

**Insight on Food: An analysis of the nutritional knowledge of first year students living in Totem Park
Residence**

Heather Ma, Marika van Reeuyk, Regan Eberding, Richard Wu, Kevin Krispin

University of British Columbia

LFS 450

April 11, 2016

Disclaimer: "UBC SEEDS Program provides students with the opportunity to share the findings of their studies, as well as their opinions, conclusions and recommendations with the UBC community. The reader should bear in mind that this is a student project/report and is not an official document of UBC. Furthermore readers should bear in mind that these reports may not reflect the current status of activities at UBC. We urge you to contact the research persons mentioned in a report or a SEEDS team representative about the current status of the subject matter of a project/report".

UBC Social Ecological Economic Development Studies (SEEDS) Sustainability
Program
Student Research Report

**Insight on Food: An analysis of the nutritional knowledge of first year students
living in Totem Park Residence**

By: Heather Ma, Richard Wu, Kevin Krispin
Regan Eberding and Marika van Reeuyk

**University of British Columbia
Land, Food & Community III**

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EXECUTIVE SUMMARY

Many undergraduate students lack the ability to appropriately assess, prioritize, and improve their level of nutrition according to research on Canadian campuses (Boland et al. 2014). Undergraduate admission at UBC has increased significantly in recent years. Since many of these students are away from home for the first time, support to encourage judicious food choices may be in order. Though many other Canadian universities have conducted studies assessing nutritional knowledge in undergraduates with relevance to Canadian Food Guide groups and individual nutrients, no existing literature was found to compare levels of knowledge regarding multiple nutrients within a single study. In addition, no known studies relating to nutrition literacy have been conducted at any of UBC's residences.

The main goal of this study was to highlight the nutritional knowledge gap of first-year students in residence nearing the completion of their academic year to help guide future nutritional education initiatives. Specific objectives include elucidating student's level of familiarity with individual nutrients (vitamin D, calcium, omega-3 fatty acids, sodium, fibre, and iron) and the sources of these nutrients in the dining hall. The specific nutrients were chosen in collaboration with Ms. Nicole Fetterly, Registered Dietician and Manager of Nutrition & Wellness at UBC Student Housing and Hospitality Services. The data provides a snapshot of the nutritional knowledge of UBC's first-year student in residence.

The survey took place at Totem Park Residence dining hall with 125 first year students participating in March 2016. The survey was designed to address confidence

in nutritional knowledge and, for students who felt somewhat or very confident, test actual knowledge on sources of specific nutrients. There was a clear nutritional knowledge deficit specifically regarding calcium, iron, protein and vitamin D. The general trends observed were summarized in four categories: nutrients with high confidence and knowledge levels (fibre and sodium); high confidence and low knowledge levels (protein); nutrients with low confidence and high knowledge levels (omega-3 fatty acids); and nutrients with low confidence and knowledge levels (calcium, iron and vitamin D).

Our findings demonstrate the importance of establishing measures to improve nutrition knowledge of first-year students at UBC. The results of this survey can be used to help guide the establishment of future programs and services, directly contributing to the health and well-being of the undergraduate population, during and beyond their university careers. We recommend public display such as signage and posters, peer health educators and cooking demonstrations. Future research on the impact of cultural background on food choices and understanding of nutrient functions is also strongly recommended.

INTRODUCTION

Nutrition is an integral component of a healthy independent life. As a person grows up, his/her knowledge and motivation to pursue a healthy diet is influenced by a variety of settings and factors, including family, home, school, community and culture. Student residences are often the first home away from home for first-year

university students. For many of these young adults, dining halls on campus are the first setting where they must regularly make food choices independently based on nutritional knowledge.

A growing body of research at Canadian universities is beginning to highlight a problem: many undergraduate students lack the ability to appropriately assess, prioritize, or improve their level of nutrition (Boland et al. 2014; Marquis 2005; Matthews et al. 2015; Strawson et al. 2013; Williams & Mazier 2013). Addressing these challenges is important to the future well-being and success of students.

Undergraduate admission at UBC has increased significantly in recent years. As the supplier of both housing and food to this growing community of students supported on campus, UBC is well placed to help students through this transition by providing specialized programs supporting nutrition education. The identification of knowledge gaps would be useful to the designers which would improve students' food literacy. Improving students' food-related knowledge should promote student health, quality of life, and transfer of skills to others during their university experience and beyond. Overall this project should contribute to the social sustainability of the food system on campus.

Current literature implies that student's nutritional knowledge is largely affected by their level of nutrition education. Recommendations following various surveys and questionnaires completed in universities across Canada include the promotion of nutrition education for students and large nutrition knowledge differences between students of different faculties. Nutrition knowledge was found to vary with years of

studies at St. Francis Xavier University in Nova Scotia, since fourth-year science students consumed less saturated fat than first-year students (Emrich and Mazier, 2009). Another study carried out at the same university revealed that students who had taken an introductory nutrition course had the best understanding of both the sources and nutritional benefits of whole grains among all students tested (William & Mazier 2013). At Western University in London, Ontario, student knowledge of the source and function of vitamin D was generally poor but, medical sciences students scored the highest among all groups (Boland et al. 2014). However, University of Alberta female students who had taken at least three nutrition courses did not demonstrate an improved level of understanding regarding requirements of the Canadian Food Guide or the Mediterranean Diet Quality index score than other students. This study demonstrates that nutrition education is likely not enough to ensure optimal dietary intake (Strawson et al. 2013). The most important factor driving food choice of 339 university students at Western University was convenience; while factors like price, pleasure and health also had significant influence (Marquis, 2005). Students who reported having poor capabilities in the kitchen also demonstrated a stronger affinity towards convenience foods. The results of the study emphasized a need for educational programming targeted towards kitchen skill development in conjunction with a shift in common thought among students that fresh, healthy foods are incompatible with a busy lifestyle (Marquis 2005). At Mount St. Vincent University in Halifax, international students identified a desire to preserve their cultural identity alongside maintenance of dietary habits. Amos and Lordly

(2014) suggest that campus cafeterias should produce culturally authentic foods for students to provide a sense of belonging. These studies suggest that while nutrition education is crucial, motivation and a suitable environment to practice healthy eating habits are also important.

The objective of this study was to survey first year students living in Totem Park Residence to gain an understanding of their general level of nutritional knowledge. The survey delivered questions surrounding nutrients of highest concern encountered at UBC.

As students from the Faculty of Land and Food Systems, with background in science and agriculture, we consider ourselves having a basic understanding of fundamental nutritional concepts and know that this topic is complex. Having lived in residence on UBC's campus ourselves, we are familiar with the challenging transition experienced by students moving out to university for the first time. As a result, we were committed to the goals of this project and believe in the importance of healthy, independent, sustainable living.

METHODOLOGY

We conducted a literature search using UBC Library online catalogues and Google Scholar with the following keywords: *vitamin D, knowledge assessment, university students, health promotion program development, Canadian university, nutrition education, perceptions, grain, dietetics, studies, college students, dietary recommendations, intentions, and self-efficacy.*

We developed survey questions addressing topics recommended by Ms. Nicole Fetterly, Registered Dietician and Manager of Nutrition & Wellness at UBC Student Housing and Hospitality Services. The survey questions were designed with the help of Dr. Marie-Claude Fortin, instructor for the course and Sean Holowaychuk, graduate student in Land and Food Systems. The nutrients identified for knowledge assessments were vitamin D, calcium, omega-3 fatty acids, sodium, fibre and iron.

Our survey employed a “confidence and verification” method where students first answered a question indicating their confidence in identifying sources of a given nutrient in the cafeteria. If their response indicated that they were extremely, fairly, or somewhat confident in their knowledge, we followed that question with another asking them to identify this nutrient’s sources from a list of five or six options thereby verifying their confidence (Appendix 1). The survey was executed as a face to face interview in one of the two first-year residence at UBC, Totem Park.

Prior to officially administering the survey, each group member conducted a test trial on three individuals which prove to be successful. We then proceeded to administer the survey to 125 first-year students in the Totem Park dining hall to obtain a 10% confidence interval (margin of error) with 90% confidence level (level of certainty) since 1003 students comprise the entire student population in this residence (Sean Holowaychuk, personal communication). We conducted the survey during lunch and dinner times during the week of March 14th, 2016. We approached individuals and asked if they were first-year students or not. Any students other than first-years were omitted from this survey. During the survey, we asked questions and

showed students the choices they could select for an answer. We did not impose a time limit.

The confidence questions were weighted with a score of three for extremely confident, two for fairly confident, one for somewhat confident and zero for not confident. Individuals who stated that they were not confident in a specific topic were not assessed for knowledge. Knowledge answers were weighted in order to emphasize the best food sources. For example, within the omega-3 source question, salmon was given a weight of 2/7, whereas the other 5 options were weighted 1/7 (Sean Holowaychuk, personal communication).

RESULTS

Confidence scores on a possible maximum of three, indicate that students had the least confidence in their knowledge about sources of vitamin D, calcium, omega-3 fatty acids and iron and the most confidence about sources of fibres, proteins and sodium (Table 1). Interestingly, students with some confidence in their knowledge knew the least about the sources of vitamin D, calcium and proteins, indicating overconfidence in their ability to determine a good source of protein. In all cases, knowledge scores remained below 0.73/1 (Table 1). Note that knowledge scores in this survey only include students who had some degree of confidence in their knowledge and exclude students with no confidence.

Table 1. Confidence and knowledge scores of first year students in Totem Park

Residence at UBC

Nutrient	Confidence Score on a maximum of 3	Knowledge Score on maximum of 1
Fibre	2.2	0.7
Protein	2.1	0.6
Sodium	2.0	0.7
Iron	1.7	0.6
Omega-3	1.6	0.7
Calcium	1.5	0.6
Vitamin D	1.2	0.5

Students identified correct sources of omega-3 fatty acids in fish with success (74-88% of respondents) but not in chia seeds (57% of respondents). Wrong answers were chosen by 14 to 30% of respondents (Fig. 1).

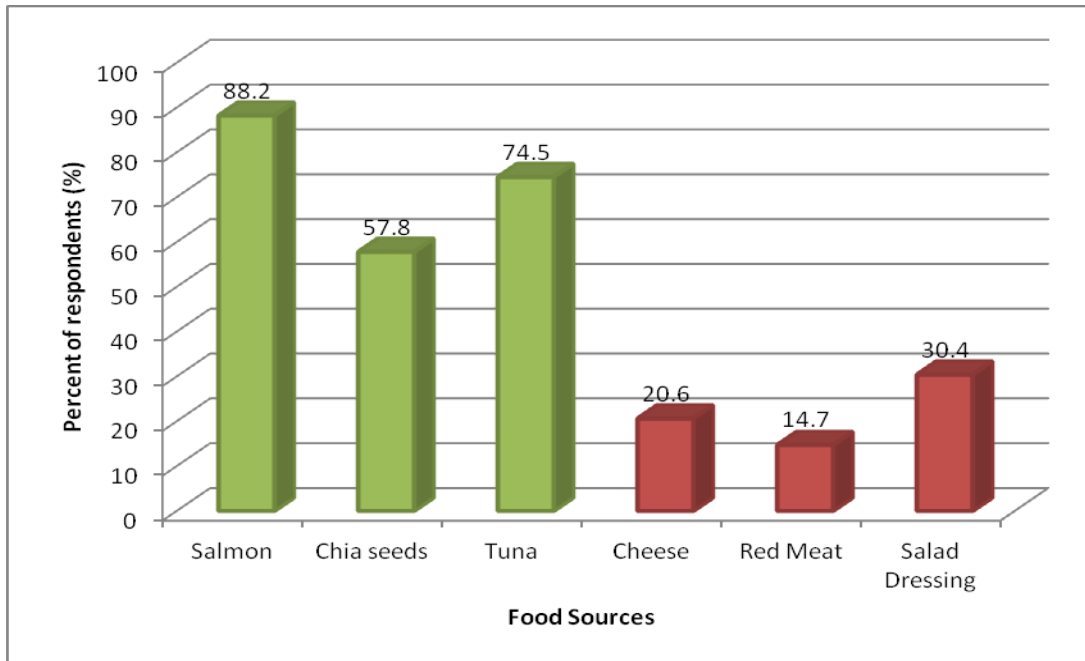


Figure 1. Percentage of students choosing answers to the omega-3 fatty acids verification question. Correct answers, green and incorrect answers, red. n=102

Students identified correct sources of sodium in noodle soup, stir fry meat, pepperoni pizza and sushi with success (65-92% of respondents) but not pasta (55% of respondents) (Fig. 2).

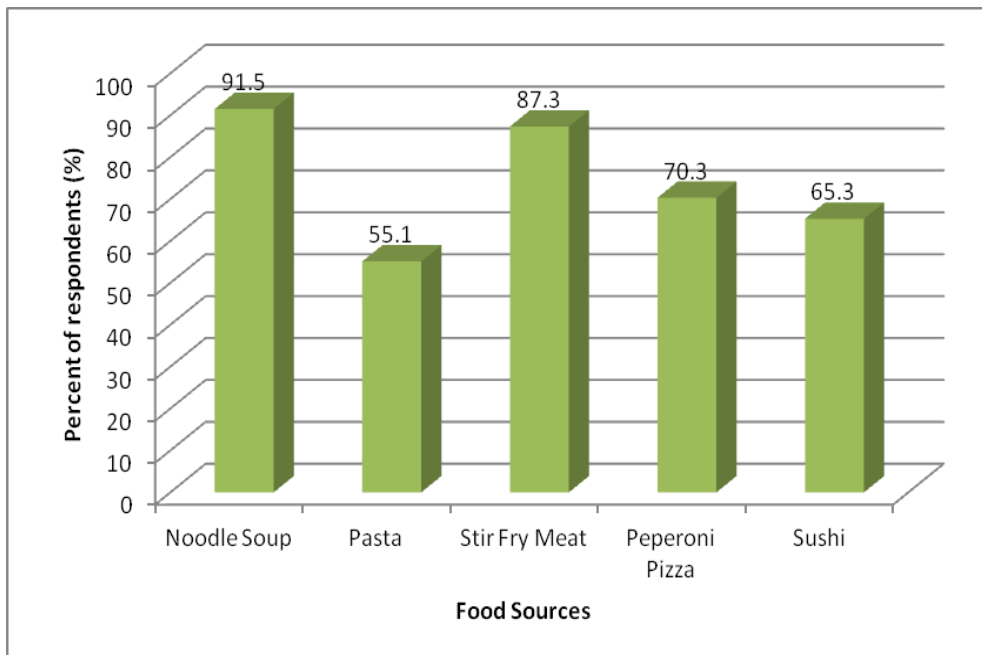


Figure 2. Percentage of students choosing answers to the sodium verification question. Correct answers, green. n=118

Students identified correct sources of iron in spinach with success (85% of respondents) but limited success with whole grains (27% of respondents) (Fig. 3). Students identified the best source of iron in lentils with success (14%) (Fig. 4).

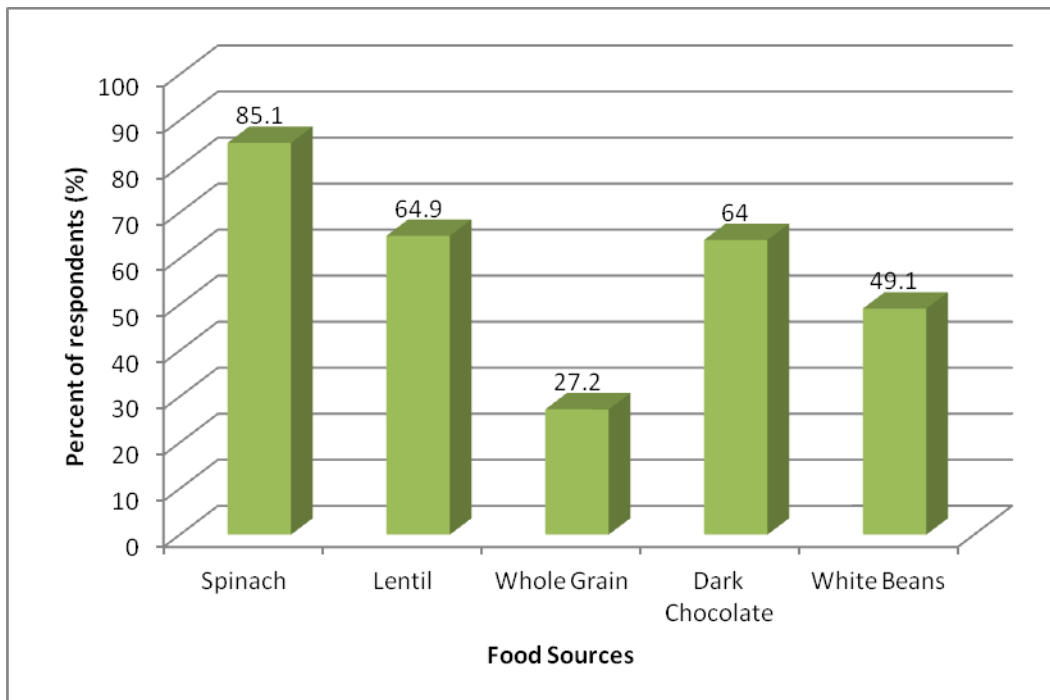


Figure 3. Percentage of students choosing answers to the iron verification question. Correct answers, green. n=114.

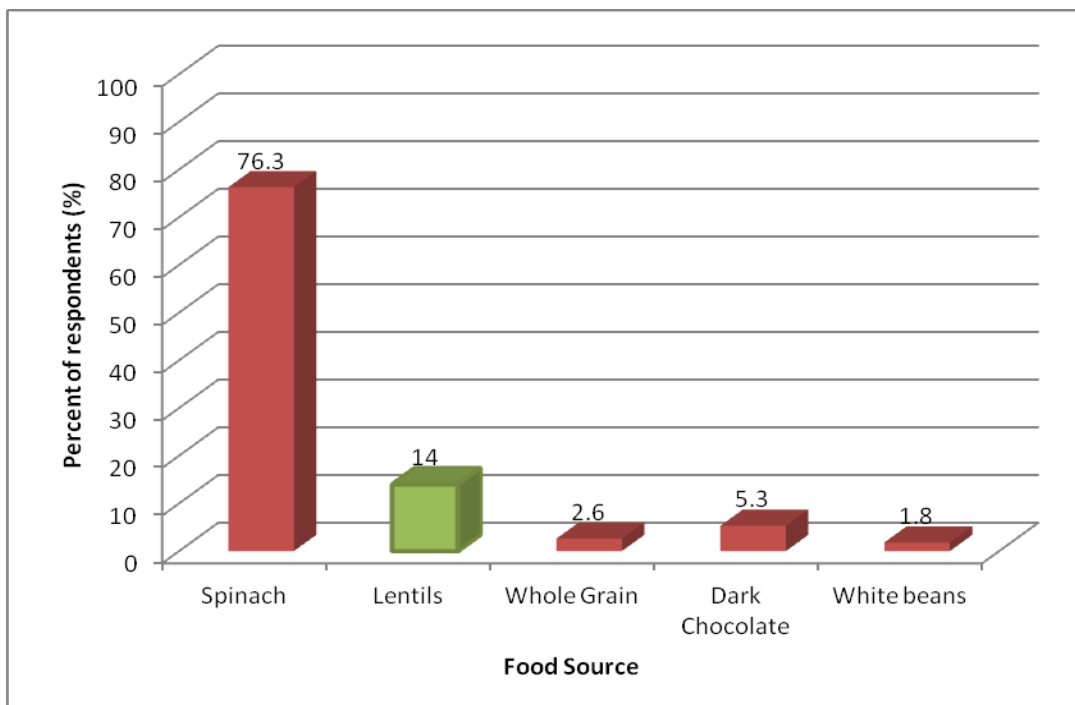


Figure 4. Percentage of students choosing answers to the best iron source question. Correct answers, green and incorrect answers, red. n=114.

Students identified correct sources of fibre in quinoa and oatmeal with success (79-81% of respondents) but erroneously identify corn flakes as a significant source (60% of respondents) (Fig. 5).

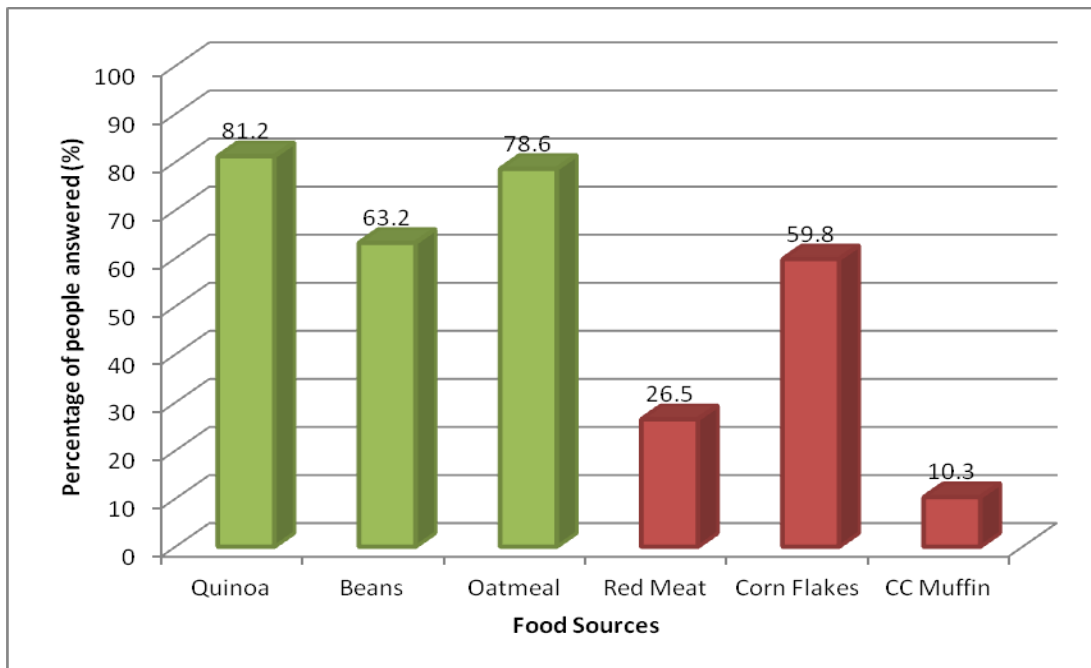


Figure 5. Percentage of students choosing answers to the fibre verification question. Correct answers, green and incorrect answers, red. n=117.

Students identified correct sources of protein in milk, lentils and eggs with success (70-88% of respondents) but not in rice and beans (44% of respondents). Wrong answer were chosen by 55% of respondents (Fig. 6).

Students identified correct sources of calcium in tofu, kale and almond milk with success (50-64% of respondents). Wrong answer were chosen by 7-31% of respondents (Fig. 7).

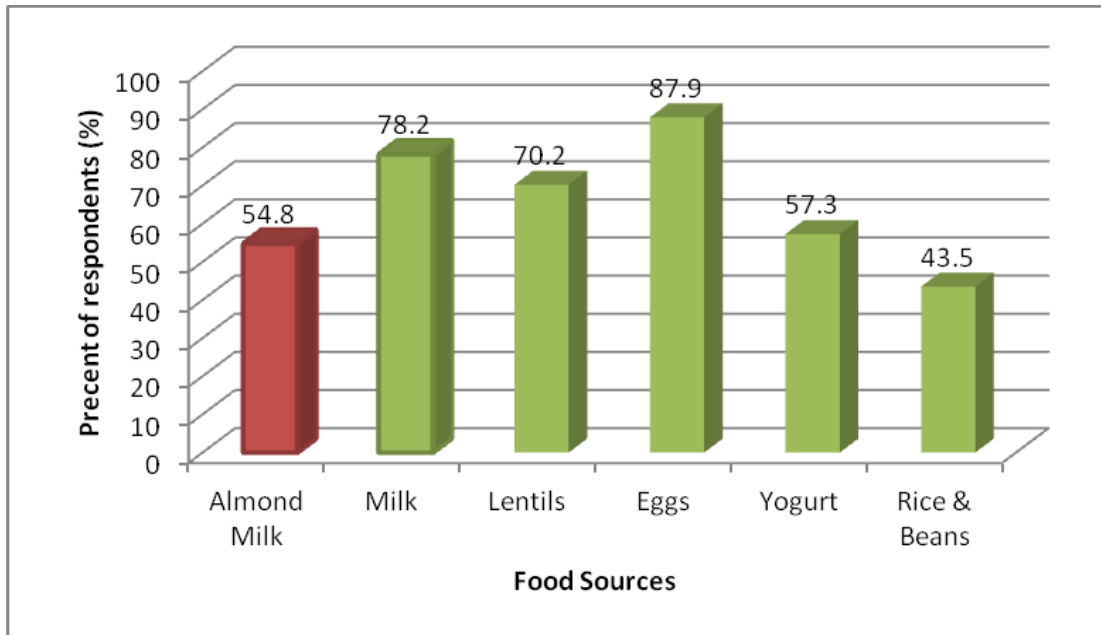


Figure 6. Percentage of students choosing answers to the protein verification question. Correct answers, green and incorrect answers, red. n=122.

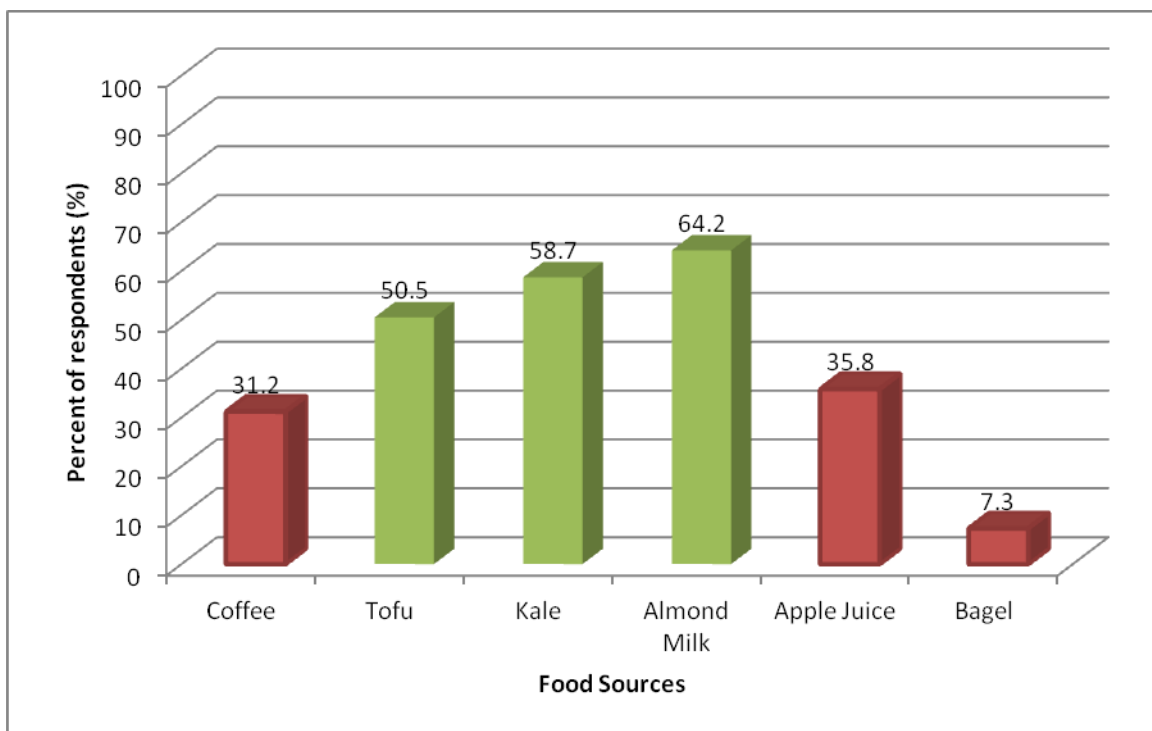


Figure 7. Percentage of students choosing answers to the calcium verification question. Correct answers, green and incorrect answers, red. n=109.

Students identified correct sources of vitamin D in egg, tuna and salmon with success (63-82% of respondents) but erroneously identify spinach as a significant source (64% of respondents). Wrong answer were chosen by 16-33% of respondents (Fig. 8).

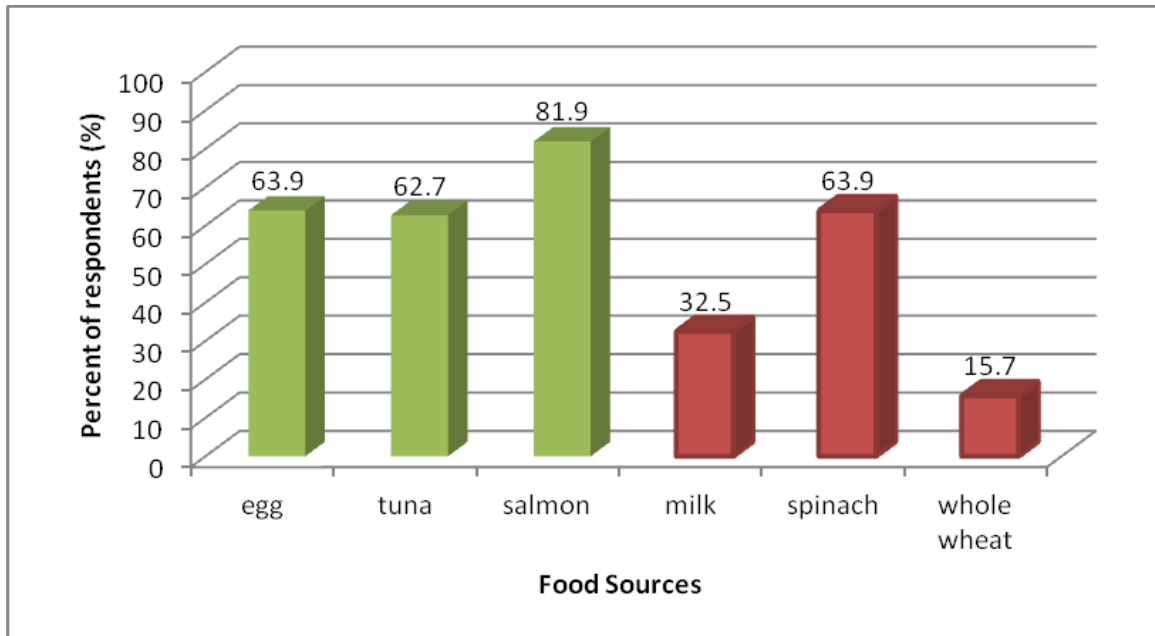


Figure 8. Percentage of students choosing answers to the omega-3 fatty acids verification question. Correct answers, green and incorrect answers, red. n=84.

DISCUSSION

Nutrients with High Confidence and High Knowledge Scores

Students demonstrated a level of familiarity towards sodium and fibre with high confidence and high knowledge scores in both nutrients.

Sodium

Sodium had the highest knowledge score with 72% and the confidence score of 2.0/3. All of the options for the verification question were correct answers as these all have the potential to contain excess sodium. Interestingly, 91% of students identified noodle soup as a high-sodium food while only 55% of student identified

pasta dish as a potential high sodium. This score can be due to the lack of description of the type of sauce or ingredients in this pasta dish causing less students to opt for this option. However, it remains that students may not be aware that pasta sauce can be high in sodium.

Fibre

Fibre also yielded high confidence and high knowledge level. An average of 74% of students chose the correct answers of quinoa, beans and oatmeal. However, 60% of students have erroneously chose corn flakes as a high fibre source. This may be due to the general trend of breakfast cereals being marketed as high-fibre food.

Nutrients with High Confidence and Low Knowledge Scores

Protein

The only macronutrient, protein, had a confidence score of 2.1/3 and a knowledge score of 57%. The high confidence may be due to the protein being a macronutrient and the subject of basic nutrition information such as meat products being good sources of protein. However, there were no meat sources in our answers and instead, we provided other high protein food sources such as lentils, eggs, yogurt and rice and beans. As many as 87% of students were able to identify eggs and 78% identified milk as high source of protein, while only 43% were able to identify rice and beans. Out of all the food options provided, rice and beans were the only complete source of protein.

Nutrients with Low Confidence Scores and High Knowledge Scores

Omega-3 fatty acid

Omega-3 fatty acid is a nutrient with a low confidence score of 1.6/3 and knowledge score of 67%. As many as 88% of students were able to identify salmon and 74% of student were able to identify tuna as a source of omega-3, but only 57% identified chia seeds as a source of omega-3. This shows that students are most comfortable identifying fish as sources of omega-3 fatty acids. Two of the correct answers, salmon and tuna, could have contributed to the high knowledge scores. We think other answers such as walnuts or ground flaxseeds could have provided a more in-depth evaluation of students' knowledge omega-3 sources.

Nutrients with Low Confidence and Low Knowledge Scores

The lack of knowledge and confidence regarding vitamin D, iron and calcium is of concern. It is safe to assume that students were unable to make proper educated decisions on dietary selections regarding these nutrients.

Vitamin D

Vitamin D has the lowest confidence score of 1.15/3 and knowledge score of 52%. Eggs, tuna, and salmon were correctly identified as vitamin D sources by 64%, 63%, and 82% of students, respectively. Though most students correctly selected the listed source of vitamin D, 63% of students also incorrectly identified spinach as a vitamin D source. We suspect a lot of students selected spinach because it was the

only vegetable on the list and daily vegetable consumption is commonly understood to be an important part of a healthy diet.

Iron

All available options (spinach, lentil, whole grain, dark chocolate and white beans) for the iron knowledge verification question were correct sources. Our results demonstrated a relatively low confidence score of 1.7/ 3. Spinach was correctly identified as a good iron source by 85% of students. However, only 27% of students correctly selected whole grain bread as a source. Furthermore, a relatively high proportion of students (76% overall) incorrectly identified spinach as possessing the highest concentration of iron. The source possessing the highest concentration of iron was lentils since it is the source that provides the most iron when consumed in the smallest amount. Therefore, 65% of students were correct in identifying lentils as a general iron source, but only 14% students successfully chose them as the source containing highest concentration of iron at intake.

Calcium

Calcium had a confidence score of 1.50/3 and a knowledge score of 55%. We were surprised that only 64% of students were able to accurately identify almond milk as a source of calcium. As a common substitute for dairy milk to those with vegan and lactose intolerant dietary restrictions, we expected more students to understand this. This could demonstrate that many students don't recognize that almond milk and dairy milk actually contain similar levels of calcium. We were surprised to observe that 58% of students (a relatively high proportion) correctly selected kale as a source of

calcium. However, for this question, kale was the only vegetable we provided as an available choice and as mentioned above, students may generally perceive vegetables as containing high levels of important nutrients relative to other food sources.

RECOMMENDATIONS

We have several recommendations for future research projects and an action plan for the UBC's community on ways to increase students' food literacy.

Action for Campus Residences

Public Displays– Signage, Poster and Pamphlet Information:

We recommend that a series of educational posters illustrating important sources of nutrients along with their functions be on display at the Totem Park and Vanier Place dining halls. If the posters are concise, attractive, and placed in strategic locations within and surrounding residence dining halls, they would provide an easy avenue for students to increase their nutritional knowledge while eating or walking by. The posters could be used to target specific nutrients of highest concern, such as iron, vitamin D and calcium. We also suggest pamphlets about healthy food choices be distributed during first-year student orientation. These pamphlets could contain specific nutrient information, portion recommendations and promotion of healthy meals and snacks.

Peer Health Educators

Peer educational nutrition programs are effective in university settings (Todorovich 2011). Furthermore, students engaged with peer health educators starting in freshman year [first-year] are likely to continue their healthy eating habits until their senior year [fourth-year] of college (White et al. 2009). At UBC, a Peer Health Educator program could be implemented through collaboration between Food Services and the Wellness Centre. The UBC's Wellness Centre is a drop-in centre that promotes programs and resources targeting mental and physical health. The peer educators could give tours of cafeterias in first-year residences on several different evenings at the beginning of the school year. During the tour, the peer educator could share his or her experiences with the challenges of healthy eating along with ways to overcome them. In addition, they could share strategies for prioritizing healthy eating amidst the regular demands of a busy student schedule including recommendations specific to exam periods when students' schedules are irregular and extremely busy.

Workshops

Ms. Fetterly is planning to introduce nutrition workshops run by student peers to create a safe, fun and engaging environment to improve food literacy. This will strengthen the community aspect of university residence as a whole by building connections between students and increasing intercultural communication, facilitating the transfer of skills and knowledge and fostering a sense of leadership and

responsibility among individuals. The data we gathered will hopefully be useful for such projects.

Cooking Demonstrations

Finally, we recommend having cooking demonstrations for students. These demonstrations could help students learn how their food is prepared and highlight the care and effort that is put into cooking food from scratch to reinforce proper decision-making throughout the term. This can also be used to raise awareness of the challenges that lie ahead when students will be moving out of the Totem Park or Vanier Place residences.

Future Research

Learning about Students' Understanding of Food Functions:

Our survey verified students' nutritional knowledge by checking if they could identify foods with certain macro- and micronutrients on offer in the dining hall. We recommend examining students' knowledge of micro- and macronutrients' main functions in the body. Students may be more inclined to develop healthy eating habits if they know the benefits associated with certain food choices.

Cultural Impact of Food Choices:

When students are faced with multiple food options in a cafeteria, it is likely that students with different cultural backgrounds will have different behaviors when selecting food. We recommend looking at international students specifically to examine the impact of a foreign food culture on food choices and identify their need

for information which may be different than that of the student population used to western food.

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APPENDIX 1: SURVEY SAMPLE

Correct answers are highlighted.

Please select: Male / Female / Other / Prefer not to disclose

Have you participated in this survey already?

- a. Yes
- b. No

Were you very familiar with the types of food here when you first arrived in the residence?

- a. Yes
- b. No

Do you think the foods you consumed before entering university is healthier than your current diet at university?

- a. Agree
- b. Strongly Disagree
- c. My diet is the same

Omega 3 is a healthy fat. How confident are you in identifying a source of Omega-3 in Totem Cafeteria?

- a. Extremely
- b. Fairly
- c. Somewhat
- d. Not confident

Can you identify all the major sources of Omega-3 fats in the cafeteria?

- a. Salmon
- b. Chia Seeds
- c. Tuna Sandwich
- a. Cheese

- b. Lean red meat
- c. Salad dressing containing olive oil

How confident are you in identifying a source of food with excess sodium?

- e. Extremely
- f. Fairly
- g. Somewhat
- h. Not confident

Sodium is useful for maintaining body functions, but consuming too much could be detrimental to health. When you buy these foods at a food outlet, do you think they have a high potential of containing excess sodium?

- a. "Mr. Noodles" noodle soup (or similar products) Y/N
- b. Pasta dish Y/N
- c. Chinese Stir-fry meat Y/N
- d. Pepperoni Pizza slice Y/N
- e. Sushi with soy sauce Y/N Potential?

Iron is important for blood health. How confident are you in identifying a source of Iron in Totem Cafeteria?

- a. Extremely
- b. Fairly
- c. Somewhat
- d. Not confident

Can you identify all the major sources of iron in the cafeteria? .

- a. Spinach
- b. Lentil
- c. Whole grain bread
- d. Dark Chocolate
- e. White beans

Out of the choices you above, which source provides the most Iron content with the smallest amount of intake?

- a. Spinach
- b. Lentil

- c. Whole grain bread
- d. Dark Chocolate
- e. White beans

Fibre is essential for maintaining proper digestion. How confident are you in identifying a source of Fiber in Totem Cafeteria?

- a. Extremely
- b. Fairly
- c. Somewhat
- d. Not confident

Can you identify all the major sources of fibre in the cafeteria?

- a. Quinoa
- b. Beans
- c. Oatmeal
- d. Red Meat
- e. Corn Flakes Cereal
- f. Chocolate Chip Muffin

Protein is essential for maintaining bodily functions. How confident are you in identifying a source of Proteins in Totem Cafeteria?

- a. Extremely
- b. Fairly
- c. Somewhat
- d. Not confident

Can you identify all the major sources of proteins in the cafeteria?

- a. Almond milk
- b. Dairy milk
- c. Lentils
- d. Eggs
- e. Yogurt
- f. Rice and beans

Calcium is crucial for maintaining bone health. How confident are you in identifying a source of Calcium in Totem Cafeteria?

- a. Extremely
- b. Fairly
- c. Somewhat

d. Not confident

Can you identify all the major sources of calcium in the cafeteria?

- a. Coffee
- b. Tofu
- c. Kale
- d. Almond milk
- e. Apple juice
- f. Bagel

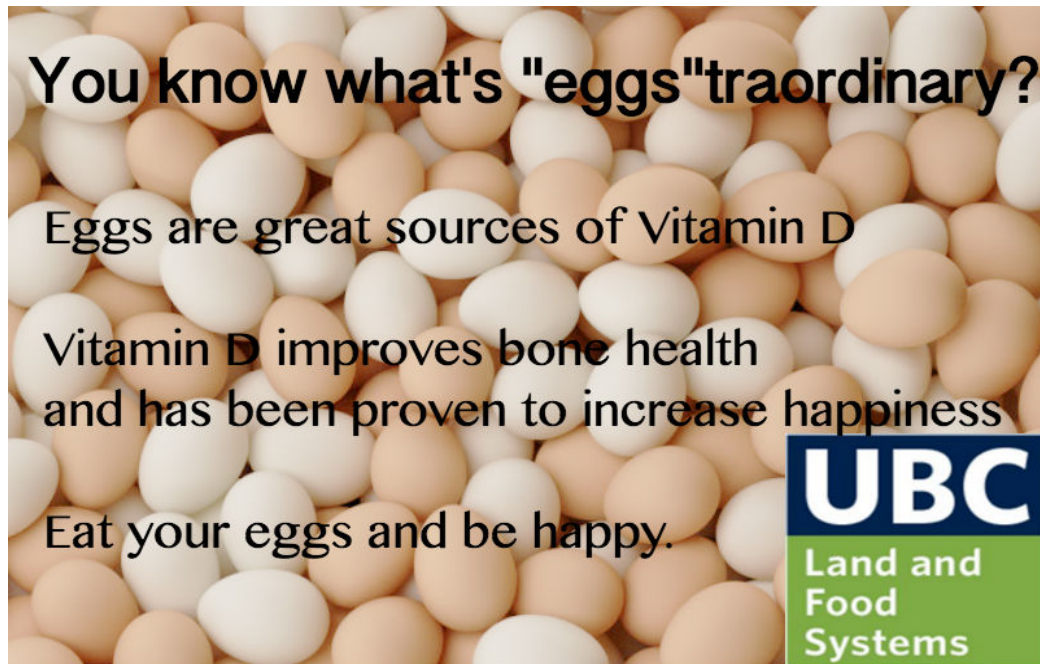
Vitamin D is essential for normal body development. How confident are you in identifying a source of Vitamin D in Totem Cafeteria?

- a. Extremely
- b. Fairly
- c. Somewhat
- d. Not confident

Can you identify all the major sources of Vitamin D in the cafeteria?

- a. Egg
- b. Tuna
- c. Salmon
- d. Non fortified milk
- e. Spinach
- f. Whole wheat bread

APPENDIX 2: SAMPLE POSTER



You know what's "eggs"traordinary?

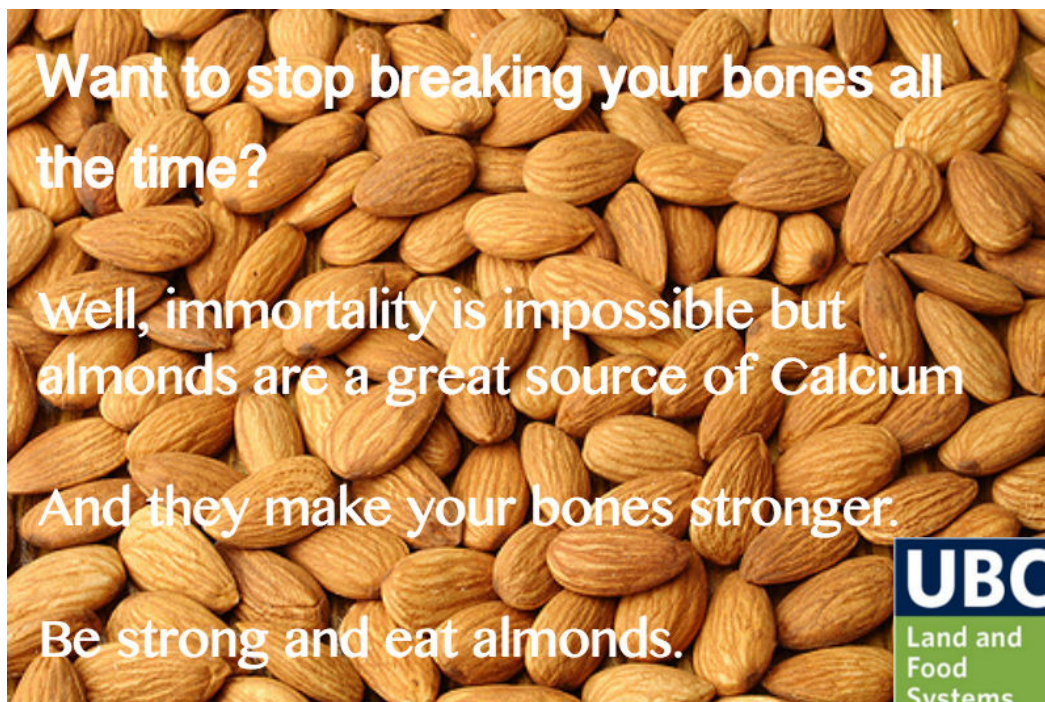
Eggs are great sources of Vitamin D

Vitamin D improves bone health
and has been proven to increase happiness

Eat your eggs and be happy.

UBC
Land and
Food
Systems

This poster features a background of numerous white and brown eggs. The text is overlaid in black, with the title in a larger, bold font. The UBC logo is positioned in the bottom right corner, consisting of a blue square with 'UBC' in white and a green square below it with 'Land and Food Systems' in white.



**Want to stop breaking your bones all
the time?**

Well, immortality is impossible but
almonds are a great source of Calcium

And they make your bones stronger.

Be strong and eat almonds.

UBC
Land and
Food
Systems

This poster features a background of many almonds. The text is overlaid in white, with the title in a larger, bold font. The UBC logo is positioned in the bottom right corner, consisting of a blue square with 'UBC' in white and a green square below it with 'Land and Food Systems' in white.