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Farmed Seafood and Canadian Health: How Higher Seafood Consumption Can Save Lives

Prepared for:
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1. Introduction

Canada's Food Guide recommends that Canadians consume at least two 75g portions of fish or seafood a week.[1] A number of studies have found a direct link between fish and seafood consumption and health benefits, particularly relating to heart health. Despite the well established benefits, Canadians currently consume, on average, just over half of the recommended weekly intake – 101g compared to 150g recommended.

The purpose of this paper is to measure the potential health benefits if Canadians ate the Canada's Food Guide recommended amount of fish and seafood. We have focused on quantifying the benefits for a reduction in the number of deaths related to coronary heart disease – one of the leading causes of death in Canada – and discuss some of the other health benefits of fish and seafood consumption.

2. Health Benefits of Fish and Seafood

A considerable body of evidence is amassing on the direct benefits of consuming seafood, in particular those rich in omega-3 oils. Omega-3 fatty acids (also known as n-3 fatty acids) are polyunsaturated fatty acids that are essential nutrients for health. Humans need omega-3 fatty acids for numerous normal body functions, such as controlling blood clotting and building cell membranes in the brain, and since the human body cannot make omega-3 fats, we must get them through food. Omega-3 fatty acids are also associated with many health benefits, including protection against heart disease and possibly stroke. New studies are identifying potential benefits for a wide range of conditions including cancer, inflammatory bowel disease, and other autoimmune diseases such as lupus and rheumatoid arthritis.

Numerous studies have now linked a variety of human health attributes directly to the consumption of EPA and DHA contained in seafood. Given that 50% of the aquatic food consumed by humans originates from farmed sources, it is not surprising that aquaculture is contributing in an important way to enhancing human health by supplying these essential nutrients.

The most common cited importance of consuming seafood is for the omega-3s contained in the fish, particularly docosahexaenoic acid (DHA). Omega-3 fortified foods have become increasingly popular in recent years; some of the oils are from agriculture sources, such as flax

[1] Canada's Food Guide recommends that Canadians eat "at least two Food Guide Servings of fish each week" and to choose "fish such as char, herring, mackerel, salmon, sardines and trout" that are "particularly high in omega 3 fatty acids which have been found to have heart health benefits." The recommended Food Guide Serving for fish and shellfish is 75 grams. See www.hc-sc.gc.ca/fn-an/food-guide-aliment/choose-choix/meat-viande/index-eng.php.

seed, which are not the same beneficial omega-3s as found in fish.[2] DHA is an essential nutrient for a variety of bodily functions including cardiovascular performance, mental alertness, stress reduction and others (Horrocks and Yeo). Omega-3s are important in reducing inflammation due to arthritis as well as the helping to prevent the onset of diabetes.

Vitamin D in oily fish like salmon is essential for good bone mineralization. Vitamins such as B12 present in seafood like mussels or oysters are implicated in relieving stress in humans. In a comprehensive study in the UK, children deficient in vitamin B12 and not eating mussels experienced greater levels of anxiety and performed more poorly on tests than children with diets of mussels providing them with excess B12 (CAIA 2009:14).

Shellfish farmed in Canada are good sources of essential minerals such as iron, zinc, and calcium, of vitamins B, and of essential omega-3 fatty acids, including DHA. A one kilogram serving of shellfish, such as blue mussels, will provide half of the recommended weekly allowance of omega-3s needed to balance our diet. Additionally, mussels are one of the best natural sources of iodine, required for normal thyroid gland function in humans.

Farmed fish such as salmon, sablefish, cod, trout or halibut are good natural sources of protein, omega-3 fatty acids, minerals and a number of vitamins. Oily fish like salmon are one of the best natural sources of vitamin D, which is necessary for bone formation and function in humans. Compared to other choices, fish is generally lower in saturated fats and higher in the long chain polyunsaturated omega-3 fatty acids, eicosapentaenoic acid (EPA) and DHA. Fish also contains high quality protein and other essential nutrients: vitamins (such as vitamin D and choline) and minerals (such as selenium, iodine, iron, zinc and copper). See Table 1 below.

Table 1: Nutrients in Fish, Other Meat and Alternatives per 75 grams (cooked)

	Total fat (g)	ALA (mg)	DHA (mg)	EPA (mg)	Saturated Fat (g)	Iron (mg)	Magnesium (mg)	Potassium (mg)	Zinc (mg)	Selenium (mcg)	Vitamin D (mcg)
Salmon, Atlantic, farmed	9.26	85	1093	518	1.88	0.26	22	288	0.32	31	5.10
Sockeye salmon, canned	7.58	65	835	554	1.75	0.67	21	262	0.58	26.6	14.62
Rainbow trout, farmed	5.40	62	615	250	1.58	0.25	24	331	0.37	11.2	4.79

[2] There are two major types of omega-3 fatty acids in our diets: One type is alpha-linolenic acid (ALA), which is found in some vegetable oils, such as soybean, rapeseed (canola), and flaxseed, and in walnuts. ALA is also found in some green vegetables, such as Brussels sprouts, kale, spinach, and salad greens. The other type, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), is found in fatty fish. The body partially converts ALA to EPA and DHA.

	Total fat (g)	ALA (mg)	DHA (mg)	EPA (mg)	Saturated Fat (g)	Iron (mg)	Magnesium (mg)	Potassium (mg)	Zinc (mg)	Selenium (mcg)	Vitamin D (mcg)
Jack mackerel, canned	4.72	32	597	326	1.39	1.53	28	146	0.76	28.3	4.72
Coho salmon, wild	3.22	41	494	301	0.79	0.28	23	326	0.42	28.5	12.67
Rainbow trout, wild	4.36	140	390	351	1.21	0.28	23	336	0.38	9.9	5.25
Halibut, Greenland (Turbot)	13.3	41	378	506	2.33	0.64	25	258	0.38	35.1	14.25
Pollock (Boston bluefish)	0.94	n/a	338	68	0.13	0.44	64	342	0.45	35.1	1.42
Arctic char	3.75	75	300	375	0.67	0.38	22	n/a	0.45	n/a	2.79
Omega-3 enriched eggs	9	n/a	150	n/a	2.25	n/a	n/a	n/a	n/a	n/a	n/a
Sole	1.15	12	194	182	0.272	0.26	44	258	0.47	43.6	1.12
Light tuna, canned	0.62	2	167	35	0.18	1.15	20	178	0.58	60.3	0.91
Cod	0.64	1	116	3	0.13	0.37	32	183	0.44	28.2	0.52
Shrimp	0.81	9	108	128	0.217	2.32	26	136	1.17	29.7	0
Tilapia	1.99	34	98	4	0.70	0.52	26	285	0.31	40.8	n/a
Chicken, dark meat	7.30	68	38	8	1.99	1.00	17	180	2.10	13.5	0.07
Eggs	7.42	25	28	3	2.32	1. 37	9	100	0.82	31.6	0.86
Chicken, breast	1.54	13	9	4	0.437	0.42	22	301	0.75	23.7	0.64
Pork	2.85	22	0	0	1.19	0.60	23	319	1.65	n/a	0.15

Source: Amounts are approximate, Based on Canadian Nutrient File, 2007, with the exception of omega-3 enriched eggs (Sindelar et al, 2004). Note: Meat from ruminants (cows, lamb, goats) is naturally low in DHA.

Seafood also contains a number of important minerals such as calcium (bone formation) and iron (blood clotting and oxygen capacity), to name but a few. The Canada's Food Guide recommends that Canadians consume at least 150 grams of cooked fish each week as part of a healthy pattern of eating. Experts around the world agree with this recommendation (WHO/FAO, 2003; US 2005 Dietary Advisory Committee, 2005; UK Scientific Advisory Committee on Nutrition, 2005). Yet, based on the most recent available data from Statistics Canada (2007 to 2011), only an average of about 101 grams per week of fish and seafood was consumed per capita in Canada; of this 83g was fish consumption, about a 45% shortfall from the Food Guide recommendations.

Table 2: Fish and Seafood available for consumption in Canada, (kilograms per person, per year)

2007	2008	2009	2010	2011
5.92	5.13	5.68	5.31	5.24

Source: Statistics Canada. *Table 002-0011 - Food available by major groups in Canada, annual (kilograms per person, per year unless otherwise noted),* CANSIM (database). The data have been adjusted for retail, household, cooking and plate loss.

According to a systematic study (Mozaffarian and Rimm, 2006), modest consumption of fish (e.g. 1-2 servings/wk, as recommended by the Canada Food Guide), especially consumption of species higher in the omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), reduces risk of coronary death by 36%, total mortality by 17% and may favorably affect other clinical outcomes such as a reduced risk of stroke. The authors found that EPA and DHA substantially reduced the risk of death from Coronary Heart Disease (CHD) when people consumed up to 175mg per week. Consumption of DHA and EPA above this level was not associated with any additional heart health benefits.

A recent study found similar results (Mozaffarian et al, 2013). Older adults who have higher blood levels of omega-3 fatty acids—found almost exclusively in fatty fish and seafood—may be able to lower their overall mortality risk by as much as 27% and their mortality risk from heart disease by about 35%, according to a new study from Harvard School of Public Health (HSPH) and the University of Washington. Researchers found that older adults who had the highest blood levels of the fatty acids found in fish lived, on average, 2.2 years longer than those with lower levels.

Furthermore, eating farmed salmon has been shown to be an effective method for elevating blood levels of DHA and EPA. Two scientists at the USDA recently studied blood levels of DHA and EPA in 19 subjects who ate farmed salmon. The subjects who ate a 9.5 ounce (270g) serving of farmed salmon tripled their blood levels of EPA. Similarly, all participants who ate at least 3 ounces of farmed salmon had a 50% increase in blood DHA levels.

3. Canadian Seafood Consumption Habits

In April 2011, the research firm Abacus Data surveyed 1,200 Canadians about their fish and seafood eating habits. Abacus Data reported their results in *Seafood Survey: Public Opinion on Aquaculture and a National Aquaculture Act.* Raw survey data was provided by Abacus Data for use in this study. Rather than repeat all of the results reported by Abacus Data, we present statistics from the survey results with special attention to how closely Canadians are following Canada's Food Guide recommendations on fish and shellfish consumption and how Canadian fish and shellfish-eating habits impact health.

Methodology and Overview

Abacus Data surveyed 1,200 people on a variety of areas related to Canadians' fish and shellfish consumption as well as their attitudes towards aquaculture. Abacus Data provided detailed response data for questions 1 to 7 of the survey related to fish and shellfish consumption habits.

Results of the survey were re-weighted to reflect Canadian and provincial populations based on 2011 Statistics Canada population data.[3]

On average, Canadians consume fish less than once per week – 3.7 times per month - and seafood less than 2 times per month. As a result, Canadians dietary levels of DHA and EPA, beneficial fatty acids found in fish and seafood, are much lower than the optimal level Mozaffarian and Rimm found in 2006.

Fish Consumption

Currently, Canadians fish consumption is well below Canada's Food Guide recommendations. Statistics Canada data shows that, on average, Canadians eat 101g of fish and shellfish per week, which is about 33% lower than Food Guide recommendations. Abacus Data found that most Canadians do not eat fish weekly. On average, Canadians eat fish only 3.7 times per month. British Columbians on average reported eating the most fish per month, about 4.2 times per month. The Atlantic Provinces reported eating fish the least frequently, 3.4 times per month.

The Abacus Data survey does show that Canadian portion sizes are a bit bigger than the Food Guide serving size of 75g. According to the Abacus survey data, a typical serving size is closer to 95g. However, the Abacus survey found that only 12% of Canadians are eating fish 7 or more times per month, which would be enough to meet Health Canada's guidelines of 150g of fish per week. Just over 5% of Canadians do not eat any fish at all. Canadians under the 30 years old were over twice as likely to not eat fish as those over 30.

Salmon is the most popular finfish – 85% of Canadians reported eating salmon. Trout was less popular with only 44% of Canadians saying that they ate trout. 88% of Canadians answered that they ate other types of fish.

Table 3: Per cent of Canadians Who Eat 0, 1 to 7, and more than 7 Times Per Month, 2011 Abacus Data Survey

	7 or more times per month	1 to 7 times per Month	0 times per month
18 to 30 years	12%	78%	10%
30 to 60 years	12%	84%	4%
60 years and up	12%	84%	3%
Female	12%	83%	6%
Male	13%	83%	4%
Total	**12%**	**83%**	**5%**

[3] In the *Seafood Survey: Public Opinion on Aquaculture and a National Aquaculture Act,* the authors used 2006 census data as weights to correct for over-sampling, we have used 2011 population weights. As a result, there are slight differences between the some values of this study and the Abacus Data report.

Table 4: Fish Eating Frequency By Province, 2011 Abacus Data Survey

	British Columbia	Prairie Provinces	Ontario	Quebec	Atlantic Provinces	Canada
Number of Times Average Person Eats Fish Per Month	4.2	3.4	3.80	3.8	3.4	**3.8**
7 or more times per month	16%	11%	13%	12%	8%	**12%**
1 to 7 times per Month	79%	86%	81%	84%	86%	**83%**
0 times per month	6%	3%	6%	4%	5%	**5%**

Table 5: Per cent of Canadians Who Ate Salmon, Trout and Other Species By Province, 2011 Abacus Data Survey

	British Columbia	Prairie Provinces	Ontario	Quebec	Atlantic Provinces	Canada
% Who Ate Salmon	88%	85%	85%	85%	76%	**85%**
% Who Ate Trout	31%	39%	46%	63%	42%	**46%**
% Who Ate Other Fish	77%	76%	85%	69%	80%	**78%**

Shellfish Consumption

On average, Canadians eat seafood (i.e. shellfish, such as clams, crab, lobster, mussels, scallops, shrimp, prawns) twice per month. Like finfish, British Columbians reported eating shellfish more often than most Canadians. In the Atlantic and Prairie Provinces, people reported eating slightly less frequently, about 1.8 times per month. Around 44% of all Canadians reported eating shellfish such as mussels, clams, and oysters, and 75% ate shrimp, crab, or lobster.

Table 6: Shellfish Eating Frequency and Species Eaten, By Province, 2011 Abacus Data Survey

	British Columbia	Prairie Provinces	Ontario	Quebec	Atlantic Provinces	Canada
Number of Times Average Person Eats Shellfish Per Month	2.4	1.8	1.7	2.4	1.8	**2.0**
% Who Ate Shellfish (Mussels, Clams, Oysters)	45%	38%	42%	52%	54%	**45%**
% Who Ate Shrimp, Lobster, Crab	75%	74%	74%	81%	75%	**76%**

Health Implications

Eighty-eight per cent of Canadians are not meeting Canada's Food Guide recommendations for fish and shellfish consumption. As a result, they are not reaching the dietary level of DHA and EPA that would greatly reduce their risk of coronary heart disease. Shellfish, an excellent source of protein and vitamins, provides a small amount of DHA and EPA. Overall, we estimate very few Canadians have enough DHA and EPA in their diets.

Presently, Canadian diets contain less than half of the optimal level of DHA and EPA: on average only 125 mg of DHA+EPA per day. Mozaffarian and Rimm found that the optimal level of DHA and EPA consumption is 250mg per day. Canadians in the Atlantic Provinces consume the least amount of DHA+EPA and British Columbians consume the most, although the difference is only 30mg per day. On average, most Canadians consume less than half of the recommended amount of DHA and EPA. In fact, nearly all Canadians – about 90% - do not consume the recommended optimal amount of DHA and EPA.

Table 7: DHA and EPA Consumption by Province

	British Columbia	Prairie Provinces	Ontario	Quebec	Atlantic Provinces	Canada
Average DHA+EPA per person per day	141	113	125	127	113	**124**
% who receive 250mg or more per day	14%	8%	11%	10%	7%	**10%**

4. Methodology and Assumptions

To estimate the potential health benefits to Canadians consuming the amount of fish and shellfish recommended in Canada's Food Guide, we examined results of a systematic review by Mozaffarian and Rimm in 2006. Mozaffarian and Rimm reported that people who consumed one or two portions of fish per week (equivalent to 1750 mg to 3500 mg of DHA and EPA) reduced their risk of mortality from Chronic Heart Disease (CHD) by 36% compared to people who consumed no fish and seafood products.

Table 1 (page 3) identified the DHA and EPA content of various types of seafood. For the purposes of this analysis, the data on DHA and EPA content was used to estimate the average DHA+EPA for a variety of fish – 10mg per gram of fish. This estimate was derived based on the detailed consumption data from the Abacus Data survey.

To estimate health benefits, we assume that Canadians currently not consuming the recommended weekly servings of fish would raise their consumption up to 7 times per month (with a average serving size of 95 grams), so that they meet the minimum recommended level of 150g of fish per week. For the purposes of the analysis, we assume that shellfish consumption would remain unchanged. We also assume that the health benefits would accrue from increased DHA and EPA consumption from fish sources through substitution of fish for other meat in current diets (meat, poultry, and meat alternatives).

According to Mozaffarian and Rimm, a 250mg per day of DHA and EPA leads to a 36% drop in mortality risk from CHD. The relationship between DHA and EPA consumption and mortality

from CHD is linear; however, consumption beyond this amount had little effect. Even if Canadians consumed the recommended level of fish, most people would likely not reach the 1750mg DHA+EPA per week maximum unless it was a fattier fish such as farmed salmon.

There are a number of methods to measure the potential health benefits for Canadians. A common method employed in health is to measure the cost to treat an illness (generally referred to as COI) and add the value of lost productivity - the number of days lost multiplied by the average wage. However, this method is a lower-bound for the actual value to society. Particularly for severe or life threatening illnesses and diseases, people value their lost enjoyment of life, mobility, or other effects on well-being that don't have a direct price. To measure the value of lives saved, surveys and other methods measure how much people are willing to pay for a small decrease in their risk of death. For example, the amount people pay for better car safety equipment is an indicator of how much people value a lower risk of death. The decrease in the risk of death multiplied by the cost gives an estimate for the value of a statistical life (VSL). The Treasury Board of Canada recommends using a VSL of $6.11 million in $2004 based on a meta-analysis of 26 studies and surveys done in the Canada and the U.S. (Treasury Board of Canada Secretariat).

Table 8: Assumptions and Sources

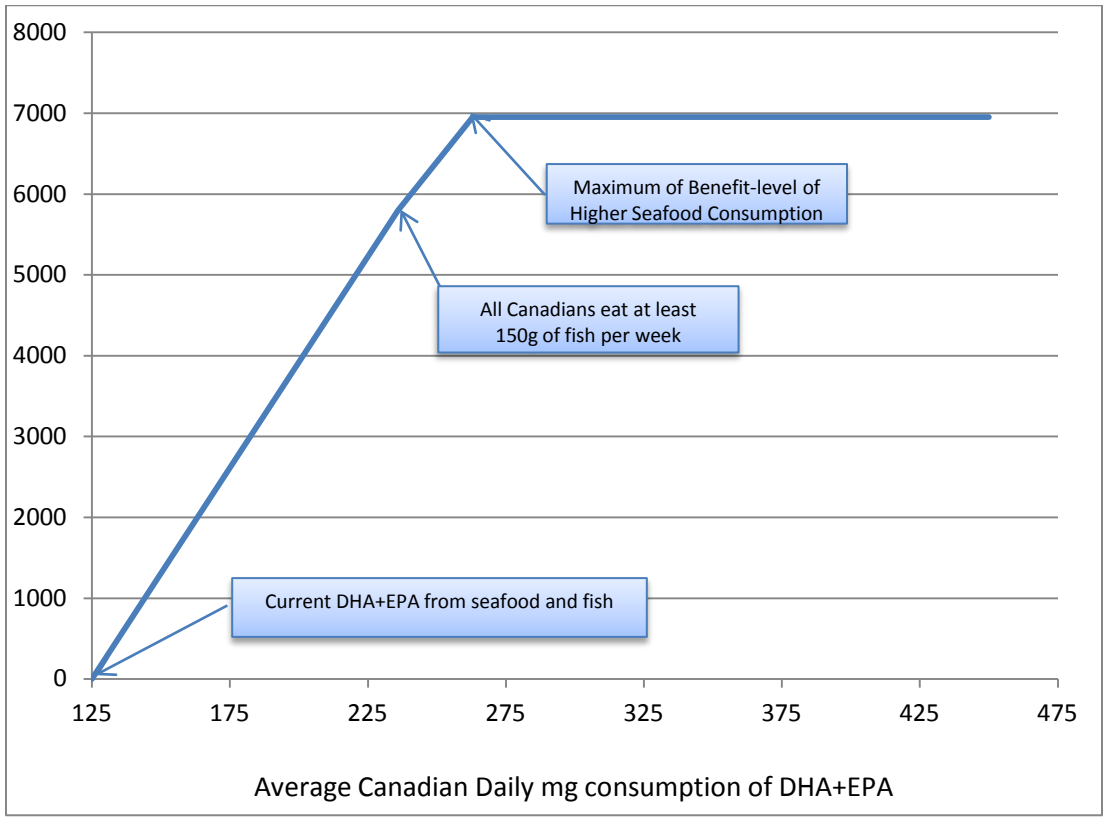
Variable	Value	Data Sources and Notes
Number of Times Fish Eaten per Month	min. 7	If # of times less than 7 -> 7 If # of times great than 7 -> unchanged
2011 Weekly Fish and Seafood Consumption	83g of fish, 18g of seafood	Statistics Canada. Table 002-0011 - Food available in Canada, annual, CANSIM, 2011
Current Average Daily EPA+DHA consumption in mg	124mg	Equivalent to DHA+EPA in 83g of various fish species (Table 1) and 18g of shrimp.
Average DHA+EPA in 75g serving of fish	745mg	Based on a weighted average of Canadians revealed preference for salmon, trout, and other fish species. The weighting is 30% wild salmon, 10% farmed salmon, 20% trout, and 50% of the average of other species.
% Reduction in Death per 250mg of EPA+DHA per day	36%	Mozaffarian and Rimm, 2006
# of CHD related Deaths per Year	35,896	Statistics Canada. Table 102-0529 - Deaths, by cause, Chapter IX: Diseases of the circulatory system (I00 to I99), age group and sex, Canada, annual (number), CANSIM.
Value of a Statistical Life	$7.2 million	Treasury Board of Canada (adjusted for $2013)

5. Results

If all Canadians ate fish at least 7 times per month (or about 150g of fish per week), the average DHA+EPA consumption would rise above the level required to maximize the heart health benefits of fish consumption. Canadians diets would go from containing 125mg of DHA+EPA per day to 236mg. However, additional health benefits could still be made, because not all Canadians will be at the highest beneficial level of DHA+EPA consumption.

Given the assumptions in explained in Section 4 and summarized in Table 8 (page 9) it is estimated that approximately 5,800 deaths could be avoided every year, if Canadians increased their consumption of fish to the levels recommended in Canada's Food Guide. As shown in Figure 1 below, if Canadians were to increase their consumption beyond the Health Guide recommended levels, we estimate that nearly 7,000 deaths could be avoided every year.

Figure 1: Increase in Number of Lives Saved per Year vs. Weekly Consumption of DHA+EPA



Note: Assumes that each portion of seafood currently consumed contains approximately 10mg of DHA+EPA per gm. Not that the maximum level would be reached if all Canadians currently consuming less 250mg of DHA and EPA per day raised their consumption to this level. We've assumed that those eating higher levels would remain unchanged.

To reach the upper-limit of benefit, on average Canadians would only need to consume an additional 29g of omega-3 rich fish per week. In general, Canadians could reach the upper-threshold of health benefits by consuming 0.4 to 5.2 more servings of several wild and farmed fish species, such as salmon, trout, and mackerel. White fish - such as cod, pollock, and tilapia - and seafood – like shrimp – have lower levels of DHA and EPA, so Canadians would need to consume many more servings to reach the optimal level of DHA and EPA.

Table 9: Additional Fish and Seafood Consumption per Week Required to Meet Upper-Limit of Reduced Mortality Risk

	Total Grams	75g Portions
Salmon, Atlantic, farmed	29	0.4
Sockeye salmon, canned	33	0.4
Rainbow trout, farmed	53	0.7
Jack mackerel, canned	50	0.7
Coho salmon, wild	58	0.8
Rainbow trout, wild	62	0.8
Halibut, Greenland (Turbot)	52	0.7
Pollock	114	1.5
Arctic char	68	0.9
Sole	123	1.6
Light tuna, canned	228	3.0
Cod	388	5.2
Shrimp	195	2.6

Note: Assumes that each portion of seafood currently consumed contains approximately 10mg of DHA+EPA per gram.

Based on the Treasury Board of Canada recommended VSL value, the benefit of over 5,800 avoided deaths is worth $42 billion per year (5,803 x $7.2 million).[4] If Canadians were to consume that maximum beneficial level of DHA and EPA, just under 7,000 lives could potentially be saved: the total benefit to Canada could be up to $50 billion per year (6,953 x $7.2 million).

Sensitivity Analysis

The health benefits of eating fish largely depend on how much beneficial fat is in each serving of fish. Although the Abacus Data survey did collect some information on Canadians fish consumption habits by species, such as whether Canadians prefer salmon to trout, the amount of

[4] Treasury Board recommends the $6.11 million VSL in Canada based on Chestnut et al. (1999) comprehensive literature review of estimates in Canada and the U.S. Adjusted for inflation using the Canadian CPI, the current VSL of Canada is $7.2 million in 2013 dollars[4].

DHA+EPA varies substantially by species and whether the fish is farm raised or wild. Wild arctic char for example has only 116mg of DHA+EPA per 75g serving, but farmed salmon has over 1600mg per serving.

To test the robustness of our results, we varied the level of DPA+EPA content from our estimate of 10 mg per serving of fish, using a range of values from 5mg to 15 mg. Monte Carlo simulation was used to recalculate our results based on the 5 mg to 15 mg range. The average from the Monte Carlo results simulation was that 5,400 lives would be saved. The 95% confidence interval was 3,600 to 6,350 lives saved.

Table 10: Monte Carlo Analysis Results

Assumptions	Minimum	Baseline	Maximum
mg of DHA and EPA per serving of fish	5	10	15

Results	Average	95% Confidence Interval	
Coronary Heart Disease Deaths Avoided	5,423	3,613	6,351
Value of Lives Save (Based on VSL of $7.2 million)	$39 billion	$26 billion	$46 billion

6. Discussion

Canadians currently do not meet Canada's Food Guide recommendations for fish and seafood consumption. Fish in particular has been very strongly associated with lower risk of heart disease. As a result, we've estimated that about 5,800 lives could be saved per year, if Canadians increased their consumption of fish to the recommended levels. Increasing levels of fish consumption to maximize the levels of attainable health benefits, as indicated by recent literature cited in this study, could save about 7,000 lives per year.

The value to Canadian society of these health benefits is considerable. Based on the Treasury Board of Canada's recommended value of life saved (VSL), 5,800 to 7,000 lives saved represent a potential benefit to Canadian society of between $42 and $50 billion per year. In present value terms, the benefits range from $490 to $580 billion (over a 25-year period at a 7% discount rate).

These estimated benefits are based only on the value to Canadian society of reduced number of coronary-related deaths per year, and do not include potential reductions in Canadian health care costs. In 1998, Health Canada estimated the cost of heart disease to the Canadian health care system to be $6.8 billion per year, which is over $9 billion in 2013 dollar values. While increased consumption of fish rich in omega-3's could reduce these costs, we have not estimated this benefit to Canadian society.

What are the implications of these findings? Clearly, there are significant potential benefits to Canadian society of changing fish consumption habits, and a need to raise Canadians' awareness of the health benefits of making healthier food choices that include increased consumption of fish. Governments and health-related advocacy groups could play an important role in this education process, by disseminating the most up to date evidence and information from the medical literature to Canadians.

To achieve these benefits, the aquaculture industry in Canada will have to be able to meet increased demand. Aquaculture is the only way to address increased demand for fresh, sustainably produced fish. The industry has indicated that with the required legislative, regulatory and policy reforms in Canada, production of locally farmed quality seafood in this country could expand to meet domestic needs, and increase exports.

A "win-win" for Canadians can be achieved: Better health outcomes for Canadians through increased consumption of fresh, sustainable, domestically-produced farmed seafood; Increased economic benefits to all Canadians through increasing industry investment, job growth; and the production of a quality food for Canadians and for export markets.

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