Alcohol intake in community dwelling older adults living in Auckland, New Zealand

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Abstract

Background: The older adult population is growing rapidly worldwide including in New Zealand. As life expectancy increases, older adults need to be aware of the physiological changes to their bodies. International studies and the New Zealand (NZ) Health Survey have identified the high prevalence of alcohol consumption in older adults. However, there is limited evidence available regarding the types and frequency of alcohol consumption in older adults living in NZ. There is also little evidence on whether older adults are adhering to the alcohol consumption guidelines in NZ. This information is important to inform strategies to support older adults with safe drinking habits.

Aim: To explore alcohol intake in older adults (65-74 years) living in the community in Auckland, New Zealand.

Methods: This study was a sub-study of the REACH (Researching Eating, Activity and Cognitive Health) study. Older adults aged between 65 to 74 years living in the Auckland community completed a sociodemographic, health and lifestyle and a food frequency questionnaire, which included questions specific to alcohol intake.

Results: Most older adults (81.4%) consumed alcohol, while 14.6% never drank alcohol and 4% used to drink alcohol. The most common types of alcoholic beverages consumed were beer (0.9 ± 2.1 standard drinks per week), red wine (1.7 ± 3.1 standard drinks per week) and white wine (1.8 ± 3.6 standard drinks per week). Males consumed more standard drinks per week (6.4 ± 7.4) than females (4.3 ± 5.6). Most older adults met the daily (98.9%), weekly (96.4%) and occasional (96.2%) drinking guidelines from the Ministry of Health. The recommendation of at least two alcohol free days per week was met by 83.8% of participants. The sociodemographic factors 'sex' (being male) was positively associated with maximum standard drinks per occasion. A higher 'index of multiple deprivation score' (IMD) (more deprived) was negatively associated with maximum standard drinks per occasion. 'Age', 'education' and 'living situation' were not associated with maximum standard drinks per occasion in older adults.

Conclusion: Many older adults consume alcohol and are mostly following the NZ alcohol consumption guidelines. Beer and wine are the most commonly consumed alcoholic

beverages. Maximum drinks per occasion is associated with sex and IMD score but not associated with age, education and living situation.

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To my family and friends, thank you for your continued support throughout the past two years. A special appreciation to my parents for the ongoing encouragement to keep pushing through and devotion to my studies and personal development that has allowed me to achieve this goal which I never deemed possible. Special thanks to my friend Ashniel Prasad for his continual support in this journey from the very start. Thank you for always being there for when times were stressful, for keeping my studies in check as well as cheering me through every obstacle this journey had me face.

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Table of Contents

List of Tables

List of Figures

List of Abbreviations and Symbols

Abbreviation or symbol	Definition
ABAS	Attitudes and Behaviour towards Alcohol Survey
AUDIT	Alcohol Use Disorders Identification Tests
FFQ	Food frequency questionnaire
HPA	Health Promotion Agency
IMD	Index of Multiple Deprivation
MoH	Ministry of Health
NZ	New Zealand
REACH	Researching Eating, Activity and Cognitive Health
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organisation

Chapter One: Introduction

1.1. Background

The population is ageing globally (Nagarajan, Teixeira, & Silva, 2021; United Nations Department of Economic and Social Affairs, 2020). By 2050, the older adult population is expected to double, reaching over an estimated 1.5 billion people (United Nations Department of Economic and Social Affairs, 2020). According to the World Health Organisation (WHO), this transition to an ageing population initially occurred in high-income countries like Japan (World Health Organisation, 2018). However, it is now also evident in low to middle-income countries such as Chile and the Russian Federation, where a rapid change to an ageing population is also being experienced (World Health Organisation, 2018). This rapid shift is likely due to many factors including declining fertility and birth rates, higher education levels and advancing medical and healthcare. Other factors include increased migration and changing patterns of marriage (Nagarajan et al., 2021; United Nations Department of Economic and Social Affairs, 2020). As these factors continue to change worldwide, the older adult population will continue to rise and have longer life expectancies (United Nations Department of Economic and Social Affairs, 2020).

The older adult population in New Zealand (NZ) is growing faster than the younger population (Ministry of Health, 2018). Older adults in NZ are defined as those over the age of 65 years (Koopman-Boyden, 2011). In 2015, only 15% of the population were older adults. By 2036, there will be a 77% increase in adults over the age of 65, approximately one in four adults (Ministry of Health, 2018). As older adults in NZ live longer, more support will be required, including healthcare, pensions, aged care homes and disability support (Ministry of Health, 2018).

The ageing process leads to inevitable changes to an individual's physiological health, which often impacts their quality of life (McPhee et al., 2016; Samarakoon, Chandola, & Ravishankar, 2011; Stevenson, Stephens, Dulin, Kostick, & Alpass, 2015). These changes include a functional decline in organ systems such as nervous, digestive, and muscular systems. Additional changes are loss of appetite, taste and smell changes, oral health decline, and lean body mass reduction. The reduction in lean body mass typically accompanies an increase in fat mass (Ferreira & Weems, 2008; Stevenson et al., 2015). Older adults are also often prescribed more than one medication for long-term use (Ferreira & Weems, 2008; Gell, Meier, & Goyder, 2015; McPhee et al., 2016). Furthermore, as older adults age, they face many lifestyle changes. These include retirement, death of a spouse, changes in income and living situations, lower levels of physical activity and changes in dietary intake (McPhee et al., 2016; Samarakoon et al., 2011; Stevenson et al., 2015).

Older adults with reduced appetite may eat smaller meals and spend longer time-consuming meals (Chapman, 2004). Lifestyle and dietary changes that occur during older adulthood may lead to changes in the consumption of alcohol including the frequency, quantities and the types of alcohol consumed (Soler-Vila, Ortolá, García-Esquinas, León-Muñoz, & Rodríguez-Artalejo, 2019; Stelander et al., 2021). As a result of the physical changes in ageing, older adults become more sensitive to alcohol when ingested. Alcohol (found in beverages such as wine, beer, and spirits) is metabolised more slowly in older adults (Ferreira & Weems, 2008; Health Promotion Agency, 2015; Stevenson et al., 2015), meaning a smaller amount of alcohol has a greater effect on body functions (Stevenson et al., 2015). These effects differ between male and female older adults due to differences in body size and composition.

Alcohol is a sedative drug that can produce side effects if consumed in excess (Ferreira & Weems, 2008; Gell et al., 2015). However, when consumed in low doses, it can act as a stimulant, exert positive and negative feelings, increase confidence and act as a depressant (Heuberger, 2009). Alcohol also affects many of the other systems of the body. Examples include increased blood pressure and triglycerides, which can damage the tissues of the heart, causing stroke or heart attack. Prolonged alcohol use increases the risk of liver damage, cancer, inflammation and cirrhosis (Griswold et al., 2018). Some studies have found a protective effect of low alcohol consumption on heart disease and diabetes which is still an ongoing part of research (Griswold et al., 2018; Grønbaek, 2009).

Current New Zealand guidelines on alcohol consumption are aimed at adults over the age of 18 years. The recommendation is no more than three standard drinks for men and two standard drinks for women per day with at least two alcohol-free days every week (Ministry of Health, 2019).

Table 1.1 New Zealand alcohol consumption guidelines for adults

Daily recommendations	Male	Female
Standard drinks per day (maximum) [1]	3	2
Standard drinks per week (maximum)	15	10
Standard drinks per occasion (maximum)	5	4
Alcohol-free days per week	At least 2	At least 2

[1]A standard drink contains 10g of pure alcohol in New Zealand. Source: Ministry of Health, New Zealand

Alcohol consumption typically declines as people age (Stevenson et al., 2015). However, international (Gell et al., 2015; Laberge, Bigelow, Lagarde, & Crizzle, 2021) and national studies (Towers, Sheridan, & Newcombe, 2017) suggest alcohol consumption in older adults is highly prevalent. The available research shows older adults drink more frequently but lower quantities when compared to younger adults (Hodges & Maskill, 2014). Studies also show that socio-demographic factors are associated with alcohol consumption in older adults; for example, older men tend to consume more alcohol than older women. Non-Māori older adults consume more alcohol frequently but lower quantities in a typical drinking occasion compared to older Māori adults (Towers, Sheridan, Newcombe, & & Szabo, 2018a).

It is important to know more about what NZ older adults are drinking, including the quantity and frequency of alcohol they consume. It has been previously identified how much and how often NZ older adults are drinking; however, little is known about the type of alcohol consumed. There is also currently limited evidence on whether older adults are consuming alcohol within the recommended guidelines. The association between alcohol consumption and socio-demographic factors in NZ older adults is limited. As the impact of alcohol intake in this age group is significant it can have an array of effects on older adults health and quality of life (Towers et al., 2017; Towers, Sheridan, Newcombe, & Szabo, 2018c). For this reason, it is important to understand whether this age group is drinking alcohol according to the guidelines.

1.2. Purpose of the study

As the older adult population in NZ is rapidly increasing, more focus is essential in the care of this age group. Alcohol impacts are more significant in older age as bodily functions decline and become more sensitive. More research is required to find out how to better prepare for the care of our older adult population in the future. This study aims to explore how and what older adults aged 65-74 years are drinking. Specifically, the study will explore the types of alcohol older adults are drinking, including the quantity and the frequency of alcohol consumed. Socio demographic factors within the study population will be explored to see if there are any associations with alcohol consumption. Exploring this is essential for understanding factors contributing to consumption of alcohol in older age. There is currently limited evidence on older adults (65-74 years) drinking patterns and whether they adhere to guidelines in NZ. Therefore, this study will provide a better understanding of NZ's older adults' current drinking patterns and adherence to guidelines. Understanding drinking patterns, such as the types and frequency of alcohol consumption, in older adults could inform public health strategies to promote adherence to current alcohol guidelines.

1.3. Aim

To explore alcohol intake in older adults (aged 65-74) living in the community in Auckland, New Zealand.

1.3.1. Objectives

1. To explore the types, quantity and frequency of alcohol consumed by older adults.
2. To compare current alcohol intake in older adults with alcohol recommendations by the NZ Ministry of Health.
3. To explore whether sociodemographic factors have an association with alcohol intake in older adults.

1.3.2. Hypotheses

1. Wine and beer will be the most common types of alcohol consumed.

2. New Zealand older adults' current drinking habits do not align with the Ministry of Health's recommendations for alcohol intake.

3. Sex, age, education, marital status, living situation and deprivation will be associated with alcohol consumption.

1.4. Thesis structure

This thesis is divided into four chapters. **Chapter one** is an introduction of the background, purpose, aims, objectives, and hypotheses of the research study. **Chapter two** is a narrative review of the current literature on alcohol intake in older adults. **Chapter three** is a manuscript of the research study for publication which includes an abstract, introduction, methods, results, discussion, and references to the relevant appendices. The final chapter, **Chapter four**, contains the conclusion and recommendations of the study findings. The appendices will include questionnaires relevant to conducting the research.

1.5. Research contributions

Table 1.2. Researchers' contribution to this study

Author	Contribution to thesis
Sheenal Chand **MSc Nutrition and Dietetic Candidate**	Primary researcher and author, statistical analysis, writing, editing, and final preparation of the thesis.
Associate Professor Kathryn Beck	Primary academic supervisor. Principal investigator of the REACH study. Application for research ethics, development of questionnaires, assistance with data collection and interpretation of the data. Reading and editing of thesis.
Associate Professor Cath Conlon	Co-academic supervisor. Co-investigator of the REACH study. Assistance with data collection and interpretation of data. Reading and editing of thesis.
Associate Dean and Professor Andy Towers	Co-academic supervisor. Provided expertise regarding alcohol consumption in older adults.
Karen Mumme	Assistance and guidance with data management and statistical analysis. Assistance with data collection.

A number of other individuals assisted with other aspects of the REACH study including recruitment and data collection.

Chapter Two: Literature Review

2.1. The ageing population

Globally, the population is ageing (Chapman, Harrison, Kostadinov, Skinner, & Roche, 2020; de Groot & van Staveren, 2010; Divo, Martinez, & Mannino, 2014; Kelfve, Agahi, Mattsson, Lennartsson, & Drugs, 2014; Nagarajan et al., 2021). An ageing population was once more common in developed countries but is now widely observed in low to middle income countries (World Health Organisation, 2018). The transition to lower birth and death rates over time has accelerated the pace of the growing ageing population (Nagarajan et al., 2021). Many other factors have led to the change in the ageing structure over time, including economic, social and environmental changes (Kelfve et al., 2014; MacNee, Rabinovich, & Choudhury, 2014). The ageing population mainly comprises women as they tend to live longer than men, especially in the advanced age groups (United Nations, 2020). According to the United Nations, 2020, the number of older adults aged over 65 is expected to increase from 9.3% to 16% in 2050.

The Te Ara Encyclopaedia of New Zealand (NZ) defines older adults as those over the age of 65 years. The older population is growing more rapidly than, the younger population in New Zealand (Ministry of Health, 2016) mainly due to the decline in mortality and increasing life span of older adults (Ministry of Social Development, 2016). In 2005, older adults 65 years and over made up around 12% of the population (Ministry of Health, 2016). Recent statistics show that in 2018, 15.2% of the population were over 65 years, 715,200 older adults (Environmental Health Indicators New Zealand, 2020). By 2035, this is expected to increase to over 20% (Ministry of Health, 2016). Figure 2.1 below illustrates the estimated growth rate of the population for different age groups over the next 50 years. The comparisons of the age groups signify the rapid growth in those 65 years and over. The sharp increase differs from the plateau projection in the other age groups.

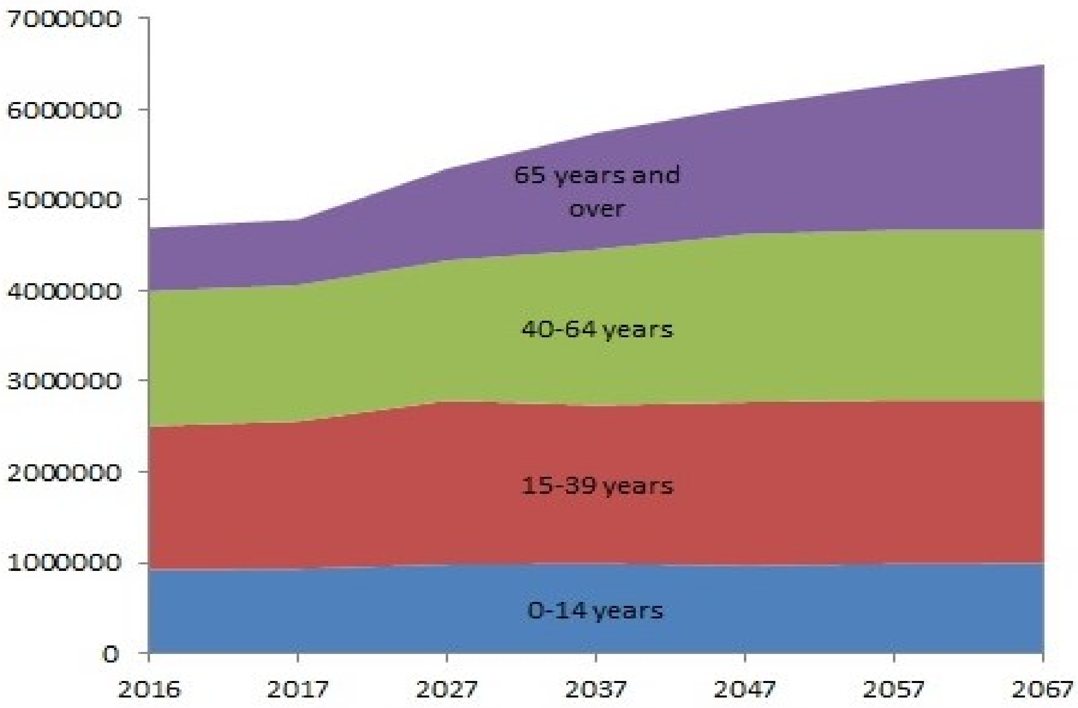

Figure 2.1. The projected population growth by age group in New Zealand from 2016 to 2067. (Ministry of Health, 2018). Source: Statistics New Zealand, 2020.

2.2. Physiological and lifestyle changes associated with ageing

Changes in lifestyle and the physiology of the body are part of an ageing process that are inevitable (Chapman, 2004; Cruz-Jentoft et al., 2010; de Groot & van Staveren, 2010; Prasad, Sung, & Aggarwal, 2012; Samarakoon et al., 2011; Stevenson et al., 2015). These include functional changes in the muscle, nervous, digestive, immune and cardiovascular systems, to name a few (Cruz-Jentoft et al., 2010; MacNee et al., 2014). Ageing is also associated with increased susceptibility to chronic diseases and illnesses (Divo et al., 2014). Lifestyle changes in older adults include the possibility of reduced physical activity, changes in alcohol and tobacco use, and changes in nutrition status (McPhee et al., 2016; Samarakoon et al., 2011).

A progressive decline in skeletal muscle mass is often associated with ageing (Saxon, Etten, & Perkins, 2015). Over time, this can lead to a loss in muscle strength and function known as sarcopenia (Cruz-Jentoft et al., 2010; Volpi, Nazemi, & Fujita, 2004). Muscle mass begins to decline from the age of 30 years by 3 to 8% every ten years; this significantly increases by the age of 60 years (Volpi et al., 2004). When muscle mass declines, it can lead to reduced muscle strength, increasing the risk of falls and injury (Saxon et al., 2015). It impacts the physical functioning of everyday life and contributes to disability (Divo et al., 2014; MacNee et al., 2014; Volpi et al., 2004).

The nervous system also experiences age-related decline linked to muscle weakness and reduced strength (Saxon et al., 2015; Stull, 2021). The number and speed of the neurons in the brain reduce along with the total brain volume (McPhee et al., 2016; Saxon et al., 2015; Stull, 2021). Ultimately, this affects the balance, sensation and coordination of older adults; this is especially important regarding physical movement and exercise (McPhee et al., 2016; Saxon et al., 2015). There are also neurons in the digestive system where a lack of functioning neurons can contribute to the dysfunction of the gastrointestinal tract in older adults (Saffrey, 2013).

The digestive system plays a vital role in the body's overall health (Saxon et al., 2015). It is essential for the breakdown of food to nutrients which the body utilises to produce energy and for cell repair (Saxon et al., 2015). The absorption of important nutrients such as iron, calcium, folate and vitamin B12 can decline as a result of reduced gastric secretions seen with ageing (Chapman, 2004; Saxon et al., 2015). A deficiency in vital nutrients can affect nutritional status over time, leading to health conditions that older adults are at risk of including malnutrition (Chapman, 2004; Saxon et al., 2015). Malnutrition is a significant condition that contributes to the increased risk of mortality in older adults (Chapman, 2004). Once diagnosed, it is often challenging to restore nutritional status (Chapman, 2004). However, this is dependent upon the severity of the condition. Other common age-related gastrointestinal changes common for this population include constipation, faecal incontinence and gastric reflux (Saxon et al., 2015).

Ageing accelerates the risk of chronic diseases and illnesses in older adults (Divo et al., 2014; MacNee et al., 2014; Prasad et al., 2012). This may be due to the increased susceptibility to inflammation in the body (Divo et al., 2014). Negative habits and lifestyle changes can predispose older adults to such non-communicable diseases, for example, low physical activity, long-term smoking and alcohol use and unhealthy eating habits (Divo et al., 2014). A condition most frequently evident in older adults is chronic obstructive pulmonary disease (COPD) (Divo et al., 2014; MacNee et al., 2014). Alzheimer's and Parkinson's, rheumatoid arthritis, osteoporosis, diabetes and cardiovascular disease are other common diseases present in older adults (MacNee et al., 2014). Lowered immunity can result in delayed wound healing and increased hospital stays (Weyand & Goronzy, 2016). These physiological and lifestyle changes in older adults can have a significant impact on their quality of life.

2.3. Impact of physical changes on dietary intake including alcohol

The process of ageing has a significant impact on appetite and dietary intake (Chapman, 2004; Ferreira & Weems, 2008; Stevenson et al., 2015). This results in a decreased feeling of hunger, smaller meals, and longer times to finish meals, which may in part be due to dental issues (Chapman, 2004). Over time, this may lead to weight loss, when energy consumed is less than what is expended (Barbara et al., 2003; Chapman, 2004). When fat tissue is lost, lean muscle tissue is also lost increasing the risk of frailty and loss of muscle function (Chapman, 2004).

Age-related physical changes in older adults include increased sensitivity to the effects of alcohol (Barbara et al., 2003; Hodges & Maskill, 2014; Stevenson et al., 2015). This results in a higher blood alcohol concentration with any amount of alcohol consumed (Ferreira & Weems, 2008; Stevenson et al., 2015). The toxic side effects of alcohol consumption also occur faster and take much longer to wear off in older adults (Barbara et al., 2003; Hodges & Maskill, 2014; Stevenson et al., 2015). The physiological changes that cause this to happen are due to the decreased gastric enzyme called alcohol dehydrogenase (Ferreira & Weems, 2008; Hodges & Maskill, 2014; Stevenson et al., 2015). This enzyme helps break down the alcohol molecules; alcohol takes longer to process, which means that it is present in the blood for a more extended period (Barbara et al., 2003; Stevenson et al., 2015).

2.4. Health effects of alcohol intake in NZ older adults

Alcohol consumption can harm the health of adults as they age (Blow et al., 2000; Sorocco & Ferrell, 2006). Excess or unsafe consumption can lead to chronic diseases, worsen existing conditions, interact with vital medications, lead to falls, injuries and increase the risk of mental health problems and alcohol addiction (Barbara et al., 2003; Blow et al., 2000; Divo et al., 2014; Heuberger, 2009; Sorocco & Ferrell, 2006). These risks impact older adults as they are more susceptible to falls and injuries, and health problems due to changes in their physiology and health status over time (de Groot & van Staveren, 2010; Divo et al., 2014).

Alcohol consumption greater than the recommended guidelines increases the risk of existing and new cardiovascular conditions, including hypertension, heart disease and stroke (Barbara et al., 2003; Blow et al., 2000; de Groot & van Staveren, 2010; Divo et al., 2014). Other severe health conditions affected by excess alcohol intake include breast cancer, liver disease, pancreatitis and diabetes (Chapman et al., 2020; Heuberger, 2009; Laberge et al., 2021; Sayed & French, 2016; Sorocco & Ferrell, 2006; Stevenson et al., 2015).

Figure 2.2 demonstrates the deaths of New Zealand adults caused by alcohol consumption in 2007, categorised by age and multiple causes such as cancer, cardiovascular disease, and unintentional injuries. The table below reveals that cancer and cardiovascular diseases were the common causes of alcohol-attributable death in men and women over 65 years of age. It is important to note that other environmental factors such as dietary intake, smoking and other lifestyle habits can contribute to disease burden (Sorocco & Ferrell, 2006; Stevenson et al., 2015). Additionally, genetic factors can predispose an individual to health conditions (Barbara et al., 2003; National Institutes of Health, 2017).

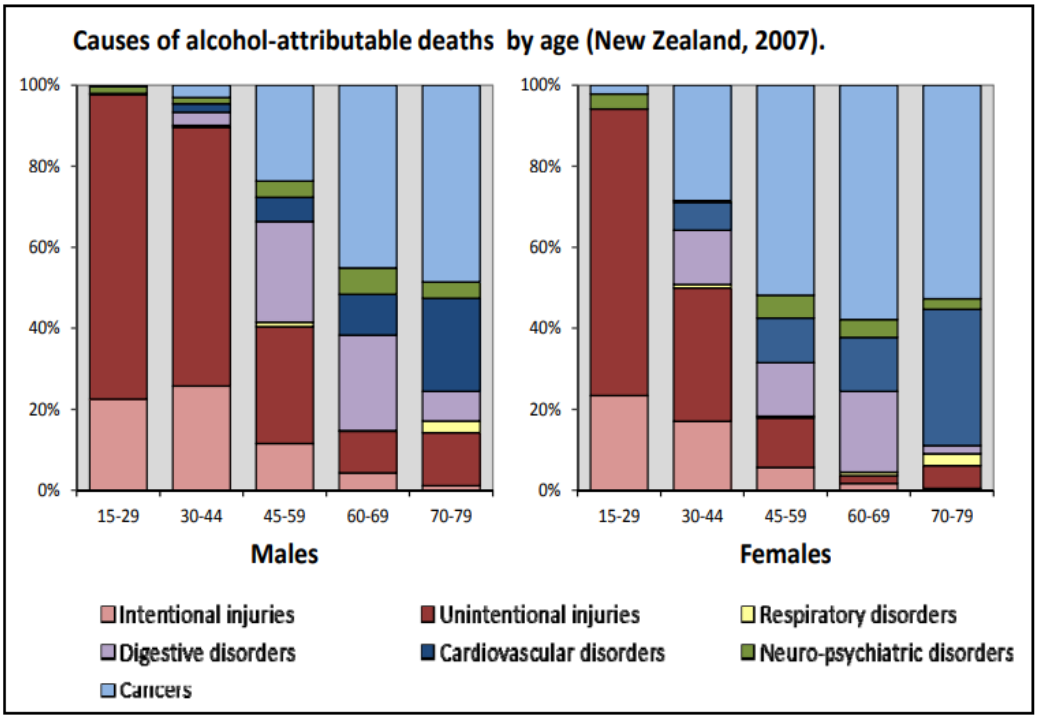

Figure 2.2. Alcohol attributed deaths by age group in New Zealand, 2007. Sourced from: Health Promotion Agency, Te Hiringa Hauora, NZ.

Older adults should be aware that alcohol intake has the potential to interact with medications (Ferreira & Weems, 2008; Gell et al., 2015; Heuberger, 2009; Kelfve et al., 2014; Stevenson et al., 2015). The harmful interactions between alcohol and prescription medications may include vomiting, nausea, headaches, drowsiness, loss of coordination, worsening side effects or a reduction in the efficacy of the medicine. (Hodges & Maskill, 2014; Stevenson et al., 2015). These interactions may be fatal. Alcohol combined with antidepressants may have an increased sedative effect, resulting in vomiting or nausea, dizziness and poor concentration (Stevenson et al., 2015). The combination of alcohol consumption and antibiotics may cause heart problems such as increased heart rate, low blood pressure and dilated blood vessels causing flushed skin (National Institute on Alcohol Abuse and Alcoholism, 2014). The National Institute on Alcohol Abuse and Alcoholism warns of an increased risk of overdose when consuming alcohol with antihistamines or allergy medications.

The effects of alcohol on women are significantly different to men, which is why men can drink more with less adverse effects (Barbara et al., 2003). Women have higher blood alcohol concentrations than men even after drinking equal amounts of alcohol (Barbara et al., 2003; Ely, Hardy, Longford, & Wadsworth, 1999; Health Promotion Agency, 2015; Hodges & Maskill, 2014; Stevenson et al., 2015). Women get intoxicated faster and experience the effects in lower doses (Ely et al., 1999; Health Promotion Agency, 2015; Hodges & Maskill, 2014; Stevenson et al., 2015). In general, women are smaller than men, which means that they carry less fluid in their bodies to manage varying alcohol concentrations (Barbara et al., 2003; Health Promotion Agency, 2015; Stevenson et al., 2015). Another factor contributing to women consuming less alcohol than men is the lower concentration of enzymes that break down alcohol in the liver (Barbara et al., 2003; Health Promotion Agency, 2015; Hodges & Maskill, 2014; Stevenson et al., 2015). The lower number of enzymes means that less alcohol breaks down, resulting in a higher blood alcohol concentration (Barbara et al., 2003; Ely et al., 1999; Health Promotion Agency, 2015; Hodges & Maskill, 2014; Stevenson et al., 2015).

There is strong evidence, particularly regarding the effects of alcohol on the human body and the impact of ageing on nutrition and alcohol intake in older adults. It is important that older adults are aware of their alcohol intake to prevent alcohol-related harm to themselves and others.

2.5. Current recommendations of alcohol intake

There are currently no standard international guidelines for alcohol intake in older adults (Ferreira & Weems, 2008; Heuberger, 2009; Laberge et al., 2021; Stockley et al., 2019). Different countries have their own set of guidelines and separate definitions of what standard drinks are (Stockley et al., 2019). Some countries have guidelines based on daily or weekly consumption and grams of pure alcohol (Stockley et al., 2019). The World Health Organisation (WHO) defines a standard drink as "A volume of (e.g., a glass of wine, can of beer, or a mixed drink containing distilled spirits) that contains approximately the same amount (in grams) of ethanol regardless of the type of beverage. The term standard drink is often used to educate alcohol consumers about the similar effects associated with consuming different alcoholic beverages served in standard sized glasses or containers (Stockley et al., 2019).

In New Zealand, adults have guidelines around safe alcohol consumption which are not specific to older adults. The advice for NZ older adults is to follow the guidelines from the Ministry of Health (MoH) and not drink any more than what is recommended (Health Promotion Agency, 2018). The guidelines recommend no more than a certain number of standard drinks per day or week. In NZ, a standard drink contains 10 grams of pure alcohol (Ministry of Health, 2019). Recommendations for women include no more than two standard drinks a day and no more than ten standard drinks a week (Ministry of Health, 2019).

In comparison, the advice for men is to consume no more than three standard drinks a day and no more than 15 standard drinks a week (Ministry of Health, 2019). A maximum of four standard drinks for women and five standard drinks for men is recommended to reduce any risk of injury on a single occasional drinking (Ministry of Health, 2019). Adults are also recommended to have at least two alcohol free days every week. The MoH provides a list of tips for low-risk drinking behaviours, such as 'eat before you drink, consume non-alcoholic drinks before alcoholic beverages, setting limits, keeping track and drinking slowly and responsibly'.

2.6. Alcohol intake in older adults

2.6.1. Global prevalence of alcohol intake

Internationally, studies report a high prevalence of alcohol consumption in older adults. (Gilson, Judd, & Bryant, 2019; Laberge et al., 2021; McEvoy, Kritz-Silverstein, Barrett-Connor, Bergstrom, & Laughlin, 2013; Resnick et al., 2003). Findings from a Canadian study found 70% of community-dwelling older adults aged 65 years and over reporting alcohol consumption on a weekly basis (Laberge et al., 2021). They noted their findings were similar to other countries like Ireland, Germany and Norway, where alcohol consumption ranges from 63 to 81% in older adults over 65 years (Laberge et al., 2021). However, an earlier study conducted in the US by Reid et al. (1999) found 53% of older adults had no current or prior alcohol use, 13% used to consume alcohol, 11% consumed less than one drink per week, 17% consumed less than 14 drinks per week and 6% drank 14 or more drinks per week (Reid, Concato, Towle, Williams, & Tinetti, 1999). The result of this study is different to the others reported because most of the older adults who never consumed alcohol were female who generally consume alcohol in lower quantities compared to males.

2.6.2. Prevalence of alcohol intake in New Zealand

It is commonly assumed that alcohol consumption typically declines as people age (Stevenson et al., 2015). In NZ, research on the prevalence of alcohol intake in older adults is scarce compared to younger age groups (Towers et al., 2017). From the available research, alcohol consumption in older adults is evident. According to Towers et al (2017), NZ had the second-highest proportion of older adult drinkers at 83%, just short of England's older adults at 87%. In comparison, the United States reported 62% and Mexico only 56%.

Figure 2.3 demonstrates data from the NZ Health Survey which shows no significant changes in alcohol intake over the past 14 years. The 65 to 74 year age group had a similar prevalence of alcohol intake compared to the 15 to 24 year age group. The 75 and over age group had a slight increase in the numbers of people drinking alcohol compared with previous years. The most recent New Zealand Health Survey data (2019-2020) found 82.1% of the 55 to 64 year olds consumed alcohol. For those aged 65 to 74 years, the prevalence of alcohol consumption was 78.1% and for those over 75-year old, the prevalence of alcohol consumption was 73.4%. (See figure 2.3).

	2006/07	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Total	83.6	79.5	79.7	80.2	79.5	80.1	79.3	78.7	80.3	81.5
Gender										
Men	87.7	84.6	83.9	84.1	84.2	84.1	83.6	82.9	84.5	84.6
Women	79.8	74.8	75.9	76.5	75.1	76.3	75.2	74.8	76.3	78.5
Age group (years)										
15-17	74.5	59.6	55.9	60.6	57.1	57.2	56.3	57.4	58.3	57.5
18-24	89.1	84.8	85.7	84.4	85.8	84.4	83.7	83.6	85.4	85.2
15-24	83.8	77.0	76.9	77.2	77.3	76.3	75.7	75.9	76.8	77.4
25-34	86.7	82.6	82.7	83.5	82.5	83.5	81.5	79.6	81.9	83.8
35-44	84.8	83.7	81.9	84.7	82.6	82.5	82.1	82.3	82.8	84.5
45-54	84.8	83.2	81.7	81.8	81.7	82.4	82.9	82.9	83.1	86.1
55-64	86.0	79.9	82.5	81.5	80.9	81.5	80.5	80.5	83.1	82.1
65-74	79.8	75.0	79.1	77.9	77.3	79.6	77.9	77.6	78.1	78.1
75+	70.4	65.3	66.3	67.2	67.7	69.5	69.1	66.2	71.5	73.4

Figure 2.3. Percentage of adults consuming alcohol containing drink in the past year among different age groups in New Zealand from 2006 to 2020. Source: New Zealand Health Survey, Ministry of Health, 2020.

2.6.3. Patterns of alcohol consumption

Patterns of alcohol consumption may change over time with age (Kelfve et al., 2014; Stevenson et al., 2015). In older adults, alcohol consumption patterns include light to moderate consumption, binge drinking and hazardous or harmful drinking (excessive drinking) (Stevenson et al., 2015; Towers, Sheridan, Newcombe, & Szabo, 2018b; Towers et al., 2018c). Light to moderate consumption (low-risk) classifies people following the recommended guidelines (Health Promotion Agency, 2018; Ministry of Health, 2019). This categorisation may vary as different countries have different alcohol consumption guidelines (Stockley et al., 2019). In contrast, binge, hazardous or harmful drinking is classified from Alcohol Use Disorders Identification Tests (AUDIT) scores (Ministry of Health, 2019; Towers et al., 2017; Towers et al., 2018c). The range of scores are from 0 to 40 where a score of 0 indicates no problems from alcohol use. Scores from 1 to 7 indicate low risk consumption and generally, scores of 8 or more are considered hazardous or harmful drinking (Towers et al., 2018c).

Older adults are more likely to drink daily or higher in frequency but less in quantity overall (Barbara et al., 2003; Hodges & Maskill, 2014). Older adults tend to have a routine-based pattern of alcohol consumption in terms of frequency and quantity compared with younger adults (Barbara et al., 2003; Towers et al., 2017).

Older adults in NZ (64%) consumed up to two drinks on each occasion which is greater than countries like England (54%) but lower than countries like the United States (74%) and Ghana (73%) (Towers et al., 2017). Women were more likely to consume (82% of women) two standard drinks of alcohol per occasion compared with males (46%) in New Zealand. On a typical occasion, the Health Promotion Agency (HPA) report found that 16% of older men consumed five or more drinks in NZ on any one occasion (Towers et al., 2017). This finding was one of the highest rates for men across all countries compared.

On average, NZ older adults drank on two to four more days per week than adults from other countries. Men in NZ had a similar frequency of drinking pattern like other countries such as India and Mexico, where men usually tend to drink more frequently than women (Towers et al., 2017).

Among several international reports on different drinking patterns, women consistently showed lower levels of harmful alcohol consumption than men (Barbara et al., 2003; Ely et al., 1999; Gilson et al., 2019; Kelfve et al., 2014; Laberge et al., 2021; Malyutina, Bobak, Kurilovitch, Nikitin, & Marmot, 2004; Stevenson et al., 2015). Data from the *New Zealand Health* and *Work and Retirement Longitudinal Study* was represented in the report by the Health Promotion Agency (2017). These data are similar with international data that show men are more likely to binge or drink hazardously when compared to women in the same age group (Towers et al., 2017). Whilst the younger age groups have the highest rates in the country, the older adults hazardous drinking prevalence remains high, with 25.2% prevalence in men aged 65 to 74 years. For women, this was 6.9% (see figure 2.4) (Ministry of Health, 2020).

Population group	Total		Men		Women		Estimated number of adults	
	%	(95% CI)	%	(95% CI)	%	(95% CI)	Total	(95% CI)
Total	25.7	(24.2 - 27.2)	34.0	(31.7 - 36.2)	17.3	(15.8 - 18.8)	839,000	(791,000 - 889,000)
Age group (years)								
15-17	20.9	(14.6 - 29.1)	25.4	(16.5 - 36.8)	16.5	(9.2 - 27.8)	21,000	(15,000 - 29,000)
18-24	38.1	(33.1 - 43.4)	43.3	(36.2 - 50.6)	32.8	(26.4 - 39.8)	155,000	(135,000 - 176,000)
15-24	34.7	(30.4 - 39.3)	39.8	(33.6 - 46.3)	29.5	(24.2 - 35.4)	176,000	(154,000 - 199,000)
25-34	28.4	(25.1 - 31.9)	34.0	(29.1 - 39.3)	22.1	(18.8 - 25.7)	169,000	(149,000 - 190,000)
35-44	25.4	(22.7 - 28.4)	34.4	(29.5 - 39.7)	16.5	(13.3 - 20.2)	132,000	(118,000 - 148,000)
45-54	32.1	(29.1 - 35.3)	43.9	(38.8 - 49.2)	20.5	(16.8 - 24.6)	177,000	(160,000 - 195,000)
55-64	21.9	(19.1 - 25.1)	32.7	(27.8 - 37.9)	11.0	(8.4 - 14.2)	108,000	(94,000 - 124,000)
65-74	16.1	(13.3 - 19.4)	25.2	(20.5 - 30.7)	6.9	(4.9 - 9.7)	57,000	(47,000 - 69,000)
75+	7.9	(5.7 - 10.9)	12.8	(9.0 - 18.0)	3.2	(1.4 - 6.2)	19,000	(14,000 - 26,000)

Figure 2.4. Prevalence of hazardous drinking in adults over the past year. Source: New Zealand Health Survey, Ministry of Health, 2020.

In NZ, few studies have investigated hazardous drinking in older adults (Stevenson et al., 2015; Towers et al., 2018c). From the available research, the rates of hazardous drinking are high and may increase the risk of negative consequences for the individual or others around them (Towers et al., 2018c). A significant proportion of older adults in Christchurch were drinking in amounts that would physically and mentally put them at risk of harm (Khan, Davis, Wilkinson, Sellnnn, & Graham, 2002). Data from the NZ Health Survey shows that among the different indicators of alcohol drinking, it is evident that there is a slight increase in the prevalence of hazardous drinking in all categories over the past five years (see table 2.1).

Table 2.1. Indicators of alcohol use in older adults (65-74 years) over the past years.

	Years				
Indicators	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**
Past year drinkers	79.6	77.9	77.6	78.1	78.1
Hazardous drinkers	12.9	13.1	16.1	15.0	16.1
Heavy episodic drinking at least monthly	14.2	15.0	15.6	15.0	17.0
Heavy episodic drinking at least weekly	8.9	9.5	9.2	10.1	10.1

Definition of indicators:

- Past year drinkers – adults aged 65-74 years have had a drink in the past year containing alcohol.
- Hazardous drinkers – adults aged 65-74 years who have an AUDIT (Alcohol Use Disorders Identification Test) score of 8 and above, shows a pattern of drinking that contains risk of damaging physical and mental health.
  The AUDIT score refers to a 10-item questionnaire covering three aspects of alcohol use (consumption, dependence, and adverse consequences).
- Heavy episodic drinking at least monthly – adults aged 65-74 years who drink six or more alcoholic drinks on one occasion at least monthly, in the past year.
- Heavy episodic drinking at least weekly – adults aged 65-74 years who drink six or more alcoholic drinks on one occasion at least weekly, in the past year.

There is limited data on what type of alcoholic beverages older adults consume internationally and nationally (Ferreira & Weems, 2008). A 2014 report by the HPA in NZ indicated that wine (59%) was the most popular drink amongst older adults aged 65 years and over; this was followed closely by beer (18%) and spirits (10%). However, no data was available regarding the amounts and frequency of consumption. There is also no recent data on what types of alcohol older adults are currently consuming. A summary of the available research in New Zealand is provided in table 2.2.

2.2. Brief descriptive summaries of original studies investigating alcohol intake in New Zealand.

Author, year, title	Population (e.g., Number, sex, age, location)	Aim of research	Methods including how alcohol intake measured	Results
Bramley et al (2003) Differences in patterns of alcohol consumption between Māori and non-Māori in Aotearoa (New Zealand)	- 44,830 adults - Male and female - 18-74 years old - New Zealand	To describe the differences in alcohol consumption patterns in Māori and non-Māori	Manuscript Data collected from five NZ surveys conducted from 1988	In all age groups, non-Māori were more likely to be alcohol drinkers. The likeliness of this trend increased with age. The frequency of alcohol consumption was higher for non- Māori across all ages. The average daily consumption was found to be similar between Māori and non-Māori
Stevenson et al (2015) Alcohol consumption among older adults in Aotearoa/ New Zealand: a comparison of 'baby boomers' and 'over 65s'	- 6642 adults - Male and female -55-70 years -New Zealand	To investigate the prevalence of hazardous and heavy episodic drinking in a population-based sample of New Zealanders aged 55-70 years	Manuscript Participants were surveyed in 2006 using the New Zealand Electoral roll. Two independent random samples were used to represent the general and Māori population	Participants that were NZ European and Māori, male, of higher income, and with a good standard of living were significantly more likely to drink hazardously. Men, those of Māori ethnicity, and participants with none or secondary qualifications only were associated with heavy episodic drinking
Towers et al (2017) The drinking patterns of older New Zealanders: National and international comparisons	- Male and female - 50 years and over - NZ and international	To explore the pattern of alcohol consumption at a national and international level	Report by the Health Promotion Agency Data sets used from four different studies. Cross-country harmonisation of questions from different studies to be able to compare variables on alcohol from different countries	Older Māori consumed alcohol less in frequency but slightly higher quantities per occasion than non-Māori. Older men were much more likely to drink more than older women and higher levels of binge drinking compared to women. Older NZs showed a tendency towards 'frequent' (more consistently throughout the week) drinking

(Towers et al., 2018a) Longitudinal patterns of alcohol use in older New Zealanders	- Respondents from the 2006-2016 NZ Health, Work and Retirement Study. - 50 years and over - New Zealand	To identify whether distinct groups of older New Zealanders could be identified based on their drinking patterns. To identify whether these groups can be differentiated by sociodemographic factors and health characteristics	Report by the Health Promotion Agency Data from the New Zealand Health, Work and Retirement Longitudinal study. Used Alcohol Use Disorders Identification Tests (AUDIT) to assess alcohol use	A large number of older adults were drinking frequently and in large amounts on each occasion. Lowest level of alcohol consumption were found in slightly older adults, female and lower economic living standard
Towers et al (2018b) New Zealanders' alcohol consumption patterns across the lifespan	- 801 New Zealanders over the lifespan - Male and female - 60 years or older	To explore the factors that initiate alcohol use, patterns of use over the lifespan, changes in hazardous drinking	Report by the Health Promotion Agency Data from Life Course History Interview study in the New Zealand Health, Work and Retirement Longitudinal Study	Gender, socioeconomic status and parents smoking behaviour predicted alcohol use in the early stages of life. Men were more likely to be drinking alcohol at an earlier age specifically in households that smoked. Men drink more frequently than women. Early alcohol use in women was more likely in high socioeconomic households
Towers et al (2018c) The prevalence of hazardous drinking in older New Zealanders'	- 4026 respondents from the NZ Health, Work and Retirement Study - 50-89 years - Male and female	To compare prevalence of hazardous drinkers using different screening tools and whether using screening tools is beneficial in identifying hazardous drinkers in older adults	Report by the Health Promotion Agency Data from 2016 wave collection of New Zealand Health, Work and Retirement Longitudinal Study	83% of participants were drinkers. Prevalence of hazardous drinking ranged between 35-40%. Almost 50% of NZ older male drinkers were hazardous drinkers

Currently, there is limited research on the types of alcohol consumed, the quantity and frequency of consumption in older adults in New Zealand. We know from the NZ health surveys and literature that drinking rates in older adults are increasing and hazardous drinking is also on the rise (Ministry of Health, 2020; Stevenson et al., 2015; Towers et al., 2017; Towers et al., 2018c). Understanding current drinking patterns, such as the types and frequency of alcohol consumption, in older adults could inform public health strategies to promote adherence to alcohol guidelines.

2.7. Determinants of alcohol consumption

2.7.1. Age

It is commonly understood that alcohol consumption typically reduces as people age (McEvoy et al., 2013; Stevenson et al., 2015). Older adults may reduce alcohol intake in part due to the increased sensitivity to alcohol or increased use of medications (Gell et al., 2015; Stevenson et al., 2015). However, not all older adults will reduce their consumption. Some studies have found older adults drink more often, while other older adults maintain alcohol intake as they age (Stevenson et al., 2015). Other studies have found no difference in drinking behaviours regarding age and have noted several factors contributing to alcohol intake (Resnick et al., 2003). High consumption may be due to more available free time, no work requirements and disposable income (Stevenson et al., 2015).

2.7.2. Sex

Generally, more men consume alcohol compared to women and men have a higher prevalence of harmful drinking and its associated problems (Table 2.2) (Gell, Meier S, & Goyder, 2014; Health Promotion Agency, 2015; Hodges & Maskill, 2014; Huckle, Yeh, Lin, & Jensen, 2013; Towers et al., 2017). In the most recent Health Survey conducted by the Ministry of Health, 81.1% of males consumed alcohol in the past year compared to 75.3% of females. This trend is consistent throughout the past 15 years, with males consistently having a higher prevalence of alcohol consumption. The 2017 HPA report indicates that older men are more likely to drink heavily on a single occasion. The report found 26% of older men in NZ drank five or more drinks on a typical occasion compared to 6% of older women (Towers et al., 2017).

2.7.3. Ethnicity

There are significant differences in the level of alcohol consumed between ethnic groups. A 2017 Health Promotion Agency NZ report and Bramley et al (2003) found that older Māori adults were more likely to not drink alcohol when compared to non-Māori older adults (Table 2.2). Older Māori and Pacific adults drink less frequently than non-Māori but tend to drink more significant amounts on one occasion (Bramley Dale, Broad Joanna, Harris Ricci, Reid Papaarangi, & Rod, 2003; Towers et al., 2017).

2.7.4. Socio-economic status

The socio-economic status of individuals can predict the level of alcohol consumption behaviour in older adults (Table 2.2) (Bareham, Kaner, Spencer, & Hanratty, 2019; Kelfve et al., 2014). High levels of regular alcohol consumption are seen more often in higher socio-economic groups (Bareham et al., 2019; Britton, Mehta, O'Neill, & Bell, 2019; Gell et al., 2015). In comparison, one study found that lower socio-economic groups demonstrate more binge drinking or harmful drinking behaviours (Bareham et al., 2019; Sorocco & Ferrell, 2006). Some older adults prioritise alcohol purchases regardless of income (Bareham et al., 2019). Stevenson et al. (2015) found that socio-economic status was independently positively associated with alcohol consumption in NZ older adults.

2.7.5. Living situation

An association between low alcohol consumption and living in an aged care facility has been found. One example was found in a residential care home (Hodges & Maskill, 2014; Stevenson et al., 2015). This association means that generally, those who live in aged care facilities consume less alcohol than those living at home (Kelfve et al., 2014). The low alcohol consumption may be due to a lack of access to alcoholic beverages in aged care facilities. A cross-sectional survey conducted in Christchurch, NZ, showed that older adults living in rest homes consumed alcohol in small quantities where the prevalence of alcohol consumption over the past 12 months was 5.1% (Khan, Wilkinson, Sellman, & Graham, 2001). Specifically, 14% of the 175 Christchurch rest home residents surveyed had never had an alcoholic drink, and 50% had not consumed alcohol in the past 12 months. Furthermore, another study in Norway observed an increased alcohol consumption in men living alone compared with men who did not live alone (Helvik, Engedal, & Johannessen, 2020).

2.7.6. Health status

Alcohol consumption declines in older adults often due to health conditions which often increase the risk of morbidity and mortality (Stevenson et al., 2015; Towers et al., 2018b). Health conditions such as liver disease, high blood pressure, cancers and diabetes can have adverse symptoms which includes interactions with medications (Prasad et al., 2012; Stevenson et al., 2015). Other reasons that cause older adults to cease alcohol intake may be due to their doctor's advice, inability to socialise as preferred, hospitalisations or generally declining overall health (Sarich et al., 2019). A 2019 Australian study showed individuals over the age of 45 were more likely to quit alcohol consumption if they had declining health or were diagnosed with one or more health condition (Sarich et al., 2019). The illnesses associated with drinking cessation included diabetes, stroke, Parkinson's disease, poor memory, heart disease and cancer. Heavier drinkers were significantly likely to stop alcohol consumption due to declining health function (Sarich et al., 2019).

2.7.7. Education

A 2017 Health Promotion Agency report regarding the drinking patterns of older New Zealanders reported that older adults in countries who drink the highest proportion of alcohol had higher education levels, while low alcohol consumption was observed in older adults in countries with lower education levels (Towers et al., 2017). A NZ study found that older adults with insufficient education levels or no school qualification binge drink at the highest level compared to older adults with secondary or tertiary education (Table 2.2) (Stevenson et al., 2015). Gell et al. (2014) supports this finding where older adults in countries with higher education levels correlate with the lowest binge drinking rates. Whereas drinking alcohol, in general, is seen in those with a higher education level (Kelfve et al., 2014; Malyutina et al., 2004).

2.7.8. Marital status

National and international studies show that being single, widowed, separated, or divorced is related to increased levels of alcohol consumption (Ellison, Barrett, & Moulton, 2008; Liang & Chikritzhs, 2012; Malyutina et al., 2004; Towers et al., 2018b). Broken relationships in mid-life or being unmarried have a strong association with increased levels of hazardous drinking (Liang & Chikritzhs, 2012; Towers et al., 2018b). In general, married people endure better health physically and mentally than others (Ellison et al., 2008).

There is limited evidence illustrating sociodemographic factors and their association with alcohol consumption (Gell et al., 2015; Kelfve et al., 2014). Research suggests certain factors lead to higher drinking rates than others, and this should be investigated in future studies.

2.8. Conclusion

Alcohol consumption in the older adult population (65-74 years) is highly prevalent. A few studies in NZ have found that the frequency of alcohol consumption is high but overall quantity consumed is low compared to other age groups. There is currently a gap in the knowledge regarding the type of alcohol consumed in this age group in NZ and overseas (Ferreira & Weems, 2008; Stevenson et al., 2015). Alcohol consumption in older adults is also linked to a variety of demographic factors shown in many international studies. In NZ, few studies have investigated alcohol consumption and its association with the sociodemographic factors in older adults. Further research can also help identify whether older adults consume alcoholic beverages within the current recommendations outlined by the Ministry of Health.

Chapter Three: Alcohol intake in community-dwelling older adults in Auckland, New Zealand

3.1. Abstract

Background: Alcohol consumption is prevalent in older adults worldwide. Significant advances in health promotion and medical care have led to an increase in life expectancy therefore, it is important to know about alcohol consumption in older adults. Currently, there is limited evidence regarding alcohol consumption in community adults living in New Zealand, particularly with regard to the types of alcohol consumed. There is also very limited evidence of comparisons of alcohol intake in older adults with the guidelines from the Ministry of Health. This information is essential to increase awareness and form future strategies on safe alcohol consumption in older adults.

Aim: To explore alcohol intake in older adults (65-74 years) living in the community in Auckland, New Zealand.

Methods: This research was a sub-study of the REACH (Researching Eating, Activity and Cognitive Health) study, a cross-sectional study aimed at investigating dietary patterns, cognitive health and metabolic syndrome in 65 to 74-year-old males and females living independently in Auckland, New Zealand. Older adults were recruited between April 2018 and February 2019 throughout the Auckland region. Data (age, sex, education level, Index of Multiple Deprivation (IMD) score, living situation and marital status) was collected using a health and demographics questionnaire. A food frequency questionnaire (FFQ) was used to extract data on the types, frequency and quantity of alcohol consumption.

Results: Participants (n=371) included 35.8% men and 64.2% women, 93.6% of NZ European ethnicity. Most participants (81.4%) consumed alcohol, 14.6% never drank alcohol and 4% used to drink alcohol. Beer (mean ± SD) (0.9 ± 2.1), red (1.7 ± 3.1) and white wine (1.8 ± 3.6) were the most frequently consumed standard drinks per week. Men were more likely to consume beer (59.1% males; 7.3% females) and red wine (49.2% males; 31.4% females) at least weekly than females. Females were more likely to consume white wine at least weekly (44.7% females; 32.0% males). Overall, men consumed significantly more standard drinks per week (6.4 ± 7.4) than females (4.3 ± 5.6). For those who drank alcohol, the majority consumed alcohol at least weekly. Most participants consumed alcohol that was within the Ministry of Health daily (98.9%), weekly (96.4%) and per occasion (96.2%) guidelines and 83.8% had two or more alcohol-free days. A small number of participants (3.8%) consumed alcohol in large amounts (over the recommended guidelines) on a single occasion. Multiple linear regression found the sociodemographic factors 'sex' (being male) was positively associated with maximum standard drinks per occasion and Index of Multiple Deprivation (IMD) score (higher deprivation) was negatively associated with maximum standard drinks consumed per occasion. 'Age', 'education' and 'living situation' were not associated with maximum standard drinks consumed per occasion.

Conclusion: Older adults were more likely to drink beer and wine compared with other alcoholic beverages. Most of the older adults consumed alcohol within the guidelines, and a small number of older adults drank large amounts on a single occasion. Being male and having a lower level of deprivation were positively associated with maximum number of drinks consumed per occasion. This information can be used to create interventions targeted towards older adults and their drinking practices.

3.2. Introduction

The older adult population is ageing rapidly worldwide due to medical care advancements and health promotion (Nagarajan et al., 2021; United Nations Department of Economic and Social Affairs, 2020). People experience a number of physiological and lifestyle changes as they age, which may include changes in alcohol consumption. With ageing, the body becomes more sensitive to alcohol and is unable to metabolise alcohol completely (Hodges & Maskill, 2014; Stevenson et al., 2015).

International studies and national surveys report a high prevalence of alcohol consumption in older adults (Ferreira & Weems, 2008; Gell et al., 2015; Laberge et al., 2021; Towers et al., 2017). A research report commissioned by the NZ Health Promotion Agency (HPA) found England had the highest proportion (87%) of older adults (aged 50 years and over) who drank alcohol followed by NZ (83%) which was considerably more than other countries such as the United States (62%) and Mexico (56%) (Towers et al., 2017). Evidence shows older adults in NZ tend to drink more frequently but in lower quantities than younger adults (Towers et al., 2017). Older adults are most likely consuming alcohol at home where they are able to pour their own drinks (Towers et al., 2017). However, there is limited evidence regarding the types of alcohol consumed by older adults, and whether older adults are consuming alcohol within the recommended guidelines.

Worldwide guidelines for alcohol consumption differ (Heuberger, 2009; Stockley et al., 2019). The Ministry of Health has developed evidence-based, up to date guidelines in NZ to promote safe alcohol consumption in adults (Ministry of Health, 2019). The current guidelines recommend that men drink no more than three standard drinks per day and women drink no more than two standard drinks per day. This equates to no more than 15 standard drinks for men and ten standard drinks for women. The Ministry of Health recommends that women consume no more than four maximum drinks per occasion and five for men, as well as having at least two alcohol free days per week. These guidelines are not specific to older adults and; the HPA indicates that these guidelines of alcohol consumption per day, per week and per occasion are likely too high for older drinkers

(Health Promotion Agency, 2018). It is important that these guidelines are followed to minimise alcohol related harm.

Studies have reported that alcohol consumption may be associated with sociodemographic factors such as age, sex, education, living situation, marital status and deprivation (Gell et al., 2015; Health Promotion Agency, 2015; Stevenson et al., 2015; Towers et al., 2018a). International data identifies that the quantity of alcohol consumed is associated with sociodemographic factors (Britton et al., 2019; Gell et al., 2015; Kelfve et al., 2014), while NZ data identifies that frequency of alcohol consumption is associated with sociodemographic factors (Towers et al., 2018a).

This research aimed to explore alcohol intake in older adults (aged 65-74) living in the community in Auckland, New Zealand; including the types, quantity and frequency of alcohol consumed. Other objectives are to compare current alcohol intake with recommendations by the NZ Ministry of Health and to determine whether alcohol consumption is associated with sociodemographic factors.

3.3. Methods

Study design and participants

This study used data from the REACH (Researching Eating, Activity and Cognitive Health) study. The REACH study is a cross-sectional study that aims to explore the relationship between dietary patterns and cognitive health and metabolic syndrome in older adults (Mumme et al., 2019). The study population includes 65 to 74-year-old adults living independently in Auckland, New Zealand. The protocol for the REACH study has previously been described (Mumme et al., 2019). The inclusion criteria also included being able to speak fluent English. Participants that were diagnosed of any conditions that may impair cognitive function or had any event in the previous two years that impacted dietary intake were excluded. The Massey Human Ethics committee granted ethical approval: Southern A, Application 17/69. All participants provided written informed consent for participation in the REACH study.

Recruitment and screening

Participants were recruited from April 2018 to February 2019 throughout the Auckland region via a variety of methods such as emailing people on the Massey University participant database, media including press releases and radio interviews, posters and flyers that were distributed via community centres, local libraries, recreation centres and sports clubs. Relevant newsletters were also used to recruit older adults through groups such as Age Concern New Zealand and online promotion using Facebook pages including GrownUps and the Office for Seniors pages. Participants who expressed interest in participating completed a screening questionnaire online or over the telephone to ensure they met the inclusion criteria.

Data collection

Participants attended Massey University in Auckland for data collection on one occasion. During the visit participants completed sociodemographic, health and lifestyle questionnaires, an online food frequency questionnaire (FFQ) and anthropometric measurements were taken (Mumme et al., 2019).

Sociodemographic, health and lifestyle questionnaire

A written questionnaire developed by the researchers of the REACH study collected sociodemographic, health and lifestyle information from each participant. The questionnaire asked questions regarding age, sex, ethnicity, highest education level, living status (alone or with others), marital status, deprivation score and alcohol intake. The deprivation score illustrates the socioeconomic deprivation for specific areas in NZ and was calculated using the participant's residential address (Exeter, Zhao, Crengle, Lee, & Browne, 2017). Alcohol intake was assessed by asking the participants whether they drank alcohol or not, how often they consumed alcohol (monthly, weekly, daily), the number of standard drinks consumed in a specific timeframe, maximum drinks in a single occasion and the number of alcohol-free days per week (Appendix A).

Dietary assessment

Dietary data were collected using an online 109-item FFQ that represented dietary intake over the previous month. The FFQ has previously been tested for relative validity (compared with a 4-day food record) and reproducibility for assessing food groups and dietary patterns (Mumme et al., 2021). The questions relevant to this study asked how often participants consumed a serving of different alcoholic beverages such as beer (all varieties), red and white wine, spirits, ready to drink beverages, port, sherry and liquors. There were several different frequencies participants could select, ranging from “I never had this beverage” to “6 plus times per day” (Appendix B). One serving was equivalent to one standard drink. The quantity amounts ranged from one can or bottle for beer, lager, cider (all varieties) and ready to drink alcoholic beverages, one small glass for wine, port, sherry and liquors and one-shot or 30ml for spirits.

Data handling

Alcohol data from the sociodemographic, health and lifestyle questionnaire was grouped based on whether alcohol was consumed, the frequency of alcohol consumption, alcohol-free days and maximum drinks per occasion for males and females.

Data from the FFQ was converted to the number of standard drinks per period per participant.

For each alcoholic beverage, the frequency data were converted to the number of standard drinks per day, week and month. For example, if wine was consumed 1-3 times per month this equated to 2 standard drinks per month, 0.5 standard drinks per week or 0.07 standard drinks per day. These totals were combined to obtain total daily, weekly and monthly values for total alcohol consumed over a given period.

Statistical analysis

Data analysis was conducted using IBM SPSS statistics (version 27.0). Descriptive statistics such as mean and standard deviation were used for continuous variables or count and percentages for categorical variables. All tables were produced using custom tables. Independent t-tests and chi-squared tests examined the differences between the sexes for participant and alcohol intake variables. Multiple linear regression was used to explore associations between maximum drinks per occasion and age, sex, education, deprivation and living situation. As marital status and living situation were correlated (R= -0.60, p= <0.001), marital status was removed from the linear regression model.

3.4. Results

Of the 371 participants who completed the REACH study, all completed the sociodemographic, health and lifestyle questionnaire and 367 answered the food frequency questionnaire (FFQ). Table 3.1 presents participant characteristics. Most of the participants were female (64.2%) and New Zealand European (93.6%) with a mean ± SD age of 70 ± 2.5 years. The majority of the participants had a post-secondary (40.2%) or university qualification (37.2%), lived with others (70.9%) and were married (65.1%). Women were more likely to have no or secondary school qualifications (27.9% women vs 14.0% men) and men were more likely to have university level qualifications (50% men vs 30.4% women) (all $p<0.001$). Significant differences were found between living situation and marital status where more females were living alone (37.8% women vs 13.5% men), and more men were married (85.6% men vs 53.8% women) while females were more often divorced or widowed (42.5% women vs 11.4% men) (all $p<0.001$).

Table 3.1. Participant characteristics

		Male n (%)	Female n (%)	Total n (%)
Participants		133 (35.8)	238 (64.2)	371 (100%)
Age (mean ± SD)	Years	70.1 ± 2.4	69.4 ± 2.6*	69.7 ± 2.5
Ethnicity	NZ European	122 (91.7)	225 (94.5)	347 (93.6)
	Māori/ Pacific Island	5 (3.8)	7 (3.0)	12 (3.2)
	Asian	6 (4.5)	6 (2.5)	12 (3.2)
Education level	Secondary [a]	18 (14.0)	66 (27.9) *	84 (22.6)
	Post- secondary	49 (36.0)	100 (41.7)	149 (40.2)
	University	66 (50.0)	72 (30.4) *	138 (37.2)
Living situation	Alone	18 (13.5)	90 (37.8) *	108 (29.1)
	With others	115 (86.5)	148 (62.2) *	263 (70.9)
Marital status [b]	Single	4 (3.0)	9 (3.7)	13 (3.6)
	Married	113 (85.6)	128 (53.8) *	241 (65.1)
	Divorced/ separated	10 (7.6)	67 (28.2) *	77 (20.8)
	Widowed	5 (3.8)	34 (14.3) *	39 (10.5)
IMD [c] (mean ± SD)	Score	2057 ± 1511	2223 ± 1377	2164 ± 1428

*Significant differences between sexes in age, education, living situation and marital status p value <0.001, [a] No qualification (n=9) and secondary (n=75) school qualifications grouped together due to low numbers, [b] Data missing for one participant in the marital status variable. [c] Index of Multiple Deprivation (IMD) (range 11-5636): the higher the score, the higher the deprivation status. Independent t-tests were used to analyse age & IMD score. Chi-square was used to analyse education, living situation and marital status.

3.4.1. Participants who drank alcohol

Most participants consumed alcohol (81.4%), 14.6% did not drink alcohol and 4.0% of participants used to drink alcohol. A chi-squared test showed no significant differences in prevalence of consumption between male and female participants (Table 3.2).

Table 3.2. Prevalence of alcohol consumption in community living older adults in Auckland, New Zealand (NZ).

		Male n (%)	Female n (%)	Total n (%)
Do you drink alcohol?				
	Yes	113 (85.0)	189 (79.4)	302 (81.4)
	No	14 (10.5)	40 (16.8)	54 (14.6)
	Used to	6 (4.5)	9 (3.8)	15 (4.0)

Chi-square test found no significant differences between the sexes.

3.4.2. Types, quantity and frequency of alcohol consumption

The FFQ showed the most consumed types of alcoholic beverages were beer, red wine and white wine (Table 3.3). Males consumed more beer, lager and cider and red wine than females, while females consumed more white wine (Table 3.3 and Figures 3.1, 3.2, 3.3). Men consumed a mean ± SD of 2.1 ± 2.7 standard drinks of beer, lager and cider per week, while women consumed a mean ± SD of 0.3 ± 1.3 standard drinks of beer, lager and cider per week. For red wine, men consumed a mean ± SD of 2.4 ± 3.5 standard drinks and women consumed a mean ± SD of 1.3 ± 2.8 standard drinks per week. Men consumed a mean ± SD of 1.1 ± 2.4 whereas women consumed a mean ± SD of 2.1 ± 4.1 standard drinks of white wine per week. The types of alcoholic beverages that were consumed the least were port, sherry and liquors; spirits (gin, brandy, whiskey, vodka) and ready to drink (RTD) alcoholic beverages. Men consumed more alcohol than females (6.4 ± 7.4 vs 4.3 ± 5.6 total standard drinks per week for women) (Table 3.3). For the most commonly consumed alcoholic beverages (beer and red wine for men and white wine for women), they were consumed at least weekly for most participants (Figure 3.1, 3.2, 3.3). Other beverages (port, sherry, liquors, spirits and RTDs) were consumed never or less than weekly by the majority of male and female participants.

Table 3.3. Types and average quantity of standard drinks consumed per week by older adults.

Types of beverages, mean ± SD of standard drinks	Male n= 132	Female n= 235	Total n= 367	p-value
Beer, lager, cider (all varieties) * **	2.1 ± 2.7	0.3 ± 1.3	0.9 ± 2.1	<0.001
Red wine *	2.4 ± 3.5	1.3 ± 2.8	1.7 ± 3.1	0.003
White wine *	1.1 ± 2.4	2.1 ± 4.1	1.8 ± 3.6	0.003
Spirits (gin, brandy, whiskey, vodka)	0.8 ± 3.3	0.5 ± 1.7	0.6 ± 2.4	0.281
Port, sherry, liquors	0.1 ± 0.2	0.1 ± 0.6	0.1 ± 0.5	0.364
Ready to drink beverages	0.0 ± 0.1	0.0 ± 0.0	0.0 ± 0.0	0.083
Total	6.4 ± 7.4	4.3 ± 5.6	5.0 ± 6.4	<0.001

Significant differences between sexes *P <0.05, ***P <0.001 tested using independent t-tests.

Figures 3. Frequency of a variety of alcoholic beverage consumption in older adults.

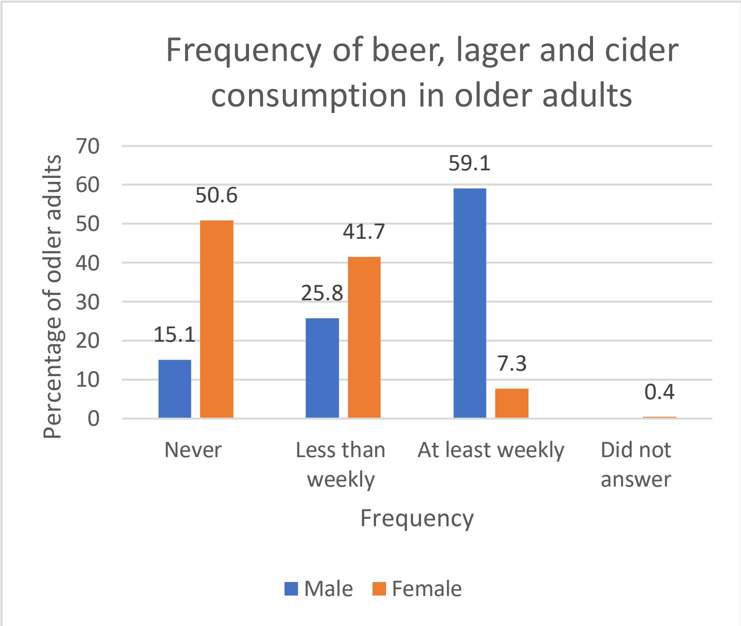

Figure 3.1. Frequency of beer, lager and cider consumption in older adults.

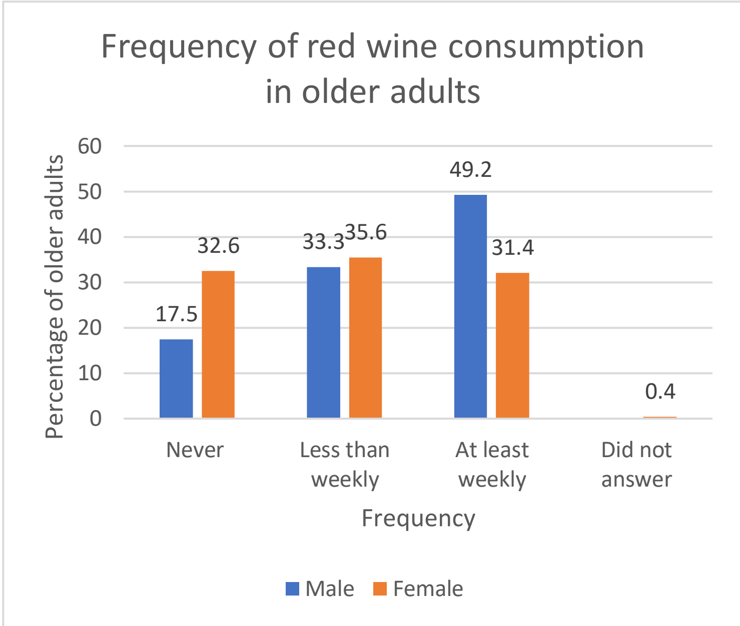

Figure 3.2. Frequency of red wine consumption in older adults.

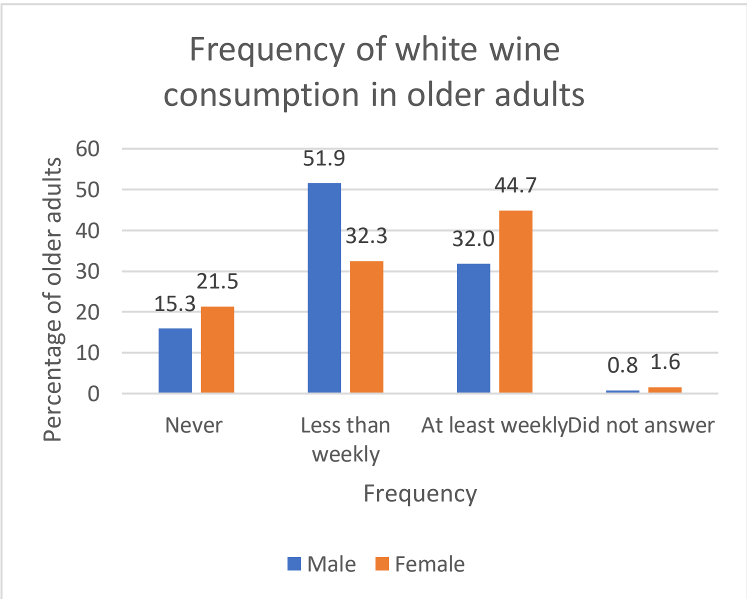

Figure 3.3. Frequency of white wine consumption in older adults.

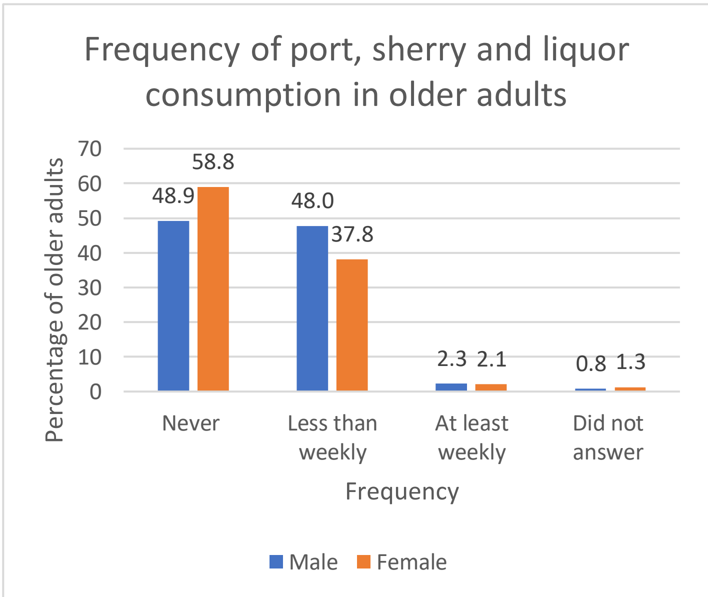

Figure 3.4. Frequency of port, sherry and liquor consumption in older adults.

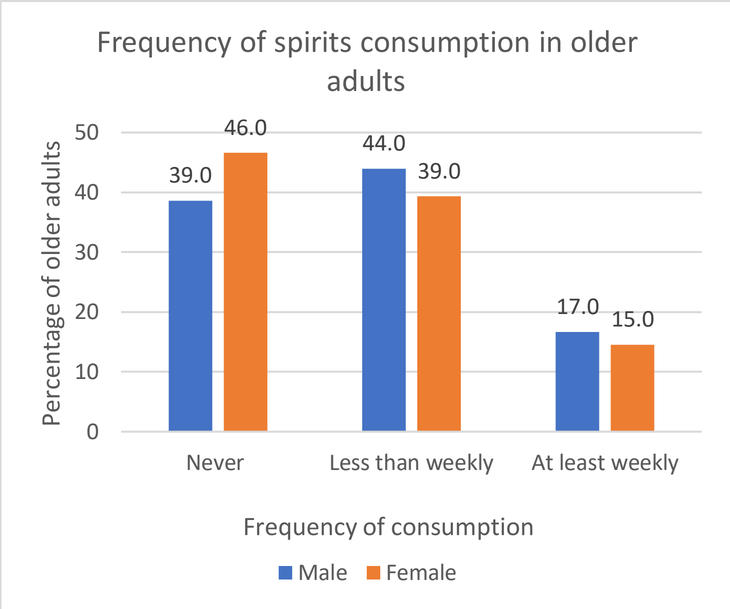

Figure 3.5. Frequency of spirits (gin, whiskey, vodka) consumption in older adults.

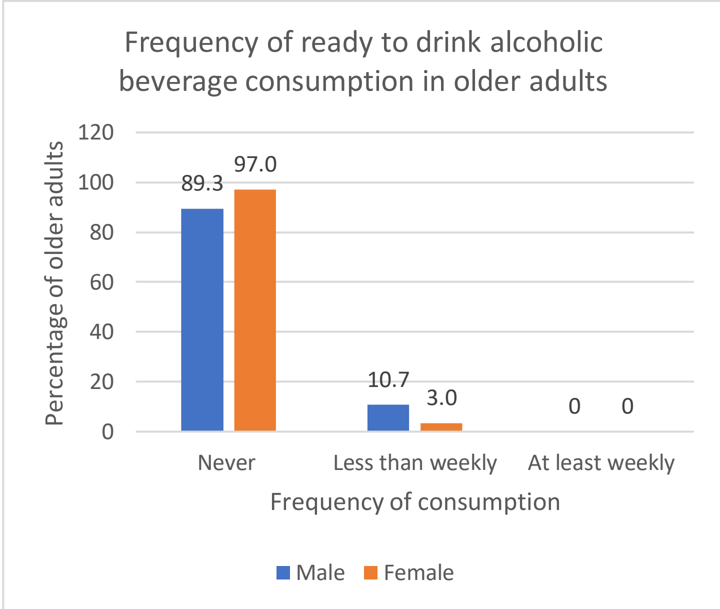

Figure 3.6. Frequency of ready to drink (RTD) alcoholic beverages in older adults.

3.4.3. Comparison of alcohol intake with alcohol consumption guidelines

Using data from the sociodemographic, health and lifestyle questionnaire, most women consumed two or less standard drinks per day (97%), and most men consumed alcohol as per the daily recommendation of no more than three standard drinks per day (98%). The majority of older females consumed within the weekly recommended guidelines of no more than ten standard drinks per week (98%). This was similar to the men where the majority consumed no more than 15 standard drinks per week (94%).

Most female participants (94%) consumed no more than four standard drinks on a single occasion, while 91% of older men consumed no more than five standard drinks on any single occasion. However, 9% of older men consumed more than the recommendations of no more than five standard drinks on any single occasion. Most older adults (83.8%) had two or more alcohol free days per week as recommended by the Ministry of Health (Ministry of Health, 2019) whereas 16.2% had one or no alcohol-free days per week. In particular, 16.6% of men had one or no alcohol-free days per week compared to 16.1% of women.

Table 3.4. Number of alcohol-free days and standard drinks consumed per day, per week and on a single occasion.[a]

		Male n (%)	Female n (%)	Total n (%)
[b] Standard drinks per DAY n= 368	0-2	120 (90.9)	230 (97.4)	350 (95.1)
	2.1- 3	10 (7.6)	4 (1.7)	14 (3.8)
	>3.1	2 (1.5)	2 (0.8)	4 (1.1)
	Total	132 (100)	236 (100)	368 (100)
[b] Standard drinks per WEEK n= 368	0-5	86 (65.2)	175 (74.2)	261 (70.9)
	6-10	21 (15.9)	39 (16.5)	60 (16.3)
	11-15	17 (12.9)	17 (7.2)	34 (9.2)
	>16	8 (6.1)	5 (2.1)	13 (3.5)
	Total	132 (100.0)	236 (100)	368 (100)
[c] Maximum standard drinks per OCCASION n= 371	0-3	101 (76.0)	220 (92.4)	321 (86.5)
	4	14 (10.5)	9 (3.8)	23 (6.2)
	5	8 (6.0)	5 (2.1)	13 (3.5)
	>6	10 (7.5)	4 (1.7)	14 (3.8)
	Total	133 (100)	238 (100)	371 (100)
[d] Alcohol free days per week n=370	None	5 (3.8)	16 (6.8)	21 (5.7)
	1	17 (12.8)	22 (9.3)	39 (10.5)
	2 or more	111 (83.4)	199 (83.9)	310 (83.8)
	Total	133 (100.0)	237 (100)	370 (100)

[a] Data from FFQ. [b]3 participants were not included in standard drinks per day and per week due to missing data. [c] 51 participants did not answer the maximum drinks per occasion question (of those, 44 said they did not drink alcohol and 7 said they used to drink alcohol). It was assumed for those 51 participants that the maximum drinks were zero. [d] 1 participant was not included in alcohol free days per week due to missing data; 5 participants did not answer the alcohol-free day question (3 participants said they did not drink alcohol, 1 said they used to drink, and 1 said they did drink). It was assumed for the 4 participants who do not or used to drink alcohol have 7 alcohol-free days.

3.4.4. Association of maximum alcohol intake per occasion with sociodemographic factors

The sociodemographic factors *'sex'* and *'deprivation'* scores were associated with maximum standard drinks per occasion, explaining 7.4% of the variance. The sociodemographic factors 'age', 'education' and 'living situation' were not associated with maximum standard drinks per occasion. Males were more likely to consume more maximum drinks per occasion than females (p <0.001). As the deprivation score increased (i.e., more deprived), the number of maximum standard drinks per occasion decreased (p=0.02) (Table 3.5).

Table 3.5. Association of sociodemographic factors with maximum standard drinks per occasion.

Sociodemographic factors	Drinks per occasion n = 371 (mean ± SD)	Standardised beta coefficient	*p*-value
Age		-0.047	0.36
Sex			
Male*	3.0 ± 2.0	-0.281	<0.001
Female	2.0 ± 1.2		
IMD score**		-0.119	0.02
Education			
Secondary	2.2 ± 2.0	-0.026	0.60
Post-secondary	2.4 ± 1.5		
University	2.4 ± 1.3		
Living situation			
Alone	2.2 ± 1.6	-0.044	0.40
With others	2.4 ± 1.5		

Adjusted R^2= 0.074, *p-value <0.001, **p-value <0.02, two participants not included in IMD score due to missing data.

3.5. Discussion

In this study of community dwelling older adults living in Auckland, New Zealand, we aimed to explore alcohol consumption patterns. Participants were predominantly NZ European, educated and living with others. This study used questionnaires to investigate the types, quantity and frequency of alcohol consumed and whether participants consumed alcohol within the recommended guidelines from the NZ Ministry of Health. The questionnaires were also used to explore whether maximum drinks per occasion were associated with sociodemographic factors such as age, sex, education, deprivation and living situation.

Beer, red and white wine were the most frequently consumed alcoholic beverage. Men consumed on average 6.4 total standard drinks compared to women who consumed 4.3 standard drinks per week in a combined total. The frequency of alcohol consumption in male and female drinkers depended on the type of beverage consumed. At least 90% of the older adults consumed alcohol within recommended drinking guidelines. Maximum standard drinks per occasion were higher and those with a lower deprivation score (i.e., least deprived).

3.5.1. Types, quantity and frequency of alcohol consumption

The majority of older adults (81.4%) in this study consumed alcohol. This high prevalence of alcohol consumption aligns with evidence from several studies worldwide where greater than 60% of older adults consume alcohol (Hodges & Maskill, 2014; McEvoy et al., 2013; Resnick et al., 2003). Beer and wine (red and white wine) were consumed more frequently compared to spirits; port, sherry, liquors; and ready to drink beverages. Spirits were the third most consumed type of alcoholic beverage in this study. This is similar to the findings from the Attitudes and Behaviour towards Alcohol Survey (ABAS) reported by the HPA where wine was most commonly consumed (Hodges & Maskill, 2014; Research New Zealand, 2013). In contrast to this study, HPA reported that older adults aged over 65 were less likely to have beer or spirits (Hodges & Maskill, 2014).

Males consumed significantly more alcohol per week than women (6.4 standard drinks compared to 4.3 standard drinks, $p<0.001$). This is evident in both the international and NZ literature (Gell et al., 2015; Hodges & Maskill, 2014; Huckle et al., 2013; Towers et al., 2017).

This study found significant differences in the quantity of alcohol consumed per week based on the different types of alcoholic beverages which is not represented in other similar studies. In this study, of those who consumed beer at least weekly, 59.1% were males compared to 7.3% of women. Interestingly, women consumed more white wine than red wine. Different types of wine were not surveyed in the ABAS report; therefore, this study presents new information that women consume more white wine and men consume more red wine. However, the 2013 ABAS report does not compare older male and females separately to observe where the differences are between sexes in consumption between different types of beverages.

Binge drinking, or hazardous drinking can be indicated by what beverages are consumed more frequently (Stevenson et al., 2015). A Swedish study found that binge drinkers have a higher frequency of beer and spirits consumption (Heckley, Jarl, & Gerdtham, 2017). However, this finding from the Swedish study was not specific for this older adult age group which indicates a limitation for comparison with the REACH study participants. Beer and wine were consumed most frequently in the REACH study however, associations between binge drinking and types of beverage consumption were not explored. Future studies can consider the frequency of consumption in different types of beverages for further insight into harmful drinking.

3.5.2. Comparison of alcohol consumption with NZ guidelines

Most female and male older adults were consuming within the daily, weekly and single drinking occasion guidelines by the MoH. The daily recommendation for women is no more than two standard drinks a day and three standard drinks for men. This study found 98.5% of men and 97.4% of women meeting the daily guideline. The weekly guideline for women and men is 10 and 15 standard drinks respectively. Findings from this study showed 94% of men and 90% of women meeting the weekly guidelines. To reduce the risk for drinking on a single occasion it is recommended that men and women drink no more than five and four standard alcoholic drinks respectively (Ministry of Health, 2019). This study found that 92.5% of men and 96.2% of women meeting the occasional drinking guidelines. A small percentage (7.5% of men and 1.7% of women) of older adults consumed over the occasional drinking recommendations. This is similar to results found in the HPA report where a higher percentage of older men had intakes over the recommended amount on a typical drinking occasion when compared to older women (Towers et al., 2017). It is important to note that the guidelines set by the NZ MoH are for adults in general, and not specific to older adults (Health Promotion Agency, 2018). The HPA indicates that the current guidelines to reduce long-term risk are likely too high for older adults (Health Promotion Agency, 2018).

There are limited studies that have compared older adults' alcohol consumption to current guidelines. The REACH study found 98.5% and 97.4% of older adults meeting the daily drinking guidelines whereas, the HPA 2014 review showed similar results with 93% of older men and 90% of older women consumed one to three and one to two standard drinks on a typical drinking day, respectively (Hodges & Maskill, 2014). Sixty four percent of older adults consumed up to two drinks per occasion in the 2017 HPA report (Towers et al., 2017). The REACH study found 96.2% of older adults consuming four to five maximum standard drinks per occasion which meets the occasional drinking guidelines in NZ. The ABAS report found a slightly lower percentage of alcohol consumption due to the possible inclusion of older adults aged above 74 years where drinking rates start to decline with advancing age (Hodges & Maskill, 2014; McEvoy et al., 2013).

3.5.3. Association of maximum drinks per occasion with sociodemographic factors

The REACH study found an association between maximum standard drinks consumed per occasion and sex and deprivation. Males were significantly more likely to consume more drinks on one occasion than females. In addition, men consumed more alcohol in quantity and frequency than women in this study which was similar to other research (Towers et al., 2017). Studies have indicated that sex is a strong predictor of alcohol intake (Huckle et al., 2013; Sudhinaraset, Wigglesworth, & Takeuchi, 2016; Towers et al., 2017; Towers et al., 2018a). In this study, we refer to 'sex' as being what individuals are born with at birth and therefore, either male or female.

Maximum drinks per occasion was also associated with deprivation score. As the deprivation score increased (higher deprivation), the number of maximum drinks per occasion reduced. A higher deprivation score may indicate a low-income status in general however, it may not represent the income specifically for participants in this study. Higher income levels have found to be associated with a higher frequency of alcohol consumption in NZ older adults (Stevenson et al., 2015; Towers et al., 2018b) and in international studies higher incomes are associated with high risk drinking (Laberge et al., 2021). Our findings indicate that those living in high deprivation areas may be consuming lower amounts of alcohol per occasion compared to those living in low deprivation areas. The Index of Multiple deprivation in NZ is based on seven variables including income. The seven domains can be used separately or in combination to explore the association with health or social outcomes (Exeter et al., 2017).

The sociodemographic factors age, education and living situation were not associated with intake of maximum drinks on a single occasion. This finding is not consistent with international literature that found intake of alcohol declines with increasing age and increases with higher level of education and those living with others (Laberge et al., 2021; Malyutina et al., 2004; McEvoy et al., 2013). However, NZ's drinking culture is different compared to other countries like the US (Bloomfield, Stockwell, Gmel, & Rehn, 2003). NZ's drinking culture can be described as "high levels of alcohol intake in occasional drinking situations rather than everyday drinking" (Towers et al., 2018a). The narrow age range in the REACH study may explain why no association was observed between age and intake of maximum drinks on a single occasion.

3.5.4. Strengths and limitations

This study provides valuable information exploring patterns of alcohol consumption in 371 community-dwelling older adults living in Auckland, New Zealand. Currently, there is a lack of data on the types of alcoholic beverages older adults are consuming. Studies comparing alcohol consumption of older adults with the guidelines in NZ is also currently limited. A limitation of this study was the REACH cohort's ethnic diversity and geographic spread as the particpants were predominantly NZ European and all were based in Auckland, NZ. This study is therefore not representative of the NZ population and prevents the opportunity of comparisons between ethnic groups. A diverse study group would be recommended in future studies. Self-reporting was also a major limitation in this study which reduces the accuracy of answers provided in alcohol based questions that may be senstive to the respondents.

3.6. Conclusion

Alcohol consumption in older adults is highly prevalent. This study found that older men consumed significantly more in quantity and frequency than older women. The most common types of alcoholic beverages consumed in the present study were beer, lager and cider (all varieties) and wine (red and white). The majority of older adults consumed alcohol within the recommendations. A small number consumed over the recommended amounts. This highlights the need to increase awareness of alcohol consumption guidelines in older adults. Maximum standard drinks per occasion was associated with the sociodemographic factors *'sex'* and *'deprivation'*. Men were more likely to drink than females and as the deprivation score increased, the number of maximum standard drinks per occasion decreased. These particular associations are representative of the REACH cohort rather than the general NZ population. More research needs to be undertaken to gain a better understanding of the types and quantity of alcohol consumed in a diverse NZ older adult population.

Chapter Four: Conclusions and Recommendations

4.1. Summary of study and achievements of aims and objectives

This sub-study of the REACH study was designed to explore alcohol intake of community-dwelling older adults aged 65 to 74 years. A total of 371 older adults were recruited between April 2018 and February 2019 throughout the Auckland region. Sociodemographic, health and lifestyle questionnaire collected information regarding age, sex, ethnicity, education level, living situation, deprivation score, marital status and alcohol intake. A food frequency questionnaire was completed regarding types, quantity and frequency of alcohol intake.

The primary objective of this study was to explore the types, quantity and frequency of alcohol consumption in NZ older adults. Results of this study indicate that alcohol consumption was prevalent in community dwelling older adults who were mainly NZ European. From the data collected, the most common types of alcoholic beverages consumed were beer, lager, cider (all varieties) and wine (red and white). Men consumed more alcohol frequently than women. Men consumed on average 2.1 ± 2.7 while women consumed 0.3 ± 1.3 standard drinks of beer, lager and cider per week. For red wine, men consumed 2.4 ± 3.5 standard drinks per week and women 1.3 ± 2.8. For white wine, men consumed 1.1 ± 2.4 and women consumed 2.1 ± 4.1 standard drinks per week. Spirits (gin, vodka and whiskey); port, sherry, liquors; and ready to drink alcoholic beverages were the least popular types of beverages and consumed less frequently. These findings are similar to the ABAS results where beer and wine were the commonly consumed alcoholic beverages in older adults (Research New Zealand, 2013). The hypothesis that wine and beer will be the most common types of alcohol consumed was therefore supported by these findings.

The second objective was to compare current alcohol intake with the recommendations by the Ministry of Health. Comparisons were made with the daily, weekly and single occasion drinking guidelines, as well as the recommended number of alcohol-free days per week. The majority of older adults consumed alcohol within the recommendations with only a small number of older adults consuming excessive amounts of alcohol. However, it is important to be aware that these guidelines of safe alcohol consumption for general adults may be too high for older adults. Future research could focus on whether older adults are aware of the drinking guidelines and whether these guidelines influence the types, quantity and frequency of alcohol intake.

The results somewhat support the hypothesis that for a small percentage of NZ older adults, current drinking habits do not align with the Ministry of Health guidelines.

The final objective was to explore whether sociodemographic factors have an association with alcohol intake in older adults. Sex and deprivation score was associated with maximum standard drinks per occasion. Being male was associated with consuming higher maximum drinks per occasion. Men were also more likely to drink more frequently than women. These findings are supported by international and national literature (Gell et al., 2015; Huckle et al., 2013; Stevenson et al., 2015; Towers et al., 2017). Deprivation score was also found to be associated with maximum standard drinks consumed per drinking occasion. As the deprivation score increased (i.e., higher deprivation), the number of maximum drinks per occasion decreased. This suggests that income or economic standard of living may be a factor contributing to alcohol intake. This means that future interventions and education regarding alcohol intake can be targeted to these commonly associated demographics in older adults. The hypothesis that sex, age, education, marital status, living situation and deprivation will be associated with alcohol consumption is partly supported by our data (sex and deprivation).

4.2. Impact

This study contributes valuable data on the types of alcoholic beverages consumed based on quantity, frequency and type of alcohol consumption. This study also contributes new knowledge on older adult alcohol consumption in relation to NZ MoH guidelines. The evidence gathered from this study is essential for understanding what older adults are drinking and in what quantities. An understanding of socio-demographic factors influencing alcohol consumption means future interventions and education regarding alcohol intake can be targeted appropriately. This is important due to the rapid increase in the ageing population in NZ which may create future challenges in healthcare.

4.3. Strengths

A major strength of this study is the reproducibility and the relative validity of the food frequency questionnaire used in the REACH study. The food frequency questionnaire was validated to identify specific dietary patterns and food groups such as alcohol consumption in older adults (Mumme et al., 2021). The FFQ provided the ability to extract information on the types of alcoholic beverages based on the frequency and quantity alcohol was consumed.

This study provides insight into the types of alcohol along with the quantity and frequency that it is consumed in this age group. It also provides a comparison of older adults drinking quantities with the current guidelines by the Ministry of Health which is limited in NZ. The lack of NZ studies on alcohol in older adults allows this study to contribute valuable information on older adults drinking nature.

4.4. Limitations

The data was all self-reported by the participants which meant that there was reliance on honesty for the completion of all questionnaires. Although this study had a large sample size, the sample was relatively homogenous in terms of age range and ethnicity. Therefore, the study population is not representative of the NZ population and the findings cannot be used to make conclusions based on the general population. A wider geographical spread throughout NZ and a sample that includes a variety of ethnic groups would allow a better representation of the NZ population.

The age band of 65 to 74 years old restricts variation of alcohol consumption between the age group. Therefore, a wider age range that includes older adults over the age of 75 years would allow further exploration of alcohol consumption between different age groups. Many international studies used samples of older adults that were 50 years and older. This made it difficult to make comparisons specifically to this study.

4.5. Conclusion

In conclusion, this research aimed to provide insight into the types of alcohol consumed by older adults. Beer and wine (red and white) were the most popular alcoholic beverage choice. Females consumed more white wine while males consumed mostly beer and red wine. Consumption of spirits closely followed with port, sherry, liquors and ready to drink beverages being the least popular alcoholic beverages. Men consumed more alcohol compared to women which has been seen in several studies in NZ and internationally. Generally, most of the older adults consumed alcohol within the recommended guidelines however, it is important to note that these current guidelines may be too high for older adults. Being male and a lower level of deprivation were positively associated with maximum drinks per occasion in the REACH cohort, which is similar to other literature. Policies produced in relation to older adults and alcohol consumption should consider that the NZ context is different to the international context due to differences in the drinking culture. By understanding this context and the specific characteristics of alcohol consumption, interventions can be more targeted.

4.6. Recommendations for future research

1. Widening the ethnic diversity and geographical spread of the older adult sample to enable variation in alcohol consumption patterns that represent the general NZ population.

2. Further analysis of alcohol intake with emphasis on questions that can investigate knowledge about age-related changes and the increased sensitivity to alcohol with the ageing body. The questions can also investigate what older adults know about current guidelines on alcohol intake by the Ministry of Health.

3. Conducting another survey on the same cohort in the future to identify if there are any changes to the types, quantity and frequency of alcohol consumed over time.

4. An analysis of health outcomes to determine whether those who are on medications or have multiple health condition abstain from drinking alcohol over time.

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4.8. Appendix

Appendix A: Health and demographics questionnaire

The REACH Study - Researching Eating Activity and Cognitive Health

Please complete the following form. All the information you give us is in confidence and will be used only for the purposes of this study. If you need any help to complete the form please ask one of the research team.

What is your gender (please tick)?

- ☐ Male
- ☐ Female
- ☐ Gender diverse

What is your date of birth (day/month/year)?

____

Which ethnic group(s) do you belong to? Tick whichever applies to you (you may tick more than one box)

- ☐ European
- ☐ Māori
- ☐ Pacific Peoples
- ☐ Chinese
- ☐ Indian
- ☐ Middle Eastern/Latin American/African

☐ Other Ethnicity

Please state which other ethnicity or ethnicities you belong to

____

Which country were you born in?

☐ New Zealand
☐ Australia
☐ England
☐ China (People's Republic of)
☐ South Africa
☐ Samoa
☐ Cook Islands
☐ Other *Please state which country* ____________________
☐ **If you live in New Zealand but were not born here, when did you first arrive to live in New Zealand?**

Month (eg. February) _______________

Year (eg. 2000) _______________

What is your first language? ____

What is your current living arrangement?

☐ Living alone

☐ Living with others

If living with others, how many others do you live with and what is their relationship to you (eg. Husband, wife, partner, son, daughter, grandson, granddaughter, flatmate, boarder, etc)

____

Which of the following best describes they type of residence that you currently live in? (please tick one box)

☐ House or townhouse – detached or 'stand alone'

☐ House, townhouse unit or apartment joined to one or more other houses, townhouses, units or apartments

☐ Unit, villa or apartment in retirement village

☐ Moveable dwelling (eg. Caravan, motorhome, boat, tent)

☐ Rest home or continuing care hospital

☐ Other, please describe

In terms of the ownership arrangements your primary residence is? (please tick one box)

☐ Owned by yourself and/or spouse/partner with a mortgage

☐ Owned by yourself and/or spouse/partner without a mortgage

☐ Owned by family/whānau

☐ Owned by a family/whānau trust

☐ Private rental

☐ State, council or kaumātua housing

☐ None of the above

☐ License to occupy

☐ Other, please specify

Are you?

☐ Married / cohabiting / civil union / de facto

☐ Divorced / separated

☐ Widowed

☐ Single

☐ Other, please describe

____

What is your highest educational level (choose one)?

☐ No qualifications

☐ Primary school

☐ Secondary school

☐ Post-secondary certificate, diploma, or trade diploma

☐ University degree

Which of the following best describes your current work situation? (please tick as many as apply)

☐ Paid employment

Occupation and number of hours of paid employment per week?

____

How long have you worked for your current employer?

____

☐ Volunteer work

Position and number of volunteer hours per week?

____

☐ Fully retired

☐ Semi-retired

☐ Other (eg. caregiver, studying, homemaker), please describe

---

If retired, at what age did you retire?

___

During your working life, what was your main occupation?

☐ Labourer (eg. Cleaner, food packer, farm worker)

☐ Machinery operator/driver (eg. Machine operator, store person)

☐ Sales worker (eg. Insurance agent, sales assistant, cashier)

☐ Community or personal service worker (eg. Teacher aide, armed forces, hospitality worker, care)

☐ Technician/trades worker (eg. Engineer, carpenter, hairdresser)

☐ Professional (eg. Accountant, doctor, nurse, teacher)

☐ Manager (eg. General manager, farm manager)

☐ Other (Please Specify) ___________________________________

What would be the total income, that your household got *from all sources*, before tax or anything was taken out of it, in the last 12 months? (Please tick one box)

☐ Loss

☐ Zero

☐ $1 - $10,000

☐ $10,001 - $20,000

☐ $20,001 - $30,000

☐ $30,001 - $40,000

☐ $40,001 - $50,000

☐ $50,001 - $60,000

☐ $60,001 - $70,000

☐ $70,001 - $100,000

☐ $100,001 - $150,000

☐ $150,001 - $200,000

☐ $201,000 or more

☐ Don’t know

☐ Prefer not to answer

The following questions are about your material standard of living – the things that money can buy. Your material standard of living does NOT include your capacity to enjoy life. You should NOT take your health into account.

Generally, how would you rate your material standard of living? (Please tick one box)

☐ High
☐ Fairly high
☐ Medium
☐ Fairly low
☐ Low

Generally, how satisfied are you with your current material standard of living? (Please tick one box)

☐ Very satisfied
☐ Satisfied
☐ Neither satisfied or dissatisfied
☐ Dissatisfied
☐ Very dissatisfied

How well does your total income meet your everyday needs for such things as accommodation, food, clothing and other necessities? (Please tick one box)

☐ Not enough
☐ Just enough
☐ Enough
☐ More than enough

Do you smoke cigarettes or a pipe?

☐ Yes

☐ No

☐ Former smoker

If yes, approximately how many cigarettes per day: ______________________

Do you drink alcohol?

☐ Yes

☐ No

☐ I used to drink alcohol, but no longer drink alcohol

If yes, how often do you usually drink alcohol?

☐ Monthly

☐ Weekly

☐ Daily

How many standard drinks of alcohol do you usually drink in the timeframe selected above?

A standard drink is 1 can of beer (330ml), 1 glass of wine (100ml), 1 Ready to Drink (RTDs), 1 shot/nip of spirits (30ml)

____

On any one drinking occasion, what is the maximum number of standard drinks you would have?

A standard drink is 1 can of beer (330ml), 1 glass of wine (100ml), 1 Ready to Drink (RTDs), 1 shot/nip of spirits (30ml)

How many alcohol free days do you usually have per week?

☐ 1 day
☐ 2 days
☐ 3 days
☐ 4 days
☐ 5 days
☐ 6 days
☐ 7 days

Have you been diagnosed by a medical practitioner with rheumatoid arthritis?

☐ Yes

☐ No

Have you been diagnosed by a medical practitioner with osteoarthritis?

☐ Yes

☐ No

If yes, which joint has been diagnosed with arthritis?

Are you currently taking medication for your osteoarthritis, or have you received injections as treatment for your osteoarthritis? If yes, please describe.

Have you ever had or been diagnosed with any of the following?

☐ Stroke

☐ Traumatic head or brain injury

☐ Dementia

☐ Mild cognitive impairment

☐ Other neurological condition

☐ Depression

☐ Anxiety

☐ Other mental illness

☐ Any other acute or chronic condition which might affect your brain function

If yes to any of the above, please describe (diagnosis, year diagnosed)

___

___

___

Do you have any family history of dementia or cognitive impairment?

☐ Yes

☐ No

If yes, please describe

___

Have you ever had or been diagnosed with any of the following?

☐ Cancer

☐ Heart trouble (e.g. angina, heart attack, heart failure)

☐ High cholesterol

☐ High blood pressure or hypertension

☐ Gut disorder that interferes with digestion and absorption of your food

☐ Gastric reflux

☐ Diabetes or persistent sugar in the urine

☐ Endocrine disease (hormone trouble)

☐ Thyroid disease (e.g. goiter)

☐ Kidney problems

☐ Liver problems (e.g. active/chronic hepatitis, cirrhosis)

☐ Respiratory condition (e.g. bronchitis, asthma, COPD)

☐ Active or chronic gout

☐ Disorder of the neck or back (e.g. lumbago, sciatica, chronic back or neck pain, vertebrae or disc problems)

☐ Sleep disorder

☐ Disability

☐ Osteoporosis

☐ Peripheral vascular disease

☐ Any other acute or chronic conditions not listed above

If yes to any of the above, please describe (diagnosis, year diagnosed)

____

____

____

Are you currently taking any medication prescribed by a medical practitioner?

☐ Yes

☐ No

If yes, please state what medication you are taking, the dosage and why

Are you taking any other medication or substances (e.g. over the counter, homeopathic, drugs other than alcohol, tobacco or prescription medication)?

☐ Yes

☐ No

If yes, please state what medication/substances you are taking, the dosage and why

Are you taking any form of supplements, including tablets or drinks?

☐ Yes

☐ No

If yes, what is the name, brand and dosage of the supplements you are taking?

How would you rate your quality of life (please tick one box)?

☐ Very good

☐ Good

☐ Neither good nor poor

☐ Poor

☐ Very poor

In general, would you say your health is:

☐ Excellent

☐ Very good

☐ Good

☐ Fair

☐ Poor

Can you see ordinary newsprint (with glasses or contact lenses if you usually wear them)? (Please tick one box)

Easily	**With difficulty**	**Not at all**
☐	☐	☐

Can you hear a conversation with one other person (even when wearing hearing aids)? (Please tick one box)

Easily	**With difficulty**	**Not at all**
☐	☐	☐

How would you describe the health of your teeth and mouth? (Please tick one box)

Excellent	**Very good**	**Good**	**Fair**	**Poor**
☐	☐	☐	☐	☐

Can you bite and chew on hard foods such as a firm apple? (Please tick one box)

Yes, without difficulty	**Yes, with difficulty**	**No**
☐	☐	☐

Do you have any mobility restrictions (eg. hip/knee replacement, ongoing pain, loss of driver's license) which impact on your daily life?

☐ Yes

☐ No

If yes, please describe.

____

____

____

Comparing yourself now to when you were 20 years old, would you say you have lost or gained weight? If so, by how much

☐ Lost 10kg or more (22lb or 1st 8lb)

☐ Lost up to 10kg (22lb or 1st 8lb)

☐ No change (0)

☐ Gained up to 5kg (11lb)

☐ Gained up to 10kg (11-22lb or 11lb-1st 8lb)

☐ Gained up to 15kg (22-33lb or 1st 8lb – 2st 5lb)

☐ Gained 15kg or more (33lb or 2st 5lb)

☐ Don't know

Has what you eat changed in the past 10 years?

☐ Yes

☐ No

If yes, please describe (eg. I eat less because my appetite is lower; I eat more vegetables).

____

____

____

Has your level of physical activity changed in the past 10 years?

☐ Yes

☐ No

If yes, please describe.

____

____

____

Compared with 10 years ago, has your intake of the following foods increased, decreased or stayed the same (tick the box which is most accurate – either eat more, eat less or eat the same)

	Eat more	Eat the same	Eat less
Fruit			
Vegetables			
Breads, cereals & grains			
Milk, yoghurt, cheese			
Oily fish and seafood (eg. salmon, tuna, mackerel, herring)			
All fish and seafood			
Red meat & poultry			

How often are you excessively sleepy during the day?

Never Rarely Frequently Often

How often do you feel that you lack companionship? (please circle)

Hardly ever Some of the time Often

How often do you feel left out? (please circle)

Hardly ever Some of the time Often

How often do you feel isolated from others? (please circle)

Hardly ever　　　　Some of the time　　　　Often

Please select the response which best describes your situation

I/We can afford to eat properly

☐ Always / often
☐ Sometimes
☐ Rarely / never
☐ Don't know

Food runs out in my/our household due to lack of money

☐ Always / often
☐ Sometimes
☐ Rarely / never
☐ Don't know

I/we eat less because of lack of money

☐ Always / often
☐ Sometimes
☐ Rarely / never
☐ Don't know

The variety of foods I am (we are) able to eat is limited by a lack of money

☐ Always / often
☐ Sometimes
☐ Rarely / never
☐ Don't know

I/we rely on others to provide food and/or money for food, for my/our household, when I/we don't have enough money

☐ Always / often
☐ Sometimes
☐ Rarely / never
☐ Don't know

I/we make use of special food grants or food banks when I/we do not have enough money for food

☐ Always / often
☐ Sometimes
☐ Rarely / never
☐ Don’t know

I feel stressed because of not having enough money for food

☐ Always / often
☐ Sometimes
☐ Rarely / never
☐ Don’t know

I feel stressed because I can’t provide the food I want for social occasions

☐ Always / often
☐ Sometimes
☐ Rarely / never
☐ Don’t know

Appendix B: Food frequency questionnaire

ALCOHOL

* In the past month I have had this food

	I never eat this food	Not this month but I have sometimes	1 to 3 times a **MONTH**	Once per **WEEK**	2 to 3 times per **WEEK**	4 to 6 times per **WEEK**	Once per **DAY**	2 to 3 times per **DAY**	4 to 5 times per **DAY**	6 plus times per **DAY**
Beer, lager, cider (all varieties) [1 can or bottle]	○	○	○	○	○	○	○	○	○	○
Red wine [1 small glass]	○	○	○	○	○	○	○	○	○	○
White wine [1 small glass]	○	○	○	○	○	○	○	○	○	○
Port, sherry, liquors [1 small glass]	○	○	○	○	○	○	○	○	○	○
Spirits e.g. gin, brandy, whiskey, vodka [1 shot or 30ml]	○	○	○	○	○	○	○	○	○	○
Ready to drink alcoholic beverages [1 bottle or can]	○	○	○	○	○	○	○	○	○	○

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