilitate networks and referrals between dietitians & other health providers working in primary health care settings to ensure communities and clients have direct access to the range of health services (e.g. private practice dietitians, public health nutritionists, dietitians working with home care, outpatient dietitians, tele-health dietitians) as well as non-traditional, alternative health services ● Train other providers (e.g. physicians, nurses, peer workers) and professionals in other sectors (e.g. social services, teachers, recreation and fitness leaders, dental assistants) on basic nutrition and health promotion to complement – not replace – dietitians’ expertise e.g. educate PHC team members about nutrition therapy used for individuals to reinforce behavioural and self-management strategies in a consistent manner ● Assist PHC teams to adopt population health strategies e.g. help to build patient registries, learn about their populations and develop long-term strategies for disease prevention and health promotion
<p>DISEASE PREVENTION</p>	<ul style="list-style-type: none"> ● Train home care workers in nutritional risk identification to identify and refer nutritionally vulnerable clients ● Provide nutritional assessment and counselling for high risk pregnant women (e.g. teens, vegetarians, low income persons) to reduce incidence of low birth weight infants ● Develop educational resource materials to promote heart healthy eating for individuals with elevated blood lipids ● Provide counselling on dietary modification and active living for women with gestational diabetes or hypertension to promote maternal and infant health ● Work with professional practice groups to establish standards for prevention and treatment of individuals with, or at risk for, diabetes ● Identify feeding issues / failure to thrive in infants and nutrition issues in preschoolers (i.e. obesity and malnutrition using NutriSTEP – Nutrition Screening Tool for Every Preschooler) and follow-up as needed ● Provide family and individual counselling for overweight and ‘at risk for overweight’ children to address childhood obesity ● Develop parent educational resource on “peanut butter-less” lunch and snack ideas to meet the requirements of “No Peanut” policy schools.

Strategies	Illustrative Examples of Action
TREATMENT	<ul style="list-style-type: none"> ● Provide nutrition and lifestyle counselling to reduce the risk of chronic disease ● Provide healthy lifestyle counselling to individuals with obesity, diabetes and hyperlipidemia along with their families to reduce the incidence of complications/co-morbidities; counselling strategies include: self-management, behavioural modification and strategies to address individuals' barriers to healthy lifestyle change. ● Provide a community-based diabetes program that utilizes interdisciplinary teams (e.g. dietitian-nurse team) to offer group education classes for people with pre-diabetes and type 2 diabetes ● Ensure evidence-based nutrition practices are followed in interdisciplinary clinics (e.g. hypertension, diabetes, failure to thrive pediatric clinic) ● Provide medical nutrition therapy to manage a broad range of medical disorders that addresses complex interactions between nutrients, medications and metabolic processes e.g. in diabetes care, integrate the effect of insulin and other medications with nutrient intake, activity patterns, and changes in nutrient metabolism that occur with diabetes, while at the same time managing nutrition therapy for co-morbidities such as hypertension and dyslipidemia ● Connect individuals and their families to community supports ● Provide case management expertise in coordinating treatment and services of multiple care providers to ensure continuity of care for clients e.g. transitioning a frail elderly client to a long term care home
REHABILITATIVE/SUPPORTIVE	<ul style="list-style-type: none"> ● Nutritional support (including home enteral or parenteral nutrition) to optimize nutrition status for: <ul style="list-style-type: none"> - Immunodeficiency disorders - Palliative care - Trauma - Dysphagia - Developmentally disabled - End of life care



Dietitians of Canada
Les diététistes du Canada

Suite 604 – 480 University Avenue
Toronto, Ontario M5G 1V2
T: 416-596-0857
E: centralinfo@dietitians.ca