CASE STUDY FOLIO INVESTIGATION

Core Topic 2: Diet, Lifestyle and Health

Raw Data:

Table 1: Jane's Food Intake

Meal	Food	Quantity
Breakfast	Kellogg's Cocoa Pops	45g
	Pura Full Cream Milk	250mL
	McDonald's Hash Brown	4
Snack	Farmers Union Iced Coffee	500mL
	Chocolate Donut	1 large
Lunch	Villi's Pie	1
	Tomato Sauce	30mL
	Coca Cola	500mL
	Instant Coffee (30mL Full Cream Milk and 2 Sugars)	240mL
Snack	Apple	1 medium
	Mars Bar	58g
Dinner	Chicken Breast with Skin Olive Oil (for pan)	500g / 1 tsp
	Mashed Potato:	2 small
	Coles Butter	1 tbsp
	Full Cream Milk	1/4 cup
	Salt	1/5 cup
	Broccolini	3 stalks
Dessert	Bulla Light and Creamy Ice Cream, Chocolate	3 scoops

Table 2: Jane's Personal Details

|	
Age (years)	54
Sex	Female
Weight (kg)	92
Height (cm)	172
BMI	31
Physical Activity Level (PAL)	Light
Estimated Energy Requirement (EER)	13907kJ
Basal Metabolic Rate (BMR)	8692kJ

Table 3: Jane's Overall Nutrient Profile

Macronutrients	Amount (kJ, g, mg)
Energy	16496.7kJ
Protein	177.7g
Total fat	171.4g
- Saturated	71.4g
- Polyunsaturated	17.3g
- Monounsaturated	69.8g
Cholesterol	536.4mg
Total Carbohydrate	419.4g
- Sugars	258g
Dietary Fibre	23.6g
Micronutrients	Amount (mg)
Sodium	4197.832mg
Calcium	1620.969mg
Iron	15.614mg

Table 4: Comparison between the Australian Dietary Guidelines (ADG) number of recommended serves per food group vs the number of serves Jane consumed, including discretionary choices (Eat For Health, 2015).

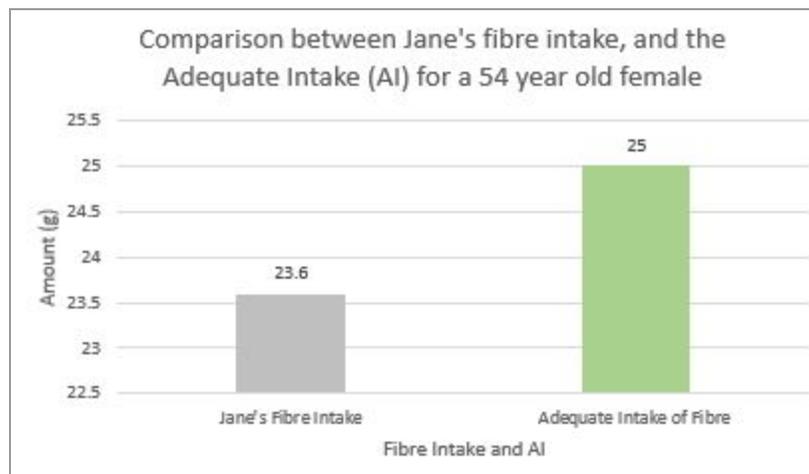| Food Group	Number of serves in Jane's diet	Number of recommended serves by ADG
Grain/cereal foods, mostly wholegrain and high fibre	2.5	4
Vegetables and legumes/beans	9	5
Lean meats and poultry, fish, eggs, tofu, nuts and seeds and legumes/beans	4	2
Milk, yoghurt, cheese and/or alternatives, mostly reduced fat	4	4
Fruit	1	2
Discretionary choices	16	2.5

Processed Data:

Graph 1: **Comparison between Jane's percentages of energy derived from carbohydrates, proteins and fats, and the Acceptable Macronutrient Distribution Ranges (AMDR) (Dietitians Association of Australia, 2020).**
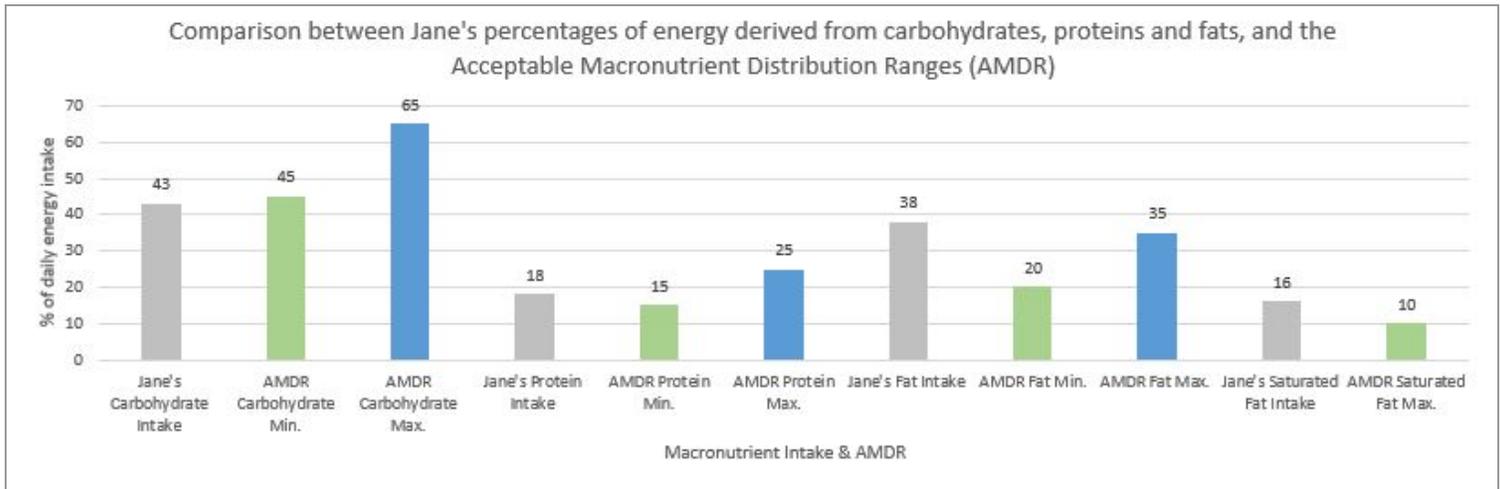

Graph 2: **Comparison of Jane's fat intake (polyunsaturated, monounsaturated and saturated).**
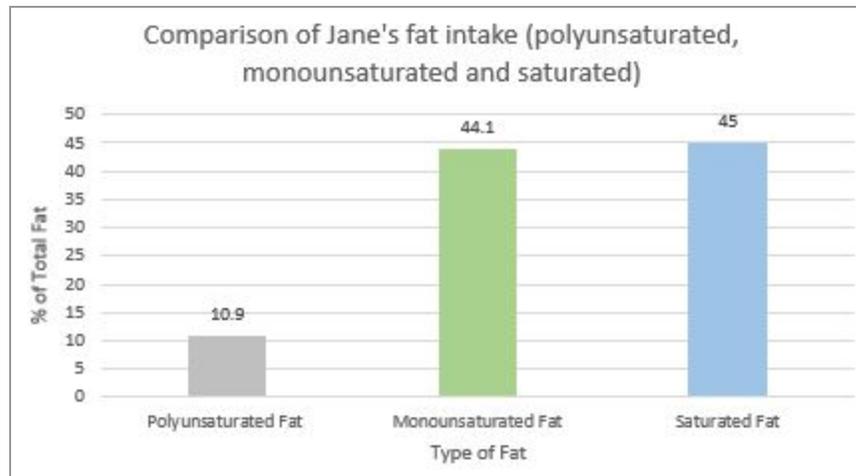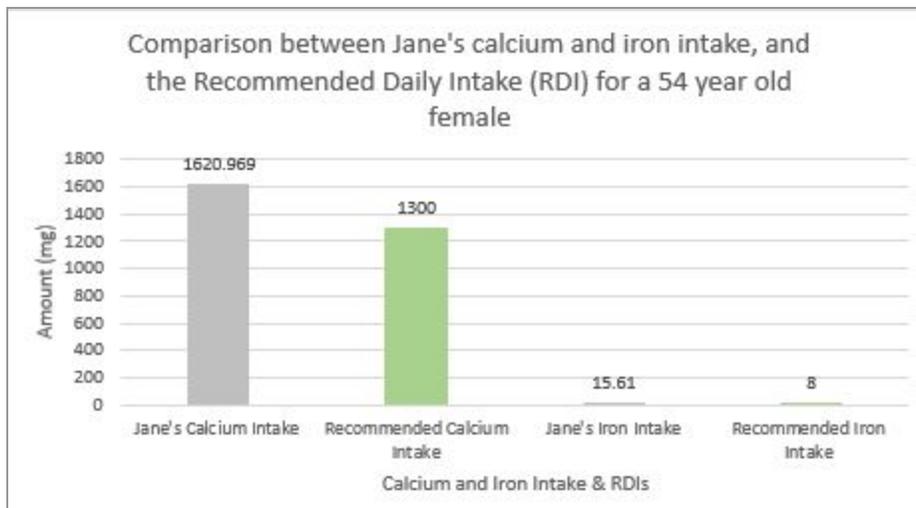

Graph 3: **Comparison between Jane's fibre intake, and the Adequate Intake for a 54 year old woman (Nutrient Reference Values, 2019).**

Graph 4: **Comparison between the number of serves Jane has consumed, and the Australian Dietary Guidelines recommended number of serves for each of the 5 food groups, including discretionary (Eat For Health, 2015).**


Comparison between the number of serves Jane has consumed, and the Australian Dietary Guidelines recommended number of serves for each of the 5 food groups, including discretionary choices
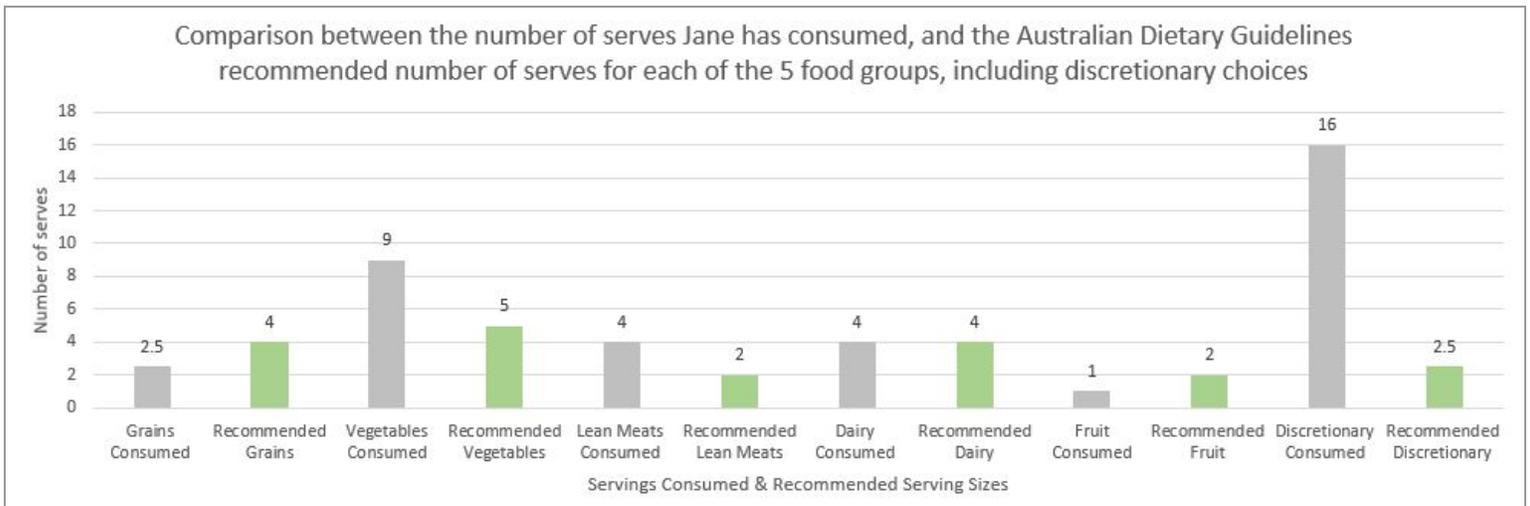
Graph 5: **Comparison between Jane's calcium & iron intake, and the Recommended Daily Intake for a 54 year old female (Nutrient Reference Values, 2014).**

Comparison between Jane's calcium and iron intake, and the Recommended Daily Intake (RDI) for a 54 year old female

Graph 6: **Comparison between Jane's sodium intake and the Upper Level for a 54 year old female (Nutrient Reference Values, 2017).**

Comparison between Jane's sodium intake, and the Upper Level (UL) for a 54 year old female
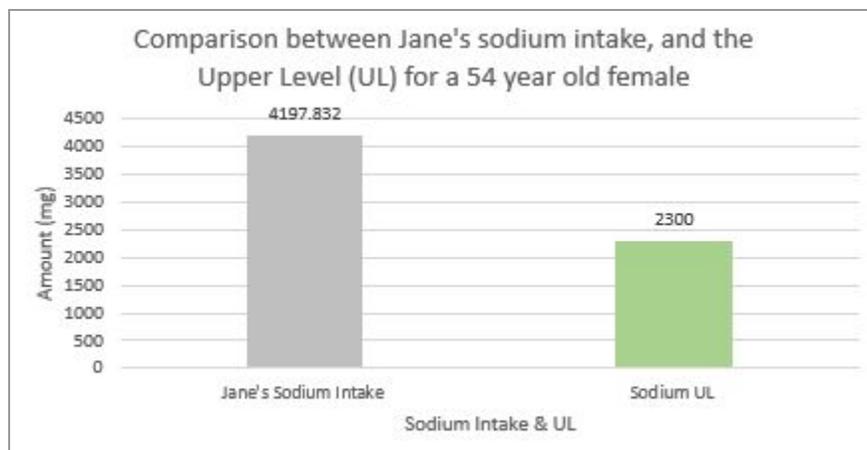
Carbohydrates:

Looking at *Graph 1,* 43% of Jane's energy intake is provided by carbohydrates, however she has consumed under the Acceptable Macronutrient Distribution Range (AMDR) of 45-65% (Dietitians Association of Australia, 2020). Although this is minimal, she should increase her intake as this nutrient plays a crucial role as a primary source of energy. This lack of carbohydrates may cause fatigue, as her cells will lack glucose to produce energy. In *Table 1,* most of Jane's carbohydrate intake comes from discretionary foods composed of simple and refined carbohydrates. These foods are high glycaemic index (GI) as they're digested and absorbed quickly after consumption, causing a rapid increase in blood glucose levels (BGLs) (Health Direct, 2018). This puts her at risk of developing Type 2 Diabetes Mellitus (T2DM) as these high GI foods cause her BGLs to be constantly high, which overworks and impairs the pancreas' ability to secrete insulin for transporting glucose into cells. Moreover, high GI foods contribute further to Jane's current obesity (having a BMI of 31); another risk factor for T2DM, as excess glucose is stored in adipose tissue (Picincu, 2019). Jane should increase her intake of complex carbohydrates as they're low GI and digested slower, which assists in managing BGLs.

Protein:

Graph 1 shows that 18% of Jane's daily energy intake comes from protein which fits sufficiently within the AMDR of 15-25% (Dietitians Association of Australia, 2020). However, increasing her consumption will allow her to benefit more from protein's crucial roles in the body, namely enzyme and hormone synthesis, as well as growth and repair of body tissues (Van De Walle, 2018). Despite meeting the range, most protein-containing foods she consumes are high in saturated fat and simple carbohydrates, such as the Farmers Union Iced Coffee, which increases her risk of developing Cardiovascular Disease (CVD). Accordingly, she should select high-protein foods lower in these nutrients such as lean meats.

Fats:

Jane's fat intake in *Graph 1,* displays that she has exceeded the AMDR of 20-35% as fats comprise 38% of her daily energy intake. Additionally, 16% of her energy intake was provided by saturated fat, which significantly surpasses the recommended range of <10% (Dietitians Association of Australia, 2020). Jane's total fat intake in *Graph 2* is composed of 10.9% polyunsaturated, 44.1% monounsaturated and 45% saturated fat. Because she's consuming almost half of her total fat intake as saturated fat, her risk of developing CVD is increased as it raises levels of low-density lipoprotein (LDL). LDL cholesterol is deposited on the artery walls, which, over time, builds up as plaque. The arteries then narrow, restricting blood flow, leading to Atherosclerosis, CVD and potentially heart attack. Contrastingly, monounsaturated (MUFA) and polyunsaturated (PUFA) fats increase levels of high-density lipoprotein (HDL), which removes LDL cholesterol from the artery walls (Mayo Clinic, 2018). Therefore, Jane should be consuming more foods high in MUFA and PUFA like nuts and various fish, and limiting her intake of saturated fat to reduce the development of Atherosclerosis and CVD. Jane's light physical activity level (PAL) and energy intake exceeding her Estimated Energy Requirement (EER) (refer to *Table 2 & 3)* cause her to be obese which accelerates her risk of CVD as levels of HDL cholesterol tend to be lower while blood triglyceride levels rise (Lewis, 2019).

Fruits, Grains & Dietary Fibre:

Graph 3 indicates that Jane consumed slightly under the Adequate Intake (AI) of 25g set for dietary fibre, as she ingested only 23.6g (Nutrient Reference Values, 2019). When looking at *Graph 4,* Jane under consumed her recommended serves for grains and fruits which justifies her fibre insufficiency. She consumed only 2.5 serves of grains whereas it is advised she consumes 4, and, consumed 1 serve of fruit while the recommended number of serves is 2 (Eat For Health, 2015). This fibre deficiency is likely to cause constipation as the stool cannot be softened for easy movement through the colon, and her light PAL also contributes to this. Chronic constipation may lead to diverticulosis, whereby small pouches form in the colon, which could advance to diverticulitis if they become inflamed (Better Health Channel, 2014). Lack of soluble fibre in Jane's diet can also increase her risk of CVD and T2DM. Soluble fibre binds to cholesterol in the colon for excretion, therefore lowering LDL cholesterol and protecting against Atherosclerosis and CVD (Moll, 2019). Soluble fibre also slows digestion, delaying absorption of simple carbohydrates into the bloodstream, thus decreasing the GI of many foods, reducing the risk of T2DM (National Institute of Health, 2020). Because Jane lacks dietary fibre, she is at a greater risk of developing these disorders.

Lean Meats & Iron:

According to *Graph 4,* Jane consumed 4 serves of lean meat, however the recommended number of serves is 2 (Eat For Health, 2015). *Graph 5* shows that the Recommended Daily Intake (RDI) for iron is 8mg, though Jane ingested 15.61mg (Nutrient Reference Values, 2014). As such, it's suggested that the chicken breast and Villi's pie in her diet contributed to her overconsumption of this food group and excessive iron intake. Since the iron Upper Level (UL) for Jane's age is 45mg, she is consuming an adequate amount to prevent iron deficiency anaemia, and because she's 54 years old, this is important to make up for her iron loss during menopause (Nutrient Reference Values, 2014). These foods she consumed are also high in saturated fat and sodium, which increases her risk of CVD and Hypertension, as discussed later.

Vegetables:

Jane has consumed 9 serves of vegetables, whereas the recommended number is 5, as seen in *Graph 4* (Eat For Health, 2015). However, *Table 1* indicates that most of these came from potatoes. While potatoes are complex carbohydrates, their starch content causes them to be high GI as they raise BGLs rapidly (Dolson, 2020). Considering that 7.4 of the 9 serves of vegetables she consumed are potatoes, this increases Jane's risk of contracting T2DM because her BGLs are continuously high, putting pressure on the pancreas to secrete insulin. As such, the insulin resistance would cause various implications such as extreme fatigue, frequent urination and blurred vision (Better Health Channel, 2015). Therefore, Jane should consume a wider range of vegetables providing additional nutrients like fibre, vitamins and minerals.

Dairy & Calcium:

Graph 4 shows that Jane consumed the recommended 4 serves of dairy (Eat For Health, 2015). However, this food group is calcium-rich, thus Jane exceeded the RDI of 1300mg, ingesting 1621mg (refer to *Graph 5*) (Nutrient Reference Values, 2014). The UL for calcium is 2500mg, therefore Jane's slight overindulgence won't pose negative impacts towards her health, in fact, the calcium will maintain her bone health and increase bone density, ultimately reducing her risk of osteoporosis. As she's 54 years old and approaching the end of menopause, decreased oestrogen levels during this period cause bone resorption and loss, leading the bone matrix to become brittle and porous (Better Health Channel, 2019). Her light PAL is another risk factor as resistance and weight-bearing exercise is critical for increasing bone density

(Osteoporosis Australia, 2019). It is crucial that Jane continues to consume 4 serves of dairy, the RDI for calcium and engage in physical activity to prevent osteoporosis, and also choose dairy foods low in fat and sugar to prevent CVD.

Sodium:

Jane has significantly exceeded the UL for sodium, 2300mg, by consuming 4198mg. This puts her at an extreme risk of Hypertension (high blood pressure) as excess sodium in the bloodstream increases blood volume. Consequently, this puts more stress on the heart as pressure is exerted on the artery walls. In turn their elasticity is impacted, resulting in Hypertension, kidney failure and potentially heart attack (Blood Pressure UK, 2020). This excess quantity of sodium in Jane's diet advances her risk of osteoporosis as it increases the amount of calcium excreted through urine (Better Health Channel, 2018). It is critical that Jane cuts her sodium intake considerably by limiting consumption of processed and discretionary foods.

Table 5: Modified Meal Plan

Meal	Food	Quantity
Breakfast	Kellogg's Original Special K	45g
	Skim Milk	200mL
	Multigrain Toast	1 regular slice
	Peanut Butter	2 tbsp
Snack	Low Fat Plain Greek Yoghurt	125g
	Instant Coffee (1 sachet of stevia, 30mL Skim Milk)	200mL
Lunch	Multigrain Bread Roll	1 medium
	Lettuce (for bread roll)	20g
	Avocado (for bread roll)	2 slices
	Light Tasty Cheese (for bread roll)	1 sandwich-sized slice
	Mixed Berry Smoothie	300mL
Snack	Apple	1 medium
	Celery	5 small sticks
	Hummus (for celery)	30g
Dinner	Chicken Breast without Skin	200g
	Olive Oil (for pan)	1 tsp
	Baked Potato	1 medium
	Broccoli (steamed)	5 small pieces
	Carrot (steamed)	5 small pieces
Dessert	Frozen Yoghurt	3 small scoops

Table 6: **Comparison between the number of serves of each food group in Jane's diet vs the number of serves in the modified meal plan, including discretionary choices.**

Food Group	Number of serves in original diet	Number of serves in modified meal plan
Grain/cereal foods, mostly wholegrain and high fibre	2.5	4
Vegetables and legumes/beans	9	5
Lean meats and poultry, fish, eggs, tofu, nuts and seeds and legumes/beans	4	2
Milk, yoghurt, cheese and/or alternatives, mostly reduced fat	4	4
Fruit	1	2
Discretionary choices	16	1

Modifications:

Guideline 2 of the ADG states that Jane should "enjoy a wide variety of nutritious foods from the five food groups everyday" (Eat For Health, 2015). In *Table 6,* the modifications made to Jane's typical eating pattern broaden her range of foods, precisely meeting the recommended serves for each food group. The alterations better suit the RDIs, AIs and ULs set for Jane's age, compared to her original diet, ultimately reducing her risk of developing the dietary disorders discussed previously.

The Coco Pops were substituted for Special K to eliminate the discretionary choice, reducing the simple carbohydrate and saturated fat content to assist in preventing T2DM. Special K is high in dietary fibre, allowing her to meet the AI and the recommended number of serves for grains. The fibre will increase her satiety to avoid overeating and further obesity. This modification prevents diverticulitis, while also reducing her risk of CVD due to the soluble fibre content. As Guideline 3 of the ADG suggests to "limit intake of foods containing saturated fat, added salt, added sugars and alcohol", various modifications were made such as switching full cream milk to skim milk, substituting Coca Cola for a smoothie, taking the skin off the chicken breast, switching hashbrowns for multigrain toast and substituting ice cream for frozen yoghurt (Eat For Health, 2015). In doing so, Jane's consumption of discretionary foods is reduced and thus put at a lower risk of T2DM, CVD and Hypertension through reduced saturated fat, sodium and simple sugars.

Additional vegetables such as broccoli, lettuce, carrot and celery were added to vary Jane's vegetable intake, as it originally consisted of 7.4 serves of potatoes. While these have a higher nutritional value, the fibre content also lowers the GI of her meals, which prevents T2DM as her BGLs are maintained more steadily. Switching her intake of saturated fat-rich foods with unsaturated fat foods like avocado and peanut butter reduces her risk of Atherosclerosis and CVD, as HDL cholesterol is increased. Finally, substituting the Farmers Union Iced Coffee for instant coffee with skim milk and stevia significantly reduces saturated fat and simple sugars, thereby further preventing T2DM and CVD, while the milk prevents osteoporosis through its calcium content.

Word count: 1560

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