

CONSUMERS' NEED FOR INFORMATION ON SUPPLEMENTS

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ABSTRACT

In Canada, many individuals are unable or do not meet the recommended nutrient intake from food alone, supplements may be one intervention strategy to help compensate for some of these inadequacies. The 2004 Canadian Community Health Survey found that 28 to 60 percent of individuals use supplements. Supplement use is positively associated with income and education level, with higher income individuals consuming a higher amount of supplements and supplement use increasing with education level. Previous research has identified several barriers to supplement usage, one of them being knowledge. The purpose of this qualitative research study was to develop a resource to help inform and educate consumers to select a supplement.

A total of 31 participants were included in data collection. Three focus groups with participants residing in low income neighbourhoods in Saskatoon, Saskatchewan, as well as, seven key informant interviews were conducted using a semi-structured interview guide. Audio tapes were transcribed and analyzed using thematic analysis to identify emergent themes. Data analysis yielded over 400 codes from the focus groups and key informant interviews. These codes were then grouped into themes and then further divided into three major topics: Barriers to Use, Resource, and Other. These data were subsequently used to create a new tool to help consumers choose an appropriate multivitamin. The aim of this resource is not to convince individuals that they need a supplement, but rather to provide information to help them choose an appropriate supplement once they have already decided to take one. This study will help to enhance the quality of information available regarding supplement selection through the use of an innovative online tool which is user friendly and meets the consumers' needs. A newly created resource based on the expressed needs, ideas, and beliefs of community members and health care professionals will serve to help to fill a void in currently available information. This provides individuals with a resource to educate themselves to select an appropriate multivitamin.

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LIST OF ABBREVIATIONS

ADA	American Dietetic Association
AHA	American Heart Association
AI	Adequate Intake
CCFN	Canadian Council for Food and Nutrition
CCHS	Canadian Community Health Survey
CL	ConsumerLab.com
CRN	Council for Responsible Nutrition
CSPI	Center for Science in the Public Interest
DC	Dietitians of Canada
DFE	Dietary Folate Equivalent
DRI	Dietary Reference Intake
EAR	Estimated Average Requirement
FDA	Food and Drug Administration
IU	International Units
KI	Key Informant
ODS	Office of Dietary Supplements
Pharm	Pharmacist
RD	Registered Dietitian
RDA	Recommended Dietary Allowance
STOFHLA	Short Test of Functional Health Literacy in Adults
UL	Tolerable Upper Intake Level
USDA	United States Department of Agriculture
UVB	Ultraviolet B

1. INTRODUCTION

1.1 Rationale

1.1.1 Nutrient intake of Canadians.

In Canada, many individuals are unable or do not meet the recommended nutrient intake from food alone. Results from the Canadian Community Health Survey in 2004 revealed that seven out of ten children aged four to eight, and half of all adults do not consume five fruit and vegetable servings a day (Garriguet, 2004). Furthermore, a third of children four to nine and two thirds of adults do not consume the recommended amount of milk products (Garriguet, 2004). These data suggest that various strategies are needed to improve nutrition in Canada. These strategies may include, for example: increased promotion of healthful foods; increased access to healthful foods through feeding programs; food fortification to increase nutrient content of commonly eaten foods; and nutrition supplements. Of these strategies, the one that can immediately help people meet nutrient requirements is use of dietary supplements. Some nutrients, specifically iron, folate, and vitamin D have proven difficult to achieve adequate intake from diet alone. In 2007, Health Canada released an updated food guide, *Eating Well With Canada's Food Guide* (Health-Canada, 2007). Among other changes, this revised food guide featured supplement recommendations for vitamin D, folic acid, and iron aimed at specific populations, such as; meeting these recommendations from food alone is not possible using the current food supply.

Income is one of the most important determinants of health; it impacts healthy eating both directly and indirectly (Power, 2005). Healthy eating may be affected directly for low-income individuals. Low-income Canadians are considered to be a nutritionally vulnerable group, as such this group is important to include in research. Food insecurity is a major issue that contributes to the vulnerability of low-income individuals, a reported 14.7% of Canadian households being classified as food insecure (Power, 2005). Food insecurity has been shown to be associated with lower energy intake, lower vitamin and mineral intake, and lower fruit, vegetable, and milk product intake (Kirkpatrick & Tarasuk, 2008). Kirkpatrick and Tarasuk (2008) identified negative associations between household food insecurity and overall intake of vitamins and minerals among several subgroups of the population. Additionally, energy intake has been found to be lower among food insecure households for men aged 31 to 50 years, as well

as men and women aged 51 to 70 years (Kirkpatrick & Tarasuk, 2008). Food insecurity has been shown to be positively associated with increased intake of carbohydrate energy sources and negatively associated with fruit, vegetable, and milk product intakes (Kirkpatrick & Tarasuk, 2008). Understanding the limitations that exist to healthy eating for low-income individuals in particular is important to improving the nutritional health of Canadians (Power, 2005).

Indirectly, income may affect healthy eating in a variety of ways. For example, income level may affect food choices and eating habits in a variety of ways including; food skills, preferences, social factors, cultural factors, access to healthy foods, and policy factors such as food labelling (Power, 2005). Some potential barriers to healthy eating, including knowledge, as identified through focus groups with low income individuals by Whiting et al. (2010) are summarized in Table 1.1.1.

Table 1.1.1 – Potential Barriers to Healthy Eating – Focus Group Responses/Emerging Themes

<p>Preferences</p> <ul style="list-style-type: none"> • Eating is social; others influence food choices, fear of unsafe or allergenic foods <ul style="list-style-type: none"> ○ <i>“It’s your family preference that affect how you eat”</i>
<p>Knowledge</p> <ul style="list-style-type: none"> • Food preparation skills, not sure which foods are needed <ul style="list-style-type: none"> ○ <i>“Everything is already pre-cooked that I got”</i> ○ <i>“I think we get a lot of information from magazines and the ads on TV and everything and we are not quite sure what is right.”</i>
<p>Accessibility</p> <ul style="list-style-type: none"> • Need to travel to store, nearness of fast foods, lack of storage/cooking facilities for foods <ul style="list-style-type: none"> ○ <i>“It’s a struggle too just to get to the food bank just to get the food and come home because I don’t have the transportation.”</i> ○ <i>“... people are running to the nearest corner store and then they are spending an arm and a leg to buy something healthy.”</i>
<p>Income</p> <ul style="list-style-type: none"> • Higher cost of healthy foods <ul style="list-style-type: none"> ○ <i>“You can go and get a Big Mac for cheaper than a bag of apples”</i> ○ <i>“I can’t afford to buy the higher-quality food, I can’t afford to buy the healthier food. All I can afford to buy is the less expensive, cheaper, unhealthy food because of the limited budget that I have”</i> ○ <i>“I think it is more important to have a home than it is to have something necessarily to eat.”</i> ○ <i>“Fruits and vegetables are very expensive and trying to eat them every day regularly, a certain amount every day, adds up to quite a bit of money and it’s hard for people.”</i>
<p>Personal Health</p> <ul style="list-style-type: none"> • Mental health issues, physical limitations, allergies <ul style="list-style-type: none"> ○ <i>“There are a lot of people I know that have some pretty big issues and some addictions that they have to deal with before they can even start thinking about being nutritionally healthy.”</i> ○ <i>“One barrier for me is emotional health. Like if I’m feeling down or I’m stressed out, I eat crappy food and I prepare terrible food for my family”</i>

Adapted from, Whiting et al., 2010.

1.1.2 Supplement use among Canadians.

Researchers have examined data from the Canadian Community Health Survey (CCHS) to assess supplement usage by Canadians (Whiting, Vatanparast, Taylor, & Adolphe, 2010). Among respondents, supplement use within the previous month was reported to be between 28-60%. Supplement usage was most significantly affected by both age and sex; for example, women over the age of 50 years had the highest rate of supplement use (Whiting et al., 2010). Other factors including income and level of education attained were found to have a positive association with supplement usage. Stated alternatively supplement use is lower in individuals with less education and lower income.

A study conducted in north-west England surveyed over 21,000 adults about their personal supplement usage. Over a third of participants reported taking a minimum of one dietary supplement (Harrison, Holt, Pattison, & Elton, 2004), a usage similar to Canadians (Whiting et al., 2010). Dietary supplement usage was found to be greater among older people, females, homeowners, non-smokers, and individuals who were physically active (Harrison et al., 2004). They also determined a positive association between eating fruits and vegetables and use of supplements. This data supports the inverse supplement hypothesis, which states that individuals who are at risk for inadequate nutrient intake are not the people who take dietary supplements (Harrison et al., 2004).

Given that the findings from CCHS data analysis support the *inverse supplement hypothesis* for Canadians, it is necessary to examine why it occurred by identifying similarities and differences between the barriers to obtaining nutrients from food and the barriers to obtaining nutrients from supplements (Whiting et al., 2010). Through focus groups among predominantly low income residents of one city in Canada, researchers examined barriers to use of vitamin-mineral supplements. Focus group participants were asked “*What barriers, if any, have influenced you concerning vitamin/mineral supplement use?*”. To further explore barriers to use of vitamin-mineral supplements key informants working in low income neighbourhoods, such as nutritionists and other health professionals, were asked “*what are barriers to use of vitamin/mineral supplements by your clients?*”. Responses to these questions were categorized into various themes, including knowledge which was identified as a barrier to supplement use by both the focus group and key informant participants. Results are listed in Table 1.1.2.

Table 1.1.2 – Responses to Barriers of Supplement Use Question

Focus Group: Barriers to Supplement Use	Key Informants: Barriers to Supplement Use
<p>Preferences</p> <ul style="list-style-type: none"> • Unable to tolerate forms such as pills, nausea after using supplements <ul style="list-style-type: none"> ○ <i>“I wouldn't even consider to take vitamins due to I can't take a tablet or capsule.”</i> 	<p>Preferences</p> <ul style="list-style-type: none"> • Do not like to take pills (think that it is not natural) • Some supplements make them feel sick <i>“A high number of the women that I see get sick from them.”</i> • Size of the pill – have a hard time swallowing it. • Remembering to take supplements or coordinating taking supplements with the other pills they have to take
<p>Knowledge</p> <ul style="list-style-type: none"> • Too many choices, unsure if needed <ul style="list-style-type: none"> ○ <i>“[I] kind of look down that aisle as I walk through the grocery store and go ‘someday I should look into that but not today.’”</i> ○ <i>“I don't know how they help me.”</i> ○ <i>“... vitamins and minerals from the supplement. Is it the same as the vitamins from vegetables and fruit?”</i> 	<p>Knowledge</p> <ul style="list-style-type: none"> • Perception they do not need it - <i>“once you explain to them the benefit of it they are much more interested.”</i> • Lack of information or incorrect information - <i>“a lot of women are really, really grateful when they find out they can get them from [Healthy Mother Healthy Baby] because they understand the value and the importance of it”</i> • Knowledge about what to purchase <i>“You need a calculator and a degree to be able to buy your vitamins and that tells you something about the market.”</i>
<p>Accessibility</p> <ul style="list-style-type: none"> • Part of routine <ul style="list-style-type: none"> ○ <i>“I just don't remember”</i> 	<p>Accessibility</p> <ul style="list-style-type: none"> • Not easily obtained, e.g., transportation to go to pharmacy or doctor's office; no local pharmacy - <i>“they are not coming in [to get supplements] because their life has a million other things going on that day”</i>
<p>Income</p> <ul style="list-style-type: none"> • Cost is additional to other needs <ul style="list-style-type: none"> ○ <i>“my doctor had advised me that I should be on certain supplements but I can't afford it”</i> ○ <i>“their prices are outrageous”</i> 	<p>Income</p> <ul style="list-style-type: none"> • Cost <ul style="list-style-type: none"> ○ <i>“If you can't buy food and you don't have enough money to do other things you're certainly not going to spend money on vitamins and minerals”</i> ○ <i>“If there was a multivitamin covered, I think we would see it go off the [pharmacy] shelves.”</i>
<p>Health Concerns</p> <ul style="list-style-type: none"> • Supplement effects not detected or could be harmful <ul style="list-style-type: none"> ○ <i>“I didn't notice any difference from when I was taking vitamins when I was pregnant and then when I got off them”</i> 	

Adapted from, Whiting et al., 2010.

1.2 Research Questions

Limited research exists regarding what consumers think about currently available resources to help them with the selection of a multivitamin. Therefore, this study was conducted in order to develop a tool to assist consumers with the selection of an appropriate multivitamin. For this study a “consumer” refers to any individual who uses or may use the resource for his or her own personal use. Through a search of currently available tools this study explores the following questions:

- What resources are currently available to assist consumers with the selection of a multivitamin?
- What are consumers’ thoughts/ideas/beliefs about currently available tools to help them select a multivitamin and what changes do they suggest?
- How do consumers respond to a newly developed multivitamin selection tool?

1.3 Purpose and Objectives

Previous research identified limited supplement usage amongst low income Canadians as well as some barriers to supplement use in Saskatoon (Whiting et al., 2010). A lack of knowledge about supplements and how to choose a multivitamin was one of the barriers to supplement use identified. The purpose of this qualitative research study was to develop a resource to help inform and educate consumers to select a supplement. This resource is not intended to convince individuals that they need a supplement, but rather to provide information to help them choose an appropriate supplement once they have already decided to take one.

1.4 Significance

The purpose of this research project was to develop a resource to help inform and educate consumers to select a supplement. The resource is not intended to convince individuals that they need a supplement, but rather to provide information to help them choose an appropriate supplement once they have already decided to take one. Previous research has demonstrated that several potential barriers exist that may impact supplement usage, including a lack of knowledge (Whiting et al., 2010). Two qualitative approaches have been combined with the aim of gaining a better understanding of the experiences of individuals living in the core neighbourhoods in Saskatoon with respect to supplement use. Participants from the core neighbourhoods were

selected based on the desire to create a resource that is inclusive of this group in an attempt to reduce health disparities. Saskatoon residents do not understand the magnitude of health disparity among income groups (Lemstra et al., 2007). The ultimate goal of this research is to create a usable tool to help individuals select a multivitamin. This tool is based on the expressed needs, ideas, beliefs, and thoughts of the target population. Focus is placed on making the tool as usable as possible for a wide range of individuals, including those with limited literacy skills. The tool is intended to fill a current void in providing individuals with a resource to educate themselves in selecting an appropriate multivitamin.

1.5 Research Environment

This project was completed under the supervision of Dr. Susan Whiting at the University of Saskatchewan. Dr. Whiting has been conducting research at the University of Saskatchewan for over two decades. Her research on Vitamin D and calcium is well known; these nutrients are often taken in supplement form. More recently, Dr. Whiting has expanded her focus to qualitative research investigating supplement usage. Additional expertise for this project came from the faculty who comprise the committee, including Dr. Jason Perepelkin, Dr. Rachel Engler-Stringer, Ms. Heather Hynes, and Dr. Jeff Taylor. This group is very diverse in its expertise and skills, stemming from management, community health and epidemiology, community nutrition, and pharmacy respectively.

1.6 Summary

Previous research has identified several barriers to supplement usage, one of them being knowledge. The purpose of this research project is to develop a resource to help inform and educate consumers to select an appropriate multivitamin. A thorough review of currently available resources to help individuals choose a multivitamin yielded limited results. The resources which were deemed potentially useful were reviewed in a series of focus groups with community members and with key informants. These discussions were tape recorded and subsequently transcribed and analyzed using thematic analysis. This review allowed for the creation, revision, and refinement of a new resource. The aim was to create a resource that is widely available, easily accessible, and usable by the largest group of individuals possible. This project will help to enhance the quality of information available regarding supplement selection

through the use of an innovative online tool which is user friendly and meets the consumers' needs.

2. LITERATURE REVIEW

2.1 Optimizing Nutritional Intake

When nutrient intake is suboptimal individuals or groups of individuals may improve their nutritional status in a variety of ways. Often one of the first methods that many people may attempt is to increase their intake of foods rich in vitamins and nutrients that they may be lacking. This may be a challenge given that many individuals may not realize what nutrients their diet is truly lacking or may not have adequate information to know what food sources are rich in particular nutrients of concern. Increasing dietary intakes of specific nutrients may be difficult for people with limited resources. Furthermore, it is important to note that food choices are based on a variety of factors and may differ among individuals, Figure 2.1, illustrates factors which contribute for food choices and their influence on health. Many individuals report that foods that are typically seen as nutritious are simply too expensive and choose less expensive alternatives. Snacks have been shown to account for more calories than the amount individuals consume at lunch and the same number of calories as supper (Garriguet, 2004). Other individuals may live in remote areas where the availability of foods is limited. If one is unable to access foods rich in nutrients they may require, adequate intake of these nutrients must come from an alternate source.



Figure 2.1 – Food Choices, Adapted from Drewnowski, 2002

2.2 Supplements and a Healthy Diet

2.2.1 Supplements.

Vitamin and mineral supplements may be recommended for consumption by individuals when they are unable to consume adequate quantities of these specific nutrients through diet alone or if they are deficient in a particular nutrient. In Canada true nutrient deficiencies are relatively rare; however, nutrient inadequacies can be quite common. Many individuals who have a nutrient inadequacy may not even be aware of it. Certain disease states such as alcoholism or malabsorption disorders are often associated with nutrient deficiencies.

Nutrient intake recommendations are based on a series of values called the Dietary Reference Intakes (DRIs). These values are based on years of research and revision of previous recommendations. DRIs are now used in North America for vitamins, minerals, macronutrients and energy. These recommendations are based on nutrient adequacy, the prevention of chronic diseases in healthy individuals, avoiding too much of a nutrient, and optimizing health (Otten, Hellwig, & Meyers, 2006). DRIs specify four reference values which can be used to assist with the planning and assessment of diets of healthy people. These values listed in Table 2.2.1 include: Estimated Average Requirements (EAR), Recommended Dietary Allowance (RDA), Adequate Intake (AI), and Tolerable Upper Intake Level (UL) (Otten et al., 2006).

Table 2.2.1 – DRI Definitions for Vitamins and Minerals

Term	Definition
Estimated Average Requirement (EAR)	The average daily nutrient intake level that is estimated to meet the needs of half of all healthy individuals in a particular life stage and gender group.
Recommended Dietary Allowance (RDA)	The average daily nutrient intake level that is sufficient to meet the needs of nearly all (97-98%) of all healthy individuals in a particular life stage and gender group.
Adequate Intake (AI)	The recommended average daily nutrient intake level based on observation or experimentation that approximates the nutrient needs of a particular group of healthy individuals. This level of intake is assumed to be adequate and is used when an RDA cannot be determined.
Tolerable Upper Intake Level (UL)	The highest average daily nutrient intake that is likely to pose no risk of adverse health effects to almost all individuals in the general population.

Adapted from, Otten et al., 2006.

2.2.2 Mandatory and discretionary fortification.

Fortification is the addition of nutrients to food, food constituents or supplements (Holick, 2009). Fortification allows for the maintenance of nutritional equivalence of substitute foods, the restoration of nutrients lost during processing, storage, or handling, and correction of documented nutritional inadequacies among the public (Sacco, Tarasuk, Sacco, & Tarasuk, 2009). In Canada these additions are controlled through the regulatory provisions (Part D Division 3 in the Food and Drug Regulations); these regulations are based on a positive-listing approach and list which foods may be fortified, what micronutrients may be added and to what level. Fortification is used as a response to the identification of a nutrient deficiency within the population. Currently, a revision to the regulatory provisions is underway which would allow for discretionary fortification of foods, allowing for expanding fortification to a wider range of products to provide for more food sources of nutrients. Discretionary fortification, sometimes referred to as voluntary fortification refers to adding vitamins and minerals to food products based on the discretion of the food product manufacturer (Sacco et al., 2009). The proposed new fortification policies will allow manufacturers to add vitamins and minerals to a wide variety of foods and increase the current nutrient additions to breakfast cereals.

Thus far the Canadian government has used fortification as a means of addressing documented nutrient deficiencies (Rosenberg et al., 2003). Currently some fortified foods include: iodination of salt, addition of vitamin D to milk, folic acid in refined grain products, and iron in flour. These additions have already shown great improvements in health and the reduction of deficiency related disease. The addition of iodine to salt became mandatory in 1949 and has eliminated almost all incidences of goiter in the country (Rosenberg et al., 2003). Folic acid fortification of grain products has shown a 37% reduction in the prevalence of spina bifida, with a more pronounced reduction of upper versus lower spina bifida (De Wals et al., 2008).

2.2.3 Folic acid.

Folate is the generic term that refers to both the naturally occurring food form, folate, and the monoglutamate form, folic acid, which is used in supplements and fortified foods (Otten et al., 2006). Foods rich in folate include dark green vegetables, beans and legumes. However, the most abundant source of folic acid is from fortified grain products. *Eating Well with*

Canada's Food Guide recommends: "all women who could become pregnant and those who are pregnant or breastfeeding need a multivitamin containing folic acid every day" (Health-Canada, 2007). Some debate exists as to whether supplementation remains necessary when considering the current level folic acid fortification of the food supply in Canada (Shuaibi, House, & Sevenhuysen, 2008). Suboptimal maternal folate status has been correlated with neural tube defects in infants, additionally, it may be a risk factor for Down Syndrome or spontaneous abortion (Shuaibi et al., 2008). Folate functions as a coenzyme in the metabolism of nucleic and amino acids (Otten et al., 2006). Homocysteine is one of amino acids metabolized through a process involving folate, inadequate folate may limit this metabolism resulting in a buildup of homocysteine, and this has been linked to increased risk for cardiovascular disease (Shuaibi et al., 2008).

Due to the many risk factors associated with suboptimal folate status folic acid fortification of grain products was deemed appropriate (Shuaibi et al., 2008). In Canada, mandatory fortification of all white flour and cornmeal began in 1998, with these foods being fortified with at least 1.5mg/kg (Otten et al., 2006). The aim of fortification is that folate intake of most women will increase by 80µg/day or more. Fortification with folate has shown to be associated with a reduction in the number of neural tube defects (De Wals et al., 2008; Shuaibi et al., 2008). When comparing women of child bearing age who take a daily supplement containing folic acid to those who do not, dietary intake between the two groups was virtually the same; however, those consuming the supplement had a significantly higher total folate intake (Shuaibi et al., 2008). High levels of folate inadequacy have been identified in several different age and sex groups with higher levels of inadequacy among those in food-insecure households (Kirkpatrick & Tarasuk, 2008).

Folate requirements vary throughout the life cycle; Table 2.2.3, highlights current recommended dietary allowances. The upper level (UL) for folate is based on the highest daily level that is likely to pose no risk of adverse effects (Otten et al., 2006). For folate this value is derived only from folic acid from supplements or fortified foods and does not include folate naturally occurring in foods. The UL is based on the exacerbation or precipitation of neuropathy in vitamin B12 deficient individuals as supplements may mask or delay diagnosis of such a deficiency. Requirements for folate are determined based on dietary folate equivalents (DFEs) which adjusts for the bioavailability of supplemental and fortified food sources of folic acid

(Otten et al., 2006). The conversion factors are 1 DFE = 1µg food folate or 0.6µg folic acid from fortified foods or 0.5µg folic acid from a supplement taken on an empty stomach. Generally, supplementation of folic acid is from a daily multivitamin or as a 400µg over the counter supplement (Otten et al., 2006).

Table 2.2.3 – Folate Requirements

Age	RDA (µg DFE/day)		UL (µg/day)
	Male	Female	
0 – 1 years	-	-	-
1 – 3 years	150	150	300
4 – 8 years	200	200	400
9 – 13 years	300	300	600
14 – 18 years	400	400	800
>18 years	400	400	1,000
Pregnancy <18 years	-	600	800
Pregnancy >18 years	-	600	1,000
Lactation <18 years	-	500	800
Lactation >18 years	-	500	1,000

Adapted from, Otten et al., 2006.

2.2.4 Vitamin D.

Vitamin D is a nutrient that is also added to foods through mandatory fortification, as well as a nutrient often recommended through supplementation. Vitamin D obtained from solar ultraviolet B (UVB) rays penetrates the skin and converts 7-dehydrocholesterol to pre-vitamin D3, which is then rapidly converted to vitamin D3. Vitamin D from both the skin and diet is metabolized in the liver to 25-hydroxyvitamin D, this is then metabolized to the active form of vitamin D, 1,25-dihydroxyvitamin D (Holick, 2007; Otten et al., 2006). Vitamin D is important for bone health; it functions to help with the intestinal absorption of calcium and phosphorus (Otten et al., 2006). The association between vitamin D and bone health was recognized almost a century ago when researchers found that a lack of sun exposure was associated with bony deformities known as rickets; conversely they found that sunlight was able to cure rickets (Holick, 2009). It was originally believed that once foods were fortified with vitamin D and the prevalence of rickets was near zero then any health problems from deficiency would be resolved; however, many children and adults continue to be deficient in vitamin D (Holick, 2009). Deficiency may be attributed to a variety of causes, including decreased sun exposure, this may

include: working indoors, sun avoidance, and modest clothing (Holick, 2009). Additionally, it is important to note that for most Canadians there are between five and six months of the year during which the sun is unable to provide adequate UVB rays to permit synthesis of vitamin D through the skin due to our latitudinal orientation (Holick, 2007; Rucker, Allan, Fick, & Hanley, 2002). Other individuals at risk of deficiency may include individuals with dark skin and those who are older (CCS, 2007). The limitations that exist to achieving adequate vitamin D synthesis from the sun make dietary sources and supplemental vitamin D even more critical. Dietary sources of vitamin D include fatty fish, eggs, and fortified milk products and breakfast cereals (Otten et al., 2006).

In recent years research has investigated alternative roles of vitamin D in health promotion and maintenance, disease prevention, and even treatment. Research has been able to establish a role linking lower vitamin D status to: a greater risk of: fractures and falls leading to osteoporosis (Bischoff-Ferrari et al., 2009), cancer (Gorham et al., 2007), poor immunity (White & White, 2008), cardiovascular disease (Giovannucci et al., 2008), and autoimmune diseases such as multiple sclerosis (Ramagopalan et al., 2009). Evidence has shown that the former DRI recommendations for vitamin D are inadequate to obtain the potential health benefits such as those listed above (Holick, 2007, 2009). Furthermore, these health benefits have prompted various organizations to release statements with new recommendations for intake above the previously recommended DRI ranges (Ross, Taylor, Yaktine, & Del Valle, 2011). The Canadian Cancer Society announced a new recommendation for vitamin D in the summer of 2007, stating that “adults living in Canada should consider taking vitamin D supplementation of 1000 international units (IU) a day during the fall and winter” they go on to state that adults at higher risk of deficiency (i.e. those who are older, have dark skin, do not go outside often, or wear clothing that covers most of their skin) should consider taking this same supplementation dosage year round (CCS, 2007). *Eating Well with Canada’s Food Guide* conservatively makes the recommendation that: “The need for vitamin D increases after the age of 50. In addition to following Canada’s Food Guide, everyone over the age of 50 should take a daily vitamin D supplement of 10 µg (400 IU)” (Health-Canada, 2007). In November 2010, the Institute of Medicine released a report reviewing the DRI’s for vitamin D. The recommended intake of vitamin D increased for all DRI age and sex groups (Ross et al., 2011). The new DRI values are listed in Table 2.2.4.

While dietary adequacy of vitamin D can be assessed through a detailed diet history, true adequacy of vitamin D status must be determined through a blood test of 25-hydroxyvitamin D. While there is no consensus on what a normal range is most experts define deficiency as a level less than 20ng.mL, while insufficiency is defined as a range between 21-29ng/mL (Holick, 2007, 2009).

Table 2.2.4 – 2011 Vitamin D DRIs

Age	Recommended Dietary Allowance (IU/day)	Upper Level Intake (IU/day)
0 – 6 months	400	1,000
6 – 12 months	400	1,500
1 – 3 years	600	2,500
4 – 8 years	600	3,000
9 – 18 years	600	4,000
19 – 70 years	600	4,000
> 70 years	600	4,000
Pregnant/Lactating	600	4,000

Adapted from, Ross et al., 2011.

2.2.5 Iron.

Iron, like folic acid and vitamin D, is both added to foods through mandatory fortification and often recommended in supplement form. Iron functions in the body as a part of proteins such as: enzymes, cytochromes, myoglobin, and hemoglobin, where almost two thirds of iron is found (Otten et al., 2006). Requirements for iron intake are specified for different gender and life stage groups. These recommendations are based factors such as: basal iron losses, menstruation, fetal requirements in pregnancy, and increased requirements related to growth (Otten et al., 2006). Due to the increased requirements during these particular life stages, the DRI values are set accordingly for these population groups. Table 2.2.5, provides the DRI values for iron.

The increased requirements associated with menstruation and pregnancy have helped to prompt the current recommendation in *Eating Well with Canada's Food Guide*, which conservatively makes the statement that: “Pregnant women need to ensure that their multivitamin also contains iron. A health care professional can help you find the multivitamin that’s right for you.” (Health-Canada, 2007). While this statement does advise individuals to speak with a health care professional, there is no recommendation regarding the quantity of iron to consume.

Some individuals may require further assistance to help select an appropriate dietary supplement to meet their iron requirements.

Table 2.2.5 – Iron Requirements

Age	RDA (mg/day)		UL (µg/day)
	Male	Female	
0 – 6 months	-	-	40
7 – 12 months	11	11	40
1 – 3 years	7	7	40
4 – 8 years	10	10	40
9 – 13 years	8	8	40
14 – 18 years	11	15	45
19 – 50 years	8	18	45
>50 years	8	8	45
Pregnancy <18 years	-	27	45
Pregnancy >18 years	-	27	45
Lactation <18 years	-	10	45
Lactation >18 years	-	9	45

Adapted from, Otten et al., 2006.

Dietary sources of iron include: meat, fish, and poultry, all of which provide highly bioavailable heme iron (Otten et al., 2006). Other foods such as vegetables, fruits and whole-grain products contain non-heme iron which is far less readily absorbed (Otten et al., 2006). Additional foods such as cereals and other grain products are fortified with iron. However, despite this fortification inadequacy still persists.

The prevalence of iron inadequacy is greater than ten percent of females between the ages of 19 to 50 years; however, even higher prevalences were identified amongst food insecure individuals (Kirkpatrick & Tarasuk, 2008). It is important to note that while iron deficiency anemia is one of the most common nutritional inadequacies in modern times, excess intake of iron is associated with gastrointestinal irritation, secondary iron overload, and even acute toxicity (Otten et al., 2006).

2.3 Consumers Sources of Nutrition Information?

2.3.1 Sources of health information.

Individuals are continually exposed to health information from a variety of sources. However, over the last several years available resources have greatly expanded and the way

consumers are able to access health information has changed significantly. In a 1989 study, Worsley randomly selected 1,000 participants in Adelaide, South Australia to complete a mail survey on diet and health beliefs. These participants were asked to rank how they perceive the reliability of health information received from various sources (Worsley, 1989). At the time, this type of study was relatively new as few previous researchers had focused on perceived reliability of health information. Family doctors, followed closely by pharmacists, were ranked as the most reliable sources of health information (Worsley, 1989). Health and medical books, nurses, and spouse or partner were all seen as relatively reliable. Magazine articles, newspaper articles, and TV commercials were seen as the least reliable. This study indicated that health care practitioners were seen as reliable sources of health information, while less traditional sources were viewed as less reliable. However, this study did not address where the public seeks health information most often. Simply because a source is viewed as reliable does not mean that consumers will actively seek out that information. This study is in contrast to more contemporary studies which have found that the introduction of modern technology has significantly impacted the way consumers seek health information.

It is undeniable that the introduction of the internet has expanded accessibility to health information. In 2009 a reported 74% of American adults went online, a significant increase from the 46% who accessed the internet in 2000 (Fox & Jones, 2009). While only 25% of American adults used the internet to search for health information in 2000, this number has soared to 61% of American adults (or 81% of internet users) in 2009. However, many still rely on traditional information sources when it comes to their health. When asked what sources an individual turns to when needing information or assistance in dealing with health or medical issues, 86% of American adults chose asking a health professional, such as a doctor; this was the most popular answer (Fox & Jones, 2009). Similarly, in 2009 80% of Canadians aged 16 and older reported using the internet for personal reasons (Statistics-Canada, 2010). The city of Saskatoon had one of the highest use rates at 89% (Statistics-Canada, 2010).

Additionally, approximately half of internet users use the internet to search for information about doctors or other health care providers (Fox & Jones, 2009). In the 2009 Internet Usage Survey, 70% of respondents reported using the internet to search for medical or health related information (Statistics-Canada, 2010). While internet accessibility has greatly expanded, some disparity exists between both level of education attained and household income

and use of the internet to search for health information. Individuals with some college education or college degrees are far more likely to use the internet to search for health information. Similarly, those living in households with annual incomes greater than or equal to \$75,000 are more likely to use the internet to search for information about doctors and/or health professionals (Fox & Jones, 2009).

With so many information sources available and increased accessibility to health information it stands to reason that certain individuals are more likely to use particular information sources when compared to other groups of individuals. A 2004 study by Dutta-Bergman analyzed data from a previously conducted survey (the Porter Novelli HealthStyles Database) to explore health information seeking by consumers. They found an association between health-conscious individuals and the use of active communication channels such as internet, books, or newspapers as a primary source of health information (Dutta-Bergman, 2004). This is contrast to the use of “passive consumption channels” like television or radio by those who are not health-oriented.

Cline and Haynes (2001) conducted an extensive review of the literature regarding seeking health information on the internet. With the increasing quantity of information that is available through the internet they chose to focus on possible benefits and consequences of this readily available information as well as the evaluation of health information on the internet. Some of these benefits to consumers include: widespread access to health information, interactivity, tailoring of information, interpersonal interactions and social supports, and the potential for anonymity (Cline & Haynes, 2001). Some possible consequences or pitfalls of the internet as a means of delivering health information include: roadblocks to access, difficulties navigating the enormous volume of available information, questionable quality and reliability including misleading, and inaccurate or incomplete information (Cline & Haynes, 2001).

The Canadian Council for Food and Nutrition (CCFN)’s 2008 Tracking Nutrition Trends VII was seventh in a series of surveys conducted by CCFN which examined self-reported food and nutrition knowledge, beliefs, and actions of adult Canadians. The survey consisted of several questions, one being related to sources of food and nutrition information participants had used in the previous year. Food product labels, the internet, magazines, newspapers and books were the most common answers, followed closely by friends/relatives/colleagues and family physicians or other health professionals. Fitness/weight loss programs and dietitians were the

least popular sources of food and nutrition information. As a second part to this survey participants were asked to rank the credibility of these same food and nutrition information sources. Dietitians, health associations, and family physicians or other health professionals were seen as the most credible sources of food and nutrition information ("Tracking Nutrition Trends VII: August 2008," 2008). While dietitians were reported as being used the least frequently as a source of food and nutrition information they were viewed as the most credible information source. Figures 2.3.1a and 2.3.1b illustrate the break-down of sources of health information used and the perceived credibility of food and nutrition information sources.

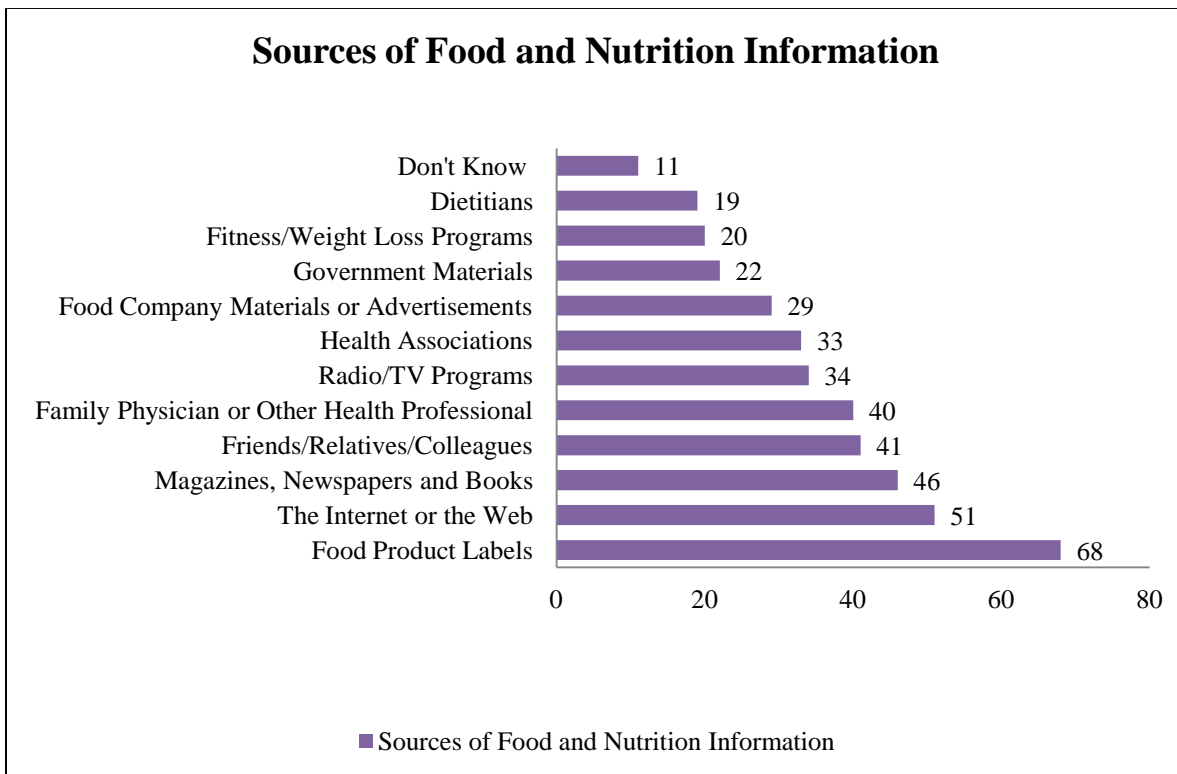


Figure 2.3.1a – Sources of Food and Nutrition Information

Responses to the question “People can get information about food and nutrition from a number of different sources. From which of the following sources have you got information on food and nutrition in the past year?” - Adapted, “Tracking Nutrition Trends VII: August 2008”, 2008.

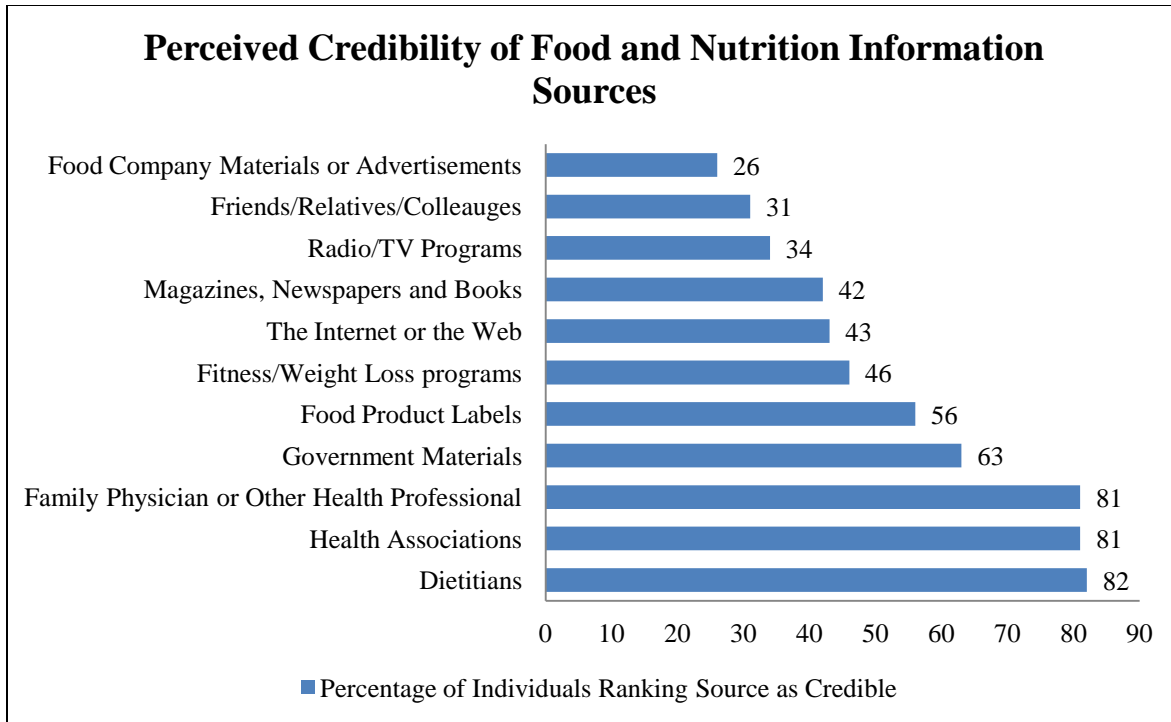


Figure 2.3.1b – Perceived and Credibility of Food and Nutrition Information Sources

Responses to the question “For each of the following, how credible do you think they are as a source for food and nutrition information?” - Adapted, “Tracking Nutrition Trends VII: August 2008”, 2008.

These results indicate that some consumers may seek information in the most convenient and accessible ways even if they do not believe them to be the most credible. While traditional sources of health information such as doctors, health care providers, and family or friends remain commonly used by many members of society, there is an increasing drive towards looking to the internet to serve as a source of information. A 2005 report for Health Canada found similar results with family members or friends (28%), pharmacists (18%), and medical doctors (14%) as being commonly sources of information on natural health products (IpsosReid, 2005). The internet was also a commonly cited source of information. As explored by Dutta-Bergman (2004) there is a correlation between health-conscious individuals and the use of active communication channels when seeking health information. One of the main challenges that exist is increasing accessibility to internet use and striving to achieve credibility and quality of available information.

2.3.2 Health literacy.

Literacy and health literacy are two terms that are often used interchangeably, and while there is overlap between the two, they are distinct terms. Literacy in the most basic sense refers to an individual's ability to read and write, and also to understand one's own native language in both written and spoken forms (Mayer & Villaire, 2007). Health literacy on the other hand goes beyond reading and writing skills which are sometimes referred to as "print-literacy", to include listening skills, speaking skills, cultural knowledge, and numeracy (Nielsen-Bohlman, 2004). Additionally, health literacy refers to how well one is able to apply literacy skills in the context of health care (Mayer & Villaire, 2007). Figure 2.3.2 illustrates the many different components that make up literacy.

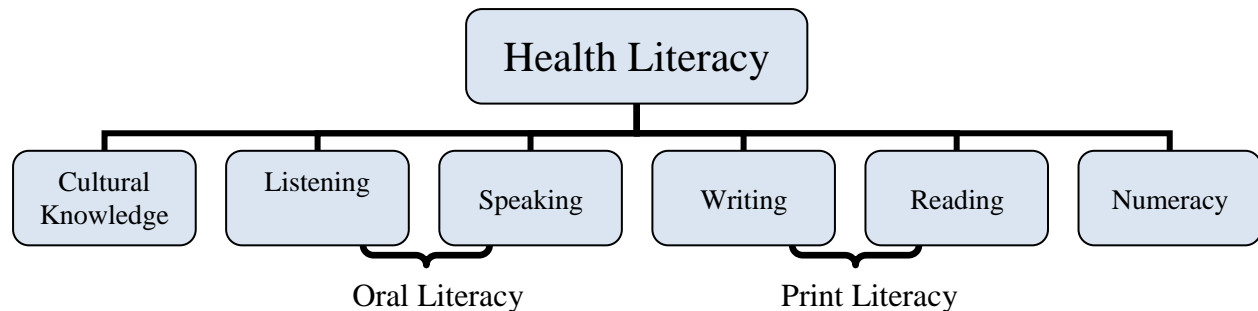


Figure 2.3.2 – Components of Literacy , Adapted from, Nielsen-Bohlman, 2004.

As individuals begin to take on more responsibility and interest in their health and the health of their families, literacy and health literacy will become increasingly important. An estimated 90 million Americans have literacy skills below the high school level, the majority of whom are native-born English speakers (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993). Literacy levels are lower among the elderly, those with less education, individuals living in poverty, minority populations, and those with limited English skills (Kirsch et al., 1993). Additionally, many individuals who manage literacy skills in their everyday lives may still struggle with understanding, obtaining, or using health information (Nielsen-Bohlman, 2004).

Low literacy can have far reaching effects. In a study conducted in Atlantic Canada a participant described how being limited by literacy impacted his opportunities for employment, adequate income, healthy food, decent housing and his exchanges with the health care system (Gillis, 2004). As a diabetic, this individual struggled to communicate with health care providers

and to manage his medication and diet. Literacy and more specifically, health literacy, has been found to be one of the most important determinants of health.

Studies have examined individuals' use and understanding of food labels, as well as ways to improve understanding (Jay et al., 2009; Mackey & Metz, 2009). Similar research using supplement labels is relatively limited; however, individuals may still obtain important nutrition information from these labels. Barriers to understanding food labels were shown to be most prevalent among individuals with low general literacy as well as those with lower health literacy skills (Jay et al., 2009).

One study conducted in three major cities across Canada examined the ease of readability and use of food product labels (Mackey & Metz, 2009). On food products, the label is a source of health information and instructions such as proper food storage and preparation. The label helps consumers to differentiate products and make informed choices about their purchases; the nutrition panel and ingredient list are two required pieces of information that serve to aid consumers. Consumers may use the food product label to locate information related to specific diets, allergies, or health concerns. A variety of readily available food products representing the Canada's Food Guide food groups were selected for this study. Focus groups were held to gain insight into what factors interfered with readability and what enhanced ease of readability. It was found that information on labels was found to be most readable and in turn most useful when it was presented with clear colour contrast, optimal size and font of print, adequate spacing between lines, proper justification and logical and organized layout and length of lines of print (Mackey & Metz, 2009). The layout, format, and type of information provided on food and supplement labels is quite similar; therefore, it is conceivable that one could extrapolate findings from studies with food labels to supplement labels. It is quite likely that there are comparable difficulties that are encountered when individuals attempt to use supplement labels, which are similar in many respects to food labels.

A study examining the effectiveness of a multi-media intervention on improving food label understanding was conducted among low income participants in New York City (Jay et al., 2009). Participants were surveyed about their current confidence in nutrition knowledge. While many individuals noted having seen food labels in the past, few individuals had actually been taught how to use them. The Short Test of Functional Health Literacy in Adults (STOFHLA) was used to assess health literacy skills. The researchers tested participants' nutrition knowledge

prior to and post intervention with a tool they developed; the tool examined participants' ability to interpret and compare food labels. The intervention group was given a pocket card on the Nutrition Facts Label and viewed a short video outlining how to use the handout, while the control group received a printed copy of an Food and Drug Administration (FDA) handout that explained the Nutrition Facts Label. The researchers found that when provided with an interactive, multimedia intervention, individuals' understanding of food labels improved (Jay et al., 2009). However, participants with low health literacy skills from either the control or intervention groups did not show an improvement in their understanding of food labels. It is important to note that both the control and intervention groups reported increased confidence in their nutrition knowledge (Jay et al., 2009).

2.3.3 Numeracy.

Numeracy involves being able to understand and use numerical information, or numbers, in everyday life (Rothman et al., 2008). Some of the skills that may be involved with numeracy include an individual's ability to do basic math functions and make sense of time, money, graphs, and probability. While literacy and numeracy skills are correlated, many individuals with adequate print literacy skills struggle to perform simple numerical tasks (Rothman et al., 2006). This is particularly problematic in health care as many health related tasks require a basic level of numeracy skills, such as prescriptions, reading food labels, and understanding health risks (Rothman et al., 2008). A correlation exists between underlying literacy skills and the ability to understand nutrition labels (Rothman et al., 2008). These numeracy skills are also important to apply when using supplement labels and reading supplement information. Therefore, numeracy is an issue that is important to address when examining the use of supplements and developing interventions to improve outcomes among individuals with low numeracy skills.

Understanding literacy, health literacy, and numeracy are critical to the development of health interventions. Literacy and numeracy have major implications for individuals' ability to understand and use health information. Over the past few decades more attention has been paid to understanding literacy, numeracy and other factors that surround these issues. However, little research has been done linking supplement use to literacy and numeracy and developing methods to help bridge gaps in this field. Literacy and numeracy skills are critical to helping individuals

understand and use supplement labels. The nutrition facts panel requires numeracy and literacy skills to interpret, so does dosage, instructions for taking the product and understanding the ingredient list of a supplement label.

2.4 Sources of Supplement Information

Searching for information and resources regarding supplement selection may be a very daunting task given that many consumers may not know where to begin to look. When individuals do find information it may require critical thinking to analyze whether this information is valid, credible, reliable, or even helpful. With the increasing popularity of the internet, vast quantities of information are available with quick and relatively easy accessibility. The abundance of information that is available may contribute to misinformation and consumer confusion. In the winter of 2008/2009 an undergraduate nutrition student at the University of Saskatchewan conducted a preliminary search for information regarding the selection and appropriateness of dietary supplements with the goal of determining if a tool for assessing dietary supplement need currently exists. While the number of search terms for nutrition and supplement related information is virtually limitless, this search was limited to a few key search terms, listed in the Methods section as Table 3.4.1. The search consisted of two parts; the first focusing on a Google search of several supplement related terms, with the second search conducted on PubMed. While several results were found through these searches the helpfulness and usability of this information was fairly limited. The results of this preliminary investigation prompted further research to focus on known organizations, sources, and websites that would be likely to have information on supplement usage and selection. These sources include government agencies, not-for profit groups, books, companies and other websites.

2.4.1 Government internet websites

2.4.1.1 Health Canada.

The Health Canada website provides information on a variety of food and nutrition related topics, from food recalls, to healthy eating tips, to helping individuals make sense of food labeling. Health Canada also is the publisher of *Eating Well with Canada's Food Guide*. This document provides general healthy eating advice for healthy individuals of all ages. A new

addition to this document in 2007 was the inclusion of supplement advice aimed at specific population groups. This resource can be viewed in the Results section as Figure 4.1.1. While Health Canada provides information to help consumers use and interpret nutrition labels, there is no equivalent resource available for using supplement labels. Furthermore, other than the recommendations for supplement use listed on *Eating Well with Canada's Food Guide*, there was no further guidance towards the selection of a supplement. When Health Canada was contacted to inquire about any further information or resources they may have on the subject, the reply indicated that dietary intake is highly individualized and that consulting a health professional such as a Registered Dietitian who can assess the situation would be the best approach. The reply from the Office of Nutrition Policy and Promotion did direct the researchers to the Dietitians of Canada website or to seek a referral from a doctor to a dietitian.

2.4.1.2 National Institute of Health Office of Dietary Supplements.

The American organization, Office of Dietary Supplements (ODS) was created in 1995 as part of the Dietary Supplement Health and Education Act of 1994 (ODS, 2009b). ODS was created to explore the role of dietary supplements, promote scientific research regarding supplements, and to collect and compile results of research pertaining to dietary supplements, ultimately looking to assess benefits and risks associated with dietary supplement use (ODS, 2009b). ODS also serves to advise the Secretary and Assistant Secretary of Health as well as the head of the National Institute of Health (NIH) (ODS, 2009b). Amongst the many programs that ODS has, one focus is on consumer-orientated products, such as fact sheets, databases of dietary supplement research activities and literature citations (ODS, 2009b).

The website offers information about on a wide range of vitamins, minerals, nutrients, herbal supplements, and even some foods. One fact sheet, entitled “Dietary Supplements: Background Information”, offers consumers information about supplements in a question and answer style format (ODS, 2009a). This fact sheet covers topics such as: what is a dietary supplement, how dietary supplements are different from foods, what claims manufacturers are permitted to make, FDA regulations, and information available on a dietary supplement label (ODS, 2009a). While this resource provides some background information about supplements as a whole, it does not provide adequate information for a consumer to make a decision about purchasing a supplement (ODS, 2009a). No information about specific population groups or

dietary needs is available as part of this resource, additionally, no recommendations for key nutrients to look for in a supplement are provided (ODS, 2009a). Furthermore, this resource has an American focus, referring to the FDA regulations and safety issues (ODS, 2009a). A positive attribute of this resource is the inclusion of a series of links to assist consumers to find additional information about supplements (ODS, 2009a). This website has additional links to information about dietary supplements, but lacks adequate information to enable consumers to easily make an informed decision about supplement use. A link on this website, labeled as an “Interactive Online DRI Tool for Healthcare Professionals”, takes the viewer to the United States Department of Agriculture (USDA) which offers a web tool that allows consumers to input a few details about themselves, such as weight, height, age, and activity level and obtain a breakdown of nutrient needs, and DRI values (USDA, 2009). While this link does not provide advice on selecting a multivitamin or supplement per say, it does provide consumers with a good starting point to assess their needs (USDA, 2009). Unfortunately, key nutrients of concern are not highlighted and this tool does not mention accounting for nutrient intake from foods (USDA, 2009).

2.4.2 Non-government organization websites.

2.4.2.1 Center for Science in the Public Interest.

The Center for Science in the Public Interest (CSPI) was established in 1971 to serve as an advocate for nutrition, health, food safety, and alcohol policy (CSPI, 2009). The Nutrition Action Health Letter is a monthly newsletter publication available by subscription with over 900,000 subscribers in North America. CSPI serves to not only educate the public, but also to advocate government policies that are congruent with scientific evidence on health providing a powerful influence on public opinion and policies.

In the June 2008 edition of Nutrition Action Health Letter a feature on multivitamin use was highlighted. This article provided a discussion about possible benefits as well as some risks associated with supplement usage. In addition to the article, this edition also provides a two page spread highlighting various nutrients, requirements, and what to look for. This article is a critical tool for assessing what is available to consumers given that it has such a large distribution. However, a subscription based article will not reach a broad enough population to have a

profound effect on influencing the general public. This tool, which may be important as a spring board in the development of further educational resources, can be found as Figure 4.1.4.

2.4.2.2 ConsumerLab.com.

ConsumerLab.com (CL) is a privately owned organization which provides independent test results and information to help consumers and health professionals to evaluate nutritional products (CL, 2009). Founded in 1999, CL has tested over 2,100 products; however, they only support a few hundred products which are able to carry the “CL Certification Seal” (CL, 2009). To access the entire CL website one must purchase a membership which is \$29.95 for one year or \$49.50 for two years. Due to this membership fee the information on their website has limited accessibility for the majority of Canadian consumers. The website features an encyclopedia resource which allows visitors to read about any herb or supplement they desire. When examining nutrients in this encyclopedia, it contains information about nutrient requirements, health benefits, food sources, therapeutic dosages, therapeutic uses, scientific evidence backing these statements, as well as safety concerns (CL, 2009). Within this encyclopedia “multivitamins/multimineral supplements” are listed as a category. This entry has information about megadoses of vitamins, but focuses on the therapeutic use of multivitamins as nutritional therapy (CL, 2009). Common nutrient deficiencies, natural versus synthetic vitamins, safety issues, and recommendations for use are all discussed (CL, 2009). This website features sound scientific evidence. Consumers and health care professionals are provided with an abundance of information which together may be synthesized into a recommendation for selecting a multivitamin supplement.

2.4.2.3 Harvard Health Publications.

Harvard Health Publications from Harvard Medical School publishes several health newsletters on a wide variety of topics. Through their website consumers may view lists of available resources; however, to view the entire article one must pay an access fee. “The Benefits and Risks of Vitamins and Minerals: What you need to Know” is a document created by Harvard Medical School. This document is intended for consumers and provides a breakdown of nutrient intake terms, summarizes vitamins and minerals, intake and benefits and discusses a variety of body systems as well as health conditions and evidence to support the use of specific

nutrients to support health of these body systems and in the treatment or prevention of these conditions (Coltrera, 2003). This document discusses the importance of nutrients coming from a varied healthy diet backed up with a daily multivitamin. It states that even the best supplements cannot contain all of the biologically active compounds found in foods; however, the diet is not able to provide everything, which is where a daily multivitamin is important (Coltrera, 2003). Information regarding specific nutrients of concern for different age and life stage groups are highlighted. Advice on choosing supplements include: look for a seal of approval, consider safe levels, ignore marketing gimmicks, do not pay more for unproven extras, and beware of potentially dangerous interactions (Coltrera, 2003). This document is quite lengthy and may be overwhelming for some consumers to follow; it provides scientific evidence for recommendations and features some key points to be aware of when selecting a multivitamin. The specific age and life stage group recommendations are particularly helpful in addressing the needs of specific individuals.

2.4.2.4 Council for Responsible Nutrition.

The Council for Responsible Nutrition (CRN) was created in 1973; they represent dietary supplement manufacturers and ingredient suppliers who adhere to federal and state regulations governing dietary supplements as well as CRN's own code of ethics (CRN, 2009). The CRN website provides information about supplement use, reading supplement labels, sports and supplements, safety, and recent news regarding supplements, such as regulation and research (CRN, 2009). The website is easy to navigate with a menu on the left side that provides information on a variety of supplement related topics. One resource that is available on the CRN website is a "Backgrounder on Multivitamins" (CRN, 2009). This backgrounder provides basic tips for selecting a multivitamin as well as rationale for the choice emphasizing safety, affordability, and a means of filling a nutrition gap. This resource also provides evidence to support the use of multivitamins by describing inadequacies in the diet of Americans. While this resource does contain useful information, the reading level is very high and it contains a great deal of text. Additionally, this resource has an American focus, describing safety issues and typical American intakes. This may make it less user friendly to Canadian consumers who may begin to wonder about safety issues in Canada or what typical Canadian dietary and supplemental intakes are like.

In addition to the background resource the website offers an interactive tool entitled “How do you read a supplement label” (CRN, 2008). This tool allows consumers to click on various parts of a “Supplement Facts” label and information about that particular item pops up. This tool is not overwhelming given that one piece of information appears at a time, allowing consumers to investigate areas of interest to them without being bombarded with information all at once. However, the supplement facts label is not provided on Canadian product brands. This resource focuses on the information about supplement labels rather than the actual nutrients themselves, providing information about serving size, ingredients, storage directions, percent daily value, and the units used to express the quantity vitamins and minerals in the multivitamin (CRN, 2008). A copy of the printable version of this resource with all the information sections visible is shown as Figure 4.1.3.

2.4.3 Health related professional organizations.

2.4.3.1 Dietitians of Canada.

Dietitians of Canada (DC) is the national organization of dietitians, representing over 5,500 dietitians nationally. They serve as the voice of the profession and work to support and advance: ethical evidence-based practice in dietetics, the profession unique body of knowledge, and prepare their members for diverse and rewarding roles in health promotion and wellness (DC, 2009). The vision of the organization is to advance through food and nutrition. In perusing the DC website there are many resources that available to the general public along with a section that is only accessible to members. One feature of the website is the DC resource search tool. This tool allows individuals to select key terms as well as a number of other limiting factors, such as age groups, populations, and language. When the term “supplement” is typed into the search field several resources come up as results. While many of these resources focus on a specific vitamin, mineral, or nutrient, a resource entitled “Do I Need a Vitamin or Mineral Supplement?” was of particular interest in this review.

This document provides tips as to what individuals need in a supplement and focuses on a variety of target population groups which goes beyond what is listed on *Eating Well With Canada’s Food Guide* to include “people who don’t drink milk”, “people who smoke” and “vegetarians”(DC, 2008). While the DC resource provides specific recommendations focused at

specific population groups it lacks detail in the recommendations. Terms such as “may need to take an iron supplement” lack the specifications required for consumers to select that supplement on their own. The resource is fairly straightforward; however, it may be beyond the literacy abilities of some individuals and some may find the amount of print text overwhelming. This resource was accessed in October 2009. However, the formatting of the resource has been updated in 2010 to match the new visual changes of the Dietitians of Canada website and resources. The resource version used for this study is shown in the Results section as Figure 4.1.2.

2.4.3.2 American Dietetic Association.

The American Dietetic Association (ADA) has more than 70,000 members and is a professional organization for food and nutrition professionals. The ADA exists to “improve the nation’s health and advance the profession of dietetics through research, education, and advocacy” (ADA, 2009). The website for this organization appears to be mainly targeted at nutrition and dietetic professionals. While there is some information available for consumers such as fact sheets and tips for healthy eating, there is no readily available information on the use or selection of supplements specifically. Typing the term “supplement” into the search field yielded approximately 500 results. Within the first ten results was a resource available for purchase entitled “Supplement Sense: Answers to Common Questions about Dietary Supplements”. This resource was not available online, it was necessary to request a copy to review. This request was not fulfilled by the ADA. Other search results included books on supplement use intended for health care professionals discussed in section 2.4.4. While further resources may be available through the members only section of this website, these were not reviewed as the general public would likely not have access to these resources. As a result, the ADA website did not feature any easy to find supplement information.

2.4.3.3 American Heart Association.

The American Heart Association (AHA) is a national voluntary health agency that aims to “build healthier lives, free of cardiovascular diseases and stroke” (AHA, 2009). The agency was first established in the early 20th century when research about heart disease was just emerging. Today it is a national American organization with a reliable reputation. The AHA

position on the use of vitamin and mineral supplements is that “healthy people get adequate nutrients by eating a variety of foods in moderation, rather than by taking supplements” (AHA, 2009). They go on to qualify this statement by stating that DRIs are the best available estimates of safe and adequate dietary intakes. They declare that there is insufficient data to indicate that healthy people may benefit from taking vitamin and mineral supplements in excess of the DRIs. These recommendations do not support the use of supplements and ignore the fact that some individuals may require supplemental nutrients as highlighted in *Eating Well with Canada’s Food Guide*. In perusing their website there is very limited information on health and diet and virtually nothing on the use of vitamin and mineral supplements.

2.4.4 Books and print sources.

2.4.4.1 Consumer focus.

In recent years nutrition has become an ever increasing area of interest for many individuals. With a rising number of books available on nutrition and dietary supplements it may be difficult for individuals to sort through this large volume of material to find credible, reliable, and useful information sources. A few books related to dietary supplement selection were selected for review.

Leslie Beck, who practices from Toronto, Ontario, is a popular Registered Dietitian who has been featured on television shows and in magazines; in recent years and she has also written several nutrition books. One such book “Nutrition Guide for Women: Managing your Health with Diet, Vitamins, Minerals, and Herbs”, outlines general healthy eating guidelines for women incorporating the use of vitamins and minerals, as well as eating and supplement use for specific conditions and disease states (Beck, 2001). Among other general recommendations such as emphasizing plant foods, choosing lower fat foods, drinking plenty of water, and exercising regularly, this book explicitly makes the recommendation to “take a multivitamin and mineral supplement each day to ensure you are meeting your needs for most nutrients” (Beck, 2001). These recommendations go on to emphasize nutrients that are important for women, among other nutrients, folate, vitamin D, and iron are all included in this list (Beck, 2001). DRI values, food sources and the importance of each of these nutrients is explained (Beck, 2001). This book is fairly straight forward, easy to follow and offers sound nutrition advice from a credible source

yet the language used in this book may be beyond the literacy abilities of many individuals. Furthermore, while this book is available in bookstores and libraries it may be inaccessible to some members of the general public.

“Supplement Savvy” is a resource book for consumers which profiles over 2,500 supplements. This book features information about supplement selection upfront followed by hundreds of pages listing various supplement products, the serving sizes, nutrient breakdown, whether these values meet current recommendations, if they have an expiration date, where to find them and lastly a section for additional comments (Becker, 1997). This book offers little in the way of analyzing if a particular supplement is worthwhile, but rather serves as a glossary of the different products which are available. While the version examined in this review is somewhat dated, similar books are published every year. This book may not be accessible to all consumers, furthermore the tables detailing specifics about each product are quite confusing and overwhelming to take so much information in; all of these factors may limit the usability and helpfulness for consumers.

The “Comparative Guide to Nutritional Supplements” is a guide book which compares dietary supplements, ranking them against other supplements based on the content of specific vitamins and minerals (MacWilliam, 2007). This resource is featured on USANA’s website as ranking their product as number one, because of this link, information contained within this book may be biased toward supporting this company’s products specifically. This resource features information about why supplementation is beneficial, relating the information to specific disease states and conditions, this information is followed by pages of charts comparing and ranking hundreds of supplemental products (MacWilliam, 2007). The book contains extensive information about a variety of products, but lacks clear guidelines to help consumers identify what type of product they require and key nutrients to look for when selecting a multivitamin.

2.4.4.2 Health professional focus.

Several books and print resources exist for health professionals that focus on dietary supplements. Many of these resources focus on individual nutrients rather than on a multivitamin as a whole. One such book which was mentioned previously from the ADA is “The Health Professional’s Guide to Popular Dietary Supplements”. This book is targeted at health care professionals and includes information on a wide range of specific dietary

supplements, but lacks any information about multivitamins as a whole (Sarubin-Fragakis & Thomson, 2007). This book contains useful evidence based information about vitamins and mineral use including: safety, interactions with other products, food sources, bioavailability and recommended intake. A health professional would be able to piece the information together to identify multivitamin needs and likely be able to assist a consumer in selecting a product. However, the book does not offer any specific suggestions that would be able to assist a health professional to address the multivitamin use of clients and consumers.

“The Health Professional’s Guide to Dietary Supplements” is another resource intended for health care professionals to assist them in recommending dietary supplements for clients. This particular book is laid out to highlight specific nutrients and minerals which have been investigated for certain disease states (Talbot & Hughes, 2007). It also features a guide ranking the evidence of particular health related claims for specific vitamins and minerals. This guide is very straight forward and easy to use and makes a nice concise resource. Again this book does not feature any information, guidance, or recommendations for the use of a multivitamin product. While both of the books reviewed in this section feature evidence based research and advice they do not offer detailed information for recommending multivitamins or the selection of a multivitamin.

2.4.5 Supplement manufactures websites.

2.4.5.1 Pfizer.

Pfizer, formerly Wyeth, is the maker of Centrum multivitamins. The company website is well laid out with tabs across the top focusing on a variety of topics. One of these tabs is “Health and Nutrition”; under this tab the website offers a variety of nutrition information, from eating well to supplement and multivitamin use (Pfizer, 2011). The “Vitamin and Mineral Resource Center” provides information for consumers about a variety of vitamins and minerals. This tool is helpful as it allows consumers to select one nutrient at a time to read about, the information includes the DRI values for men and women, food sources, and its role in health, focusing on both known roles and new mechanisms of action currently under investigation. The Centrum website provides adequate resources and nutrition resources to help guide and direct consumers toward healthy eating and supplement selection. An innovative interactive feature of this

website is the nutrition calculator tool, this resource allows consumers to input their gender, age range, and a typical day of intake and a nutritional assessment is generated highlighting nutrients lacking in the diet and those that are adequate. This tool along with the other reading and resources available on this site couple prove valuable in assisting a consumer to select a dietary supplement. Unfortunately, this website does not offer an interactive tool or guide per se to assist with selecting a multivitamin. However, it is quite simple to follow and they do feature consumer centered nutrition information.

2.4.5.2 USANA.

The USANA operates through “direct selling”, in which products are sold person-to-person, away from a fixed retail location (USANA, 2009). The website features a variety of products, labeled: Nutritionals, Diet and Energy, and Personal Care. Each nutritional product has information about what the product is intended for, body benefits, which explain what the product is targeted to do and the ingredients list. The ingredient list provides a list of the nutrients in the product and allows the consumer to roll their mouse over each nutrient to reveal more information about that particular nutrient; furthermore there is downloadable label information which indicates how much of each nutrient is in the product. When the “Health Pak” product was viewed many of the nutrients provided more than 100% of the daily value in one packet alone, some provided more than 1000%, with a recommended dose of two packets per day plus nutrient intake from food this may raise concern about toxicity. The website features little information about vitamins, nutrients, and nutritional health. Most of the information that is available is vague, with no clear recommendations provided, other than to purchase the USANA products. This website would not be helpful for consumers attempting to learn about dietary supplements.

2.4.5.3 Bayer.

Bayer is the Canadian subsidiary of Bayer AG which is a global pharmaceutical company who provides services and manufactures products; multivitamins are just one of the many products Bayer creates. Bayer’s adult multivitamins are marketed and sold under the name “One a Day”. Bayer also creates the children’s multivitamins, “Flintstones” and “Bugs Bunny”. While the Canadian website for One a Day products does not contain any information about the

multivitamin products, nutrient intakes, or other consumer information about the products (Bayer, 2009a), the American website provides information about the products and information to assist consumers in making decisions about supplement use. This website features an interactive glossary of terms that consumers can click on a frequently asked questions section on a variety of topics, and a “quiz” which allows consumers to fill out a few questions about themselves and provides suggestions for which multivitamin product is appropriate for their needs (Bayer, 2009b). Neither the Canadian or American websites have a simple to follow fact sheet or similar resource to help consumers select a multivitamin based on their nutritional needs (Bayer, 2009a, 2009b). While these websites do make suggestions for supplement use consumers must trust Bayer enough to follow this advice. For those who seek more information about why they are choosing a supplement or would like to choose a different brand there is very little advice available.

2.4.6 Social networking websites.

The number of individuals who search the internet for health information has increased dramatically in the last several years, and was found to be one of the sources that individuals seek nutrition information from most often ("Tracking Nutrition Trends VII: August 2008," 2008). In 2009 a reported 61% of American adults used the internet to search for health information (Fox & Jones, 2009). Individuals are beginning to rely on the internet more frequently than physicians as a source of health information (Vance, Howe, & Dellavalle, 2009). The internet is beneficial to consumers as it offers: widespread access to health information, interactivity, tailoring of information, interpersonal interactions and social supports, and the potential for anonymity (Cline & Haynes, 2001). The widespread use of the internet for health information has the power to increase even further with the addition of social media websites.

Social websites such as: Facebook, MySpace, Twitter, and YouTube are part of user-generated wave of internet sometimes referred to as Web 2.0 (Vance et al., 2009). These websites are particularly popular among individuals aged 18 to 30 (Vance et al., 2009). When Facebook was searched in the fall of 2009 for the term “Supplements” over 4,600 different groups came up, the term “Nutrition” revealed more than 15,000 groups. These groups are comprised of individuals who have chosen to join the group. However, the majority of the groups focused on specific products and did not contain general information on nutrition, health,

or supplement use. At the time this search was conducted in 2009 there were only a few recognizable groups, “Dietitians of Canada 2008-2009 Dietetics Interns”, “Future Dietitians of Canada”, “Nutrition and Dietetics Students of Canada”, on Facebook which may be legitimate nutrition groups. This medium appears to remain underused as a source for nutrition information. These particular groups did not provide any nutritional information, but rather were networking groups for individuals in nutrition professions or training to interact. Facebook and other similar websites may prove to be a powerful marketing medium which could be explored further in the future. Social media marketing is a new relatively new concept and essentially refers to advertising and promotional efforts on social media websites (Vance et al., 2009). While currently underused in public health education, this form of communication allows messages to spread rapidly with little effort (Vance et al., 2009).

2.5 Summary of Literature Review

A broad range search for information on supplements via Google and PubMed was conducted in the winter of 2008/2009. This search yielded many results, most of which were not helpful as they were either, vague, biased, or even incorrect. Following this search a more directed approach was taken, focusing on organizations and websites likely to have information to assist consumers with the selection of a multivitamin. This search yielded four useful resources which were used in the data collection process. This latter search illustrated that these resources would likely be difficult for the average consumer to find if they did not know what or where to search. Thus an accessible (i.e., easy to locate) resource would be of value to Canadian consumers.

3. RESEARCH METHODS

3.1 Methodology

Qualitative methods were used throughout this study. Semi-structured key informant interviews and focus groups were conducted and were analyzed using qualitative thematic analysis. Thematic analysis involves creating and applying codes to a set of data to help make sense of the information and identify patterns or themes within the data (Braun & Clarke, 2006). Emergent themes were identified by reviewing the transcripts and identifying themes and ideas. This was done through a thorough review of the data, identifying key concepts, ideas, and trends and grouping this information into categories. Bundling information, creating links, and identifying relationships amongst the data helped to create value and assist in discovering new ideas.

3.1.1 Qualitative research.

Qualitative research in a basic sense involves the non-numerical and interpretive analysis of phenomena (Polgar & Thomas, 2000). Creswell (2009) describes qualitative research as:

A means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data (p. 4).

Study participants are viewed as people, not merely participants, and an attempt is made to gain insight into their experiences, views, and actions. Qualitative research focuses on the social constructions of reality, the relationship between researcher and phenomena, and situational constraints (Denzin & Lincoln, 1998). Most often qualitative research explores issues that place importance on how social experiences are created and given meaning (Denzin & Lincoln, 1998). In contrast, quantitative research places emphasis on measurement and causal relationships between variables not on processes (Denzin & Lincoln, 1998).

There are a number of situations in which to use qualitative research methods including when (Richards & Morse, 2007): 1) little is known about an area or understanding is limited, 2) attempting to make sense of complex ever changing situations, 3) exploring the views of participants, 4) the way they experience a situation and the meaning they put on something,

constructing a theory that reflects reality, and 5) trying to deeply understand a phenomena or situation.

For this study qualitative research methods were used to explore and understand an area about which little was known as well as to understand the views of participants (Richards & Morse, 2007). Using qualitative research methods allows one to analyze the data to synthesize a formal research question. This research project involved exploring the limited number of multivitamin resources that were currently available. This lead to the examination of how these resources could be improved upon and made more accessible to the general population from the perspective of the target population.

3.1.2 Thematic analysis.

Thematic analysis is a process that can be used with most qualitative methods. Through coding and theme identification it allows for the translation of qualitative information into data (Boyatzis, 1998). Thematic analysis can help to make sense of seemingly unrelated material, analyze qualitative information, or convert qualitative information into quantitative data.

Thematic analysis can go beyond organizing and describing data to help interpret various aspects of the research. While many individuals argue that thematic analysis is a process performed within major analytical traditions, others argue that thematic analysis should be considered a method in its own right (Braun & Clarke, 2006). One of the main advantages of thematic analysis is flexibility (Braun & Clarke, 2006). For this study thematic analysis was appropriate as the goal is to learn more about what consumers think about the currently available resources. An attempt was made to gain insight into what their needs are and how to best meet these needs was made.

Thematic analysis allows the researcher to communicate findings and provide an understanding of a phenomenon (Boyatzis, 1998). This process involves four main stages: (1) recognizing a “codable moment”, (2) using themes and codes consistently, (3) developing codes, and (4) interpreting information. For this study, thematic analysis allowed for the discovery of trends amongst individual responses to identify major themes and areas on which to focus further efforts.

Some obstacles and challenges associated with thematic analysis may include projection, which involves attributing something that is your own character, emotion, or value to the data.

This may be difficult to overcome when a researcher has too much familiarity with the phenomenon under study (Boyatzis, 1998). The stronger an ideology or theory a researcher holds, the more likely they are to project their values onto those from whom raw data was collected. Additionally, the mood and style with which data is analyzed may impact the interpretation of data (Boyatzis, 1998). As qualitative research is subjective, the researcher's fatigue, frustration, confusion, etc. will decrease the ability to sense themes and create codes. Lastly, sampling, as with any type of qualitative research, has an impact on the quality of the data (Boyatzis, 1998). The rule "garbage in, garbage out" applies to thematic analysis, namely the quality of data obtained directly impacts the quality of the results formed and analyzed from the data. Potential approaches to help minimize these obstacles and challenges include: developing clear explicit codes, establishing consistency of judgment; and focusing closely on the raw data (Boyatzis, 1998).

3.1.3 Key informant interviews.

Interviews are a data collection method which involves one-on-one discussion on a particular topic. During an interview the interviewer asks questions to gain information about the interviewee's world (Kvale & Brinkmann, 2009). Interviewing provides a way to access the context of an individual's behavior thus allowing the researcher to understand the meaning of the behaviour (Seidman, 2006). Key informant interviews involve specifically selected individuals; often the informant is someone who has training, knowledge, or personal experience in a particular area of interest.

3.1.4 Focus groups.

A focus group is a special type of group with a specified size, composition, and purpose, assembled to gather opinions (Krueger & Casey, 2009). Often focus groups may be used to obtain information and enhance the researchers understanding of a topic quickly (Richards & Morse, 2007). Kruger and Casey (2009) define a focus group study as:

A carefully planned series of discussions designed to obtain perceptions on a defined area of interest in a permissive, nonthreatening environment. Each group is conducted with 5 to 10 people led by a skilled interviewer. The discussions are relaxed, and often participants enjoy sharing their ideas and perceptions (p. 2).

There are several different uses of focus groups. Classically focus groups were first widely used in consumer-oriented, marketing research; other areas of use include the academic and scientific environment as well as non-profit and public areas (Richards & Morse, 2007). There are several features which typically define focus groups; they involve people, who share similarities, through discussion the focus groups produces qualitative data, ultimately helping to understand a particular topic (Krueger & Casey, 2009).

Focus groups involve people, ideally five to ten participants, but the size may vary from four to twelve participants (Krueger & Casey, 2009). Group discussion is most effective when participants are comfortable and feel free to share. A small group allows individuals to share their thoughts and insights; however a group which is too small will generate fewer ideas. When a focus group becomes too large the group has a tendency to “fragment”. Fragmenting refers to when individuals desire to share their opinions but are intimidated by the large group or are unable to as there are insufficient pauses in conversation. This leads to participants whispering to those next to them. Furthermore, large groups may be difficult to control. The size of the focus group is best directed by the purpose of the study as well as desired participant characteristics (Krueger & Casey, 2009).

Participants for focus groups are selected based on similarities of importance to the research study (Krueger & Casey, 2009). Desired characteristics are communicated to participants prior to the study and recruitment is based on finding individuals who possess these traits. Some similarities that may be of interest include: an occupation; age; gender; socioeconomic status, and past involvement with a program or service.

Focus groups produce qualitative data through discussion and the use of open-ended questions (Krueger & Casey, 2009). Quality focus group questions possess several characteristics. Most often they evoke conversation, are clear, short, open-ended, are easy to say, and include language that participants are familiar with. Information obtained from focus groups is often compared to the data obtained from other focus groups. The quality of data obtained from a focus group is dependent on the focus group facilitator (Richards & Morse, 2007). The facilitator is responsible for ensuring that discussions are balanced and keeps the conversation moving and flowing (Richards & Morse, 2007).

Focus groups assist researchers in understanding a specific topic of interest. They are helpful in exploring participants perceptions and feelings (Krueger & Casey, 2009). Focus

groups may be used for several purposes including: assisting with decision making, guiding product development, and providing insight into organizational issues and concerns (Krueger & Casey, 2009).

Focus groups may be used in conjunction with other research methods. Often focus groups are ideal to establish a basic understanding of a topic before pursuing further data collection (Krueger & Casey, 2009). While focus groups are useful in collecting data there are several criticisms of this data collection method. Participants often intellectualize their responses during focus group discussion. When discussing past behaviours they tend to describe themselves as thoughtful and rational (Krueger & Casey, 2009). Furthermore, focus group participants may simply make up responses, produce trivial results, or dominant individuals can greatly impact the group. Understanding the potential weaknesses of focus groups is important to using them in the most effective and suitable way.

3.2 Researcher's Background

Self-reflection and clarification of potential researcher bias is important to establish (Creswell, 2009). A researcher's interpretation of findings may be influenced by many factors in their background, including: gender; culture; actions; and socioeconomic status. The following is a brief overview of potential characteristics which may impact the interpretation of the findings for this research project.

I was born and raised in Saskatoon, Saskatchewan. I grew up in a middle-class, two parent home on the east side of the city. I completed elementary and high school education in the public school system. This was followed by the completion of an undergraduate degree at the University of Saskatchewan with an internship in the Saskatoon Health Region. I convoked in June 2009 with a Bachelor of Science in Nutrition. I began graduate studies in Nutrition in September 2009. At this same time I began working part-time as a clinical dietitian for the Saskatoon Health Region.

As a registered dietitian I am familiar with vitamins and minerals, supplements, and multivitamins. During my undergraduate education I was definitely influenced to believe in "food first", that people can get what they need from food and that supplementation was often viewed as a last resort. During internship and after completing my degree this opinion evolved as I realized that meeting one's needs is more easily said than done. I personally believe that a

daily multivitamin is important for many people. I take a daily multivitamin and try to have my husband do so as well. With this in mind I understand the struggles that many face with taking a supplement; remembering to take the product and knowing which one to pick are challenging. I know the value of taking vitamin D, I use supplemental vitamin D, yet this is a supplement which I most often forget to take.

The limited experience I have working with community members from the selected target population came during my undergraduate degree where I completed a community needs assessment on one of the core neighbourhoods in Saskatoon. I also worked on a project which involved some shadowing at a community school. My limited experience with the core neighbourhoods as well as my chosen career as a dietitian as well as my own views on supplementation may influence my interpretation of this research study.

3.3 Study Design

Qualitative research methods were selected for this study to explore consumers' needs in greater depth. As little previous research has been done examining what resources are currently available to help consumers choose a multivitamin, qualitative research was the most appropriate method for this study. Figure 3.3 illustrates the non-linear process of qualitative research. The separate units in the figure represent the major components of the project. This research approach was used to allow for flexibility in the data collection, data analysis, and creation of the new resource. For example, the creation of new resource step specifically underwent revision and refinement using input from focus group participants and key informants before creating the final resource.

The newly created resource will be available on the Dietitians of Canada website, www.dietitians.ca. As this study was funded by Dietitians of Canada, the resource that was created was made specifically for that purpose.

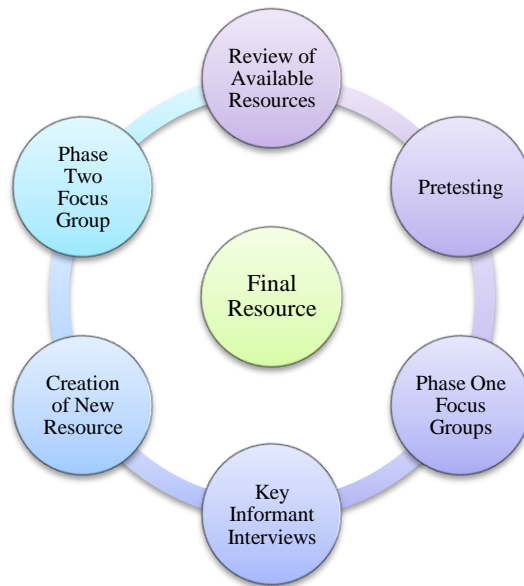


Figure 3.3 – Non-linear Process of Research Project

3.4 Review of Current Resources

Prior to beginning this project an examination and review of currently available resources for Canadian consumers focused on the selection of a dietary multivitamin was conducted during the winter of 2008/2009. This search involved a preliminary investigation of supplement selection resources including a Google and PubMed search, followed by a direct investigation. This search revealed a limited number of useful resources that were currently available. This led to the examination of how these resources could be enhanced and made more accessible to the general population from the perspective of the target population and helped to synthesize the research questions.

3.4.1 Preliminary investigation of supplement selection resources.

Searching for information and resources regarding supplement selection may be a very daunting task as many consumers may not know where to begin to look. It was assumed that an internet search would simulate the actions of a consumer looking for information. While the number of search terms for nutrition and supplement related information is virtually limitless, this search was limited to a few key search terms. The search, conducted in winter of 2008-2009, consisted of two parts; the first part focused on a Google search of several supplement

related terms, while the second search was conducted on PubMed with similar terms. Search terms are listed in Table 3.4.1.

This preliminary search yielded many results, which are provided in the Results section. The majority of the searches were not usable for the present study for many reasons: information obtained through the Google searches often contained information about purchasing supplements, weight loss, and bodybuilding; while some sites did provide pointers on what to look for when purchasing a multivitamin these recommendations were often vague or difficult to understand. These searches were also quite repetitive, with several of the same sites coming up multiple times with the different search terms. The PubMed searches resulted in significantly fewer sites and these were either related to specific nutrients, disease states, or were completely unrelated to the topic of interest. The limited results from these searches lead to a more directed search, focusing on organizations known or suspected to have resources to help individuals choose a multivitamin.

Table 3.4.1 – Search Terms and Limits

Google Search	PubMed
<p>Limits: Language – English Region – Canada</p>	<p>Limits: Language – English Subjects – Humans Publication Dates – 2000 to 2009</p>
<p>Search Terms “Supplements” “Choosing a Supplement” “Choosing a Dietary Supplement” “Multivitamin Need” “Vitamins and Minerals” “Nutritional Supplement Guidance” “Selecting a Supplement” “Selecting a Multivitamin” “How to Choose a Supplement” “How to Choose a Multivitamin” “Do I Need a Supplement” “Do I Need a Multivitamin”</p>	<p>Search Terms “Use of Supplements” “Choosing a Dietary Supplement” “Assessing Supplement Need” “Multivitamin Need” “Selecting a Multivitamin” “Selecting a Supplement” “Selecting a Vitamin” “Nutritional Supplement Guidance”</p>

3.4.2 Directed investigation of supplement selection resources.

The results of this preliminary investigation prompted further research to focus on known organizations, sources, and websites that would be likely to have information on supplement

usage and selection. These sources include government agencies, not-for profit groups, books, companies and other websites. A review of resources from each of these groups is detailed in the literature review section. Figure 3.4.2 provides a visual conceptualization of the items reviewed.

This investigation yielded four resources which were potentially useful in assisting a consumer with the selection of a multivitamin and thus capable of being helpful for future resource development were: *Health Canada's Eating Well with Canada's Food Guide*, *CSPI's How to Read a Multivitamin Label*, *CRN's How do you Read a Supplement Label*, and *DC's Do I Need a Vitamin or Mineral Supplement?*.

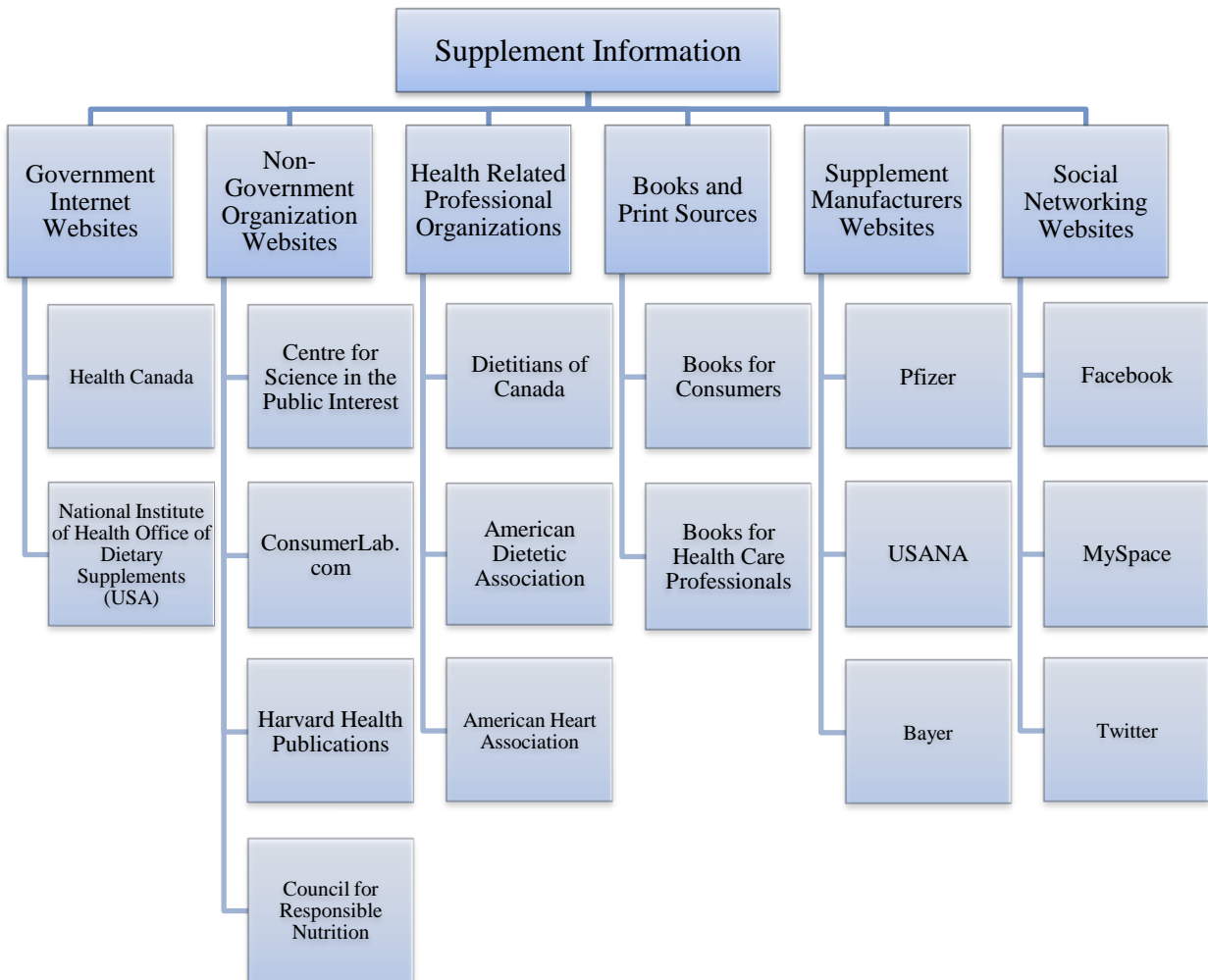


Figure 3.4.2 – Sources of Supplement Information Review Overview

3.5 Pretesting

The resources identified as being potentially useful in developing a new resource were initially pre-tested in an ad hoc way to determine whether they should be used in focus group assessments. Colleagues and fellow university students were approached and selected based on convenience, willingness to participate, and limited familiarity with nutrition information. Participants were interviewed one-on-one at mutually agreed upon times using open-ended questions to cover the ground required to form meaningful conclusions. These questions were developed before hand and helped to guide the interview process. Questions were selected based on an initial review of the resources and through discussion between researchers. A semi-structured interview approach was used to allow the researchers to understand what matters to respondents, maintain a conversational tone and avoid disruption of the participants train of thought (Richards & Morse, 2007). The responses obtained from these interviews were useful in developing a focus group guide for use with the focus groups.

Participants were asked to review the resources one at a time and answer simple questions about each resource. The selected resources were assessed based on characteristics such as usability and general acceptance. The questions which were posed included:

- How usable are these resources for providing information on how to select a supplement?
 - What makes them usable?
 - Unusable?
- How could these resources be improved?
- How would these resources be used by the general public?

During the pre-test interviews notes were recorded by hand for future reference. The data obtained from this investigation was not used in any analysis, but rather served to guide and assist the researcher. The responses obtained were used by the researcher to help develop interview guides and plan for the focus groups and key informant interviews.

The interviews conducted during the pre-test period occurred during January 2010 and February 2010. A total of four interviews were conducted. Interviews continued until the researchers felt they have enough information to guide them in the development of a semi-structured interview guide and a focus group guide.

A semi-structured interview guide is developed when researchers have adequate information about an area to develop meaningful questions prior to the interview, yet there is not enough information to answer the questions themselves (Richards & Morse, 2007). This format will allow the researchers to be well prepared for the group testing while still inviting detailed responses to the questions posed. Initial data analysis is critical to guiding future data collection. Ideally this would be a reciprocal relationship that continues until no new results are found, this is referred to as saturation (Jacelon, O'Dell, Jacelon, & O'Dell, 2005).

3.6 Ethical Considerations

Following the pre-test period and the development of both a semi-structured interview guide and a focus group guide, ethics approval from the University of Saskatchewan Behavioural Ethics Board was sought. A full application including information about the study design, methods and procedures, participant recruitment and selection, incentives for participation, consent, any potential researcher conflict of interest, and dissemination of results was included as part of the application. In addition to this information all relevant forms were also submitted for approval.

Once approval was received, April 22, 2010, participant recruitment commenced. All participants were required to review and sign a consent form prior to their participation in any form of data collection. The consent form, attached in Appendix A – Focus Group Consent Form and Phase Two Focus Group Consent Form, were given to the participants prior to the focus group discussion, this served to address the issue of confidentiality. Upon signing the consent form, the participants acknowledged their responsibility and agreement to protect the confidentiality of what others in the group said during the sessions; they also acknowledged that other focus group participants may not respect their confidentiality. During the introduction to the focus group session, the focus group moderator orally reviewed the participant's responsibility to respect the confidentiality of the other participants. A separate consent form, attached in Appendix A – Key Informant Consent Form, was developed for the key informants interviews.

Neither the names of focus group participants nor the names of the community organizations, directors and key informants appear in any written and/or oral report arising from the study unless permission of the key informant has been obtained. Direct quotations from

study participants are used anonymously. The identity of any participants or organizations was not recorded, except to characterize participants as a part of a coded (numbered) group or key informant.

The ethics application was approved April 22, 2010, the certificate of approval is attached in Appendix B. Upon development of the resource the need to change the questions to more appropriately evaluate the newly created resource was deemed necessary. An amendment memo was submitted to the University of Saskatchewan Behavioural Ethics Committee in winter 2011. This amendment outlined changes to the questions; the revised questions used during the phase two focus group are listed in the focus group section. An extension of ethics approval was also obtained for an additional year, until April 2012.

3.7 Participants

A series of three focus groups consisting of six to eleven participants each were conducted with the target population. These focus groups involved participants from the core neighbourhoods in Saskatoon. Participants from this population were selected given that literacy and numeracy skills may be problematic for lower income individuals, possibly including members from this group. This population group was chosen to be as inclusive as possible of the general public. The goal of the created resource is not necessarily to target this group alone, but to create resources which are useful for the widest range of people as possible.

An attempt to recruit six to eight participants for each focus group was made. This number was selected as the ideal number is between five and ten participants (Krueger & Casey, 2009). This size of group is manageable, allowing enough opportunity for everyone to share their opinions but is not limited by too narrow of views which may be obtained from a smaller group. Participants were also required to meet the following inclusion criteria: adult between the ages of 18 and older; residence within the core neighbourhoods in Saskatoon; and willingness to participate on the day the focus group has been organized to meet (which was subject to room availability).

Participants were recruited with the assistance of Janet Phillips who, as a part-time employee of CHEP, is a leader in Collective Kitchens. Through her involvement with the community she was able to ask community group leaders for permission to recruit volunteers to participate.

Seven key informant interviews were conducted with opinion leaders in their own right. Participants included individuals selected from the focus group population, dietitians, and pharmacists. Key informants were recruited using purposeful sampling (Creswell, 2009). Key informant interviewees were identified through the use of snowball sampling, where key informants suggest other possible future individuals to interview. Any potential key informants were reviewed with respect to their role in the community and those which were perceived to be helpful in understanding the research question were approached with a request for participation. Figure 3.7 shows a timeline of dates when focus groups and key informant interviews were completed.



Figure 3.7 – Timeline of Focus Groups and Key Informant Interviews

3.8 Key Informant Interviews

Seven key informant interviews were conducted. Prior to participation key informants were required to complete a consent form, shown in Appendix A. Initially four key informant interviews were completed. The initial stage of key informant interviews involved two community members, one community dietitian, and one community pharmacist. Interviews took place from spring through to fall 2010. Key informants were asked to review and evaluate the found resources. They were also asked about where they seek information about supplements, what they would like a tool to look like, where and how they would like to find more information on supplements.

The interviewees were asked about what type of information would help people to make choices about supplements and what prevents or stops individuals from taking multivitamins and about where and how individuals find information on supplements, where they would like to find information on supplements and what communication forms would be most useable. Interviewees were shown the four resources which were currently available and deemed as potentially useful and asked the questions using the interview guide shown as Table 3.8.

Table 3.8 – Initial Key Informant Interviews – Interview Guide Questions

<p>Question area 1: Reaction to Currently Available tools (questions will be asked for each resource the group is shown)</p> <ol style="list-style-type: none"> 1. What do you like about this resource? 2. What do you dislike about this resource? 3. Would this resource help you to choose a supplement? 4. How could this resource be improved?
<p>Question area 2: Barriers to Supplement Use</p> <ol style="list-style-type: none"> 1. What kinds of barriers, if any, have you come across when selecting a multivitamin? <ol style="list-style-type: none"> a. Barriers for people you work with? 2. What types of barriers do you think exist that may stop people from taking a supplement? 3. What do you suggest to eliminate the barriers?
<p>Question area 3: Communication Strategy</p> <ol style="list-style-type: none"> 1. Where have you looked for information in the past about multivitamins or supplements? <ol style="list-style-type: none"> a. Where do you think others look for information? 2. How do you think this resource should be made available to the public? <ol style="list-style-type: none"> a. Any suggestions to improve or enhance accessibility? 3. Where would you like to access this resource? (both physically and in cyberspace) 4. Would you use a resource like this if it was available?

Responses to questions were tape-recorded. These audio files were subsequently transferred to the computer and transcribed with omission of connector words to improve flow and readability. Transcription of all but two of the interviews was completed by the researcher using Dragon Naturally Speaking 9.5 software. Two of the interviews were transcribed externally by an individual with a Masters of Arts degree in English, outsourced in the interest of

time. All transcripts were reviewed before being coded and the researcher was present during all of the data collection sessions. These transcripts were analyzed with the identification of emergent themes. This information was used for resource development and refinement.

The completion of the initial key informant interviews yielded much insight into resource development, barriers to supplement use, and information sources. However, following the creation of the first draft of the new resource the decision to complete an additional three interviews was made to gain further insight; a total of seven interviews were conducted which complied with the original ethics application and plan to complete five to ten interviews. These interviews were conducted with one community member who was recruited from the phase two focus group, one community dietitian, and one community pharmacist. These interviews were conducted during spring 2011. Participants were asked the questions listed in Table 3.8, however, in addition to the four resources they were also shown the newly created tool. These additional three interviews were also recorded, transcribed, and analyzed.

Following all of the key informant interviews, participants had the opportunity to review their transcript and comment on whether they felt the document accurately reflected the conversation and discussion that was held. Participants were sent the transcript via e-mail. All participants responded saying that they felt the transcript was accurate. One participant was able to clarify the spelling of a information source through this process. Key informants were remunerated with a \$25 gift card to a grocery store which served as an honorarium. Additionally, a gift card to compensate for child care was provided in one situation as required.

3.9 Focus Groups

Focus groups were chosen based on the premise that attitudes and perceptions are not formed in isolation but rather through interaction with people (Morse & Field, 1995). Unlike an interview, focus groups provide discussion between participants which may help to discover different perceptions, or points of view (Richards & Morse, 2007). The opinion of one participant may be able to provoke a thoughtful and meaningful response from another participant.

A total of three focus groups were conducted in Saskatoon, Saskatchewan during spring 2010 through to winter 2011. Focus groups were held at a variety of community locations which were easily accessed by the participants. Prior to participation participants were asked to read

and sign a consent form outlining the potential risks of the study. Table 3.9a details the date and location of the focus group and the number of participants in attendance.

Table 3.9a – Details of Focus Groups

	Phase One – Focus Group #1	Phase One – Focus Group #2	Phase Two – Focus Group #3
Date	May 18, 2010	June 15, 2010	February 25, 2011
Location	Westview Place, Davidson Cres, Saskatoon, SK	CUMFI Wellness Centre, 315 Ave M, Saskatoon, SK	CHEP, St. Paul’s Hospital, Saskatoon, SK
Number of Participants	7	11	6

Approximately ten individuals were invited to participate in each group with the aim of having six to eight participants. Potential participants were approached at the community leaders’ discretion for each focus group. Participants met the inclusion criteria detailed in the participants section. All participants were remunerated with a \$25 gift card to a grocery store which served as an honorarium, child care, and snacks were provided during the focus group session.

The focus groups were used to capture what consumers expect and need from a resource, as well as their thoughts, feelings, and ideas on the currently available the resources which were presented to them. Those wishing to participate were asked to read and sign a consent form approved by the ethics board. During the first phase of focus groups participants were shown the currently available resources which were selected during the investigation of supplement selection resources. Focus group members were given a chance to review the resources prior to being asked questions about them. The resources were presented in the same order for all of the focus group sessions. They were shown the resources in the following order: Health Canada’s – *Eating Well with Canada’s Food Guide*, Dietitians of Canada’s – *Do I Need a Vitamin or Mineral Supplement?*, Council for Responsible Nutrition’s – *How do you Read a Supplement Label*, and lastly Centre for Science in the Public’s Interest’s – *How to Read a Multivitamin Label*. Participants in the phase one focus groups were asked questions using the focus group guide shown as Table 3.9b. Additional probes were used as required to generate discussion.

Questions were posed from the focus group interview guide with responses recorded with a tape-recorder. Following the phase one focus groups, the tape-recordings were transferred to the computer and subsequently transcribed. Transcripts were edited for connector words such as “umm” and “like” to improve flow and readability. Each individual comment was uniquely numbered with no links or connections made as to what participant made which comment. This was done to avoid linking certain comments back to any one individual and also to minimize bias that previous comments may impose on comments made later in the discussion. These transcripts were analyzed with the identification of emergent themes. Synthesis of focus group feedback was completed and used for future resource development, refinement, and the development of the phase two focus group questions.

Table 3.9b – Phase One – Focus Group Questions

<p>Question area 1: Reaction to Currently Available tools (questions were asked for each resource the group is shown)</p> <ol style="list-style-type: none"> 1. What do you like about this resource? 2. What do you dislike about this resource? 3. Would this resource help you to choose a supplement? 4. How could this resource be improved? <ol style="list-style-type: none"> a. Probe regarding layout, format, amount/density of text b. What would make it more useful? c. Any information that you think would be helpful to you or your family/friends?
<p>Question area 2: Barriers to Supplement Use</p> <ol style="list-style-type: none"> 1. What kinds of barriers, if any, have you come across when selecting a multivitamin? <ol style="list-style-type: none"> a. Any other barriers that you think others may face? 2. What types of barriers do you think exist that may stop people from taking a supplement? <ol style="list-style-type: none"> a. Any other barriers that may stop others from using a supplement? b. What do you suggest to eliminate the barriers?

Following the phase one focus groups a new tool was created based on the comments and identified themes from these focus groups. The tool drew on the strengths of each of the reviewed and evaluated to resources to create a new tool which attempted to meet the needs of consumers. This tool was initially reviewed by committee members as well as the initial four key informants as a professional courtesy. These individuals were asked to give feedback if they

wished. This feedback helped to further refine the resource prior to presenting it to the phase two focus group.

A phase two focus group was conducted with participants recruited in a similar fashion as during the first phase of focus groups. During this focus group participants were asked to review the newly created tool to assist with further refinement of the newly developed tool prior to launching the resource for general public use. The phase two focus group was used to evaluate the tool and discuss ways of helping the general public to access this information. Participants were asked the questions in Table 3.9c.

Table 3.9c – Phase Two – Focus Group Questions

<p>Question area 1: Reaction to Newly Created Resource</p> <ol style="list-style-type: none"> 1. What do you like about this resource? 2. What do you dislike about this resource? 3. Would this resource help you to choose a supplement? 4. How could this resource be improved? <ol style="list-style-type: none"> a. Does the title grab your attention? b. Any suggestions for a different title? c. Any thoughts about the format? Layout? Text density?
<p>Question area 2: Usefulness of Resource with Actual Supplement</p> <p>After reviewing the newly created tool, participants were given a multivitamin box</p> <ol style="list-style-type: none"> 1. Does this tool help you to understand this multivitamin label? 2. Based on what you read on the handouts do you think this multivitamin is appropriate for you? <ol style="list-style-type: none"> a. Is there any additional information that you would need to help make that decision?
<p>Question area 3: Communication Strategy</p> <ol style="list-style-type: none"> 1. Where have you looked for information in the past about multivitamins or supplements? 2. How do you think this resource should be made available to the public? 3. Where would you like to access this resource? (both physically and in cyberspace) <ol style="list-style-type: none"> a. If you were to look for this on the internet, what terms would you search? 4. Would you use a resource like this if it was available?

The purpose of the phase two focus group was to improve the resource as well as to gain an understanding of participants' initial reactions to the resource. This evaluation was also helpful in assessing if participants were able to use the tool to understand a multivitamin label. Participants were asked to review a popular multivitamin product using the new tool and assess if it was the right product for them. Responses from this focus group were recorded by hand. A back up tape-recording of the session was also completed for future reference as necessary. Responses were grouped together and used to improve and refine the newly created resource.

3.10 Presentation of Resources

During all of the focus groups and key informant interviews the four found resources were presented in same order. This was done to minimize the potential for differences in reaction to the resources between the groups. The order of presentation was selected based on the responses obtained during the pre-testing with colleagues. Resources were shown to the participants in the order of least to most helpful, based on the perceptions of the resources obtained during the pre-test period. Each of the resources was handed out to participants one at a time and they were given the opportunity to review the resources prior to any questions being asked. Before viewing the next resource participants were asked to hand the previous resource back.

3.11 Demographic Information

Following all the focus group sessions and key informant interviews, participants were asked to complete a demographic information form that included questions about age, gender, level of education attained, primary source of household income, and household composition. Participants were notified that they were free to omit any questions that they did not feel comfortable answering. There was also an additional spot for participants to leave comments should they desire to do so. The demographic information sheet is in *Appendix C*.

3.12 Data Analysis

Following the key informant interviews and focus groups the audio recordings were transferred to computer data files. Subsequently these recordings were transcribed; the transcriptions were analyzed using thematic analysis which allowed for theme identification and

categorization. Thematic analysis involves creating and applying codes to a set of data to help make sense of the information and identify patterns or themes within the data (Braun & Clarke, 2006). Transcripts were read multiple times with themes, key ideas, and interesting comments being flagged and given a unique code which described the essence of the comment. This process was completed in Microsoft Word using the highlighting and the comment tool under review. Then all of the coded portions of the text were copied and pasted into a Microsoft Excel document. Each portion of text was aligned with its corresponding code in unique cells. This allowed the researcher to sort through all of the codes and group similar codes together. From this, emergent themes were identified by reviewing the codes and portions of text. These themes were grouped into three major topics; resource, barriers to use, and other. Figure 3.12 illustrates a schematic of code, theme, and topic development in relation to each other.

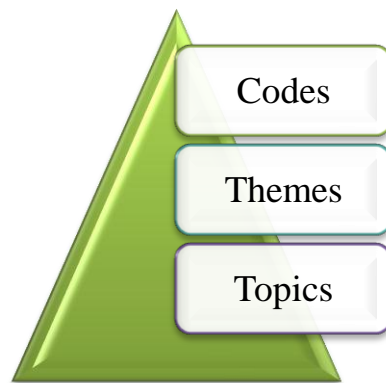


Figure 3.12 – Schematic of Data Analysis

Bundling information, creating links, and identifying relationships amongst the data helped us to create value and assist in discovering new ideas. Synthesis of focus group and key informant feedback was completed and used for future resource development and refinement. Data analysis often occurred concurrently with data collection as several interviews and focus groups were conducted.

Following all data collection and analysis transcripts from all of the key informant interviews and the two phase one focus groups were reviewed and audited by an external individual. Dr. Tanis Vye Mihalynek, PhD, RD reviewed the transcripts and then read this thesis to verify the analysis and interpretation of the focus group and interview data. The report from the external auditor is attached as Appendix D – External Audit of Research Transcripts Report.

4. RESULTS

4.1 Review of Current Resources

Both the preliminary and subsequent directed investigations of supplement selection resources yielded an abundance of information. The preliminary review of resources for information about supplement selection or tools that would help consumers in choosing supplements yielded many results. However, the helpfulness and quality of these resources was poor. Table 4.1 summarizes the results of the Google and Pubmed searches. This led to a more directed search approach, examining specific organizations and websites which were likely to offer supplement information but were not easily found through a search engine such as Google. Therefore, the resources that were examined were not easily accessible to consumers.

Table 4.1 – Summary of Preliminary Results for Supplement Selection Resources

Google Search		PubMed	
Completed: Dec 13, 2008 - Jan 9, 2009 Limits: Language – English Region – Canada		Completed: Dec 13, 2008 - Jan 9, 2009 Limits: Language – English Subjects – Humans Publication Dates – 2000 to 2009	
Search Terms	Results (Websites)	Search Terms	Results (Journal Articles)
“Supplements”	2, 550, 000	“Use of Supplements”	3, 186
“Choosing a Supplement”	92, 600	“Choosing a Dietary Supplement”	3
“Choosing a Dietary Supplement”	6, 150	“Assessing Supplement Need”	10
“Multivitamin Need”	33, 800	“Multivitamin Need”	13
“Vitamins and Minerals”	240, 000	“Selecting a Multivitamin”	0
“Nutritional Supplement Guidance”	12, 000	“Selecting a Supplement”	11
“Selecting a Supplement”	70, 600	“Selecting a Vitamin”	8
“Selecting a Multivitamin”	7, 790	“Nutritional Supplement Guidance”	13
“How to Choose a Supplement”	65, 900		
“How to Choose a Multivitamin”	4, 060		
“Do I Need a Supplement”	905, 000		
“Do I Need a Multivitamin”	48, 500		

While most of the resources found from the directed search were not helpful in assisting with the selection of a multivitamin, this investigation did reveal several resources which were deemed potentially useful. This led to examining what is seen as a useful or high quality resource. While this concept is dependent on the needs and preferences of the user, some general components arose during the examination of resources, including:

- Detail, sufficient to explain concepts, but not overwhelming to readers
- Format, clear and uncluttered
- Accurate and correct information
- Appropriate language for the target audience
- Applicable to the target audience (e.g. age, gender)

Design and visual appeal is also very important in leading the reader through the document. The following attributes are important (Luisi, 2006):

- Use of white space to separate and emphasize key points
- Use of headings
- Minimizing number of different fonts used
- Limiting use of all capital letters
- Use of highlighting, decoration, and colour in moderation

While many of resources reviewed in the literature review section had positive attributes only a few were selected as useful. The above criteria were used to identify four resources as potentially useful.

- Health Canada's – *Eating Well with Canada's Food Guide*
- DC's – *Do I Need a Vitamin or Mineral Supplement?*
- CRN's – *How do you Read a Supplement Label*
- CSPI's – *How to Read a Multivitamin Label*

Each of these resources, as well a comparison of their strengths can be found in the following sections. These resources were used as a starting point to draw on their strengths for the development of a new resource.

4.1.1 Eating well with Canada's food guide.

Advice for different ages and stages...

Children

Following *Canada's Food Guide* helps children grow and thrive.

Young children have small appetites and need calories for growth and development.

- Serve small nutritious meals and snacks each day.
- Do not restrict nutritious foods because of their fat content. Offer a variety of foods from the four food groups.
- Most of all... be a good role model.

Women of childbearing age

All women who could become pregnant and those who are pregnant or breastfeeding need a multivitamin containing **follic acid** every day. Pregnant women need to ensure that their multivitamin also contains **iron**. A health care professional can help you find the multivitamin that's right for you.

Pregnant and breastfeeding women need more calories. Include an extra 2 to 3 Food Guide Servings each day.

Here are two examples:

- Have fruit and yogurt for a snack, or
- Have an extra slice of toast at breakfast and an extra glass of milk at supper.

Men and women over 50

The need for **vitamin D** increases after the age of 50.

In addition to following *Canada's Food Guide*, everyone over the age of 50 should take a daily vitamin D supplement of 10 µg (400 IU).

Figure 4.1.1 – “Eating Well with Canada’s Food Guide” Advice for different ages and stages, (Health-Canada, 2007)

4.1.2 Do I need a vitamin or mineral supplement?.



Eat Well, Live Well

Brought to you by:



Dietitians of Canada
Les diététistes du Canada

Step Right Up to Healthy Eating

Do I Need a Vitamin or Mineral Supplement?

Most healthy adults can satisfy their vitamin and mineral needs by eating well with Canada's Food Guide – but there are important exceptions.

Eating Well with Canada's Food Guide now recommends specific supplements for women who may become pregnant, women who are pregnant or breastfeeding, and adults over the age of fifty. Further, people who smoke, and people with restricted diets may need more of certain nutrients than what they might get from healthy food choices. There are also certain medical reasons to use or limit the use of particular vitamin and mineral supplements. Your physician and registered dietitian can help advise you of your specific vitamin and mineral requirements, as getting too much of certain nutrients is as much of a concern as getting too little.

Women of childbearing age
All women who could become pregnant should take a multivitamin containing 400 µg (0.4 mg) of folic acid every day to help prevent having a baby with a neural tube defect. This is a birth defect that affects the baby's brain, skull or spine. Folic acid needs are also increased for pregnant and breastfeeding women and these women should also take a multivitamin containing folic acid every day. Pregnant women need to ensure that their multivitamin contains sufficient iron as needs increase by 50%. A health care professional can help in the selection of the appropriate multivitamin.

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Do I Need a Vitamin or Mineral Supplement?

People who don't drink milk
Cow's milk is a key source of calcium, vitamin D and other bone-building nutrients. People who drink less than 500 mL (2 cups) of milk or fortified plant beverage (e.g. soy) daily need a vitamin D supplement. Foods such as yogurt may provide a small amount of vitamin D when made with vitamin D fortified milk. In addition, calcium and other bone-building nutrients may also be lacking if milk or alternatives are not consumed. A supplement in this case may be recommended.

People who smoke
Smoking increases the need for vitamin C. People of any age who smoke should take a supplement containing vitamin C, as well as including food sources such as oranges, grapefruit and potatoes.

Vegetarians
A well planned balanced vegetarian diet (lacto, lacto-ovo, vegan) can meet most nutritional needs. Vegans who exclude all animal products from their food choices require a source of vitamin B12 either from foods fortified with vitamin B12 or a supplement. Young women who are vegetarian may need to take an iron supplement.

To Meet Nutrient Needs - Follow Eating Well with Canada's Food Guide
For most people, eating the types and amounts of food recommended by the food guide for your age and sex provides you with the vitamins and minerals your body needs.

You need over 50 different nutrients for good health.
Eating a variety of foods is the best way to get the variety of nutrients that you need for health.

Vitamin and mineral supplements do not provide important nutrients such as fibre, carbohydrates, protein and essential fats.
Satisfy your need for these nutrients by eating vegetables, fruit, whole grains, milk, cheese, yogurt, meat, fish, eggs, beans, nuts and seeds as well as canola, olive, and soybean oils.

Phytochemicals are natural plant chemicals found in vegetables, fruit, whole grains, nuts and seeds.
Many of these substances have been shown to be good for your health. Research also shows that these phytochemicals are more effective when eaten as foods, rather than as supplements.



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Eat Well, Live Well

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Vitamin and Mineral Supplement Tips

Restricted calorie diets may leave you short on some essential nutrients.
If you are on a very low calorie diet, you should get the advice of a registered dietitian and check with your physician. A multivitamin supplement may be recommended.

You don't get energy from eating vitamin pills.
You do get energy as calories from carbohydrates, fats and proteins in the food you eat. Vitamins in food help convert energy from these food components into a type of energy your body can use but they do not supply energy by themselves. Why not try a daily walk to energize yourself while strengthening your heart, lungs and muscles?

If you are "stressed out", pay close attention to what you eat.
Eating well can help you cope with the stresses of daily living – over eating or under eating are not solutions. A supplement will only provide some missing nutrients if you are not eating well.

You may require vitamin or mineral supplements for medical conditions such as anemia or osteoporosis or during times of physical stress, such as after an operation or during a severe infection. It's important to follow the advice of your physician and registered dietitian.

Dietitians provide food and nutrition information you can trust. Find a dietitian in your area at www.dietitians.ca/find or call 1-888-901-7776.



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Taking large amounts of vitamins or minerals can be dangerous.
Vitamin A, vitamin D, niacin, calcium, iron, and selenium are particularly toxic in high doses. Large amounts of vitamin B6 and fluoride also have harmful side effects. Taking more than 2000 mg of vitamin C, for example, may cause diarrhea and gastrointestinal problems, and is not recommended.

Talk to your physician or registered dietitian about your particular needs and eating pattern before taking any supplements. If you are unsure about any vitamin or mineral supplement you are interested in buying speak to the pharmacist. Keep supplements, especially those containing iron, away from children.

Helpful Links

- Learn more about *Eating Well with Canada's Food Guide* at www.healthcanada.gc.ca/foodguide
- Find out how your food choices measure up at www.dietitians.ca/eattracker

This Factsheet distributed compliments of:

Figure 4.1.2 – “Do I Need a Vitamin or Mineral Supplement?”, (DC, 2008)

4.1.3 How do you read a supplement label.

How do you read a supplement label?

Serving size is the manufacturer's suggested serving expressed in the appropriate unit (tablet, capsule, softgel, packet, teaspoonful).

Amount Per Serving heads the listing of nutrients contained in the supplement, followed by the quantity present in each serving.

International Unit (IU) is a standard unit of measure for fat soluble vitamins (A, D and E).

Milligram (mg) and microgram (mcg) are units of measurement for water soluble vitamins (C and B complex) and minerals. A milligram is equal to .001 grams. A microgram is equal to .001 milligrams.

Percent Daily Value (DV) tells what percentage of the recommended daily intake for each nutrient for adults and children ages 4 and up is provided by the supplement.

An asterisk under the "Percent Daily Value" heading indicates that a Daily Value is not established for that nutrient.

The list of all ingredients includes nutrients and other ingredients used to formulate the supplement, in decreasing order by weight.

All supplements should be stored in a cool, dry place in their original containers, out of the reach of children and should be used before the expiration date to assure full potency.

The manufacturer's or distributor's name and place of business or phone number are required to appear on the label.

Supplement Facts

Serving Size 1 tablet

Suggested Use: Adults, take one tablet per day with meal

Amount Per Serving	% Daily Value
Vitamin A 5000 I.U.	100%
50% as Beta Carotene	100%
Vitamin C 250 mg	417%
Vitamin D 400 I.U.	100%
Vitamin E 200 I.U.	667%
Vitamin K 80 mcg	100%
Thiamin 5 mg	333%
Riboflavin 5 mg	294%
Niacin 20 mg	100%
Vitamin B ₆ 5 mg	250%
Folic acid 400 mcg	100%
Vitamin B ₁₂ 6 mcg	100%
Biotin 150 mcg	50%
Pantothenic Acid 10 mg	100%
Calcium 200 mg	20%
Iron 18 mg	100%
Phosphorus 200 mg	20%
Iodine 150 mcg	100%
Selenium 35 mcg	50%
Magnesium 200 mg	50%
Zinc 15 mg	100%
Copper 2 mg	100%
Boron 150 mcg	*

* Daily Value not established

Ingredients: vitamin A acetate, beta carotene, vitamin D, dl-alpha tocopherol acetate, ascorbic acid, thiamin mononitrate, riboflavin, niacinamide, pyridoxine hydrochloride, vitamin B12, biotin, d-calcium pantothenate, potassium chloride, dicalcium phosphate, potassium iodine, ferrous fumarate, magnesium oxide, copper sulfate, zinc oxide, manganese sulfate, sodium selenate, chromium chloride, sodium molybdate, microcrystalline cellulose, calcium carbonate, sodium carboxymethyl cellulose

Storage: Keep tightly closed in dry place; do not expose to excessive heat

KEEP OUT OF REACH OF CHILDREN

Expiration date: JUN 2013

Company V, Cityville, New York 01010

Figure 4.1.3 – “How do you Read a Supplement Label?” Printable version of interactive tool, (CRN, 2008)

4.1.4 How do you read a multivitamin label.

COVER STORY

HOW TO READ A MULTIVITAMIN LABEL

The numbers on the label of this made-up multivitamin represent the latest recommendations from Canadian and U.S. scientists at the Institute of Medicine (IOM), which is part of the U.S. National Academy of Sciences. The numbers, which are for foods and supplements combined, vary slightly by age and gender. In most cases, we picked the highest level for adults, excluding pregnant and breastfeeding women. The levels in many multivitamins are based on outdated advice, so they may not match the IOM's recommendations.

VITAMIN A (retinol). Some multivitamin have 5,000 IU (International Units) or more of vitamin A, but you need only 3,000 IU a day. Too much retinol (listed on labels as vitamin A palmitate or vitamin A acetate) may increase the risk of hip fractures, liver abnormalities, and birth defects. Beta carotene, which the body converts to vitamin A, doesn't cause those problems. But very high doses (33,000 to 50,000 IU a day) may increase the risk of lung cancer in smokers. Our advice: Don't get more than 4,000 IU of retinol or 6,000 IU of beta carotene from your multi; less retinol would be even better. Instead, load up on beta-carotene-rich vegetables and fruits like carrots, cantaloupe, sweet potatoes, and broccoli, which may help prevent some cancers.

VITAMIN D. It helps you absorb calcium and may reduce the risk of cancer, diabetes, and falls. Many people get too little vitamin D from sunlight (especially in the winter) or from their food. The Institute of Medicine recommends 200 IU a day for adults 50 and under, 400 IU for people 51 to 70, and 600 IU for anyone over 70. Some vitamin D experts say that everyone should get at least 1,000 IU a day. (We agree.) Those amounts include what you get from the sun, from salmon and other fatty fish, and from fortified foods like milk, margarine, and some brands of yogurt. They also include the vitamin D that's added to many calcium supplements. Most multivitamins have 400 IU of vitamin D.

THIAMIN (B-1), RIBOFLAVIN (B-2), NIACIN (B-3), B-6. The higher-than-recommended levels in many multivitamins are harmless. Two exceptions: More than 100 mg a day of vitamin B-6 can cause irreversible neurological damage. And as little as 50 mg a day of niacin can cause flushing. Super-high doses of niacin (3,000 mg a day or more) may cause liver damage, though you won't find that much in a multi.

VITAMIN B-12. Most multivitamins have at least 6 mcg. That's more than the 2.4 mcg the Institute of Medicine recommends for adults, but it's perfectly safe. (So are the higher doses—around 1,000 mcg—that are found in some multivitamins.) Ten to 30 per cent of older people are unable to absorb the B-12 that's found naturally in food. So if you're over 50, get at least some of your B-12 in the form that's added to supplements and fortified foods. A B-12 deficiency can cause irreversible nerve damage and may masquerade as Alzheimer's disease.

IRON. Many people, especially premenopausal women, are deficient. But taking too much can cause constipation or iron overload if you're susceptible. Men and post-menopausal women should look for a multivitamin with no more than 10 mg of iron or should take a multi for premenopausal women every other day. A multi with 14 to 18 mg is fine for premenopausal women.

MAGNESIUM. Canadians get too little from their food (among the best sources: whole grains and beans). A deficiency may increase the risk of diabetes and colon cancer. Look for a multi with at least 50 mg (and preferably 100 mg). The Institute of Medicine recommends 320 mg a day for women and 420 mg for men. More than 350 mg a day from a supplement may cause diarrhea.

SELENIUM. Many multivitamins have considerably less than the Institute of Medicine's recommended level (55 mcg). A large study is under way to see if high doses (200 mcg a day) can lower the risk of skin cancer and diabetes, so it's safest to take no more than about 100 mcg a day.

IODINE, MANGANESE, MOLYBDENUM, CHLORIDE, BORON. Ignore. There's no evidence that people need more than what they get from their food.

Institute of Medicine (IOM) Recommendations	
Vitamin A	3,000 IU
Vitamin C	90 mg
Vitamin D	400 IU
Vitamin E	33 IU
Vitamin K	120 mcg
Thiamin (Vitamin B-1)	1.2 mg
Riboflavin (Vitamin B-2)	1.3 mg
Niacin (Vitamin B-3)	16 mg
Vitamin B-6	1.7 mg
Folic Acid	400 mcg (0.4 mg)
Vitamin B-12	2.4 mcg
Biotin	30 mcg
Pantothenic Acid	5 mg
Calcium	1,200 mg
Iron	18 mg
Phosphorus	700 mg
Magnesium	420 mg
Zinc	11 mg
Copper	0.9 mg
Selenium	55 mcg
Chromium	35 mcg
Iodine	150 mcg
Manganese	2.3 mg
Molybdenum	45 mcg
Chloride	2,300 mg
Potassium	4,700 mg
Boron	
Nickel	
Silicon	
Tin	
Vanadium	

VITAMIN C. Most multivitamins contain at least 60 mg. The Institute of Medicine recommends 75 mg a day for women and 90 mg a day for men. Roughly 250 to 500 mg saturates the body's tissues, so more than that is probably excreted. Taking more than 1,000 mg of vitamin C at one time in a supplement may cause diarrhea.

VITAMIN E. Doses of 30 to 800 IU a day haven't protected against heart disease or stroke, and 400 IU a day or more may slightly raise the risk of dying. Studies are under way to see if 400 IU a day prevents prostate cancer. To play it safe, stick to no more than 100 IU.

VITAMIN K. The Institute of Medicine recommends 120 mcg a day, yet most multivitamins have little or none. In recent studies, taking extra vitamin K didn't strengthen bones, as earlier studies had suggested. You can get vitamin K from leafy greens, some calcium supplements, and vitamin K supplements. Vitamin K can interfere with blood-thinning drugs like Coumadin, so people who take those drugs should check with their doctor before taking a multivitamin that contains vitamin K.

FOLIC ACID. If you could become pregnant, look for a multivitamin with 400 mcg (0.4 mg) to reduce the risk of birth defects. Others should probably take less until studies clarify whether high intakes (roughly 1,000 mcg, or 1 mg, a day or more from supplements and foods combined) raise the risk of cancer. One option is to take a multivitamin with 400 mcg of folic acid every other day (see p. 5).

BIOTIN, PANTOTHENIC ACID. Ignore. You'd have to eat a bizarre diet to run short.

CALCIUM. Calcium may help prevent colon cancer and (with vitamin D) may reduce the risk of osteoporosis. Shoot for 1,000 mg of calcium a day (if you're 50 or younger) or 1,200 mg (if you're over 50). But men should get no more than around 200 mg from their multi, since 1,500 mg a day or more may raise prostate cancer risk.

PHOSPHORUS. Unnecessary to take in a multi. Too much may impair calcium absorption, and we already get more than we need from our food.

ZINC, COPPER. Look for 8 mg (women) or 11 mg (men) of zinc and 0.9 mg of copper. There's no harm in taking a multi that has somewhat more (15 mg of zinc and 2 mg of copper are typical), but don't take more than 23 mg of zinc. Getting more than 40 mg a day from pills and foods like meat, poultry, beans, nuts, dairy foods, and some fortified cereals may make your body lose copper. And in one study, men who took more than 100 mg of zinc a day for at least 10 years were more than twice as likely to be diagnosed with advanced prostate cancer as men who took none.

CHROMIUM. The Institute of Medicine recommends only 20 to 25 mcg a day (women) or 30 to 35 mcg a day (men). Many brands with chromium have closer to 100 mcg, which is safe.

POTASSIUM. Ignore. The amounts in multivitamins are low. And while the potassium chloride that's used in supplements may lower blood pressure and the risk of stroke, it won't help prevent kidney stones and bone loss like the potassium citrate that's found in fruits and vegetables.

NICKEL, SILICON, TIN, VANADIUM. Ignore. It's not clear that they're needed.

>>>>>

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Figure 4.1.4 – “How to Read a Multivitamin Label”, (CSPI, 2008)

4.1.5 Comparison of selected resources.

The found resources shown in the previous section are compared in Table 4.1.5. Details regarding the perceived strengths and weaknesses, as well as a few additional comments about each of the resources are highlighted. These four found resources were all shown to the focus group and key informant participants in the order listed in the comparison table.

Table 4.1.5 – Comparison of Supplement Selection Resources

Source	Strengths	Weaknesses	Additional Comments
<p>Health Canada</p> <p><i>Eating Well with Canada's Food Guide</i></p> <p>(Health-Canada, 2007)</p>	<ul style="list-style-type: none"> • Provides recommendations for specific population groups • Provides specific details for vitamin D (i.e. 400 IU a day) 	<ul style="list-style-type: none"> • Vague statements such as “a health care professional can help you find a multivitamin that’s right for you” • Does not address other vitamins or minerals that may be lacking for certain population groups • Recommendation for vitamin D may be below optimal recommendation 	<ul style="list-style-type: none"> • While this resource does provide specific recommendations for various population groups it omits additional nutrients of concern
<p>DC</p> <p><i>Do I Need a Vitamin or Mineral Supplement?</i></p> <p>(DC, 2008)</p>	<ul style="list-style-type: none"> • Addresses various population groups needs 	<ul style="list-style-type: none"> • Recommendations are not specific enough to allow consumers to make supplement selections independently • Lots of text, may be overwhelming 	<ul style="list-style-type: none"> • This tool provides population specific recommendation but lacks sufficient detail
<p>CRN</p> <p><i>How do you Read a Supplement Label</i></p> <p>(CRN, 2008)</p>	<ul style="list-style-type: none"> • Interactive tool • Not overwhelming, allows consumers to investigate areas they are interested in • Visually appealing 	<ul style="list-style-type: none"> • Focus only on supplement label information not vitamin or mineral information • No advice for selecting a multivitamin • “Clickable” areas are not highlighted, difficult to know where to click 	<ul style="list-style-type: none"> • While this tool has helpful information for consumers to understand supplement labels it lacks additional information to assist consumers to make an informed decision to select a multivitamin
<p>CSPI</p> <p><i>How to Read a Multivitamin Label</i></p> <p>(CSPI, 2008)</p>	<ul style="list-style-type: none"> • Provides a nice visualization of a food label • Talks about all nutrients, providing some background • Emphasizes nutrients of concern 	<ul style="list-style-type: none"> • Inaccessible to many consumers • High level of literacy required for comprehension • Unclear breakdown of nutrient requirements for different population groups 	<ul style="list-style-type: none"> • While this tool is laid out clearly it may not be accessible to many consumers or provide important information for all.

CSPI – Center for Science in the Public Interest, CRN – Council for Responsible Nutrition, DC – Dietitians of Canada

4.2 Qualitative Results

The seven key informants who participated in interviews included three community members, two community dietitians, and two community pharmacists. Interviews ranged in length from approximately 25 to 55 minutes. In addition, a total of three focus groups were conducted for this research project. The initial two focus groups in phase one had seven and eleven participants each. The third focus group conducted in phase two included six participants.

4.3 Demographic Information of Participants

The results from the age, sex, education, and income source questions are summarized in Table 4.3. The table shows a comparison between the key informant and focus group participants but these results were not analyzed for statistical significant due to the small number of participants and the nature of qualitative research. There was a total of 31 participants, the majority of whom were female (n=30).

Table 4.3 – Summary of Demographic Information Results

Question	Value	TOTAL	Key Informants	Focus Groups
Age <i>“How old are you?”</i>	18-30	8	1	7
	31-50	20	6	14
	51-70	3	0	3
	71+	0	0	0
	No Response	0	0	0
Sex	Female	30	7	23
	Male	1	0	1
	No Response	0	0	0
Education <i>“What is the highest level of education that you have completed?”</i>	Less than grade 12	7	0	7
	High school diploma	7	0	7
	Some post-secondary	4	1	3
	Post-secondary degree/diploma	11	6	5
	Graduate degree	0	0	0
	No Response	2	0	2
Primary Income Source <i>“What is your primary source of household income?”</i>	Social assistance program	11	0	11
	Employment insurance	1	0	1
	Self employed	1	0	1
	Employed/Waged	9	6	3
	Family members	5	1	4
	Student loans	0	0	0
	Pension	1	0	1
	Other	7	0	7
	No Response	0	0	0

Participants represented a wide variety of ages; the majority were between 18 and 50 years of age with a few between 51 and 70 years of age. Additionally, there was a wide range of responses to the question about primary income sources. Of note is that while the question stated to select one's "primary" income source a few individuals reported more than one source. The demographic information form also asked participants about their household composition. Overall, the majority of the participants resided in homes comprised of multiple individuals.

4.4 Themes

Transcripts from the seven key informants and two phase one focus groups were analyzed for emergent themes. Transcripts were coded, identifying interesting, important and emphasized points. These codes were then combined into themes, and the themes were grouped into three major topics. Data from the focus groups and key informant interviews were analyzed concurrently allowing for understanding of the data as a whole. During the coding process identifiers were attached to each individual code. This provided the opportunity to group the data obtained from these enquiries and use it for comparison between the focus groups and key informant interviews responses. Responses from the phase two focus group were analyzed separately and used for resource refinement and improvement and were not combined with data from the other sources.

Over 440 individual codes were identified from the two focus groups and seven key informant interviews included in this analysis. These were broken down into three major topics; Barriers to Use, Interdisciplinary Issues, and Resource. Within each topic there were several themes and sub-themes. Figure 4.4 provides a schematic of the major topics and themes.

Several themes were identified that pertained to barriers to use or potential barriers to use. Participants in the key informant interviews identified and discussed barriers to use far more frequently. Most commonly participants expressed concern over the cost of supplements, beliefs and practices about taking supplements, and a lack of information as barriers to supplement use.

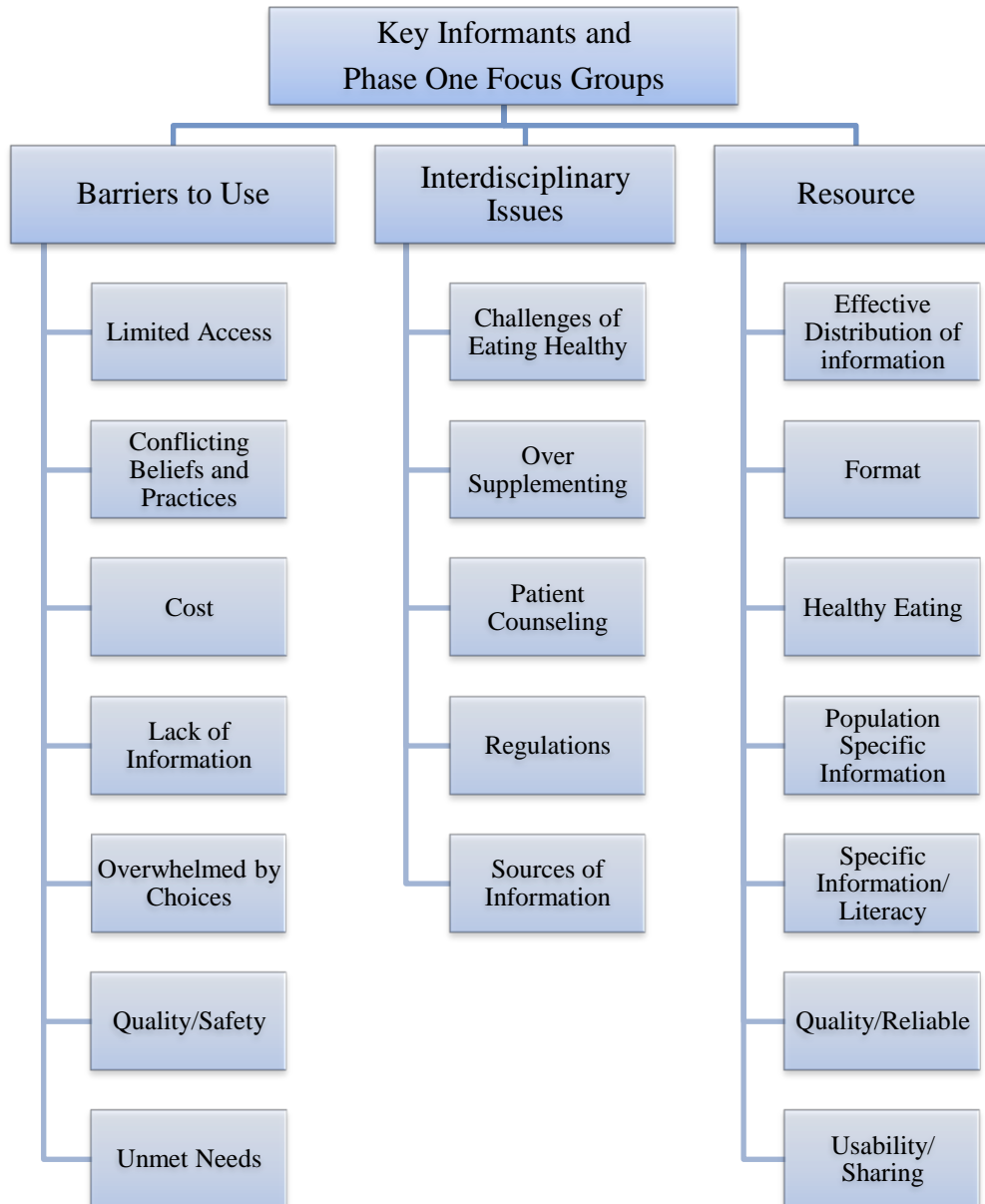


Figure 4.4 – Topics and Themes – Key Informant Interviews and Phase One Focus Groups

The barriers to use topic includes both barriers to use, discussion about what stops individuals from taking a supplement, and potential strategies or current interventions which help to eliminate and/or reduce barriers to use. Table 4.4a shows a comparison of the barriers to use themes as well as subthemes. This table compares the responses obtained from key informants who were health care professionals with key informants who were community members as well as with focus groups.

Table 4.4a – Comparison of Barriers to Use Themes

Theme	Key Informants Health Care Professionals	Key Informants Community Members	Focus Groups
Limited Access	x		
Conflicting Beliefs and Practices	x	x	x
Difficulty taking	x	x	x
Motivation	x		
Not needed	x	x	
Not Remembering	x		x
Cost	x	x	x
Lack of Information	x	x	x
Lack of Information/Knowledge	x	x	x
Lack of Promotion	x	x	
Literacy	x		
Myths/misinformation	x		x
Overwhelmed by choice	x		x
Quality/Safety	x		
Unmet Needs	x	x	

Several other themes were identified during the analysis of the transcripts. Themes which were interesting but did not specifically pertain to barriers to use or the creation of a new resource were classified into the interdisciplinary issues category. These themes varied considerably. Of particular interest is the sources of information theme which includes search terms, this addresses how participants would like to search for information on supplements and multivitamins. Table 4.4b details the wide variety of themes identified as part of the interdisciplinary issues topic.

Table 4.4b – Comparison of Interdisciplinary Issues Themes

Theme	Key Informants Health Care Professionals	Key Informants Community Members	Focus Groups
Challenges of Eating Healthy	x		x
Over Supplementing	x		
Patient Counselling	x		
Regulations	x		
Sources of Information	x	x	x

Health professional key informants discussed patient counselling, regulations for supplements and concerns about over supplementing in addition to describing search strategies

and sources of information. Sources of nutrition information was a theme discussed by key informants who were health care professionals, key informants who were community members, and focus groups.

Themes identified as being pertinent to resource development, content, and distribution of the information were all included in the resource topic. There was much agreement between the key informants and focus groups for themes in this topic, Table 4.4c highlights a comparison of the resource related themes. The transcripts from the key informant health care professionals, the key informant community members, and the focus groups all included; effective distribution of information, format, healthy eating, population specific information, specific information/literacy, and quality/reliable as themes.

Table 4.4c – Comparison of Resource Related Themes

Theme	Key Informants Health Care Professionals	Key Informants Community Members	Focus Groups
Effective Distribution of Information	x	x	x
Format	x	x	x
Healthy Eating	x	x	x
Population Specific Information	x	x	x
Specific Information/Literacy	x	x	x
Quality/Reliable	x	x	x
Usability/Sharing	x	x	

4.5 Barriers to Use Themes

Numerous themes pertaining to barriers to supplement use were identified. Barriers to use were successfully separated into seven main themes which cover a wide range of ideas.

4.5.1 Limited Access

Access to supplements may be a barrier to supplement use for many individuals. Health care professionals specifically acknowledged and expressed a concern over access to supplements as a barrier to supplement use.

...access probably in some of the areas in Saskatoon I would say. We know about food security, many major urban areas do have food deserts and they do have access to some drugstores or pharmacies etc. but I don't know what their access would be in certain

urban centres. I'm sure access would be an issue, I don't know if costs are higher in certain areas of the city...(KI – Health Care Professional RD)

During the key informant interviews some of the health care professionals discussed currently available programs that help to ease some of the barriers to use. Access to the point of purchase, as well as to health care professionals can be a barrier to use and for individuals to understand what they need.

...programs like working at Kids First we have home visitors that will drive you to your doctor to get a prescription renewed, that's really helpful. That's breaking down a lot of the barriers is that Kids First will drive families to the doctor, they will drive you to the pharmacy to pick up your prescription, they might help you read through things better to understand how you're going to take it. (KI – Health Care Professional RD)

Health care professionals themselves discussed a lack of understanding about coverage and funding to cover the costs of supplements. They expressed that if they were able to gain a better understanding of the programs and coverage that is available and who qualifies for the various programs they would be able to improve access to these products for individuals.

...government support on the labeling and promotion, you just need appropriate funding to promote what you are doing here. (KI – Health Care Professional Pharm)

Understanding all of the different programs out there to help people, like; employment supplement, if they're on social assistance the different coverage they're going to have, the non-insured health benefits for First Nations people, understanding all those different things would really help health professionals better. (KI – Health Care Professional RD)

4.5.2 Conflicting beliefs and practices.

Focus group and key informant participants indicated that several different beliefs, ideas, habits and practices impact their decision or ability to take or not to take a multivitamin. Table 4.5.2 shows the various sub-themes as well as some example quotations portraying these concepts. Participants from both the focus groups as well as the key informants expressed concerns about practices surrounding taking supplements, either difficulty physically taking the supplements or difficulty to remember or to prioritize taking a supplement. Only the key informants noted that individuals may not feel supplements are needed, while no focus group participants expressed this concern in the same way. Participants from focus groups, along with the key informants, did mention that they did not know the roles or importance of certain nutrients. They also indicated that they wanted more information about and promotion of

supplements. However, in light of these expressed deficits in knowledge they did not specifically indicate that they did not feel supplements were needed.

Table 4.5.2 – Table of Beliefs and Practices Subthemes and Examples

Theme	Subtheme	Example
Beliefs and Practices	Difficulty taking	<p>Poor acceptance: <i>...if you have an infant taking vitamin D, and it's a fight every single time you're trying to give them the vitamin D supplement you're just going to sometimes pick your battles and today you're going to pick the battle of changing their diaper, not force-feeding them vitamin D. (KI – Health Care Professional RD)</i></p> <p>Feeling sick: <i>I try, I have a weak stomach, sometimes in the morning I couldn't and when I was going to work I couldn't eat until my first break and then I tried to take my multi on my way out the door, that's when I remember to take my multi (Focus Group Participant)</i></p> <p>Difficulty swallowing pills: <i>The size of them, because some of them are, like even the pre-natal vitamins are huge...(Focus Group Participant)</i></p>
	Motivation	<p>Motivation: <i>I have a lot of clients as well, who they have a lot going on in their life and income is an issue...chances are, getting food on tables is going to be their priority not necessarily getting a supplement, if they have extra cash at the end of the month is not going to worry about supplementation. So motivation for taking supplements too I think is an issue. (KI – Health Care Professional RD)</i></p>
	Not needed	<p>No Noticeable Immediate Effects: <i>...you take your multivitamin you don't feel any different.... You take your pain med, your pain goes away so you've got that action has a result, multivitamins you don't see that, other than you might pee funny colours, so folks who have it don't experience the benefit, because it's more of a long term benefit. So, perhaps folks who haven't made that purchase who are looking to buy one, you know, they know their friend is on a multivitamin, well nothing changed when Bob started taking it, so is it that important? (KI – Health Care Professional Pharm)</i></p> <p>Not Historically Used: <i>Why should we take vitamins now when 40 years ago we didn't need to take it, or 50 years, especially with the Aboriginal elders, they ask me the same thing about carrots: "Why should I eat carrots when it was never part of our diet?" (KI – Community Member)</i></p> <p>Healthy Eating is Enough: <i>...a lot of people do feel that eating healthy is good enough and that you don't need to supplement... (KI – Health Care Professional Pharm)</i></p>

4.5.3 Cost.

Participants from the focus groups, health care professionals, and community member key informants all expressed concern about cost as a major barrier to supplement use. Many community member participants indicated that they were on a limited budget and supplements are not always something that they can fit in to that budget or that they even consider.

Sometimes, it's the price. I know my dad he only gets a certain amount for his pension, and by the time he's covered his rent and everything, he's got no money left over for food and vitamins.(Focus Group Participant)

...every average person ha[s]to pay for the vitamins on their own. And when you live on a tight budget, vitamins, it's not even in the realm of your thoughts. (KI – Community Member)

Many community member participants from the focus groups expressed concern over not having adequate funding to even consider purchasing a multivitamin. Community member and health care professional key informants noted that clients and individuals they work with may be unable to afford to buy supplements. On the other hand other individuals placed more emphasis on the financial strain placed on the budget by purchasing brand name or health store products. This indicates the need to provide information to consumers about the importance, or non-importance of brand names.

Cost again, some of those guys are really pricey, especially when you get into kind of your brand name guys, you know, Jamieson or Natural Factors, or heaven forbid you go to a health food store, their prices seem to be much higher, so that could be a bit of a barrier. (KI – Health Care Professional Pharm)

I've found I've spent a lot of money on something where I could get a good multivitamin for a lot less; a good quality multivitamin... (KI – Community Member)

Participants also expressed a desire to have coverage for multivitamins and supplements, similar to what is currently available for prescription medications. The argument was made that the government needs to recognize the need for supplementation and provide some form of assistance to cover the costs of supplements. Individuals also discussed attempting to get supplements prescribed by their physicians. Participants stated that when they attempted to get coverage for their supplements many of them were not covered by their funding agencies.

For the federal government to really realize that our population is getting sicker, and to actually do something about the mineral and vitamin supplement for the Canadian people where it's important and paid for as part of our health plan. (KI – Community Member)

Or your doctor can prescribe them for you...that's what I tried but some of them are not covered by Indian Affairs, we're treaty and a lot of our medication is covered but not the vitamins, that should be covered, I don't know who you talk to about.... if they want to help their people...they should cover those. (Focus Group Participant)

4.5.4 Lack of information.

A lack of information, a lack of knowledge, a lack of promotion, myths and misinformation, as well as literacy skills, were all described as barriers to supplement use. While these deficits are variable they all focus on a lack of information as the primary barrier, and as such these subthemes were amalgamated together as one theme. Participants expressed a concern about a lack of information available to them to help them understand vitamins and minerals.

Participants discussed in detail their need for more information. One individual mentioned that she did not know if she needed a supplement but suspected she did. Both health care professionals and community members stated that it is crucial for supplement users to understand what they take and why it is important. They also felt improving understanding would improve individuals' willingness to take supplements.

In accordance with a lack of information, participants also expressed a concern about a lack of promotion for supplement use. A participant indicated that health care professionals do not always get to advocating for supplement use when there are other issues at hand. Other concerns with respect to a lack of literacy skills and myths and misinformation were also discussed. A health care professional stated that for some clients, for whom English is not their first language, have difficulty expressing their basic needs and supplements are not even a consideration. While a lack of information makes selecting a supplement difficult, misinformation is likely to make this process even more challenging, as was expressed with myths and misinformation being a hindrance to providing appropriate information. Table 4.5.4 lists subthemes and examples that make up the lack of information as a barrier to supplement use theme.

Table 4.5.4 – Table of Lack of Information Subthemes and Examples

Theme	Subtheme	Example
Lack of Information	Lack of Information/ Knowledge	<p>Lack of information made easily available: <i>Unless you have some kind of form of education or knowledge, people are not looking for it, unless there's a poster or else, or walking down the hallway and waiting for somebody, they'll stop and read the poster or something, otherwise they keep on walking. People are too busy to think about it. (KI – Community Member)</i></p> <p>...where would I look [for supplement information]? I wouldn't have a clue, because I don't think the information is out there. (KI – Community Member)</p> <p>Lack of knowledge, unsure if supplements are needed: <i>I try to eat healthy, but I still, I don't know if it's my age, like I don't have energy in the mornings, I think I need vitamins (Focus Group Participant)</i></p> <p>Lack of knowledge, understanding why supplements are necessary important: <i>I think that's another thing sometimes people just take things they don't even know why they are taking them. I think people also need to know why they are taking them. (KI – Health Care Professional RD)</i></p> <p>cause if you don't know why you're taking it and you're not into vitamins normally you're not going to be willing to take it (Focus Group Participant)</p>
	Lack of Promotion	<p>Lack of Promotion: <i>No promotion of taking it, you know, you go to your doctor, your doctor is so focused on that you're diabetic and got to get your blood sugars under control, blah, blah, blah, you know, forgets to say oh by the way, the basis of good health is proper nutrition. I think there is a lack of promotion by health care professionals, because it's kind of like the very last thing on the list, again, because it doesn't have that immediate health benefit perhaps. (KI – Health Care Professional Pharm)</i></p>
	Literacy	<p>Literacy issues: <i>We get a lot of immigrants that can't even express what they need clearly in English, so to go into [multivitamin] stuff would be a big problem. (KI – Health Care Professional Pharm)</i></p>
	Myths/ misinformation	<p>Myths and misinformation: <i>The biggest barrier is the myths, the media that's out there that leads them in the wrong direction so they will pick instead of a full multivitamin, they'll pick one vitamin over another ... (KI – Health Care Professional Pharm)</i></p>

4.5.5 Overwhelmed by choices.

Many participants identified being overwhelmed by the vast number of choices at the point of purchase as a barrier to supplement use. Both community members and health care professionals identified being overwhelmed, even intimidated, by choices as a barrier to use. The sheer volume of choices may be a barrier to selecting a product and completely deter an individual from even attempting to make a selection.

You go to the store and you're overwhelmed with walls and walls of choices all claiming to be the best (Focus Group Participant)

you look at these shelves, really its intimidating and it's the size of the room we're in right now and it'll go corner to corner and you're like "oh my" (Focus Group Participant)

Memory comes to mind, just that people forget all the time. Motivation, cost would definitely be, acceptance, and just being overwhelmed, I just don't know what to take so I'm not going to take anything. (KI – Health Care Professional RD)

4.5.6 Quality and safety.

Some participants did express a concern over quality and/or safety as a potential barrier to use. A health care professional indicated that as new research becomes available and discoveries are made that may connect a nutrient with potentially harmful outcomes, participants will stop taking their supplements.

...when they find out that there's something that's harmful and it's in their vitamin they'll drop the vitamin...(KI – Health Care Professional Pharm)

Additionally, many individuals expressed a need for information about quality and safety to be included on a new resource. However, only the health care professionals identified concerns about safety as a potential barrier to supplement use.

4.5.7 Unmet needs.

Unmet needs refer to a lack of products to meet individuals' real or felt requirements. A participant expressed that she had difficulty finding a supplement that was appropriate for her as recommended by her physician, and this meant she would not take a supplement. Additionally, a health care provider noted that multivitamin products have changed very little over the last several years and that the currently available products may not meet the needs of all consumers appropriately:

The last barrier is really they do not make multivitamins right for most people. They have not changed the vitamin formulation forever in industry and not recognizing that here in Saskatchewan maybe we need something different. (KI – Health Care Professional Pharm)

This barrier to supplement use is likely extremely difficult to address as the production and manufacturing of new products is controlled by large companies.

4.6 Interdisciplinary Issues Themes

Participants discussed a wide variety of interesting ideas, and these topics are presented as “other themes” as they did not fall under barriers to use or were not related to the resource. They mentioned issues related to discrepancies for low income individuals compared to middle and high income issues, such as eating habits. Other issues involved concern about over-supplementing and a desire for increased regulations for manufacturers. Health care professionals described some components of their patient counselling practices. Lastly, participants shared current sources of information about nutrition and supplements and how they would like to search for information.

Many participants expressed concern about the financial struggles they face when trying to eat healthy, especially related to *Canada’s Food Guide to Healthy Eating*. Concerns were raised about how challenging it is to afford healthy foods and to eat according to the Food Guide.

...if you follow the Canada Food Guide, you should, but realistically, I’m low-income and I work with people who are low-income, and they can’t afford to follow Canada’s Food Guide all the time. They don’t get enough of their vegetables and their fruits, or you know, or their whole grain products that they need. (KI – Community Member)

Furthermore, there was concern about struggling to eat according to *Canada’s Food Guide* for all types of individuals regardless of income level, and how difficult it may be to consume the recommended number of servings from each food group every day. This was described as being challenging to fit this in to one’s lifestyle.

The servings, the portions, I think are difficult to fit into a real lifestyle for most people and they’ll say that, so it’s almost not achievable in many cases, in most cases...(KI – Health Care Professional Pharm)

One of the health care professionals also expressed concern about over-supplementing. This concern was related to how much money consumers may be wasting on these products if

they did not really need them, as well as the potentially harmful effects that multiple products may have.

I do find that people who supplement tend to over-supplement. So they not only buy a multivitamin they'll buy everything else on top of it depending on the fad of the day...My concern is when I add them up for them it tends to be a lot and sometimes harmful and a waste of money actually. I think that's the bigger thing. (KI – Health Care Professional Pharm)

Health care professionals discussed the importance of interprofessional collaboration to assist consumers with selection of the most appropriate multivitamin. They emphasized the role and expertise that different health care providers can share to most effectively assist patients. Dietitians are able to perform a diet assessment to identify nutrients that are lacking while pharmacists may have increased knowledge about certain nutrients.

I think dietitians, and pharmacists should work together, I think dietitians know how to do the assessment to be able to decide where a diet may or may not be lacking, and you would think that a pharmacist would know more about the bioavailability. (KI – Health Care Professional RD)

A pharmacist also shared about their typical approach to helping a consumer select a multivitamin. Pharmacists often start the selection process with a well recognized brand name that provides a wide range of vitamins and minerals. They then assess what additional needs the consumer may have and how to look for a product or additional products as needed to meet the consumers' requirements.

...we always go to the common Centrum®, which is the minimal, we say minimal and then we go from there with our customers. So, if they have a specific need then we add one if we need to and pick vitamins that are more geared towards them and Centrum® tries to do that within its own line. (KI – Health Care Professional Pharm)

Sources of information that consumers used regarding nutrition and supplements were discussed in all phase one focus groups and during all of the seven key informant interviews. Participants reported a wide variety of sources that they search for information about supplements. Some sources included using the internet, television and media, or hearing information from friends and family. Health care professionals mentioned some of the professional resources that they use to find information. There was concern about possibly not being up to date with the most current research. Sometimes they may hear a bit of information from a media source initially which they then might proceed to examine further using their own known and trusted information sources.

As the intent of the created resource is to be available online, particular attention was paid to what consumers had to say about the internet as a source of information about supplements. Individuals from both the focus groups and key informant interviews indicated that they use the internet as a source for health information currently; however other health care professionals mentioned that the internet may be difficult for some individuals to access.

I think it's a challenge for some people to go online, so that would be an issue for sure. (KI – Health Care Professional Pharm)

There was also concern expressed about the reliability and credibility of some of the information on the internet and that they were unsure how to assess if the information was valuable. The initial search of supplement selection information yielded vast quantities of information that was often not helpful, biased, inaccurate, or not useful. Table 4.6a lists quotations that represent participants' statements about sources of information.

Table 4.6a – Sources of Nutrition and Supplement Information

<p>Resources for Consumers:</p> <p><i>I think the first source for any consumer is the label up front. (KI – Health Care Professional Pharm)</i></p> <p><i>The second source they go to is usually media; they get that information first and then that's when they decide to supplement. (KI – Health Care Professional Pharm)</i></p> <p><i>...the internet, I mean I read tons and tons on the internet, for me that's the greatest resource...(Focus Group Participant)</i></p>
<p>Resources for Health Care Professionals</p> <p><i>I look at PEN or DC, I'll do a medline or pubmed search. (KI – Health Care Professional RD)</i></p> <p><i>I always look in our pharmaceutical references, which is the OTC product one that's given out by CPHA, the pharmaceutical association. (KI – Health Care Professional Pharm)</i></p> <p><i>I think we're a bit behind sometimes with the research as well because we're not updated that well; sometimes we do hear it from Oprah first, then we have to go and do our research online. (KI – Health Care Professional Pharm)</i></p> <p><i>I try to access stuff on the internet; I think that would be good. But how to find accurate information that's correct is very difficult, I don't know how you would do that, I don't understand that. (KI – Community Member)</i></p>

All types of participants frequently mentioned the role health care professionals play in providing information about supplements. While pharmacists were often viewed as a good source of information about vitamins, minerals, and supplements; doctors were not viewed in this same way. Focus group participants expressed distrust of doctors' knowledge of nutrition. Dietitians were seen as a source of nutrition education but some focus group participants expressed that they would not know how to connect with a dietitian. Furthermore, health care professionals discussed that they felt they needed to know more about supplements. Some of the relevant quotations pertaining to participants views about health care professionals as sources of nutrition and supplement information are listed in Table 4.6b.

Table 4.6b – Health Care Professionals as Sources of Supplement Information

<p>Health Care Professionals as a Source of Information:</p> <p><i>If the doctors were more knowledgeable about [supplements], then people would feel comfortable going to their doctor and asking them...I know a lot of people who will go to their pharmacist before they go to the doctors. I also know a lot of people who will go to an herb shop or something like that, before they ever go near a doctor. But then there's others, who, if it's not approved by the doctor, they're not gonna take it. (KI – Community Member)</i></p> <p><i>I would just ask the pharmacist if I was stuck. If there was nobody to ask, I'd just put it off for another day, until I could find more information on it. (Focus Group Participant)</i></p> <p><i>In there it says to go to your doctor or dietitian to find out more information. Usually, the doctor is the last person I'd go to, to find out about nutrition, because they don't study it, they don't have the knowledge or the background (Focus Group Participant)</i></p> <p><i>Where would you find a dietitian? (Focus Group Participant)</i></p> <p><i>...in terms of knowledge maybe if health professionals were better informed, and again I think about pharmacists and dietitians if we were better informed and we had better tools to facilitate or to help people choose supplements, I mean that's a start. (KI – Health Care Professional RD)</i></p>
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4.7 Resource Themes

During the focus groups and key informant interviews participants were asked to review the four resources which were identified as being potentially useful in helping consumers select a multivitamin. Participants reviewed the resource, indicating what features they liked, what they disliked, and how the resource could be improved among other questions. Points which were

brought up repeatedly were viewed with increasing value. Common statements about the reviewed resources were grouped together and where feasible and applicable efforts were made to address these concerns with the creation of a new resource. The following themes were identified and attempts were made to incorporate these ideas.

4.7.1 Effective distribution of information.

During the review and evaluation of the found resources presented to the participants several comments about how and where they would like to access the information were made. Key informants were specifically questioned about how they thought the resource should be made available to the public and where would they like to access the resource. Participants wanted the resource available online, accessible by computer, but they also recognized that not everyone has access to computers or chooses to actively seek out information about choosing a supplement.

[distribution] definitely by computer because almost everything is accessible by computers nowadays. (KI – Community Member)

The only problem is this format if it's only on the computer it's going to make it difficult for people to access. (KI – Community Member)

Health care professionals not only thought this information was important for the general population and clients they serve, they also thought that this area was very important and that distribution of information about supplements and multivitamins would be valuable to share with their peer group. One of the dietitians had several ideas about using online learning to disseminate this knowledge to other dietitians. Similarly, pharmacists also felt that information was worthwhile sharing with health care professionals, possibly through the use of a small print version.

I mean, us being health professionals, webinars, podcasts, online learning, Dietitians of Canada, I mean, those are all things that I think are quick and easy for people to do I think. I know that DC has that supplement course, I mean; this could be part of the DC supplement course. Get some continuing education credits for physicians and pharmacists. (KI – Health Care Professional RD)

...needs to be I guess in three ways; online – how could it not be online, but that's not going to serve all the population, your more senior folks may not be computer savvy. I would love to see something more similar to that right next to the multivitamins, it's not a branded product so it's not like its Wyeth putting it out which may favour one product

over another, it's not a Shopper's chain thing, we're not promoting Life brand over any other thing, and it's a totally unbiased document. Could be there, the number of people that are going to use it are going to be 25%, but it's nice to have it out there for those who will. And I think the third thing that needs to go out to your health care professionals, a nice easy smaller pocket sized version of that or regular page, 8.5 x 10, nice to have just a quick easy reference, but it'd have to have reliable information which that one seems to contain and be updated as the world changes I suppose. (KI – Health Care Professional Pharm)

Participants expressed a desire to have the created resource be accessible in a variety of ways. The internet, the use of media, and at the point of sale were all highly regarded as means of distributing information. Participants mentioned the use of television advertisements and even advertising at local sporting events such as at Blades games, which is the local junior hockey team that is part of the western hockey league.

Whenever you want impact, it's again, the TV ads, utilize what people are doing now, could say even at the hockey game, at the Blades game, having a, during a, whatever is going to a happen, a commercial or, "Did you know! Canadians do not get enough vitamin D! Why? It's winter time." (KI – Community Member)

The idea that information needs to be available right at the point of purchase was stressed by one of the key informants. They made the comment that you do not memorize this information and that the point of purchase, when one is trying to decide which product is appropriate is where the question arises. Furthermore, the idea of having a service to assist consumers with the selection of a multivitamin was brought up. This idea was equated to having a blood pressure monitor which is often available in local pharmacies. While, the idea of implementing a service like this sounds helpful it is most definitely out of the scope of this project, however, perhaps an effective resource may help to fill this void.

...any facts or any information really needs to be at the point of sale because that's when the question arises, you don't memorize what is vitamin K for and you don't memorize what the daily requirements are. (KI – Health Care Professional Pharm)

Needs to be available online, free access to everybody, I mean, pharmacists or all pharmacies should maybe have some kind of a tool or service for people to walk in where you actually purchase your supplements for people to be able to decide what to get. I mean they have blood pressure monitoring why wouldn't we have something like that to help where they get it. (KI – Health Care Professional RD)

4.7.2 Format.

Format was one topic that was discussed frequently by all participants. Participants shared their ideas and thoughts about the layout of the existing resources as well as the draft of the newly created tool. Everything from visual appeal to font size, from wording to colours was discussed. The comments obtained from this theme were used to directly impact the format of the newly created tool; however, some were not feasible, practical, or possible in the scope of this project or context of this resource.

The suggestion was made to have the resource online where consumers would be able to click on the information they were interested in and more information would come up allowing them to explore the topic in greater depth.

...if it wasn't a print document the only thing I would think is just cut out all the sort of subtext and have all the titles where someone could just click. You know, find "I am a woman of childbearing age" click, and then just that amount of information came up. (KI – Health Care Professional Pharm)

... I see it as something that is interactive is probably nice, that you could choose your target population, okay I'm a woman, I'm a man, and I'm this age, I have these diseases, I mean these show the nutrients you should think about, and then you could go deeper and deeper and deeper into it. (KI – Health Care Professional RD)

Several other comments were used directly to aid in the creation of the new resource.

Table 4.7.2 lists a variety of formant specific quotations shared by study participants and the impact that had on the creation of the resource.

Table 4.7.2 – Quotations about Format and their Impact on the Newly Created Resource

Subtheme	Quotation	Impact on Created Resource
Aesthetics/ Eye Appeal	<i>It's good information, and it's colourful and bright, so it makes your eyes want to read more or look into it (Focus Group Participant)</i>	<ul style="list-style-type: none"> • Use of bright colours, including; <ul style="list-style-type: none"> ○ Coloured headings ○ Coloured supplement bottle ○ Coloured banner across top of resource • Attempt to create eye appeal
	<i>It would be nice if there was a picture on this one too. People are sometimes visual to attract. (KI – Community Member)</i>	<ul style="list-style-type: none"> • Inclusion of images such as the supplement bottle on the sheets for separate DRI age/sex groups • Attempt to create eye appeal with inclusion of colours
	<i>...this is starting to look more like what an actual product label might</i>	<ul style="list-style-type: none"> • Inclusion of supplement bottle • Attempt to make resource familiar to

	<p><i>look like to consumers, so already it's better. It looks familiar, it looks like what I might have in my hand when I'm trying to choose. (KI – Health Care Professional Pharm)</i></p>	<p>general public</p> <ul style="list-style-type: none"> ○ Order of nutrients similar to that typically found on products ○ Inclusion of common and scientific names ○ Inclusion of different ways of writing out units
	<p><i>The only thing that may be difficult is actual font size, because sometimes it's not the young twenty year olds that are desperate for a multivitamin. Nine times out of ten its usually our older folks that vision impairment may be a problem (KI – Health Care Professional Pharm)</i></p>	<ul style="list-style-type: none"> ● Resource will be available online as well as for download and printing as a PDF <ul style="list-style-type: none"> ○ Font size options limited for print version ○ Online resource font will be larger ○ Potential for font size selection option for online tool
Clarification of Units	<p><i>...some of the wording is, to quote my father, "ten-dollar words". And so they may not understand like, I don't even know what that is. Is that a UG or an upside down H, or?...micrograms (KI – Community Member)</i></p>	<ul style="list-style-type: none"> ● Consideration of word selection, literacy <ul style="list-style-type: none"> ○ Due to the nature of vitamin and mineral names difficult to ensure resource is suitable for those with limited literacy skills ● Inclusion of information about units on general information page ● Inclusion of different ways of writing units that one may see on products
	<p><i>I like how they use the, not sure if it's the chemical name, versus you know B1 is thiamine, puts them both in there, because some things are listed differently depending on the product (KI – Health Care Professional Pharm)</i></p>	<ul style="list-style-type: none"> ● Inclusion of both common and scientific names <ul style="list-style-type: none"> ○ A variety of names were included where possible as some of these may be seen on supplement products
Usability	<p><i>When we say resource like this if its quick, easy, good information, yes, for sure. That one pager with what, why, when, how and what not to do, yes, definitely (KI – Health Care Professional Pharm)</i></p>	<ul style="list-style-type: none"> ● Concise, attempt to eliminate extraneous words and information ● Attempt to place all pertinent information on one sheet <ul style="list-style-type: none"> ○ Use of general information sheet as a basic resource ○ Inclusion of separate information sheets specific for each DRI age/sex group ○ Print version of all information sheets limited to one page
	<p><i>I like the fact that it does give a couple websites as well, so you can kind of look for other information, and a place to find dietitians, because most people don't have access (Focus Group Participant)</i></p>	<ul style="list-style-type: none"> ● Creation of a web based tool ● Potential to link other websites to the created resource ● Inclusion of websites for the online version of the resource

4.7.3 Healthy eating.

Healthy eating was frequently mentioned during both the phase one focus groups and the key informant interviews. Participants appreciated that healthy eating is important and should not be viewed as secondary to the use of a multivitamin. They acknowledged that individuals should eat healthy, consuming fruits, vegetables, and whole grains and that a multivitamin is supplemental to a healthy diet not as a replacement. A multivitamin is not going to solve problems but rather should be considered as part of a healthy lifestyle. Emphasis on the need to remind individuals of the importance of a healthy diet and the role that a multivitamin may play in achieving this was included in the created resource. Participants made several comments with respect to the importance of healthy eating and the use of supplements.

...it still focuses on eating nutritiously, and eating whole grains, and fruits and vegetables, and that you can't get the phytochemicals in supplements. Because I think sometimes we think oh yeah, we'll eat crap today at McDonalds or a bag of chips, I better take my multivitamins. Its still, okay, look, we have to eat healthy. (Focus Group Participant)

One thing people also have to be taught about multivitamins, is multivitamins are not a cure all, a proper diet and exercise, it all goes hand in hand. I mean if you're not going to eat right and take care of yourself a multivitamin isn't going to do anything. (Focus Group Participant)

It's nice to say don't take too much, don't think there's a magic pill that's going to keep you healthy and give you everything you need, and stresses that your dietary intake should really be your primary source of things, with sort of a multivitamin being what I call your "safety net", so whatever you can't get from your diet this is here for that. (KI – Health Care Professional Pharm)

4.7.4 Population specific information.

Upon review of the resources presented to the participants many individuals felt that the current resources were not inclusive of a variety of population groups. Participants felt that the *Eating Well with Canada's Food Guide* left out many individuals, there was often not a "spot" where they fit in on the list of recommendations. One participant stated that they didn't feel that they fit into any of the categories presented, but when pressed placed themselves in the women of childbearing age.

That every single person who looked at this would fit into a category... I think someone should be able to look at this and something should maybe pertain to them, so that might be one idea. (KI – Health Care Professional RD)

They went on to state that large portions of the population are not represented in the recommendations for different groups of people.

...there are large populations that don't, that aren't children, women of childbearing age, or men and women over the age of 50, so we are talking about adults that aren't pregnant or breastfeeding, or who could become pregnant that are missing from this, which is, a large part of our population, so it's missing a huge part of our population. (KI – Health Care Professional RD)

These opinions led to the decision to create a tool that is as inclusive of different groups as possible, recognizing that individuals of different sexes and varying age groups have different needs. This prompted the creation of individual resources each targeting a specific DRI age and sex group. One participant stated the following about the use of different fact sheets targeted at the DRI age/sec groups.

I think it is of immense value that you're focusing on a particular group. (KI – Health Care Professional Pharm)

The need for population specific information likely goes beyond addressing the needs of different age, sex, and pregnancy or lactating groups. Many individuals with certain disease states as well as dietary habits have specific nutrient needs that may require supplementation. One respondent stated that when they attempt to assist a consumer with supplement selection they ask several questions related to diet.

I use as a screening question when trying to help people choose the appropriate vitamin is dietary habits. So, "are you vegetarian?" – maybe you require more B12 or more iron, "do you drink dairy products?", a lot of lactose intolerant people that could maybe use a vitamin, or multivitamin with more calcium or something. So, they don't have that, maybe that sort of demographic is missing. We find a lot of vegetarian or selective food eaters if you will out there and this doesn't appeal to them. I think it's just this very small overview of information people need, it's not very specific, only mentions three things; iron, folic acid, and vitamin D, no recommended daily intakes there. (KI – Health Care Professional Pharm)

A screening tool including some of these questions among others may be helpful in identifying some specific nutrient needs of individuals. This however goes beyond the scope of the present project.

4.7.5 Specific information/ literacy.

Participants expressed a desire for more detailed and specific information. They stated they wanted to know the role of specific vitamins and minerals. They were interested in knowing what food sources vitamins and minerals come from, and the benefits and potential risks of consuming these vitamins and mineral. Participants were very interested in knowing how much of a nutrient they required. They repeatedly expressed a desire for more and more information. Table 4.7.5 lists quotations shared by participants requesting more information and the impact that had on the creation of the resource.

Literacy and numeracy may be an issue for many individuals. Participants in both the focus groups and key informant interviews were given copies of the resources and asked several questions regarding the handouts. When one participant had trouble reading a word aloud, she stated how this would have prevented her from reading further.

There's a lot of reading. And some of the reading, for... phyto techno... chem... what in the world?...but there used to be a time where I'd look at that one word and go "I'm not reading this, I don't even know what that is." So it would just turn me off the whole thing. (KI – Community Member)

Table 4.7.5 – Information Subthemes, Quotations, and Impact on Resource

Subtheme	Quotation	Impact on Resource
Detailed In-depth Information	<i>It would be nice to have click on links if this is online and I'm assuming you can read it right on there, that you could go deeper into certain things, because I think you would want to. (KI – Health Care Professional Pharm)</i>	<ul style="list-style-type: none"> • Inclusion of information about a variety of nutrients, not limited to just a few • Comment regarding clickable links very much appreciated, unfortunately unable to add interactive links at this time
	<i>Understanding units, that's huge, like I said, nobody ever understands the units I find. (KI – Health Care Professional RD)</i>	<ul style="list-style-type: none"> • Inclusion of information about units on general information page • Inclusion of different ways of writing units that one may see on products
	<i>Zinc, and cooper, and bare-on (boron), like I don't get it, what are these for and why do you need them for? (Focus Group Participant)</i>	<ul style="list-style-type: none"> • Inclusion of information about roles of nutrients as space permits <ul style="list-style-type: none"> ○ Potential for links to nutrient specific resources in the future
Information about Dosage and Specifics about Quantities	<i>One thing I really don't like is a lot of the things now list the percentage of daily value and don't list the milligrams and I hate that. Because then you have no idea, because you don't know what they're saying the percentage is that you should have. (Focus Group Participant)</i>	<ul style="list-style-type: none"> • Inclusion of recommendations (DRI values) as well as what amount to look for in a multivitamin for most nutrients as applicable • Use of units most often seen on supplement products as well as different ways they may be written

	<i>You click on them, and does it really explain, percent daily value, someone might see it and oh I need 100% of everything, and same with vitamin C, I mean 417%, is that good? Vitamin E, 667%, is that good. I mean there needs to be a little more clarification, what to be looking for. (KI – Health Care Professional RD)</i>	
	<i>I would like to see one more thing though; is when to take a multivitamin and with what... (KI – Health Care Professional Pharm)</i>	<ul style="list-style-type: none"> • Inclusion of information about when to take supplements, including the statement below: <i>When taking a multivitamin always keep in mind the dosage and follow the directions listed on the label. Take your multivitamin with food and drink a glass of water. Avoid taking multivitamins with other medications.</i>
Food Sources of each Nutrient	<i>...nowhere in there does it even list the sort of minerals and vitamins you can expect to get from certain products like lean beef, you know, how much iron would you get from that, that kind of stuff, I think might be helpful for folks as well. (KI – Health Care Professional Pharm)</i>	<ul style="list-style-type: none"> • Inclusion of information about food sources as was practical with the consideration of space limitations • Focus was placed on foods and/or food groups with the highest amounts of a particular nutrient

4.7.6 Quality/Reliable

Participants discussed their desire for information about quality and safety about multivitamin products. Individuals were concerned about the quality of non-brand name and less expensive products. For this reason we included that brand is not important on our created resource. Information about natural products and the regulations of these products including the drug identification number (DIN) and natural health products (NHP) on the label were included on the created resource.

...they're going to need the multi-vitamin, but what do they choose? Are they gonna go for something that is fairly cheap? And if they go for something cheap, what's the quality like? (KI – Community Member)

Some participants were also concerned about the harmful effects that specific vitamins may have on individuals, including the potentially harmful effects taking too many supplements. They stated that since multivitamins are sold over the counter, individuals often assume they are safe. Concerns about safety were addressed by including a statement about safe supplementing and avoiding over-supplementing. While the majority of nutrients found in supplements are safe

and most often provided in safe levels in most products the newly created resource includes statements of warning of some of the side effects of specific nutrients, such as vitamin K.

If you had some of the precautionary things in here that would be nice to see. Things like even vitamin K there's not a lot in these vitamins, but a precaution for someone that perhaps is on warfarin. (KI – Health Care Professional Pharm)

Large Amount of Vitamins, because some people just assume because you can buy anything over-the-counter it's totally safe, and it does say, you know, watch how much you take. I like that iron is highlighted, that can certainly be a problem. (KI – Health Care Professional Pharm)

Participants expressed a need for reliable and unbiased information in order for them to trust the resource. One of the health care professionals discussed the need to include that the brand is unimportant when trying to select a multivitamin. They stated that they often do not trust the information that companies provide. Other participants also echoed these concerns, stating that having a outside institution supporting the information makes it more trustworthy for them.

Do we ever look at labeling, or what's out there, or vendors? No, we don't believe them, we just don't. (KI – Health Care Professional Pharm)

It just seems like they don't have the information there and a lot of the times on the individual products it's not, you wonder whether they're just making this claim or it's something neutral where there has been an outside institution saying... has approved it, you know putting their name behind it. (Focus Group Participant)

The health care professional went on to state that individuals should recognize that brand is not important. This concern was addressed by not having the created resource affiliated with any specific company or brand. The information provided is based on recommendations and RDA values from the Institute of Medicine and the resource will be found on the Dietitians of Canada website which is a trusted national organization of nutrition professionals. Furthermore, the resource specifically states that brand is unimportant when selecting a multivitamin and that individuals should find a product that contains nutrients that meet their needs.

I would like to see what should you look for in part of this; people think brand is important, or source and I think it's important to emphasize that that's not. (KI – Health Care Professional Pharm)

4.7.7 Usability and sharing.

Following the creation of the new resource, the tool was shared with the later three key informants, which included one community dietitian, one community pharmacist, and one community member. These participants reviewed the resource and one last theme emerged regarding the usability and how participants intended to share this information with others. All three of the key informants who reviewed the new resource stated that it was helpful and that they would use it in their personal lives and/or professional practice. The community member who reviewed the resource stated that they would share this tool with their family. Health care professionals shared how they would use the resource in their practice and to help consumers select a multivitamin. Participants shared the following statements among others.

...as a mother of three children I'd probably go through this with them, be kind of an educational experience, and for my husband, I'd put it on my fridge. (KI – Community Member)

This is a resource that if it was posted somewhere at point of sale we could take their product to the chart, and say “look it meets all of these requirements and it gives you the reasons why you need these specific vitamins” and if they wanted to look into it further they could. (KI – Health Care Professional Pharm)

Health care professionals stated that they thought the tool would be effective. However, they could see the benefit of going through the resource with a consumer to help them understand more fully. This issue likely arose due to the limitations of a print resource, including the lack of interaction the user has with the tool and the limited volume of information that can physically be included. Unfortunately, it is not feasible to have a health care professional or trained expert review the resource with consumers. However, this does raise the issue that if health care professionals are distributing the created resource or directing consumers to find the resource they may wish to consider reviewing the tool with them.

I think without somebody going through this with you and talking more about supplement use with you I don't know if it would be super straight forward to choose a multivitamin or supplement just by reading this for somebody who doesn't really understand supplements that well. (KI – Health Care Professional RD)

4.7.8 Incorporation of resource topics.

During the key informant interviews and focus groups, participants discussed a variety of needs and suggestions for changes about the four resources. These topics are listed in Table 4.7.8.

Table 4.7.8 – Incorporation of Resource Topics into the Resource

Theme	Quotation	Impact on Resource
Challenges of Healthy Eating	<i>One thing people also have to be taught about multivitamins, is multivitamins are not a cure all, a proper diet and exercise, it all goes hand in hand. I mean if you're not going to eat right and take care of yourself a multivitamin isn't going to do anything. (Focus Group Participant)</i>	<ul style="list-style-type: none"> • Emphasis placed on importance of healthy eating as a multivitamin cannot provide what food can, inclusion of the following statement: <i>Eating well and including food from all four food groups everyday is important. Multivitamins can help to supplement vitamins and minerals. They do not provide everything that food can, like energy, protein, and fibre among other things. Multivitamins should not be used to replace healthy eating.</i>
Population Specific Information	<i>That every single person who looked at this would fit into a category... I think someone should be able to look at this and something should maybe pertain to them, so that might be one idea. (KI – Health Care Professional RD)</i>	<ul style="list-style-type: none"> • Addition of general information page with specific separate sheets for each DRI age/sex group
Literacy and Numeracy	<i>There's a lot of reading. And some of the reading... phyto techno... chem... what in the world? You know, what... I could probably, phytochemicals. I know people, and not so much now anymore, but there used to be a time where I'd look at that one word and go "I'm not reading this, I don't even know what that is." So it would just turn me off the whole thing. (KI – Community Member)</i>	<ul style="list-style-type: none"> • Consideration of literacy, attempt to include common language and make resource more easy to read <ul style="list-style-type: none"> ○ Difficult to reduce reading level to grade 6-8 as there is no easy to read alternative to many vitamin and mineral names ○ Unnecessary information and use of overly scientific terms were avoided where possible
Quality and Safety	<i>...they're going to need the multi-vitamin, but what do they choose? Are they gonna go for something that is fairly cheap? And if they go for something cheap, what's the quality like? (KI – Community Member)</i>	<ul style="list-style-type: none"> • Inclusion of information regarding quality and safety of vitamins on the general information sheet, including the statement: <i>Those with a NPN or DIN number on the label have been assessed by Health Canada. They are considered safe, of high quality, and do what they claim.</i>
Reliable and Unbiased	<i>I would like to see what should you look for in part of this; people think brand is important, or source and I think it's important to emphasize that that's not. (KI – Health Care Professional Pharm)</i>	<ul style="list-style-type: none"> • Inclusion of reliable information • Not attempting to sell any particular products • Emphasis that brand name products are not require, including the statement: <i>Brand is not important; look at the nutrient content to help you choose.</i>

4.8 Newly Created Resource

Upon review of the data collected through focus groups and key informant interviews a new resource was created. The expressed needs of participants and the reviews of the found resources shaped the foundations for the new resource. A new information sheet was created to focus on each DRI age/sex group with one general information sheet applicable to all. Figure 4.8a reveals the general information sheet about *How to Choose a Multivitamin*. Figure 4.8b shows an example of DRI age/sex group specific information; *How to Choose a Multivitamin: Focus on Women Aged 19 to 30*.

The sheets shown here are copies of the PDF versions which will be available on the internet from the Dietitians of Canada website; www.dietitians.ca. This site can easily be found by typing Dietitians of Canada in a search engine such as Google. The resource will be available to view online. It will include information for each of the DRI establish age/sex groups. This information will be viewable online and also downloadable as a PDF for individuals to print off.

How to Choose a Multivitamin

Vitamins and minerals help our bodies to work properly. Vitamins and minerals serve many different roles in our bodies. Most vitamins and minerals can be found in food, but sometimes a supplement may be helpful to ensure you are getting enough of what you need. A multivitamin is any supplement often in pill form that contains more than one vitamin or mineral.

Supplements may be important for:

- People with medical issues
- Women who are pregnant, may become pregnant, or are breastfeeding
- Older adults – Men/women over 50
- People who restrict certain foods from their diet
- Children and adolescents
- People who are unable to routinely follow Canada's Food Guide

Multivitamins + Healthy Eating

Eating well and including food from all four food groups everyday is important. Multivitamins can help to supplement vitamins and minerals but do not provide everything that food can, like energy, protein, and fibre among other things. **Multivitamins should not be used to replace healthy eating.**

Safety and Risks

With multivitamins, if a little is good more is not necessarily better. Even though multivitamins are sold over the counter, practicing safe supplementing is important. Always follow the directions listed on the bottle and the advice of your health care professional.

Look for multivitamins with a **NPN or DIN number** on the label. Multivitamins in Canada are assessed by Health Canada and are under the Natural Health Products Regulations. Those with a **NPN or DIN number on the label have been assessed by Health Canada and are considered safe, of high quality, and do what they claim.** Non-medicinal ingredients that are included for binding and stability are also safe.

Understanding Units

Many different units, like milligram (mg), microgram (abbreviated mcg or µg) and international units (IU), can be found on multivitamin labels. This can be confusing for many people. Units are used to express the quantity of a vitamin or mineral most appropriately. Amounts of vitamin A, D, and E are usually written as IUs, while mg and mcg are used for other vitamins and for minerals.

What Should You Look For?

Multivitamins can help to add nutrients that may be lacking from the diet. While many multivitamin products list dozens of nutrients, more doesn't mean better. Focus on those vitamins and minerals which are on the fact sheet for your age and gender. **Brand is not important;** look at the nutrient content to help you choose.

When taking a multivitamin always keep in mind the dosage and follow the directions listed on the label. **Take your multivitamin with food and drink a glass of water. Avoid taking multivitamins with other medications.**

In general a product that contains an assortment of vitamins and minerals is easier to select, than single sources of each vitamin and mineral, for most people. Some multivitamins target specific groups of people, for example, pregnant women or men over 50 years. Finding the multivitamin that more closely matches who you are is a good place to start.

Special considerations for...

People with medical issues. Some diseases require a person to take more of or to avoid excess of specific vitamins or minerals. For example, individuals with osteoporosis may need additional calcium and vitamin D, those with hemochromatosis must avoid iron.

Women who are pregnant, may become pregnant, or are breastfeeding have higher needs of vitamins such as folic acid to prevent neural tube defects. Women who are pregnant also have higher iron needs.

Older adults, men and women over the age of 50, have increased nutrient needs, mainly due to smaller appetites.

People who limit, restrict, or avoid certain food groups, for example those who are lactose intolerant, vegetarians, or individuals who do not eat gluten. People who restrict certain foods may not be getting enough of certain nutrients depending on what foods they avoid.

Children and adolescents often have higher nutrient needs as they are still growing and developing.

Figure 4.8a – How to Choose a Multivitamin – General Information

How to Choose a Multivitamin

Focus on Women aged 19 – 30

Vitamins and minerals help our bodies to work properly. Vitamins and minerals can be found in food. Following *Eating Well with Canada's Food Guide* will help ensure you get enough of what you need. For people who are unable to do so, a supplement may be helpful. A multivitamin is any supplement that has more than one vitamin or mineral.

Vitamin A (*Beta-Carotene, Retinol, Vitamin A Acetate*) Recommendation: 2310 IU/day.

Vitamin A is found in animal foods such as milk and liver, and in fruits and vegetables. Look for a multivitamin with 2000 IU to 5000 IU, with most coming from Beta-Carotene.

Vitamin D (*Vitamin D₂, Vitamin D₃, Calciferol*) Recommendation: 600 IU/day, however some groups are recommending 1000 IU to 2000 IU. Vitamin D is made by the sun in summer months. Food sources are milk and ocean fish. Look for a multivitamin with at least 400 IU to 600 IU and consider taking an additional Vitamin D supplement in the winter months.

Vitamin E (*α-Tocopherol or Alpha-Tocopherol*) Recommendation: 22 IU/day (which is 15 mg/day).

Vitamin E is in seed oils. Look for a multivitamin with 20 IU to 30 IU of vitamin E.

Vitamin C (*Ascorbic Acid*) Recommendations: 75 mg/day.

Vitamin C is found in most fruits and vegetables; look for a multivitamin with 50 mg to 250 mg.

Vitamin K Recommendations: 90 µg/day (also written as 90 mcg/day).

Vitamin K is found in green leafy vegetables. It helps blood to clot and for this reason many multivitamins contain little or none.

B Vitamins: Thiamin (*Vitamin B₁*), **Riboflavin** (*Vitamin B₂*), **Niacin** (*Vitamin B₃, Nicotinic Acid*

Nicotinamide), **Vitamin B6** (*Pyridoxine*) Recommendations: Thiamin 1.1 mg/day,

Riboflavin 1.1 mg/day, Niacin 14 mg/day, Vitamin B6 1.3 mg/day. Found in many foods.

Multivitamins containing more than these recommended amounts are not a concern.

Vitamin B12 (*Cobalamin*) Recommendation: 2.4 µg/day (also written as 2.4 mcg/day).

Vitamin B12 is in animal based foods. Most multivitamins have more than the recommended amount; this is not a cause for concern.

Folic Acid (*Folate*) Recommendation: 400 µg/day (also written as 400 mcg/day).

Found in leafy green vegetables, folic acid is important in preventing neural tube defects. Women of childbearing age should look for a multivitamin with 400 µg.

Biotin and Pantothenic Acid Recommendations: Biotin 30 µg/day (also written as 30 mcg/day), Pantothenic Acid 5 mg/day. Widespread in foods.

Multivitamins may or may not include these vitamins; if they are absent this is not a concern.

Calcium Recommendation: 1000 mg/day.

Most multivitamins may contain only small amounts (150 mg to 400 mg); therefore, additional calcium supplements may be important for those who do not eat dairy products often.

Iron Recommendation: 18 mg/day.

Iron can be found in meat, fish, and poultry with lower amounts in plant foods. Women need more iron because of menstrual losses, however too much may cause constipation; look for a multivitamin with 5 mg to 15 mg.

Magnesium Recommendation: 310 mg/day.

Magnesium is found in green leafy vegetables, whole grains, and nuts. Look for a multivitamin with 50 mg to 100 mg as more is unlikely.

Phosphorus Recommendation: 700 mg/day.

Almost all foods contain phosphorus; look for a multivitamin with as little as possible.

Zinc Recommendation: 8 mg/day. Found in meats and alternatives.

Look for a multivitamin with 8 mg of zinc; avoid taking more than 40 mg/day.

Selenium, Copper, Manganese, Chromium, Iodine, Boron, Molybdenum Some or all of these minerals may be found in multivitamins. If these are absent it is not a concern.

Vitamins:
Vitamin A
Beta-Carotene
Vitamin D
Vitamin E
Vitamin C
Vitamin K
Thiamin (Vitamin B1)
Riboflavin (Vitamin B2)
Niacin
Vitamin B6
Vitamin B12
Folic Acid
Biotin
Pantothenic Acid
Minerals:
Calcium
Iron
Magnesium
Phosphorus
Zinc
Selenium
Copper
Manganese
Chromium
Iodine
Boron
Molybdenum

Figure 4.8b – How to Choose a Multivitamin – Focus on Specific Age/Sex Group

4.9 Response to Newly Created Resource

Following the initial four key informant interviews and phase one focus groups a draft version of a new resource was created based on participant feedback. This draft version of the resource was reviewed by key informants and masters committee members. Committee member responses were used to revise the resource which was then shown to phase two focus group participants. The key informants had no suggestions for improvements. Responses from this focus group were used for quality improvement; to refine layout, wording and aesthetics of the resource. Some responses were helpful in confirming that attributes of the resource were well received and subsequently left unchanged.

Many of the statements shared during the phase two focus group were similar to responses previously obtained. One new idea was the inclusion of information about non-medicinal ingredients. This topic was difficult to address as there are so many different non-medicinal ingredients. Table 4.9a lists some aesthetic changes that evolved out of the phase two focus group.

Table 4.9a – Aesthetic Changes Made Based on Phase Two Focus Group Responses

Response/Statement	Impact on Resource
<ul style="list-style-type: none"> • Green is not good for titles on the sub paragraphs • Small green print on general information page does not capture attention 	<ul style="list-style-type: none"> • Change of title font colour to brighter more bold colour • Change of accent colours to match titled writing
<ul style="list-style-type: none"> • Would like to see a space between numbers and the IU or unit 	<ul style="list-style-type: none"> • Format change made <ul style="list-style-type: none"> ○ Addition of space between values and units throughout resource
<ul style="list-style-type: none"> • Likes the bottle on the general information sheet 	<ul style="list-style-type: none"> • Affirmation that supplement bottle is desirable to the general public <ul style="list-style-type: none"> ○ No action taken, bottle remains on resource
<ul style="list-style-type: none"> • Likes lines from bottle to the different nutrients 	<ul style="list-style-type: none"> • Affirmation that design linking supplement bottle to information is desirable to the general public <ul style="list-style-type: none"> ○ No action taken, lines remain on resource

Two versions of a content reduced resource were created. A sample of these two pared down resources are shown as Figures 4.9a and 4.9b. The first pared down resource will be referred to as level one, while the resource that has a further reduction of information will be referred to as level two.

How to Choose a Multivitamin

Focus on Women aged 19 – 30

Vitamins and minerals help our bodies to work properly. They are found in food. Following *Eating Well with Canada's Food Guide* is important to make sure you get enough of what you need. For people who are unable to do so, a supplement may be helpful.

Vitamin A - Recommendation: 2310 IU/day. Found in animal foods, fruits, and vegetables.
Look for a multivitamin with 2000 IU to 5000 IU.

Vitamin D - Recommendation: 600 IU/day. Made by the sun in summer months.
Look for a multivitamin with 400 IU to 600 IU. Consider taking extra vitamin D in the winter.

Vitamin E - Recommendation: 22 IU/day (which is 15 mg/day). Found in seed oils.
Look for a multivitamin with 20 IU to 30 IU of vitamin E.

Vitamin C - Recommendations: 75 mg/day. Found in most fruits and vegetables.
Look for a multivitamin with 50 mg to 250 mg.

Vitamin K Recommendations: 90 µg/day (or written as 90 mcg/day). Found in green vegetables.
It helps blood to clot and for this reason many multivitamins contain little or none.

B Vitamins: Thiamin, Riboflavin, Niacin, Vitamin B6
Recommendations: Thiamin 1.1 mg/day, Riboflavin 1.1 mg/day, Niacin 14 mg/day, Vitamin B6 1.3 mg/day. Found in many foods.
Multivitamins with more than the recommendations are not a concern.

Vitamin B12 - Recommendation: 2.4 µg/day (also written as 2.4 mcg/day).
Found in animal based foods.
Most multivitamins have more than the recommended amount; this is not a concern.

Folic Acid (Folate) Recommendation: 400 µg/day (also written as 400 mcg/day).
Found in leafy green vegetables, folic acid is important in preventing neural tube defects.
Look for a multivitamin with 400 µg.

Biotin and Pantothenic Acid - Recommendations: Biotin 30 µg/day (also written as 30 mcg/day), Pantothenic Acid 5 mg/day. Widespread in foods.
Not always in multivitamins; if they are absent this is not a concern.

Calcium - Recommendation: 1000 mg/day.
Most multivitamins contain only small amounts (150 mg to 400 mg); extra calcium supplements may be important for those who do not eat dairy products often.

Iron - Recommendation: 18 mg/day. Found in meat, fish, poultry, with less in plant foods.
Women need more iron because of menstrual losses. Look for a multivitamin with 5 mg to 15 mg.

Magnesium Recommendation: 310 mg/day. Found in green leafy vegetables, whole grains, nuts.
Look for a multivitamin with 50 mg to 100 mg as more is unlikely.

Phosphorus Recommendation: 700 mg/day. Found in almost all foods.
Look for a multivitamin with as little as possible.

Zinc Recommendation: 8 mg/day. Found in meats and alternatives.
Look for a multivitamin with 8 mg of zinc.

Selenium, Copper, Manganese, Chromium, Iodine, Boron, Molybdenum Some or all of these minerals may be found in multivitamins. If these are absent it is not a concern.



Vitamins:
Vitamin A
Beta-Carotene
Vitamin D
Vitamin E
Vitamin C
Vitamin K
Thiamin (Vitamin B1)
Riboflavin (Vitamin B2)
Niacin
Vitamin B6
Vitamin B12
Folic Acid
Biotin
Pantothenic Acid
Minerals:
Calcium
Iron
Magnesium
Phosphorus
Zinc
Selenium
Copper
Manganese
Chromium
Iodine
Boron
Molybdenum

Figure 4.9a – Level One Pared Down DRI Age/Sex Group Resource

How to Choose a Multivitamin

Focus on Women aged 19 – 30

Vitamins and minerals help our bodies to work properly. They are found in food. Following *Eating Well with Canada's Food Guide* is important to make sure you get enough of what you need. For people who are unable to do so, a supplement may be helpful.

Vitamin A - Recommendation: 2310 IU/day.

Look for a multivitamin with 2000 IU to 5000 IU.

Vitamin D - Recommendation: 600 IU/day.

Look for a multivitamin with 400 IU to 600 IU. Consider taking extra vitamin D in the winter.

Vitamin E - Recommendation: 22 IU/day (15 mg/day).

Look for a multivitamin with 20 IU to 30 IU of vitamin E.

Vitamin C - Recommendations: 75 mg/day.

Look for a multivitamin with 50 mg to 250 mg.

Vitamin K Recommendations: 90 µg/day (90 mcg/day).

Many multivitamins contain little or none.

B Vitamins: Thiamin, Riboflavin, Niacin, Vitamin B6

Recommendations: Thiamin 1.1 mg/day, Riboflavin 1.1 mg/day, Niacin 14 mg/day, Vitamin B6 1.3 mg/day.

Many multivitamins contain more than recommendations, this is not a concern.

Vitamin B12 - Recommendation: 2.4 µg/day (2.4 mcg/day).

Many multivitamins have more than the recommended amount; this is not a concern.

Folic Acid (Folate) Recommendation: 400 µg/day (400 mcg/day).

Look for a multivitamin with 400 µg.

Biotin and Pantothenic Acid - Recommendations: Biotin 30 µg/day (30 mcg/day), Pantothenic Acid 5 mg/day.

Many multivitamins do not contain these vitamins; if they are absent this is not a concern.

Calcium - Recommendation: 1000 mg/day.

Many multivitamins contain only small amounts (150 mg to 400 mg).

Iron - Recommendation: 18 mg/day.

Look for a multivitamin with 5 mg to 15 mg.

Magnesium Recommendation: 310 mg/day.

Look for a multivitamin with 50 mg to 100 mg as more is unlikely.

Phosphorus Recommendation: 700 mg/day.

Look for a multivitamin with as little as possible.

Zinc Recommendation: 8 mg/day.

Look for a multivitamin with 8 mg of zinc.

Selenium, Copper, Manganese, Chromium, Iodine, Boron, Molybdenum

Some or all of these minerals may be found in multivitamins. If absent it is not a concern.

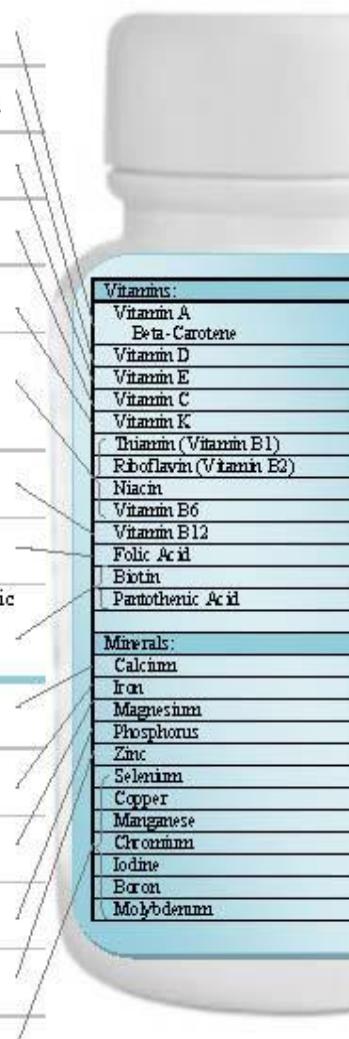


Figure 4.9b – Level Two Pared Down DRI Age/Sex Group Resource

These two additional versions of the resources were created as both the researcher and committee members speculated that the original version may be contain too much information, in a dense format, for the general public. The level one resource has content which is reduced slightly from the original version. This included elimination of some extraneous words, a pared down list of food sources, and reduced amount of information about benefits and potential risks of nutrients. The level one resource may be most appropriate for use by consumers. The level two pared down resource was also created. The level two resource has even less information with food sources and the majority of risks and benefits of nutrients eliminated all together. This second resource is almost simply a list of DRIs and suggestions for how much of a nutrient one should look for in a multivitamin. Both of these resources are less informative but may be desirable to the general public or those who are not as interested in multivitamins.

4.10 Summary of Results

Four resources to assist consumers with the selection of a multivitamin were identified as being potentially helpful. These resources were found through a directed search of organizations likely to have information suitable for this purpose. Participants in focus groups and key informant interviews viewed the resources and made suggestions about what they like and disliked about the resource among other things. Positive attributes were identified about each resource, but in general they did not feel that any one resource would be helpful with the selection of a multivitamin. Participants expressed a desire for more detailed, in-depth information about nutrients, food sources, and requirements. Data obtained from the focus groups and key informant interviews was used to create a new resource to assist with the selection of a multivitamin. Participants also shared about barriers to supplement use, and how they would like to access information about the selection of a multivitamin.

5. DISCUSSION

5.1 Discussion

This study has led to an understanding of the need for a consumer resource on supplement choice. The study consisted initially of a literature review and both broad range and directed searches for information and resources to assist consumers with the selection of a multivitamin; this allowed for the exploration of what is available to consumers. This was followed by the focus groups and key informant interviews that provided insight into what type of information the public desires. All of this work was done in an attempt to answer the three research questions for this study:

- What resources are currently available to assist consumers with the selection of a multivitamin?
- What are consumers' thoughts/ideas/beliefs about currently available tools to help them select a multivitamin and what changes do they suggest?
- How do consumers respond to the multivitamin selection tool that is developed?

5.2 Currently Available Resources

“What resources are currently available to assist consumers with the selection of a multivitamin?”

This question was deemed important as a first step for this study as previous research conducted by Whiting et al. (2010) identified a lack of knowledge as a barrier to supplement use. Prior to continuing with the decision to create a new resource, it was important to identify what was already available.

Initially, a broad-range review of resources was attempted using Google, which is touted as the most popular search engine (comScore.Inc, 2011). Using basic terms related to multivitamins, supplements, and nutrients, this initial search yielded very limited results. This led to a more directed search, investigating if any resources to assist with the selection of a multivitamin were available. From this, four tools were deemed potentially useful for establishing a starting point on which to base the remainder of the study. These four resources were shown to participants in focus groups and key informant interviews for discussion about

their thoughts, ideas, and beliefs. Ultimately, this initial research question led systematically into the examination of the second of the three research questions.

- Health Canada's - *Eating Well with Canada's Food Guide*
 - Accessible via the Health Canada website (www.hc-sc.gc.ca):
 - <http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/order-commander/index-eng.php>
- Dietitians of Canada's – *Do I Need a Vitamin or Mineral Supplement?*
 - Accessible via the Dietitians of Canada website (www.dietitians.ca):
 - [http://www.dietitians.ca/Nutrition-Resources-A-Z/Fact-Sheet-Pages\(HTML\)/Miscellaneous/Do-I-Need-a-Supplement-.aspx](http://www.dietitians.ca/Nutrition-Resources-A-Z/Fact-Sheet-Pages(HTML)/Miscellaneous/Do-I-Need-a-Supplement-.aspx)
- Council for Responsible Nutrition's – *How do you Read a Supplement Label*
 - Accessible via the Council for Responsible Nutrition's website (www.crnusa.org):
 - http://www.crnusa.org/pdfs/CRN_How_to_read_a_ds_label.pdf
- Centre for Science in the Public's Interests' – *How to Read a Multivitamin Label*
 - Accessed via the June 2008 copy of *Nutrition Action Newsletter*

5.3 Consumer's Thoughts/Ideas/Beliefs about Currently Available Tools

“What are consumers' thoughts/ideas/beliefs about currently available tools to help them select a multivitamin and what changes do they suggest?”

In order to create a resource which was acceptable and useful to the target population, participants were approached to enquire about their thoughts, ideas, and beliefs about the found resources. The four selected resources were shown to key informants and focus group members during the data collection process. Participants were asked to share their likes and dislikes about the resources, how the resources could be improved, and if the resources would help them to choose a supplement among other things.

In general participants identified positive attributes about each resource which they liked and felt were helpful. As a whole, however, they disliked and did not feel any would help them or their clients select a multivitamin. The majority of the comments for improvement were directed at formatting and aesthetic issues or at a desire for more detailed information, such as how much of specific vitamins and minerals they should consume, where different vitamins and

minerals are found, and the role, risk, and benefits of each vitamin and mineral. Both focus group participants and key informants shared similar feedback with the exception of concerns about literacy and numeracy. Key informants expressed a concern that the reading level may be beyond the abilities of some individuals. No focus group participants verbally stated that the resources needed to more inclusive of individuals with limited literacy skills. However, some focus group participants did express that they did not know specific words such as nutrient names.

5.3.1 Process of creating a new resource.

A cyclical approach was used to create the new resource. Figure 3.3 portrays the various steps involved. Many steps or portions of steps occurred concurrently or were revisited during the research process. The cyclical nature of the diagram used during the creation of the new resource may be used for future evaluation and possible revision of the resource as well. Use of this process allowed for reflection and integration of new ideas throughout the creation of the new resource.

The responses and discussion generated during the key informant interviews and focus groups directly influenced the creation of the new resource. Everything from comments regarding format to requests for more information were included. An attempt to include as many comments and suggestions as possible was made.

Many comments were shared by participants about what they liked and disliked about the resources they were shown. Participants shared many opinions about the format of the resource. Table 4.7.2 lists comments made by participants about format and aesthetic appeal specifically and the corresponding actions taken during the creation of the new resource as an attempt to address these desires.

Participants also shared about what type of information they wanted included on the resource that was created. Suggestions for more information and more detailed information were commonly made requests. Table 4.7.5 lists some of the quotations indicating a desire for more information and the subsequent impact this made to the creation of the new resource.

Including adequate amounts of information to meet the expressed needs of the participants was a major challenge that was encountered during the creation of the new resource. Due to the limited amount of space available when trying to confine the resource to one page, the

decision was made to provide the most essential information only: recommended intake, what to look for in a multivitamin, basic information about food sources, and risks of excess or the role of the nutrient, as deemed necessary. Additional comments and the impact on the new resource are listed in Table 4.7.8.

5.4 Response to Newly Developed Multivitamin Selection Tool

“How do consumers respond to the multivitamin selection tool that is developed?”

Following the initial four key informant interviews and phase one focus groups a draft version of a new resource was created based on participant feedback. Responses from the phase two focus group were used for quality improvement; to refine layout, wording and aesthetics of the resource. In general participants responded well to the resource. All of the key informant participants felt that the new resource would be helpful to them either personally and/or professionally. The idea to use the resource as an educational or instructional tool was introduced by key informant participants.

5.4.1 Use of resource to select a multivitamin.

A new theme which emerged out of the phase two focus group and later key informant interviews was the idea of usability and sharing of the resource. Participants in the phase two focus group were asked to review the newly created resource while looking at a popular multivitamin product. They were asked if they thought the product was right for them based on the information on the new resource. It was obvious that some participants struggled during this process. Some participants looked confused, even scratching their head as they looked back and forth between the product and the resource. Participants had difficulty answering if the product was right for them. One participant brought up the idea that;

...you only have so much time to figure it out, the question is if you want to take the time (Focus Group Participant)

When the focus group participants were directly asked if the product was right for them many participants stated that it was not right for them, this may have been the correct answer for some individuals. Initially one participant immediately shared that this product was not right for her; this sentiment was then echoed by others. It is difficult to know if the others truly felt it

was not right for them or if they were just following the lead of the first individual. Some participants did not respond to the question or stated that they did not know if it was right for them. One individual stated that;

I would take this, it's a multivitamin, some is better than none (Focus Group Participant)

Participants may have been unsure if the product shown to them was appropriate for their needs because at this stage the resource was not the final version during this focus group and they may have found it too overwhelming. Perhaps participants were hesitant to share their thoughts about if the product was an appropriate for fear of being wrong or being judged by other participants. These limitations are important to consider. It is interesting to note that when these same participants were asked if they would use the resource the majority of participants said that they would. The findings of this investigation may indicate that despite the persistent request for more information a simpler resource may be more appropriate for the general public.

5.4.2 Format and final layout.

Based on feedback from participants and limitations with distribution this resource is presented as essentially two sheets. The first sheet provides general information about multivitamins and is aimed at the entire population (Figure 4.8a). The second sheet provides more directed information focused as specific DRI age/sex groups (Figure 4.8b).

Many respondents did provide feedback and make comments about the resource being cluttered or overwhelming:

I think the font's tight, I think that's the only reason why, I shouldn't say bland as much as I think it's overwhelming, but I don't know how you could shorten it up any more. You have everything I want, I wouldn't want to take anything out. It would be tough. (KI – Health Care Professional Pharm)

...it's just a lot of great information on a sheet, and there's a lot there but it's all valuable. It's helpful for me as a woman reading that. I don't find it overwhelming really if I have time to sit down and read it. (KI – Community Member)

...you've got kind of the most amount of white space you can get in the page without losing any info. I don't know what I would do to change it; I don't know that I would change it. (Health Care Professional RD)

This feedback was valued but difficult to utilize as the statements were conflicting. As a compromise all information was included with the knowledge that a modified version with less

information may be a viable option. Additionally, when viewing the resource online the information will be much more spread out allowing for greater amounts of white space. These versions of the resource are shown as Figures 4.9a and 4.9b.

5.4.3 Use for health care professionals.

Based on the interactions with the key informant participants the idea that this resource may be very useful for health care professionals emerged. The intention of the resource is to be beneficial for the general public. However, the idea that this resource may have an alternate application as a teaching tool for health professionals arose later. Both of the health care professional key informants who reviewed the newly created resource stated that they thought the tool was very useful and that it would be beneficial in their practice.

I guess it could also require more support, counselling if I was to hand it out to tell them how to read it. It's obvious to us but I think you literally should take a bottle and show them according to the product they picked, or the one you would choose for them. (KI – Health Care Professional Pharm)

I'm not sure what the ultimate goal with this if it would just be something able for people to print off by themselves or access by themselves or if it would be something distributed through a dietitian or through a pharmacist or health professional if it's going that route it might, coming from a health professional then being able to go through it a little bit with somebody would be really helpful. (KI – Health Care Professional RD)

The created resource may be able to play an important role for health care professionals as both a resource for themselves as well as a teaching tool. Furthermore, health care professionals may be seen as a gate keeper of information. Focus group participants reported that they often seek advice about vitamins and supplements from health care professionals. This is supported by the Tracking Nutrition Trends survey from 2008 which reports that 40% of respondents sought information about food and nutrition from their family physician or other health care professionals ("Tracking Nutrition Trends VII: August 2008," 2008). For health care professionals to be able to refer patients along to appropriate information is of value.

Furthermore, for health care professionals to be well informed about multivitamins and requirements for specific age groups is important. Many participants shared that health care professionals are their first source of information.

I would just ask the pharmacist if I was stuck. If there was nobody to ask, I'd just put it off for another day, until I could find more information on it. (Focus Group Participant)

Other participants, including some community members and some health care professionals alike expressed concern over a lack of confidence in health care providers with respect to knowledge of supplements and nutrition. Community members expressed concern about approaching their doctor for information about supplements. Despite this concern many individuals still seek information about supplements from their health care providers. Dietitians have been reported as being used the least frequently as a source of food and nutrition information; however, they were viewed as the most credible information source ("Tracking Nutrition Trends VII: August 2008," 2008). This expertise in food may not translate to supplement knowledge and may indicate a need for further information and education for health care professionals about supplementation specifically. This indicates a perceived need for a resource to assist health care professionals. The created resource may be able to address some of these concerns by providing a resource for a variety of uses; general public information use, health care professional resource, and a health care professional teaching tool.

If the doctors were more knowledgeable about it, then people would feel comfortable going to their doctor and asking them. (KI – Community Member)

...in terms of knowledge maybe if health professionals were better informed, and again I think about pharmacists and dietitians if we were better informed and we had better tools to facilitate or to help people choose supplements, I mean that's a start. (KI – Health Care Professional RD)

As a dietitian a resource with the basic information about what to look for in a multivitamin will be helpful for both personal and professional use. During formal training and education, dietitians are taught about nutrients and the specifics about how much an individual needs, as well as the roles, benefits, and risks of these vitamins and minerals. However, the practical implications of how much one should look for in a multivitamin product are not emphasized. This new resource should be helpful; it serves as a brief overview of the common nutrients in a multivitamin and will be helpful in counselling individuals about the selection of a multivitamin that is appropriate for them. Having a one page resource with all of the pertinent information present is valuable, as this resource can be used as a teaching tool and then given to the individual to take home as a reminder of what to look for. In practice, key nutrients of concern can be highlighted for a particular individual based on their dietary habits and specific needs, and focus can then be placed on those during the counselling session.

5.5 Barriers to Supplement Use

Participants identified several barriers to supplement use. Many of these barriers were consistent with previous research. Examining and understanding potential and existing barriers to supplement use is important in confirming the need for creating a new resource to assist individuals with the selection of a supplement. While both the key informant and focus group participants identified several similar types of barriers, key informants discussed barriers to use more. This is likely because questions pertaining to this area were specifically posed to these individuals. Additionally, the nature of a one on one discussion may help individuals to feel more comfortable to share their insights or own personal experiences about what they or what they perceive others may face as a barrier to supplement use. Despite these differences there were several themes which were commonly seen in the transcripts from both the focus groups and key informant interviews.

It was difficult to separate themes about barriers to use as many barriers as well as solutions to these barriers are often multi-factorial. Barriers to use were successfully separated into seven main themes which cover a wide range of ideas. Some of these barriers included those related to beliefs and practices, including difficulty taking supplements and issues surrounding motivation and/or remembering to take supplements. Cost and information related barriers were also commonly mentioned by all groups of participants. Participants mentioned that multivitamins were too expensive and also discussed the importance of getting supplements prescribed by physician so that these costs would be covered. This topic was covered from different perspectives; health care professionals felt they needed to know more about coverage for supplements, while the community members wanted more coverage for these products.

Focus group and key informant participants all discussed a lack of information as a barrier to use, this theme tied in very closely with access issues. Not only do individuals potentially struggle to access supplements in a physical sense, but they also recognize that accessing information may be a barrier. This provides further rationale for the need of an easily accessible resource to help consumers choose a multivitamin.

One major difference between the key informants and focus group participants was the discussion about access to supplements. The health care professionals discussed access as a barrier to supplement use; this same concern was not expressed by the community member focus group participants. Research conducted by Whiting et al. (2010), also found that accessibility

was a barrier to supplement use as perceived by health care professionals. This study also found that low-income participants viewed access as a barrier to healthy food and healthy eating (Whiting et al., 2010). Members of the general public may not view access to supplements as such a barrier as supplements are often available for purchase in a wide variety of stores.

5.6 Validity and Reliability

Validity and reliability are often terms most associated with quantitative research rather than with qualitative research (Richards & Morse, 2007). Essentially, validity requires that the results of the research accurately reflect what was studied. Conversely, reliability requires that if the study were duplicated the same results would be found. In qualitative research it is often difficult to exactly replicate a study and much of the data collected requires interpretation which is why validity and reliability are difficult to ascertain.

During this study multiple research methods were used to help ensure reliability. Key informant interviews and the use of focus groups were both employed as a means of ensuring that statements and opinions were similar using both data collection methods. In addition to these data collection methods the transcripts were audited by an external professional to ensure that the interpretation of the transcripts and code development were accurate.

A diverse group of individuals was included as key informants. It was felt important not to ignore lower income participants. However, most focus group participants and key informants were women. Both community members and health care professionals were included, enhancing the quality and validity of data obtained. Key informants were sent a copy of their transcript after their interview session. They were asked to indicate if they felt the transcript accurately reflected their thoughts and the discussion that was held. All participants indicated that they felt the transcripts were accurate.

Details of all data collection and analysis were documented during the process. All consent forms were kept in a secure location. These strategies help to provide sufficient information to duplicate the study with relative accuracy should the need or desire to do so exist.

In addition to striving to achieve reliability and validity involvement of dietitians throughout the research process was an important consideration. As the final tool will be available on the Dietitians of Canada website it was important to this national organization to have registered dietitians involved throughout the process. This was achieved by involving

dietitians as participants in the key informant interviews, as a reviewer of the resource, and by having a dietitian serve as the external auditor of the transcripts.

For consumers, having the resource available on the Dietitians of Canada website should lend credibility to the resource. Consumers trust dietitians as being a reliable source of information. The Tracking Nutrition Trends VII survey identified dietitians as the most credible source for food and nutrition information ("Tracking Nutrition Trends VII: August 2008," 2008); 82% of survey respondents identified dietitians as a trusted source of information, this was followed closely by health associations at 81% ("Tracking Nutrition Trends VII: August 2008," 2008). Thus the Dietitians of Canada website is an ideal website to launch the new resource.

An external auditor is able to provide an objective assessment of the study and enhances the overall validity of the study (Creswell, 2009). Transcripts from the key informant interviews and phase two focus groups were reviewed by an external auditor. The external auditor found that there were no major omissions in the reporting and analyses of the transcripts. This indicates that the interpretation of the data presented here represents what was discussed during the key informant interviews and phase one focus groups. This is a strength of the study which helps to increase the validity. The summary report from the external auditor is attached as Appendix D – External Audit of Research Transcripts Report. The external auditor did identify the opportunity to explore the data further which may be useful for future work.

5.7 Communication Strategy

The final version of the new resource “How to Choose a Multivitamin” and “How to Choose a Multivitamin: Focus on each specific DRI age/sex group” will be available for viewing by health care professionals as well as the general public on the Dietitians of Canada website (www.dietitians.ca). This resource will be available for viewing online as well as for download as a PDF document. Many participants expressed a desire to have the resource as a printed document; an emphasis was placed on a desire to have the information right at the point of purchase.

Needs to be available online, free access to everybody, I mean, pharmacists or all pharmacies should maybe have some kind of a tool or service for people to walk in where you actually purchase your supplements for people to be able to decide what to get. I mean they have blood pressure monitoring why wouldn't we have something like that to help where they get it. (KI – Health Care Professional RD)

...to have a [re]source like this available at the pharmacy counter so you could just borrow it and have some signage by the supplement area...(KI – Community Member)

The ideas obtained regarding distribution of information are helpful for deciding how to most effectively distribute the resource to the general public. Regardless of the method of distribution, one participant made the point that the information needs to be right in their face and not just another hand out sitting on a shelf.

...maybe, it's right in their faces with the information. Because we can develop all this paper we want, maybe it'll never be used, it's just another resource that's just sitting on the shelf. It's in the face kind of information. (KI – Community Member)

Other ideas regarding the use of media, advertising, and government involvement were also shared by participants. Unfortunately, while these suggestions are appreciated the implementation of these interventions is not feasible within the scope of the present study. Use of billboards, television advertisements, radio advertisements, and the use of social media are all considerations for future work. The implementation of a social marketing strategy may assist in reaching a wider audience. Social marketing involves the use of traditional marketing principles and techniques. Social marketing refers mainly to efforts focused on influencing the behaviours of a target audience that improve health, prevent injuries, protect the environment and contribute to communities (Kotler & Lee, 2008).

5.8 Limitations

Limitations exist which may impact the research study. Some basic limitations such as researcher bias and time constrictions are inherent to qualitative research (Richards & Morse, 2007). Measures to overcome these limitations were taken where possible. Research bias is disclosed in this document. Attempts were made to examine the data objectively. A facilitator who was well known in the community was used to conduct the focus groups, and the researcher's presence may have impacted the responses participants share. However, for this study discussions were focused on less intimate topics than some research, as such it is assumed that participants were candid in their responses. In terms of time constraints, efforts were made to adhere to timelines to complete the research in a timely fashion yet not rush the process.

It is not known whether data collection went to the point of saturation. Only seven key informant interviews and three focus groups, with a total of 31 participants, were conducted. The majority of participants for this study were women. The inclusion of more men may have highlighted additional ideas, thoughts, or concerns.

Limitations associated with the presentation and viewing of resources during the data collection may have impacted the results obtained, as time for viewing or explanation of the resources may have been insufficient. Other limitations associated with the presentation and development of the new resource may impact the future usability of tool. Lastly, the financial means for distribution of the newly created resource may be a limitation pending the chosen distribution and marketing strategy.

While, there were no voiced complaints or discussion about not understanding concepts or ideas we are not able to assume that all participants fully understood everything on the resources. Recognizing the issues individuals face in terms of literacy and numeracy skills prompted the creation of a tool with the intent of it being relatively easy to read. The aim was to create a tool written for a grade six to eight reading level. Unfortunately, due to the multi-syllabic nature of many of the vitamin and mineral names this was extremely difficult to achieve. By creating a tool that is inclusive and considers those for whom reading may be problematic we are more likely to reach a wider range of individuals and not exclude some because of their literacy skills or a lack thereof.

Resources were presented one at a time in the same order to all focus group and key informant interviews. Once the resource was viewed and questions posed the resource was handed back prior to moving on to the same process for the next resource. There was no comparison between resources. Had participants been able to view resources laid out side by side it may have impacted their opinion. Potentially there may have been more discussion about likes and dislikes had there been the opportunity for direct comparison.

Participants shared many ideas about the preferred format and design of the newly created resource. Due to graphic design skill limitations not all of these ideas could effectively be implemented by the researcher. Participants consistently expressed a desire for more information. Unfortunately, for the printed resource space constraints were a limiting factor to the amount of information that was placed on the resource. Attempts to maximize the amount of white space available as well as the font size of the text were made, but this was balanced with

the requests for more information. The idea to have a point-and-click type of online resource was suggested by the participants. Due to the technical limitations of the website which hosts the new resource this request was not possible and therefore not implemented.

The new resource will be available on-line for viewing as well as for download and printing. Participants expressed a desire for distribution of the resource in a variety of ways such as the use of multimedia, government involved marketing, and marketing at local events among other strategies. These distribution channels are limited due to financial and time constraints.

5.9 Future Work

The newly created resource will be available online on the Dietitians of Canada website for the public. Future work may involve expanding the information about each individual nutrient, including the creation of nutrient specific sheets which can be linked to the newly created resource. Other work may include keeping the new resource up to date as DRI values are anticipated to continue to change with the completion of new and emerging.

Additionally, while a draft of the new resource was trialed with a focus group and reviewed by key informants no evaluation of the resource has been completed. An evaluation of the usability, helpfulness, and accessibility may be important aspects to consider in the future.

In addition to the basics of evaluating and keeping the resource up to date, future work may involve learning modules. Health care professional participants expressed a desire for web-based learning, webcasts, and learning modules, this may be an area for future work. To provide education and a basic understanding for health care professionals, the general public, and possibly even children and adolescents are all possible future avenues to consider for future work. Other future work may involve some social marketing strategies and promotion of the new resource.

6. CONCLUSIONS

Previous research has identified several barriers to supplement use. Some of these barriers include: cost, difficulty taking supplements, access to supplements, and a lack of knowledge. The data obtained from the focus groups and key informant interviews during this study reinforce that these barriers may impact supplement usage among the general public. These findings provide rationale for the present study and the need for creating a means by which to provide information and knowledge to the general public. By providing information to help educate consumers this will hopefully help to address and possibly overcome a lack of knowledge as a barrier to supplement use.

This study focused on addressing a lack of knowledge as a barrier to supplement use. After searching for currently available resources to assist consumers with the selection of a multivitamin with limited success; four resources were deemed potentially useful and were used during the data collection process. Community members, as well as community dietitians, and community pharmacists were recruited as participants for focus groups and key informant interviews. Community members were selected from core neighbourhoods in Saskatoon, Saskatchewan as this group may be underserved. The goal of including the selected population is to consider the needs of potential resource users and to create a resource which is usable by a wide range of individuals. A focus was placed on making the tool as usable as possible for a wide range of individuals, including those with limited literacy skills.

During the key informant interviews and focus group sessions the four found resources were discussed and highlights of what participants liked and disliked about the resource were drawn upon to create a new resource. Participants liked attributes about each of the four resources they were shown, however, in general they did not feel confident that any one of the resources would help them to choose a multivitamin. The new tool is based on the expressed needs, ideas, beliefs, and thoughts of the target population. Feasible and applicable ideas/suggestions were included where possible. Participants expressed a desire for more information including specifics about dosing, benefits and risks, and food sources of each vitamin and mineral.

Based on the responses obtained through the key informant interviews and focus groups a new resource was created. A general information page as well as separate sheets focusing on each DRI age/sex group were created in an attempt to reach the greatest number of individuals.

The new resource is available online at the Dietitians of Canada website, www.dietitians.ca, for online viewing, as well as for download and printing. This website is accessible and free to the general public.

The newly created resource “*How to Choose a Multivitamin*”, and “*How to Choose a Multivitamin: Focus on [a specific DRI age/sex group]*” was shown to participants in the phase two focus group as well as the later three key informant interviews. While no formal evaluation of the new resource was conducted, the new resource was well received by participants. Many individuals shared about how they would make use of this resource.

The aim of this study was to create a new resource to help inform and educate consumers. The goal of the resource is to provide assistance to consumers with the selection of a multivitamin. The created resource is not intended to convince individuals that they require a supplement but rather to provide information to assist them with the decision about what they should look for in a multivitamin. This information will hopefully help consumers to subsequently select a multivitamin which is appropriate for them and their needs.

The created resource has many positive attributes. First and foremost, the “*How to Choose a Multivitamin*” resource was created based on feedback from the general public while drawing ideas from existing resources. The resource has several different versions each customized according to the different DRI age/sex groups; this provides for more individualized information without excluding anyone. Recommended DRI values as well as what to look for in a multivitamin are listed on the resource, this is important as these two values are most often not the same. Recommendations of what to look for in a multivitamin are based on realistic values which one may actually see in a multivitamin. The resource highlights main areas of concern for each nutrient, with emphasis on food sources, benefits, and risks as appropriate. The resource is accessible via a reliable and trusted website and is available viewing online or download and printing.

The new tool will help to fill a void in currently available information. It will provide individuals with a resource to educate themselves on how to select an appropriate multivitamin. Health care professionals also identified that the new resource would be useful in practice and thus it may serve as a teaching or instructional resource on which client counselling may be based.

7. REFERENCES

- ADA. (2009). <http://www.eatright.org>. Retrieved November 27, 2009
- AHA. (2009). <http://www.americanheart.org>. Retrieved November 26, 2009
- Bayer. (2009a). <http://www.oneaday.ca>. Retrieved December 15, 2009, 2009
- Bayer. (2009b). <http://www.oneaday.com>. Retrieved December 15, 2009
- Beck, L. (2001). *Nutrition for Women: Managing Your Health with Diet, Vitamins, Minerals and Herbs*. Toronto, ON: Prentice Hall Canada.
- Becker, G. L. (1997). *A Shopper's Guide to Brand-Name Dietary Supplements: Supplement Savvy*. New York, NY: Dell Publishing.
- Bischoff-Ferrari, H. A., Willett, W. C., Wong, J. B., Stuck, A. E., Staehelin, H. B., Orav, E. J., et al. (2009). Prevention of nonvertebral fractures with oral vitamin D and dose dependency: a meta-analysis of randomized controlled trials. *Archives of Internal Medicine*, 169(6), 551-561.
- Boyatzis, R. E. (1998). *Transforming Qualitative Information: Thematic Analysis and Code Development*. Thousand Oakes, Ca: SAGE Publications.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- CCS. (2007). *Canadian Cancer Society Announces Vitamin D Recommendation*. Retrieved November 20, 2009
- CL. (2009). <http://www.consumerlab.com>. Retrieved December 15, 2009
- Cline, R. J. W., & Haynes, K. M. (2001). Consumer Health Information Seeking on the Internet: the State of the Art. *Health Education Research*, 16(6), 671-692.
- Coltrera, F. (2003). *The Benefits and Risks of Vitamins and Minerals: What You Need to Know*. Boston, MA: Harvard Health Publications.
- comScore.Inc. (2011). comScore Releases April 2011 U.S. Search Engine Rankings (http://www.comscore.com/Press_Events/Press_Releases/2011/5/comScore_Releases_April_2011_U.S._Search_Engine_Rankings ed.). Reston, VA.
- Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- CRN. (2008, October, 2008). *How do you Read a Supplement Label?* Retrieved September 25, 2009

- CRN. (2009). *www.crnusa.org*. Retrieved Decmber 2, 2009
- CSPI. (2008). How to Read a Multivitamin Label. *Nutrition Action Health Letter*, 6-7.
- CSPI. (2009). *Center for Science in the Public Interest*. Retrieved November 18, 2009
- DC. (2008). *Do I Need a Vitamin or Mineral Supplement?* Retrieved November 28, 2009
- DC. (2009). *http://www.dietitians.ca*. Retrieved November 28, 2009
- De Wals, P., Tairou, F., Van Allen, M. I., Lowry, R. B., Evans, J. A., Van den Hof, M. C., et al. (2008). Spina bifida before and after folic acid fortification in Canada. *Birth Defects Research*, 82(9), 622-626.
- Denzin, N. K., & Lincoln, Y. S. (1998). *Collecting and Interpreting Qualitative materials*. Thousand Oaks, CA: SAGE Publications Inc.
- Dutta-Bergman, M. J. (2004). Primary Sources of Health Information: Comparisons in the Domain of Health Attitudes, Health Cognitions, and Health Behaviors. *Health Communication*, 16(3), 273-288.
- Fox, S., & Jones, S. (2009). The Social Life of Health Information: Pew Internet.org.
- Garriguet, D. (2004). Nutrition: Findings from the Canadian Community Healt Survey Overview of Canadians' Eating Habits. In S. Canada (Ed.). Ottawa, ON: Health Statistics Division.
- Gillis, D. E. (2004). A Community-Based Approach to Health Literacy Using Participatory Research. *Adult Learning*(15), 14-17.
- Giovannucci, E., Liu, Y., Hollis, B. W., Rimm, E. B., Giovannucci, E., Liu, Y., et al. (2008). 25-hydroxyvitamin D and risk of myocardial infarction in men: a prospective study. *Archives of Internal Medicine*, 168(11), 1174-1180.
- Gorham, E. D., Garland, C. F., Garland, F. C., Grant, W. B., Mohr, S. B., Lipkin, M., et al. (2007). Optimal vitamin D status for colorectal cancer prevention: a quantitative meta analysis. *American Journal of Preventive Medicine*, 32(3), 210-216.
- Harrison, R. A., Holt, D., Pattison, D. J., & Elton, P. J. (2004). Are those in need taking dietary supplements? A survey of 21 923 adults. *British Journal of Nutrition*, 91(4), 617-623.
- Health-Canada. (2007). Eating Well with Canada's Food Guide In H. Canada (Ed.). Ottawa, ON.
- Holick, M. F. (2007). Vitamin D Deficiency. *New England Journal of Medicine*, 357(3), 266-281.
- Holick, M. F. (2009). Vitamin D Status: Measurement, Interpretation, and Clinical Application. *Ann Epidemiology*(19), 73-78.

- IpsosReid. (2005). *Baseline Natural Health Products Survey Among Consumers* (Final Report): Ipsos Reid.
- Jacelon, C. S., O'Dell, K. K., Jacelon, C. S., & O'Dell, K. K. (2005). Analyzing qualitative data. *Urologic Nursing, 25*(3), 217-220.
- Jay, M., Adams, J., Herring, S. J., Gillespie, C., Ark, T., Feldman, H., et al. (2009). A randomized trial of a brief multimedia intervention to improve comprehension of food labels. *Preventive Medicine, 48*(1), 25-31.
- Kirkpatrick, S. I., & Tarasuk, V. (2008). Food insecurity is associated with nutrient inadequacies among Canadian adults and adolescents.[erratum appears in J Nutr. 2008 Jul;138(7):1399]. *Journal of Nutrition, 138*(3), 604-612.
- Kirsch, I. S., Jungeblut, A., Jenkins, L., & Kolstad, A. (1993). Adult Literacy in America: A First Look at the Results of the National Adult Literacy Survey (NALS). In U. S. DepartmentofEducation (Ed.). Washington, DC: National Center for Education Statistics.
- Kotler, P., & Lee, N. R. (2008). *Social Marketing: Influencing Behaviors for Good* (3 ed.). Thousand Oaks, CA: Sage Publications.
- Krueger, R. A., & Casey, M. A. (2009). *Focus Groups: A Practical Guide for Applied Research* (4th ed.). Thousand Oaks, Ca: SAGE Publications, Inc.
- Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the Craft of Qualitative Research Interviewing* (2nd ed.). Thousand Oaks, Ca: SAGE Publications, Inc.
- Lemstra, M., Neudorf, C., Beaudin, G., Lemstra, M., Neudorf, C., & Beaudin, G. (2007). Health disparity knowledge and support for intervention in Saskatoon. *Canadian Journal of Public Health Revue Canadienne de Sante Publique, 98*(6), 484-488.
- Luisi, J. P. (2006). Designing Documents, Slides, and Screens. In K. O. Locker & I. Findlay (Eds.), *Essentials of Business and Administrative Communication* (Canadian ed., pp. 392-409): McGraw-Hill Ryerson.
- Mackey, M. A., & Metz, M. (2009). Ease of Reading of Mandatory Information on Canadian Food Product Labels. *International Journal of Consumer Studies, 33*, 369-381.
- MacWilliam, L. (2007). *Nutrisearch Compartive Guide to: Nutritional Supplements* (4th ed.): Northern Dimensions Publishing.
- Mayer, G. G., & Villaire, M. (2007). *Health Literacy in Primary Care: A Clinician's Guide*. New York, NY: Springer Publishing Company, LLC.

- Morse, J. M., & Field, P. A. (1995). *Qualitative Research Methods for Health Professionals* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Nielsen-Bohlman, L. (Ed.). (2004). *Health Literacy: a Prescription to End Confusion*. Washington, DC: The National Academies Press.
- ODS. (2009a). *Dietary Supplements: Background Information*. Retrieved December 9 2009
- ODS. (2009b). <http://dietary-supplements.info.nih.gov/>. Retrieved December 9, 2009
- Otten, J. J., Hellwig, J. P., & Meyers, L. D. (Eds.). (2006). *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements*. Washington, DC: National Academies Press.
- Pfizer. (2011). <http://www.centrumvitamins.ca>. Retrieved April 20, 2011
- Polgar, S., & Thomas, S. A. (2000). *Introduction to Research in the Health Sciences* (4th ed.): Elsevier Limited.
- Power, E. M. (2005). Determinants of Healthy Eating Among Low-income Canadians. *Canadian Journal of Public Health*(96), S37-S42.
- Ramagopalan, S. V., Maugeri, N. J., Handunnetthi, L., Lincoln, M. R., Orton, S. M., Dymment, D. A., et al. (2009). Expression of the multiple sclerosis-associated MHC class II Allele HLA-DRB1*1501 is regulated by vitamin D. *PLoS Genetics*, 5(2), e1000369.
- Richards, L., & Morse, J. M. (2007). *User's Guide to Qualitative Methods* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Rosenberg, I. H., Abrams, S. A., Beecher, G. R., Champagne, C. M., Clydesdale, F. M., Goldberg, J. P., et al. (Eds.). (2003). *Dietary Reference Intakes: Guiding Principles for Nutrition Labeling and Fortification*. Washington, DC: National Academies Press.
- Ross, C. A., Taylor, C. L., Yaktine, A. L., & Del Valle, H. B. (Eds.). (2011). *Dietary Reference Intakes for Calcium and Vitamin D (Free Summary)*.
- Rothman, R. L., Housam, R., Weiss, H., Davis, D., Gregory, R., Gebretsadik, T., et al. (2006). Patient understanding of food labels: the role of literacy and numeracy. *American Journal of Preventive Medicine*, 31(5), 391-398.
- Rothman, R. L., Montori, V. M., Cherrington, A., Pignone, M. P., Rothman, R. L., Montori, V. M., et al. (2008). Perspective: the role of numeracy in health care. *Journal of Health Communication*, 13(6), 583-595.
- Rucker, D., Allan, J. A., Fick, G. H., & Hanley, D. A. (2002). Vitamin D Insufficiency in a Population of Health Western Canadians. *CMAJ*, 166(12), 1517-1524.

- Sacco, J. E., Tarasuk, V., Sacco, J. E., & Tarasuk, V. (2009). Health Canada's proposed discretionary fortification policy is misaligned with the nutritional needs of Canadians. *Journal of Nutrition, 139*(10), 1980-1986.
- Sarubin-Fragakis, A., & Thomson, C. (2007). *The Health Professional's Guide to Popular Dietary Supplements* (3rd ed.): American Dietetic Association.
- Seidman, I. (2006). *Interviewing as Qualitative Research* (3rd ed.). New York, NY: Teachers College Press.
- Shuaibi, A. M., House, J. D., & Sevenhuysen, G. P. (2008). Folate Status of Young Canadian Women after Folic Acid Fortification of Grain Products. *Journal of the American Dietetic Association*(108), 2090-2094.
- Statistics-Canada. (2010). Canadian Internet Use Survey, 2009. In S. Canada (Ed.) (pp. 2-4): The Daily Statistics Canada.
- Talbott, S. M., & Hughes, K. (2007). *The Health Professional's Guide to Dietary Supplements*. Philadelphia, PA: Lippincott Williams & Wilkins.
- Tracking Nutrition Trends VII: August 2008. (2008). Canadian Council for Food and Nutrition.
- USANA. (2009). <http://www.usana.com>. Retrieved December 15, 2009
- USDA. (2009). <http://www.fnic.nal.usda.gov>. Retrieved December 9, 2009
- Vance, K., Howe, W., & Dellavalle, R. P. (2009). Social Internet Sites as a Source of Public Health Information. *Dematol Clin, 27*, 133-136.
- White, J. H., & White, J. H. (2008). Vitamin D signaling, infectious diseases, and regulation of innate immunity. *Infection & Immunity, 76*(9), 3837-3843.
- Whiting, S. J., Vatanparast, H., Taylor, J., & Adolphe, J. (2010). Barriers to healthful eating and supplement use in lower-income adults. *Canadian Journal of Dietetic Practice & Research, 71*(2), 70-76.
- Worsley, A. (1989). Perceived Reliability of Sources of Health Information. *Health Education Research, 4*(3), 367-376.

APPENDIX A

Phase One Focus Group Consent Form

Phase Two Focus Group Consent Form

Key Informant Interview Consent Form

Phase 1 Focus Group – Consent Form (2 pages)

You are invited to participate in a study entitled *The Consumers' Need for Information on Supplements*. Please read this form carefully and feel free to ask any questions you might have.

Project Director:

Susan Whiting
College of Pharmacy and Nutrition,
University of Saskatchewan,
110 Science Place, Saskatoon, SK S7N 5C9
Phone: 966-5837
Email: susan.whiting@usask.ca

Research Assistant:

Megan McKay
College of Pharmacy and Nutrition,
University of Saskatchewan,
110 Science Place, Saskatoon, SK S7N 5C9
Phone: 261-6347
Email: mgm419@mail.usask.ca

The purpose of this study is to explore consumer's thoughts, ideas and beliefs about currently available resources to help people choose a multivitamin. We would like to hear about what type of information would help people to make choices about supplements. Additionally, we are interested learning about what prevents or stops individuals from taking multivitamins.

As a member of a community group who meets the selection criteria of this research project, you have been invited to participate in this study. Your opinions and comments are useful to identify the ways of improving currently available resources about multivitamins.

Participants will be asked to:

- 1) Participate in a group discussion (about 1 – 1½ hours) where we will talk about your thoughts, ideas, and beliefs about currently available resources to help consumers pick a multivitamin, and ways to improve these materials. We will also talk about what you think stops you or others from using multivitamins.
- 2) Possibly participate in an individual interview if clarification is needed or desired.
- 3) Be honest in your answers and discussions.
- 4) Fill out a demographic information form after the group discussion.

There are no foreseeable risks from participating in this project. One of the investigators will take notes during the interview. The interview will also be tape recorded with your permission. Your name and comments will remain confidential and your interview group will be assigned a code (a number). After the focus group discussion, and prior to the data being included in the final report and presentations, you will have an opportunity to review the transcript of the discussion and make any changes that you want. With your permission, we may use direct quotations from this interview in the oral and written reports.

The meeting will be arranged in an accessible place. We will pay for travel costs and babysitting as necessary. An honourarium of a \$ 20 grocery gift certificate will be paid to the participants.

The benefits for the research team are to recognize how currently available research tools can be improved to meet the needs of the general public.

The research team will undertake safeguards to keep this discussion confidential, but cannot guarantee that other members of the group will do so. Please respect the confidentiality of the other members of the group by not disclosing the contents of this discussion outside this group, and be aware that others may not respect your confidentiality. What you tell us will not be identified as your statements. Nothing you say will be used to judge you or your program.

Your participation is voluntary, and you may withdraw from the study for any reason, at any time, without penalty of any sort. If you find something about the room uncomfortable for you, please feel free within the discussion to let us know, so that we may address this if possible. If for any reason you become uncomfortable or do not wish to participate in the discussion, you are free to leave. If there is any question you do not wish to answer, you may decline by saying, "pass". You and your program will not suffer any penalty or negative consequence should you decline participation at any point in this discussion.

If you have any questions concerning the study, please feel free to ask at any point; you are also free to phone/email the research director and assistant at the numbers/email addresses provided above if you have questions at a later date.

This study has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board on April 22, 2010. Any questions regarding your rights as a participant may be addressed to that committee through the ethics office (966-2084).

I have read and understood the description provided above; I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I consent to participate in the study described above, understanding that I may withdraw this consent at any time. A copy of this consent form has been given to me for my records.

(Name of Participant)

(Date)

(Signature of Participant)

(Signature of Project Director)

Phase 2 Focus Group – Consent Form (2 pages)

You are invited to participate in a study entitled *The Consumers' Need for Information on Supplements*. Please read this form carefully and feel free to ask any questions you might have.

Project Director:

Susan Whiting
College of Pharmacy and Nutrition,
University of Saskatchewan,
110 Science Place, Saskatoon, SK S7N 5C9
Phone: 966-5837
Email: susan.whiting@usask.ca

Research Assistant:

Megan Koo
College of Pharmacy and Nutrition,
University of Saskatchewan,
110 Science Place, Saskatoon, SK S7N 5C9
Phone: 261-6347
Email: mgm419@mail.usask.ca

The purpose of this study is to explore consumer's thoughts, ideas and beliefs about a newly created resource to help people choose a multivitamin. We would like to hear about what type of information would help people to make choices about supplements and how the tool could be improved. We are also interested in learning about what prevents or stops individuals from taking multivitamins. Additionally, we would like to find out where and how they would like to access information on supplements and what communication forms would be most useable.

As a member of a community group who meets the selection criteria of this research project, you have been invited to participate in this study. Your opinions and comments are useful to identify the ways of improving currently available resources about multivitamins.

Participants will be asked to:

- 1) Participate in a group discussion (about 1 – 1½ hours) where we will talk about your thoughts, ideas, and beliefs about the newly created resource to help consumers pick a multivitamin. We will also ask you about how you would like to access information about supplements and ways we can make this information easily accessible.
- 2) Possibly participate in an individual interview if clarification is needed or desired.
- 3) Be honest in your answers and discussions.
- 4) Fill out a demographic information form after the group discussion.

There are no foreseeable risks from participating in this project. One of the investigators will take notes during the interview. The interview will also be tape recorded with your permission. Your name and comments will remain confidential and your interview group will be assigned a code (a number). After the focus group discussion, and prior to the data being included in the final report and presentations, you will have an opportunity to review the transcript of the discussion and make any changes that you want. With your permission, we may use direct quotations from this interview in the oral and written reports.

The meeting will be arranged in an accessible place. We will pay for travel costs and babysitting as necessary. An honourarium of a \$25 grocery gift certificate will be paid to the participants.

The benefits for the research team are to recognize how currently available research tools can be improved to meet the needs of the general public.

The research team will undertake safeguards to keep this discussion confidential, but cannot guarantee that other members of the group will do so. Please respect the confidentiality of the other members of the group by not disclosing the contents of this discussion outside this group,

and be aware that others may not respect your confidentiality. What you tell us will not be identified as your statements. Nothing you say will be used to judge you or your program.

Your participation is voluntary, and you may withdraw from the study for any reason, at any time, without penalty of any sort. If you find something about the room uncomfortable for you, please feel free within the discussion to let us know, so that we may address this if possible. If for any reason you become uncomfortable or do not wish to participate in the discussion, you are free to leave. If there is any question you do not wish to answer, you may decline by saying, "pass". You and your program will not suffer any penalty or negative consequence should you decline participation at any point in this discussion.

If you have any questions concerning the study, please feel free to ask at any point; you are also free to phone/email the research director and assistant at the numbers/email addresses provided above if you have questions at a later date.

This study has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board on April 22, 2010. Any questions regarding your rights as a participant may be addressed to that committee through the ethics office (966-2084).

I have read and understood the description provided above; I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I consent to participate in the study described above, understanding that I may withdraw this consent at any time. A copy of this consent form has been given to me for my records.

(Name of Participant)

(Date)

(Signature of Participant)

(Signature of Project Director)

Key Informant – Consent Form (2 pages)

You are invited to participate in a study entitled *The Consumers' Need for Information on Supplements*. Please read this form carefully and feel free to ask any questions you might have.

Project Director:

Susan Whiting
College of Pharmacy and Nutrition,
University of Saskatchewan,
110 Science Place, Saskatoon, SK S7N 5C9
Phone: 966-5837
Email: susan.whiting@usask.ca

Research Assistant:

Megan McKay
College of Pharmacy and Nutrition,
University of Saskatchewan,
110 Science Place, Saskatoon, SK S7N 5C9
Phone: 261-6347
Email: mgm419@mail.usask.ca

The purpose of this study is to explore consumer's thoughts, ideas and beliefs about currently available resources to help people choose a multivitamin. We would like to hear about what type of information would help people to make choices about supplements. We are interested in learning about what prevents or stops individuals from taking multivitamins. Additionally, we would like to find out where and how individuals would like to access information on supplements and what communication forms would be most useable.

As an opinion leader, you have been invited to participate in this study as you are someone who may influence healthy eating. Your opinions and comments are useful to identify the ways of improving currently available resources about multivitamins. Participants will be asked to participate in the interview where we ask about you about your experiences and personal thoughts.

There are no foreseeable risks from participating in this project. One of the investigators will take notes during the interview. The interview will also be tape recorded with your permission. Your name and comments will remain confidential and your interview group will be assigned a code (a number). After the focus group discussion, and prior to the data being included in the final report and presentations, you will have an opportunity to review the transcript of the discussion and make any changes that you want. With your permission, we may use direct quotations from this interview in the oral and written reports.

The meeting will be arranged in an accessible place. We will pay travel costs such as parking.

The benefits for the research team are to recognize how currently available research tools can be improved to meet the needs of the general public.

The research team will undertake safeguards to keep this discussion confidential, but cannot guarantee that other members of the group will do so. Please respect the confidentiality of the other members of the group by not disclosing the contents of this discussion outside this group, and be aware that others may not respect your confidentiality. What you tell us will not be identified as your statements. Nothing you say will be used to judge you or your program.

Your participation is voluntary, and you may withdraw from the study for any reason, at any time, without penalty of any sort. If you find something about the room uncomfortable for you, please feel free within the discussion to let us know, so that we may address this if possible. If for any reason you become uncomfortable or do not wish to participate in the discussion, you are free to leave. If there is any

question you do not wish to answer, you may decline by saying, “pass”. You and your program will not suffer any penalty or negative consequence should you decline participation at any point in this discussion.

If you have any questions concerning the study, please feel free to ask at any point; you are also free to phone/email the research director and assistant at the numbers/email addresses provided above if you have questions at a later date.

This study has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board on April 22, 2010. Any questions regarding your rights as a participant may be addressed to that committee through the ethics office (966-2084).

I have read and understood the description provided above; I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I consent to participate in the study described above, understanding that I may withdraw this consent at any time. A copy of this consent form has been given to me for my records.

(Name of Participant)

(Date)

(Signature of Participant)

(Signature of Project Director)

APPENDIX B

Ethics Approval Certificate

Ethics Amendment Approval Certificate



PRINCIPAL INVESTIGATOR
Susan J. Whiting

DEPARTMENT
Nutrition and Dietetics

BEH#
10-75

STUDENT RESEARCHER
Megan McKay

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED
University of Saskatchewan

SPONSOR
DIETITIANS OF CANADA

TITLE
Consumers' Need for Information on Supplements

ORIGINAL REVIEW DATE
27-Mar-2010

APPROVAL ON
22-Apr-2010

APPROVAL OF:
Ethics Application
Consent Protocol

EXPIRY DATE
22-Apr-2011

Full Board Meeting

Date of Full Board Meeting:

Delegated Review

CERTIFICATION

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: http://www.usask.ca/research/ethics_review/



John Rigby, Chair
University of Saskatchewan
Behavioural Research Ethics Board

Please send all correspondence to:

Research Ethics Office
University of Saskatchewan
Box 5000 RPO University, 1602-110 Gymnasium Place
Saskatoon SK S7N 4J8



Behavioural Research Ethics Board (Beh-REB)

Certificate of Approval Study Amendment

PRINCIPAL INVESTIGATOR
Susan J. Whiting

DEPARTMENT
Nutrition and Dietetics

Beh #
10-75

INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT
University of Saskatchewan

STUDENT RESEARCHER
Megan Koo

SPONSORING AGENCIES
DIETITIANS OF CANADA

TITLE
Consumers' Need for Information on Supplements

APPROVAL OF
Phase 2 Focus Group Consent Form
Phase 2 Focus Group - Letter of Intent
Phase 2 Focus Group - Interview Guide

APPROVED ON
18-Jan-2011

CURRENT EXPIRY DATE
22-Apr-2011

Full Board Meeting

Date of Full Board Meeting:

Delegated Review

Expedited Review

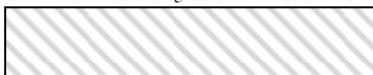
CERTIFICATION

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: http://www.usask.ca/research/ethics_review/



John Rigby, Chair
University of Saskatchewan
Behavioural Research Ethics Board

Please send all correspondence to:

Research Ethics Office
University of Saskatchewan
Box 5000 RPO University, 1602-110 Gymnasium Place
Saskatoon SK S7N 4J8

APPENDIX C

Demographic Information Sheet

Demographic Information

These questions are for demographic purposes only. Please feel free to skip or not answer questions if you do not feel comfortable.

1. How old are you (please circle)?

- 18-30
- 31-50
- 51-70
- 71 and over

Male ____ Female ____

2. What is the highest level of education that you have completed (please circle)?

- less than grade 12
- high school diploma
- some post-secondary
- post-secondary degree/diploma
- graduate degree

3. What is your primary source of household income (please circle)?

- social assistance program
- employment insurance
- self employed
- employed/waged
- family members
- student loans
- pension

other: _____

4. Including yourself, how many people live in your household? _____

5. Including yourself, how many generations (children, parents, grandparents, etc.) live in your household? _____

6 a. How many adults over the age of 18 years live in your household? _____

b. How many youth aged 18 years or younger live in your household? _____

Interviewer: _____ Date: _____

Comments:

APPENDIX D

External Audit of Research Transcripts Report



July 31st, 2011

To: Dr. Susan Whiting, Professor, College of Pharmacy & Nutrition, University of Saskatchewan

Re: External audit of research transcripts
(key informant interviews and focus group sessions)

Dear Dr. Whiting;

The external audit of transcripts is now completed for the research project entitled, “Consumers’ need for information on supplements.”

Of primary relevance, no major omissions were identified in the reporting and analyses of research transcripts.

Yet although the data reporting was observed as adequate, opportunities do exist to delve deeper into the data and potentially provide more contributions to this field of inquiry based on the richness of the transcript data in conjunction with the significance of this topic to the public’s health. Some examples to consider for future analysis include:

- a summary of simple counts of vitamin, mineral and other natural health products cited
- more visual representation of themes in regards to their direction and magnitude
- potential sub-themes that could be examined further: media – opportunities and challenges; inter-professional practice and education; funding mechanisms; and lifespan considerations as examples.

Please do not hesitate to contact me should you have any questions regarding the general or specific items as outlined above.

Thank you again for this wonderful work opportunity.

Yours Sincerely,

Tanis Vye Mihalynuk, PhD, RD

Wellwinds Nutrition

T:902-690-7743

E: tanisvye1@yahoo.com