The Epidemiology of Headaches in an Elderly Population within the Life Rights Buildings of an Elderly Care Facility in KwaZulu-Natal

By

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I, Keegan Craig Hughes, do hereby declare that this dissertation is representative of my own work in both conception and execution (except where acknowledgements indicate to the contrary)

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DEDICATION

I dedicate this dissertation to:

My Dad and Mom, Craig and Janet Hughes, without whom I would never have been able to accomplish my dreams. You have been my unyielding support both emotionally and financially through this adventure and I cannot thank you enough. You have both guided me into being the person I am today. Without you both this would not have been possible.

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ABSTRACT

Aim: The aim of this study was to determine the prevalence of selected headaches and their impact on the elderly residing within a particular elderly care facility in KwaZulu-Natal, South Africa.

Subjects: Elderly participants, aged 60 years and older, residing in a selected elderly care facility in KwaZulu-Natal.

Methodology: Once the Institutional Research Ethics Committee (IREC) approved the study, The Association for the Aged (TAFTA) granted permission for the researcher to conduct the study in their life rights buildings. The researcher then administered the questionnaires to the elderly who met the inclusion criteria, on the same day that they had read and completed the information letter and informed consent. The researcher and the research assistant remained present to read the questions to any participants unable to read or who were no longer able to read and answer any questions the participants may have had throughout the process. A total of 123 informed consent forms and questionnaires were distributed and collected, a return rate of 72% (p<0.05). All completed questionnaires were analysed by only the researcher and the statistician.

Results: In total, 123 questionnaires were utilised for statistical analysis. The results indicated that 45.5% (p=0.3) of the participants presented with headaches and of these participants, 64.3% had primary headaches, while 35.7% presented with suspected secondary headaches (p=0.03). Of the primary headaches, tension type headache (TTH) had the highest prevalence at 17.1%, with migraine at 7.3% and cluster headache at 2.4%. This is congruent with current literature indicating that TTH has the highest effect on the elderly population.

Conclusion: This study is consistent with previous studies conducted on the prevalence of headaches in the elderly. This study has contributed to a greater understanding of headaches experienced by the elderly and the impact headaches have on their daily lives. Focus needs to be placed on satisfactory and effective healthcare, with patient and practitioner education alike to enhance the quality of life and the ability to function self-sufficiently as an elderly individual.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

CGRP:	Calcitonin gene-related peptide
CNS:	Central nervous system
CSD:	Cortical spreading depression
CTH:	Cluster-type headache
CTTH:	Chronic tension type headache
DBS:	Deep brain stimulation
ETTH:	Episodic tension type headache
GP:	General practitioner
ICAD:	Internal carotid artery dissection
ICHD-3:	International Classification of Headache Disorders 3rd Edition
IHS:	International Headache Society
MRI:	Magnetic resonance imaging
MTH:	Migraine-type headache
NSAIDs:	Non-steroidal anti-inflammatory drugs
p:	Level of significance
SOL:	Space occupying lesion
TAC:	Trigeminal autonomic cephalgia
TAFTA:	The Association for the Aged
TTH:	Tension-type headache
UN:	United Nations

CHAPTER 1: INTRODUCTION

1.1 Introduction to the study

This chapter provides an overview of the study. It discusses the background to the study, purpose or rationale of the study, and the study aim and objectives.

1.2 Background to the study

Headaches are the most common neurological symptom, affecting almost everyone at least once in their lifetime (Falavigna *et al*., 2010). Headaches can be divided into two main types, i.e. primary and secondary.

Primary headaches are benign, recurrent headaches that are not caused by an underlying disease or biomechanical distresses such as cervical spine dysfunction, torticollis, degeneration or muscular strain.

Secondary headaches, more commonly known as “sinister headaches”, are caused by an underlying disease such as infection, trauma, vascular disease or neoplasms (De Luca and Bartleson, 2010).

Although headache prevalence is thought to decrease in individuals older than 65 years of age (Ruiz *et al.*, 2014), headaches are still one of the most common complaints seen in the elderly (Yildirim, Derle and Topak 2014; Song *et al.*, 2016), with more than 52% of headache patients being over the age of 65 years (Ruiz *et al.,* 2014). A major contributing factor is that primary headache disorders, where studied, have been shown to have a lifetime prevalence of 91.3% (Steiner *et al.*, 2014).

Due to the large variety of headaches, it is important to identify and understand the prevalence, incidence and related factors of these headaches, as previous studies regarding headaches seem to differ in these regards (Kurt and Kaplan, 2008). This lack of comprehensive understanding of headaches is directly correlated to public-health education failure and lack of attentiveness and understanding of headache disorders among the general public (Steiner, 2005). The lack of recognition of the

socioeconomic cost linked to headache disorders in many countries is largely as a result of the lack of acknowledgment that headaches are ailments requiring healthcare (Peters *et al*., 2012). Headaches are seen to have a low priority in healthcare worldwide.

Therefore, it is vital that epidemiological studies on headaches are conducted. By adding to the current literature on headaches in the elderly, health care providers will be able to recognise the nature of such headaches and the features that influence them in the elderly population (Kurt and Kaplan, 2008). By understanding elderly headaches, practitioners can then advise on how to manage, and in many cases avoid certain headaches through diet, exercise and lifestyle choices (Hershey and Bednarczyk, 2012), therefore, eluding the need for pharmaceutical and medical interventions,and the side effects that follow.

1.3 Research problem, aim and objectives

1.3.1 Research problem

Although headache prevalence decreases in the elderly, it still causes issues and is under-studied. The lack of knowledge regarding headaches in this segment of the population hinders the ability of chiropractors and other health care providers to effectively diagnose and treat headaches, thus leading to chronicity. This outcome may negatively affect an individual's quality of life as well as their finances.

1.3.2 Aim

The aim of this study was to determine the prevalence of selected headaches and their impact on the elderly, residing within a selected elderly care facility in KwaZulu-Natal, South Africa.

1.3.3 Objectives

1. To determine the prevalence of headaches in general and primary headaches in particular in a specific elderly population.
2. To investigate selected risk factors (such as smoking, family history, current medication, sleep patterns) that are associated with primary headaches in an elderly population.
3. To determine the impact of headaches on the daily activities of the elderly.

1.4 Hypotheses

Null Hypothesis (HO) 1: The prevalence of headaches in the elderly is not significantly associated with risk factors such as smoking, family history, stress and tension, current medication and sleep patterns.

Alternate Hypothesis (HA) 1: The prevalence of headaches in the elderly is significantly associated with risk factors such as smoking, family history, stress and tension, current medication and sleep patterns.

Null Hypothesis (HO) 2: Headaches do not have an impact on the activities of daily living in the elderly population.

Alternate Hypothesis (HA) 2: Headaches do have an impact on the activities of daily living in the elderly population.

1.5 Rationale

Of the countless painful states that afflict humankind, headache is the most common and can occur for so many different reasons, which makes the evaluation of it difficult (Rudra, Chatterjee and Ray, 2015). Headaches rank in the top 10 most disabling conditions for males and in the top five for females (Stovner *et al.*, 2007).

The World Health Organisation (2011), states that headache disorders are pervasive, prevalent and disabling yet they are under-recognised, under-diagnosed and under-treated worldwide. According to a collaborative study between the World Health Organisation, the World Headache Alliance, the International Headache Society (IHS) and the European Headache Federation, it was noted that the prevalence and burden of headaches in at least half of the world's population is almost completely unknown due to a lack of existing studies from the former USSR, Eastern Europe, Australia and Africa (Stovner *et al.,* 2007). This lack of knowledge regarding headaches and their underlying pathophysiology, combined with a lack of academic interest, has hindered the ability of health care providers such as chiropractors to effectively diagnose a headache which could result in the use of non-specific treatments (Jensen and Stovner, 2008). The existing literature has contradictory findings concerning headaches: because of this contrast in the literature, it is vital that epidemiological studies on headaches are conducted in order

to assist health care providers to recognize the nature of such headaches and features that influence them (Kurt and Kaplan, 2008).

If research is conducted to improve clinical practice, then the study participants should embody the target population. However, this is not always the case because physicians often recommend treatment plans for the elderly based on data from studies involving predominantly younger, healthier participants (Mody *et al*., 2008). In general it is a serious concern that the aged are under-represented in the majority of health-related research. This is seen in several population-based studies that have not included people aged 65 years or over (Prencipe *et al*., 2001). To support this, Kurt and Kaplan (2008) indicate that it is imperative that studies are conducted to determine the headache profiles of the different age groups to plan for their overall healthcare.

According to the United Nations (UN), (United Nations, 2015) between the years 2015 and 2030, the number of people aged 60 years or over in the world is expected to grow by 56%, from 901 million to 1.4 billion people, and will account for more than 20% of the world's population by the year 2050. The elderly population within the sub-Saharan African region is predicted to increase from 36.6 million to 141 million by 2050 (Gerber *et al*., 2016).

The incidence of chronic illness and disability increases with age; the longer one lives, the more likely one is to experience illness and disability. Rudra, Chatterjee and Ray, (2015) supports the need to understand and manage common chronic headache conditions in the elderly population. Primary headaches have the ability to decrease functionality, limit activity and social interaction, which in turn will decrease the quality of life of headache sufferers.

South Africa has well-established health professions and a relative abundance of health professionals; however, South Africa is also riddled with problems and restrictions. As a result, the South African health care is unequally allocated along the public, private, rural, peri-urban and urban and poor-wealthy divisions (van Rensberg, 2014). The majority of the elderly population cannot afford private medical care so are among the 83% of the general population who visit often overcrowded public healthcare facilities, with long waiting times, staff shortages and a poor quality of care (Rabie, Klopper and Watson, 2016).

Socioeconomic factors have an influence on the elderly's access to and perception of healthcare. Their socioeconomic status directly effects the environments they live and work in, which may put their health at risk. Their health-promoting or opposing behaviours, which can be a result of the lack of knowledge of disease, may affect their utilisation of health care services when it is needed (Katterl, 2011).

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to provide current and relevant literature on headache epidemiology in the elderly. This chapter includes all relevant information on the prevalence, risk factors, pathogenesis, diagnosis and management of the different sub-types of headaches. The information was gathered using Pubmed, Google Scholar, the Durban University of Technology Library and the Institutional Repository.

2.2 Definitions

2.2.1 Definition of elderly

The literature is not consistent in clearly defining the age at which being elderly begins. Researchers have used different age group cut-offs for defining elderly persons, beginning at 50, 55, 60 or 65 years (van Oosterhout, Cheung and Haan, 2016).

The UN has accepted the definition of an elderly person or individual as someone who is 60 years and older (United Nations, 2015). Therefore, in accordance with the UN, this study will use this definition.

2.3 Definition of headache

The IHS (Headache Classification Committee of the International Headache Society [IHS] 2018) defines a headache as a pain located in the head, above the orbitomeatal line and/or nuchal ridge. A headache is either acute or chronic and differs in both character and site (Curry and Green, 2007).

2.4 Types of headaches

Headaches are divided into two broad types: primary and secondary headaches (Ahmed, 2012).

Primary headaches are benign, recurrent headaches that are not caused by underlying disease or biomechanical distresses such as cervical spine dysfunction, torticollis, degeneration or muscular strain. While primary headaches constitute the vast majority of headache disorders (Ahmed, 2012), they are not considered to be dangerous.

Although secondary headaches are more infrequent than primary headaches, they are more significant in the elderly population, accounting for 15% of the total headaches encountered in the elderly population, compared to 1% to 6% among patients younger than 65 years of age (Ruiz et al., 2014). The subsequent sections will provide an overview of the different types of primary and secondary headaches.

2.4.1 Primary headaches

According to the IHS (2018), primary headaches can be divided into various sub-types. These sub-types include tension-type headache (TTH), migraine headache (MTH), trigeminal autonomic cephalgia (TAC) and other primary headache disorders. Headache is one of the most common neurological complaints in elderly patients, with 52% of patients with headaches being elderly (Song *et al.*, 2016). Although primary headaches are more common, they are not life-threatening.

2.4.1.1 Tension-type headache

Tension-type headache is the most common type of primary headache (van Oosterhout, Cheung and Haan, 2016), with a lifetime prevalence in the general population ranging between 30% and 78% in different studies (IHS, 2018). Tension-type headaches are a common headache in the elderly and increases in prevalence with increasing age (Royce, 2011). According to Capobianco (2003), there is a TTH prevalence of 27% in the population over 65 years, compared to 20% prevalence in the rest of the population. Tai *et al.* (2012), reported a significant proportion of elderly patients suffered from chronic daily headaches (47.1%) while headache frequency was lower (less than 15 days/month) among the younger patients. Tai *et al.* (2012) stated that this is explained by the relatively greater frequency of chronic headaches, specifically chronic tension-type headache in the elderly as compared to younger population.

The clinical features of TTH include a pressing or tightening (non-pulsating) sensation with a mild or moderate intensity (Rudra, Chatterjee and Ray, 2015). It is bilateral in location and is not aggravated by physical activity (Rudra, Chatterjee and Ray, 2015). The IHS (2018) states that TTH is not associated with nausea or vomiting; however, either photophobia or more commonly phonophobia may present in conjunction with TTH.

Episodic TTH usually is associated with a stressful event. This headache type is of moderate intensity, self-limiting and usually responsive to non-prescription drugs (Blanda, 2017a). Chronic TTH often reoccurs daily and is associated with hypertonic muscles of the neck and scalp. This type of headache is bilateral and usually occipitofrontal in location (Blanda, 2017a).

Professional opinion regarding gender demographics of TTH is at odds. According to Chowdhury (2012), TTH is not gender inclined. However, Prencipe *et al.* (2001) revealed that TTH was more prevalent in elderly females (39.8%) compared to males (20%) and was more commonly noted between the ages of 75 to 84 years.

Van Oosterhout, Cheung and Haan (2016) state that 1.5% of men and 2.7% of women over the age of 60 years suffer from chronic TTH, making this condition very common in the elderly. Song *et al.* (2016) confirm this statement by testifying that TTH have a higher frequency in the elderly compared to the younger age group.

2.4.1.2 Migraine headache

Migraine headache affects over 20% of individuals at some point in their lives (Weatherall, 2006) and is classified as the second most common headache (Ahmed, 2012). In the Global Burden of Disease Study (GBD) (Institute for Health Metrics and Evaluation, 2010), migraine headache was ranked as the eight most prevalent disorder in the world overall and the number one disabling brain disorder (Weatherall, 2006). However, among the elderly population, migraine occurs less frequently than TTH (Tai *et al.*, 2012).

Clinically, migraine characteristics can change with aging. The severity of attack decreases, headaches are less frequently throbbing or pulsating, and the accompanying symptoms occur less often, all of which makes it more difficult to distinguish migraines from TTH (van Oosterhout, Cheung and Haan, 2016). The

characteristics of migraine attacks may be present from 4 to 72 hours if unsuccessfully treated or ignored (IHS, 2018). The name ‘migraine’ originally comes from the Greek word *hemicranias*, meaning ‘half of the head’, representing one of the most striking features of the condition, i.e. in many cases pain only affects one half of the head (Weatherall, 2006). The other common presentation includes nausea, vomiting, photophobia, phonophobia, and in some cases it may present as a bilateral throbbing headache (Fowler, Capobianco and Dodick, 2004). Lastly, migraine attacks tend to start more often (up to 60%) in the night or early morning (Gori *et al.*, 2015).

Migraine headaches comprise two major types, i.e. migraine without aura and migraine with aura. Migraine without aura is a clinical syndrome characterised by headache with specific features and associated symptoms (IHS, 2018). Migraine with aura is primarily characterised by the transient focal neurological symptoms that usually precede or sometimes accompany the headache (IHS, 2018). Some individuals also experience a prodromal phase, occurring hours or days before the headache and/or a post-dromal phase following headache resolution. According to the IHS society (2018), prodromal and post-dromal symptoms include hyperactivity, hypoactivity, depression, cravings for particular foods, repetitive yawning, fatigue, neck stiffness and/or pain. It has also been established that depression and especially anxiety are often comorbid with migraine headaches (Lampl *et al.*, 2016). Therefore, migraine headaches must always be considered when assessing these disorders.

Prencipe *et al*. (2001) found elderly women to have a higher migraine prevalence than elderly men. The sample size was 833, of whom 470 were female and 363 were male. The study found that 92 participants suffered from migraines, of whom 65 were female and 27 were male. A study conducted by Rudra, Chatterjee and Ray (2015) agreed by maintaining that the prevalence of migraine headaches after 65 years of age was higher for females in comparison to males.

2.4.1.3 Trigeminal autonomic cephalgias

Trigeminal autonomic cephalgias (TACs) are primary headaches with a common clinical phenotype of trigeminal pain (Benoliel, 2012). According to the IHS (2018), the TAC classification includes cluster headache, paroxysmal hemicrania and short-

lasting, unilateral, neuralgiform headache attacks with conjunctival injection and tearing (SUNCT).

Cluster type headache (CTH) is the most prevalent headache among TACs (Ahmed, 2012). Cluster type headaches that occur over the age of 60 are more frequently a continuance of a disorder that began during young adulthood (Fowler, Capobianco and Dodick, 2004). Cluster type headaches are a form of sporadic, short-lived, agonising, strictly unilateral head pain associated with automatic dysfunction (Rudra, Chatterjee and Ray, 2015). The headache has been noted to last anywhere between 15 minutes to three hours and can occur once every other day to eight times a day (IHS, 2018).

According to Benoliel (2012), CTH characteristics are unilateral, periorbital or ocular pain. The pain is of an excruciating severity which is generally rated as eight or higher out of ten on the numerical pain rating scale and is usually accompanied by at least one ipsilateral autonomic phenomena/signs. These autonomic features include ipsilateral conjunctival injection, rhinorrhoea, nasal congestion, facial and forehead sweating, ptosis, miosis and/or eyelid oedema and/or with restlessness or agitation (Ahmed, 2012; Xie *et al.*, 2013; IHS, 2018). A cardinal feature of CTH is the unique circadian (daily intervals) and circannual (intervals of one year) rhythmicity of the headache (Benoliel, 2012).

According to Rudra, Chatterjee and Ray (2015), CTH is divided into two forms i.e. episodic and chronic. The term episodic CTH indicates that there is a remission period. However, chronic CTH sufferers experience daily or near-daily headaches for more than one year without remission (Rudra, Chatterjee and Ray, 2015). Cluster headache is episodic in 80% to 90% of cases (Ahmed, 2012).

Cluster Type Headache rarely begins as late as the eighth decade (Fowler, Capobianco and Dodick, 2004) when compared to MTH, therefore, epidemiological studies regarding CTH are rare and minimal information can be extrapolated (Xie *et al.,* 2013).

Research shows that men are affected with CTH three times more often than women (IHS, 2018). According to Stiener and Martelletti (2007), CTH affects up to 3 per 1 000 men and up to 1 per 2 000 women in the general population. Xie *et al.* (2013)

further state that CTH occurs predominantly in men. In contrast, the chronic form of CTH has a higher prevalence among elderly women (van Oosterhout, Cheung and Haan, 2016).

2.5 Incidence and prevalence of primary headaches

Headache is one of the most common complaints of the neurological system (Stovner *et al*., 2007). However, prevalence data on the elderly population is sparse. This is due to several population-based studies not including individuals aged 65 or over, and the number of elderly people in studies not being sufficiently large enough to obtain reliable estimates (Prencipe *et al.*, 2001).

Capobianco (2003) revealed the prevalence of headache between the ages of 55 to 75 years to be 53% in men and 64% in women. Rudra, Chatterjee and Ray (2015) revealed a headache range in the elderly population of from 5% to 50%. These rates may be skewed as a result of elderly individuals complaining less about illnesses or as a result of the emergence of other more serious problems which may suppress the reporting of an apparently benign problem such as a headache (Rudra, Chatterjee and Ray, 2015).

Most headaches diagnosed in elderly individuals are primary headaches, mainly migraine and TTH (Ruiz, 2014). Although migraine often first begins in the younger population and then declines with age, approximately 33% of patients with migraine will continue to suffer recurrent attacks as they age, and a minority will have their first attack in their older years (Fowler, Capobianco and Dodick, 2004).

In this age group, TTH is the most common headache (50% to 80%) and in the majority of elderly individuals presenting with headaches, a final diagnosis of TTH can be made (van Oosterhout, Cheung and Haan, 2016). According to van Oosterhout, Cheung and Haan (2016), TTH prevalence is approximately 25% among individuals 60 to 65 years of age and is higher in the highest age groups.

The evaluation and management of headache in the elderly population must be considered in the perspective of comorbid conditions and polypharmacy which are common in the elderly (Fowler, Capobianco and Dodick, 2004). These conditions may affect the outcome of such prevalence studies. Table 2.1 lists studies which

show the prevalence of primary headaches in the elderly in different regions of the world.

Table 2.1: Prevalence of primary headaches in the elderly

References	Population	Sample size	TTH	MTH	CTH
Prencipe *et al*., 2001	Italy (363 males) (470 females) > 64 years	833	44.5%	11%	-
Lisotto *et al*., 2004	Italy (50 males) (180 females) > 65 years	230	25.7%	32.2%	-
Ruiz *et al*., 2014	Spain (73 males) (189 females) > 64 years	262	28.7%	23.8%	-
Tai *et al*., 2015	South-East Asia (24 males) (46 females) > 54 years	70	45.7%	18.6%	1.4%
Zhang *et al*., 2016	Northern-China (2366 males) (2671 females) > 59 years	5038	2.02%	0.85%	-
Song *et al*., 2016	Korea > 65 years Onset of headache only	152	55.6%	13.4%	0%

2.6 Trigger factors for primary headaches

Zhang *et al.* (2016) tabulated variables which may affect headaches and compared them to the healthy population of the study as shown in Table 2.2.

Table 2.2: Univariate analysis comparing healthy participants with those suffering from primary headaches in the elderly

		Healthy participants	Participants with a primary headache
Number of participants		4519	519
Gender	Male	2241(49.6%)	125(24.1%)
	Female	2278(50.4%)	394(75.9%)
Smoker	Yes	1338(29.6%)	86(16.6%)
	No	3181(70.4%)	433(83.4%)
Alcohol	Yes	1164(25.8%)	62(11.9%)
	No	3355(74.2%)	457(88.1%)
Social activities	Yes	793(17.5%)	29(5.6%)
	No	3726(82.5%)	490(94.4%)
Comorbidities:			
• Hypertension	Yes	1520(33.6%)	209(40.3%)
	No	2999(66.4%)	310(59.7%)
• Diabetes mellitus	Yes	337(7.5%)	55(10.6%)
	No	4182(92.5%)	464(89.4%)
• Heart disease	Yes	631(14%)	140(27%)
	No	3888(86%)	379(73%)

Source: Zhang et al. (2016)

Headache sufferers try to understand the cause of their headache but this is more difficult than it seems as there are both genetic and environmental factors which can simultaneously contribute to the headache processes, thus making it difficult to distinguish a cause (Stiener and Martelletti, 2007). Stress and tension have been reported to be the leading trigger in TTH as there is a positive correlation between them (Ashina, Bendtsen and Ashina, 2005).

Trigger factors for migraine headaches include certain foods, red wine, certain stressors, lifestyle habits and some medications, specifically hormone replacement treatment in women (Rudra, Chatterjee and Ray, 2015). The most common of these

causes is hunger but this is more in relation to the younger population (Stiener and Martelletti, 2007). Rudra, Chatterjee and Ray (2015) state that the environmental triggers for migraine headaches comprise flickering lights, noise and certain types of weather changes. These and most other triggers represent some form of stress and suggest that people with migraine do not respond well to change (Stiener and Martelletti, 2007).

Alcohol, even a small amount, may trigger an attack during a CTH period, which is an active periods of 6–12 weeks when CTH occur regularly (Benoliel, 2012), however, alcohol will not have an effect at other times, generally when the patient is in remission or out of an active period (Stiener and Martelletti, 2007). In a recent study, 10 patients (38.5%) who presented with CTH indicated that alcohol consumption was the trigger, followed by weather changes, sleep irregularity, cold wind and emotional changes (Xei, 2013). Altitude hypoxemia has been known to trigger CTH attacks during a cluster period (Benoliel, 2012). This type of hypoxia is a decrease in the amount of breathable oxygen in high altitudes caused by low atmospheric pressure which in turn causes low oxygen saturation in arterial blood (Ke, Wang and Xiao, 2016). Benoliel (2012) suggested it was best to avoid volatile substances such as paint and certain medications, one being nitro-glycerine (Royce, 2011) during a cluster period as such exposure may result in an attack.

2.7 Pathogenesis of primary headaches

The pathogenesis of primary headaches differs according to their sub-types as defined below.

2.7.1 Tension-type headache

The exact mechanism of TTH is unknown (Fumal and Schoenen, 2008) as a result of the paucity of scientific interest (Ashina, Bendtsen and Ashina, 2005). Involvement from peripheral factors including vascular, muscular (constant over-contraction of scalp muscles) and psychogenic (Singh, 2015) are suggested to be causes. According to the IHS (2018), TTH is no longer considered to be primarily psychogenic but rather neurobiological, and is a result of dysregulation of the central nervous system (Ashina, Bendtsen and Ashina, 2005).

A number of recent studies strongly suggest that peripheral pain mechanisms are most likely to play a role in frequent and infrequent episodic TTH (ETTH); however, central pain mechanisms play a more influential role in chronic TTH (CTTH) (Lozano Lopez *et al.,* 2016; IHS, 2018).

Although emotional factors are considered one of the main triggers for TTH, severity of major life events (known as daily hassles) have been associated with CTTH frequency (Ashina, Bendtsen and Ashina, 2005). As TTH is multifactorial (Fumal and Schoenen, 2008), several concurrent pathogenic mechanisms may be responsible for the headache. Extracranial myofascial nociception is considered to be one such mechanism (Fernández-de-Las-Peñas, Cuadrado and Pareja 2007). Fernández-de-Las-Peñas, Cuadrado and Pareja (2007) noted that active trigger points in the upper trapezius, sternocleidomastoid and temporalis muscles were more common in patients with ETTH than in healthy controls. The researchers went on to state that ETTH participants showed greater forward head posture and lesser neck mobility than the healthy controls. Although headache is not related directly to muscle contraction, peripheral muscle tenderness is still a common finding in TTH (Ashina*,* Bendtsen and Ashina, 2005; Singh, 2015).

Chronic TTH may affect regulation of peripheral mechanisms leading to increased activity of the pericranial muscle tissues or the release of neurotransmitters in the myofascial tissues (Singh, 2015). Bendtsen (2000) describes this process as central sensitisation at the level of the spinal dorsal horn/trigeminal nucleus as a result of prolonged nociceptive inputs from pericranial myofascial tissues. These plastic changes to the central nervous system (CNS) have been hypothesised as the cause of low blood flow through the ‘tender spots’ (trigger points) in the myofascial tissue in individuals suffering from TTH (Ashina, Bendtsen and Ashina, 2005).

2.7.2 Migraine type headache

The knowledge of migraine pathogenesis is insufficient as its specific cause is still unknown (Edvinsson, 2001). Current literature supports the theory that MTH mechanisms involve inherited alteration to brain excitability, intracranial arterial dilatation, recurrent activation and increased sensitisation of the trigeminovascular pathway (Noseda and Burstein, 2013). Due to significant advances in understanding over the decades, it is presumed that the presence of genetic factors may increase

an individual's susceptibility to MTH (Sun-Edelstein and Mauskop, 2009; Noseda and Burstein, 2013).

The current theory states that genetically predisposed individuals are more likely to have a hyperexcitable trigeminovascular complex (Sun-Edelstein and Mauskop, 2009). In these individuals, the trigeminovascular neurons release neurotransmitters such as calcitonin gene-related peptide (CGRP) and substance P when the headache triggers are present (Sun-Edelstein and Mauskop, 2009). This release of neurotransmitters is a result of transient cortical malfunction, commonly known as aura, which is caused by cortical spreading depression (CSD) which occurs arbitrarily in the cortex before the headache pain arises.

According to Noseda and Burstein (2013), CSD is caused by electrical or chemical stimuli affecting the cortex of the brain resulting in prolonged depression of the cortical neurons (Sun-Edelstein and Mauskop, 2009). This depression causes the cortex to release neurotransmitters such as CGRP and substance P, which then cause meningeal neurogenic inflammation resulting in nociceptive information traveling along the trigeminal nerve to the brainstem trigeminal nucleus caudalis and then to the thalamic nuclei and cortex where the migraine pain is eventually perceived (Sun-Edelstein and Mauskop, 2009). The trigeminal system is the only known pain-sensitive innervation provided for the cranial vasculature due to the central convergence of trigeminal and upper cervical pain inputs (Edvinsson, 2001).

Magnesium is believed to play a role in the features of MTH. Sun-Edelstein and Mauskop (2009) have hypothesised that during a migraine attack, magnesium is depleted. This hypomagnesemia results in the release of substance P, which is believed to affect the sensory fibres producing the headache pain.

2.7.3 Cluster type headache

Although CTH has a clinical definition, its pathophysiology is poorly understood and there are still pieces missing with which to complete the puzzle (May, 2005; Leroux and Ducrous, 2008). Cluster headache has conventionally been considered a vascular headache but there is clinical evidence suggesting that vascular reactions detected during the attacks are primarily due to CNS discharge (Franzini *et al*., 2004).

In order to find the mechanism for CTH, one must first elucidate the three major features of cluster headache i.e. the trigeminal distribution of the pain, ipsilateral cranial autonomic features and the episodic pattern of attacks (circadian rhythm) (May, 2005). May (2005) further states that the severe unilateral pain is likely to be preceded by activation of the first (ophthalmic) division of the trigeminal nerve, whereas the autonomic symptoms such as lacrimation are due to activation of the cranial parasympathetic outflow from the facial nerve.

Due to CTH having a unique periodicity with attacks occurring one or two hours after falling asleep or in the early mornings, it is believed that the hypothalamus plays a major role in the causation of the headache (May, 2005). This is reinforced by Franzini *et al.* (2004) who explain that positron emission tomography studies have shown an activation of the posterior hypothalamus during CTH attacks. Success of hypothalamic deep-brain stimulation (DBS) in the treatment of CTH has strengthened this statement.

Although CTH is not thought to be genetic, it has been shown to have a positive familial history. Studies using large twin registries have revealed that monozygotic twins present a higher concordance rate for CTH (2/12 pairs) than dizygotic twins (0/25 pairs), therefore signifying the existence of genetic factors (Leroux and Ducrous, 2008).

2.8 Clinical presentation and diagnostic criteria for primary headaches

The IHS classification of headaches is used to provide standardisation for the diagnosis of headaches. In order to diagnose any headache, the headache must present clinically with the findings listed in Table 2.3 to Table 2.10 as per the IHS (2018).

An infrequent ETTH presents typically bilateral, pressing or tightening sensations and are of mild to moderate severity, lasting minutes to days. The pain is not exacerbated with physical activity and is not linked with nausea, although photophobia or phonophobia may well be present (IHS, 2018) (Table 2.3).

Table 2.3: Infrequent episodic tension type headache

	Diagnostic criteria
1	At least 10 episodes of headache occurring on < 1 day/month on average (< 12 days/year) and fulfilling criteria 2–4
2	Lasting from 30 minutes to seven days
3	At least two of the following four characteristics: A. bilateral location B. pressing or tightening (non-pulsating) quality C. mild or moderate intensity D. not aggravated by routine physical activity
4	Both of the following: 1. no nausea or vomiting 2. no more than one of photophobia or phonophobia
5	Not better accounted for by another ICHD-3* diagnosis.

* International Classification of Headache Disorders 3rd Edition (IHS, 2018)

A frequent ETTH typically presents bilaterally and is pressing or tightening in quality and of mild to moderate strength, and can last minutes to days. The pain does not exacerbate with physical activity and is not linked with nausea, although photophobia or phonophobia may be associated (IHS, 2018) (Table 2.4).

Table 2.4: Frequent episodic tension type headache

	Diagnostic criteria
1	At least 10 episodes of headache occurring on 1–14 days/month on average for > 3 months (12 and < 180 days/year) and fulfilling criteria 2–4
2	Lasting from 30 minutes to seven days
3	At least two of the following four characteristics: 1. bilateral location 2. pressing or tightening (non-pulsating) quality 3. mild or moderate intensity 4. not aggravated by routine physical activity such as walking or climbing stairs
4	Both of the following: 1. no nausea or vomiting 2. no more than one of photophobia or phonophobia
5	Not better accounted for by another ICHD-3 Diagnosis

A CTTH evolves from frequent episodic tension type headache, with daily or recurring episodes of headache, typically bilateral, pressing or tightening in quality and of mild to moderate intensity, and lasts hours to days or may even be constant.

The pain does not intensify with physical activity but may be linked with mild nausea, photophobia or phonophobia (IHS, 2018) (Table 2.5).

Table 2.5: Chronic tension type headache

	Diagnostic criteria
1	Headache occurring more than 15 days/month on average for > 3 months (more than 180 days/year), fulfilling criteria 2–4
2	Lasting hours to days, or unremitting
3	At least two of the following four characteristics: 1. bilateral location 2. pressing or tightening (non-pulsating) quality 3. mild or moderate intensity 4. not aggravated by routine physical activity such as walking or climbing stairs
4	Both of the following: 1. no nausea or vomiting 2. no more than one of photophobia or Phonophobia
5	Not better accounted for by another ICHD-3 diagnosis.

Migraine without aura is best defined as a recurrent headache with bouts lasting between four to 72 hours. The distinctive characteristics are a unilateral location, pulsating quality, moderate or severe intensity, and is associated with nausea and/or photophobia and phonophobia (IHS, 2018) (Table 2.6).

Table 2.6: Migraine without aura

	Diagnostic criteria
1	At least five attacks fulfilling criteria 2-4
2	Headache attacks lasting 4–72 hours (when untreated or unsuccessfully treated)
3	Headache has at least two of the following four characteristics: A. unilateral location B. pulsating quality C. moderate or severe pain intensity D. aggravation by or causing avoidance of routine physical activity (e.g. walking or climbing
4	During headache at least one of the following: 1. nausea and/or vomiting 2. photophobia and phonophobia
5	Not better accounted for by another ICHD-3 diagnosis.

Migraine with aura or a classic migraine is best described as a recurring headache, lasting minutes, accompanied by unilateral fully reversible visual, sensory or other central nervous system symptoms that usually develop steadily and are typically followed by head pain and associated migraine symptoms (IHS, 2018). The diagnostic criterions are presented in Table 2.7.

Table 2.7: Migraine with aura

	Diagnostic criteria
1	At least two attacks fulfilling criteria 2 and 3
2	One or more of the following fully reversible aura symptoms: A. visual B. sensory C. speech and/or language D. motor E. brainstem F. retinal
3	At least three of the following six characteristics: A. at least one aura symptom spreads gradually over 5 minutes B. two or more aura symptoms occur in succession 3. each individual aura symptom lasts 5–60 minutes 4. at least one aura symptom is unilateral 5. at least one aura symptom is positive 6. the aura is accompanied, or followed within 60 minutes, by headache
4	Not better accounted for by another ICHD-3 diagnosis.

A chronic migraine is a headache that occurs on 15 or more days a month for longer than three months. During these three months, at least eight days of a month must feature migraine symptomology (IHS, 2018) (Table 2.8).

Table 2.8: Chronic migraine

	Diagnostic criteria
1	Headache (migraine-like or tension-type-like1) on 15 days/month for > 3 months, and fulfilling criteria 2 and 3
2	Occurring in a patient who has had at least five attacks fulfilling criteria 2–4 for Migraine without aura (Table 2.5) and/or criteria 2 and 4 for Migraine with aura (Table 2.6)
3	For 8 days/month for > 3 months, fulfilling any of the following: A. criteria 2 and 4 for Migraine without aura Table 2.5) 2. criteria 2 and 3 for Migraine with aura (Table 2.6) 3. believed by the patient to be migraine at onset and relieved by a triptan or ergot derivative
4	Not better accounted for by another ICHD-3 diagnosis.

Cluster type headaches are extremely severe, they are strictly unilateral pain which is orbital, supraorbital, temporal or in any combination of these sites, lasting from 15 to 180 minutes and occurring once every other day to even eight times a day (IHS, 2018) (Table 2.9).

Table 2.9: Cluster type headache

	Diagnostic criteria
1	At least five attacks fulfilling criteria 2–4
2	Severe or very severe unilateral orbital, supraorbital and/or temporal pain lasting 15–180 minutes (when untreated)
3	Either or both of the following: 3.1. at least one of the following symptoms or signs, ipsilateral to the headache: a) conjunctival injection and/or lacrimation b) nasal congestion and/or rhinorrhoea c) eyelid oedema d) forehead and facial sweating e) miosis and/or ptosis 3.2. a sense of restlessness or agitation
4	Occurring with a frequency between one every other day and eight per day
5	Not better accounted for by another ICHD-3 diagnosis.

Chronic cluster headache attacks occur for one year or longer without remission. If remission does occur, these periods last less than three months (IHS, 2018) (Table 2.10).

Table 2.10: Chronic cluster type headache

	Diagnostic criteria
1	Attacks fulfilling criteria for cluster headache (Table 2.8) and criterion 2 below
2	Occurring without a remission period, or with remissions lasting < 3 months, for at least one year.

2.9 Diagnosis of primary headaches

Primary headache conditions are diagnosed using criteria that are symptom based. Elderly individuals report specific patterns of recurrent headache possessing distinctive features (Kaniecki, 2007). According to van Oosterhout, Cheung and Haan (2016), such features have an altered presentation in the elderly often making diagnosis difficult.

According to De Luca and Bartleson (2010), several prospective observational studies in an emergency room setting have authenticated the notion that new onset headaches after the age of 50 years are linked with an increased likelihood of intracranial pathology. Therefore, obtaining an accurate and detailed history is vital for an elderly individual presenting with a headache (Capobianco, 2003). The detailed case history, a general physical examination and a neurological examination usually permit a definitive diagnosis, but when there are doubts, diagnostic testing is indicated (De Luca and Bartleson, 2010). This is to rule out any organic causes of headache as 30% of headaches in the elderly population are considered to be from a secondary cause, especially if such a headache has a new onset (Tanganelli, 2010).

2.9.1 Red flags

One of the cardinal differences between primary and secondary headache syndromes is that secondary headaches are defined by detectable structural or physiological disorders (Kaniecki, 2007). Such conditions repeatedly present with phenotypic headaches similar to TTH or other primary headaches. Although

symptoms may be shared between the sub-types, with secondary headaches often exhibiting one or more “red flags” which help signify organic origins (Table 2.11).

Table 2.11: Red flags for secondary headaches

- Abnormal general or neurologic examination
- First or worst headache
- Headache with atypical aura (lasting more than one hour or including motor weakness).
- Headache with syncope or seizure
- Headache triggers being Valsalva, exertion or postural change
- New headache in those aged older than 50 years
- New headache with cancer or other immunosuppressing diseases
- Progression of or fundamental change in headache
- Persistent morning headache associated with nausea.
- Rapid initiation of headache

Source: Adapted from Kaniecki (2007) and Scott (2011)

2.9.2 Tension-type headaches

Tension-type headaches lack distinctive features, therefore it is a diagnosis of exclusion which is based on the absence of associated symptoms (Crystal and Grosberg, 2009; Crystal and Robbins, 2010). As a result of this, there is no specific diagnostic test available for TTH (Singh, 2015).

A detailed history, a general physical examination and neurological examination with a diagnostic headache diary detailing all drugs consumed between the initial and follow-up visit is vitally important to aid in making a diagnosis (Jensen, 2003). During a case history and examination, if the headache is presenting atypically, then intracranial lesions should be suspected, and neuroimaging is required (Jensen, 2003; Singh, 2015).

Although unspecific, manual palpation of the peri-cranial muscles and their insertions is recommended to demonstrate muscular factors and influence in the headache as well as to assist in planning a treatment strategy which would include strengthening and relaxation techniques if any tenderness was present (Jensen, 2003).

2.9.3 Migraine type headache

A thorough clinical evaluation including a case history is currently the gold standard for diagnosing an MTH (Samaan *et al.*, 2010; Scott, 2011).

Neuro-imaging studies used for the evaluation of MTH include magnetic resonance imaging (MRI) and computed tomography (Holle and Obermann, 2013). These neuro-imaging scans are indicated when the patient presents with a first attack involving focal neurological deficits or altered mental status or when focal findings persist between attacks (Rima *et al*., 2017). Single-photon emission computed tomography scans differ from other neuro-imaging as they are only indicated during the aura phase of migraine to investigate levels of hypoperfusion (ischemia) of the brain (Rima *et al*., 2017).

According to Samaan *et al.* (2010), a well-structured migraine interview based on the IHS diagnostic criteria is a useful and valid tool to identify migraine in research settings and to a limited extent in clinical settings. The information gathered by such an interview will provide relevant findings to help with the diagnosis.

2.9.4 Cluster type headache

The way CTH presents is important in helping distinguish this type of headache from MTH for a more accurate diagnosis (Leroux and Ducrous, 2008). Unfortunately, most CTH cases have a diagnostic delay of three or more years as CTH headache presentation shares similarities with migraine headaches often resulting in misdiagnosis and mismanagement (van Vliet *et al*., 2003).

Trigeminal autonomic cephalgias are often presentations of underlying pathology and all patients should undergo neuro-imaging, especially of the pituitary, orbit and trigeminal pathway to rule out any abnormalities (Leroux and Ducrous, 2008; Benoliel, 2012).

Individuals presenting with new onset CTH must always be thoroughly investigated. Such investigations should include Doppler ultrasound or angiogram of the neck vessels to exclude carotid artery dissection and other sinister causes of headache similar to CTH (Godeiro-Junior *et al.*, 2008).

Positron emission tomography is used to scan the hypothalamus which is usually activated during nitroglycerin triggered and spontaneous cluster type headaches, and where one of the cardinal features i.e. rhythmicity, is controlled (May, 2005).

If all prior examinations wield no definitive results, the response of the TAC to different headache treatment therapies can be used as a final validation of the diagnosis (Benoliel, 2012).

2.10 Differential diagnoses of primary headaches

When assessing an elderly individual for headaches, one must always assume the possibility of a sinister cause. Tables 2.12 to 2.14 provide an overview of the differential diagnoses which are relevant and must be excluded when examining an individual for the suspected primary headache.

An overview of the differential diagnoses for TTH is illustrated in Table 2.12.

Table 2.12: Differential diagnosis for tension-type headache

Differential	Reasoning
Migraine and cluster type headache (Singh, 2015; Blanda, 2017a)	Overlapping symptomology and presentation
Medication overuse headache (Stiener and Martelletti, 2007)	Drug interactions in the elderly resulting in a similar headache presentation to TTH
Sinusitis (Blanda, 2017a)	Location of pain similar to that of a TTH being mainly frontal pain
Brain abscess (George, 2017)	Headache is the most common presenting symptom and is often nonspecific.
Temporomandibular joint syndrome (Blanda, 2017a)	The peri-cranial muscle tenderness seen in TTH has a similar location to that of temporomandibular joint pain.

An overview of the differential diagnoses for MTH is illustrated in Table 2.13.

Table 2.13: Differential diagnosis for migraine type headache

Differential	Reasoning
Tension-type headache (Singh, 2015; Blanda, 2017a)	Overlapping symptomology and presentation
Cluster type headache (van Vliet *et al*., 2003)	Presence of nausea, vomiting, and photophobia during attacks, therefore CTH can initially be mistaken as migraine.
Sinusitis (Kernick, 2011)	85% of diagnosed chronic sinusitis is in fact migraine
Transient ischemic attacks (TIAs) (Fowler, Capobianco and Dodick ., 2004)	Migraine type headache may consist of a recurring hemi-sensory disturbance, language dysfunction, visual disturbances, therefore being easily confused with TIAs.
Intracranial aneurysm (Chawla, 2018)	Is the primary consideration if the headache is severe and of sudden onset and reaches maximum intensity in minutes. Some of the general features include photophobia nausea and vomiting, thus mimicking a migraine.
Hemi-crania continua (Freidman *et al.*, 2013)	Unilateral head pain that is often associated with nausea, vomiting, photopobia and phonophobia
Space occupying lesion (Chawla, 2018)	Headache is usually intermittent, lasting a few hours. It may be progressive
Viral meningitis (Chawla, 2018)	Migraine and meningitis share similar features such as headache, irritability, nausea, vomiting and a stiff neck

An overview of the differential diagnoses for CTH is illustrated in Table 2.14.

Table 2.14: Differential diagnosis for cluster type headache

Differential	Reasoning
Migraine type headache (van Vliet *et al*., 2003)	Cluster type headache can initially be mistaken as migraine, this is due to CTH occasionally presents with nausea, vomiting, and photophobia during attacks.
Horner's syndrome (Friedman and Digre, 2013)	Also presents with a sudden onset headache. Cluster type headache may be noted in conjunction with Horner's syndrome.
Paroxysmal hemi-crania (Leroux and Ducros, 2008)	Overlap in clinical criteria, differs from CTH by the smaller length and higher incidence of attacks. Has a higher incidence in women.
Sinusitis (van Vliet *et al*., 2003; Edvardsson, 2013)	Cluster headache may be a symptom or trigger by sinusitis. Cluster type headache is comparatively often mistaken for and is referred to dentists or ENT specialists
Internal carotid artery Dissection (ICAD) (Godeiro-Junior *et al.*, 2008)	Headache is the most common symptom, pain is usually unilateral and localised and mimics CTH. Lacrimation, conjunctival injection and nasal congestion from a Horner's syndrome may present in ICAD.
Trigeminal neuralgia (Singh, 2016; Blanda 2017b; Capobianco, 2004)	Trigeminal neuralgia is the most common neuralgic disorder in the elderly. It Presents as a stabbing unilateral facial pain that is triggered by chewing or similar activities, this is a similar presentation to CTH.

2.11 Management of primary headaches

The crux of headache management is diagnosis (Rudra, Chatterjee and Ray, 2015). The vast majority of primary headaches can be effectively treated by a primary care physician with the correct clinical diagnosis (Ahmed, 2012). The type of treatment varies between headache types and is dependent on morbidity, level of disability and individual preferences. The common headache types will be discussed below with respect to management.

2.11.1 Tension-type headache

Tension-type headache is rarely debilitating and the majority of patients will only seek treatment when chronicity has occurred (Ahmed, 2012). Tension-type headache in the elderly should always be treated with non-pharmacological therapies first, as in this age group, careful consideration must be used when

prescribing the use of medication (Capobianco, 2003). According to Crystal and Grosberg (2009), this form of treatment is advantageous in the elderly as it helps reduce the risk of polypharmacy, comorbidity and impaired metabolism.

Lifestyle management is generally the first step in the management of TTH. This includes optimising and regulation of sleep patterns, regular and healthy eating as well as reducing stress and headache triggers (Kaniecki, 2007; Scott, 2011). Behavioural interventions such as cognitive behavioural therapy and biofeedback training have shown to help reduce stress (Crystal and Grosberg, 2009). Several meta-analysis studies involving behavioural treatments for TTH found them to be effective, resulting in a 35% reduction in headache frequency (Kaniecki, 2007; Fumal and Schoenen, 2008).

Physical treatments such as massage, heat, cryotherapy, transcutaneous electrical nerve stimulation and changes to ergonomics have been shown to be beneficial for acute TTH, but not episodic TTH (Fumal and Schoenen, 2008). Castien *et al*. (2011) noted that manual therapies (chiropractic and physiotherapy) are more effective than general practitioner care in short- and long-term reduction of chronic TTH symptoms. Several studies on manual therapy have shown a reduction in frequency, intensity, analgesic use and increase in quality of life in patients with TTH (Lozano Lopez *et al*., 2016).

Pharmacological treatment in the elderly should be limited to two days a week or less, as chronic TTH is a risk factor for medication overuse which can also result in a medication overuse headache developing (Crystal and Grosberg, 2009; Castien *et al*., 2011).

For the management of infrequent episodic TTH, over the counter analgesics such as paracetamol and ibuprofen are indicated (Ahmed, 2012). For frequent episodic and chronic TTH, tricyclic antidepressants such as amitriptyline are indicated with proven efficacy (Ashina, Bendtsen and Ashina, 2005; Ahmed 2012). It has been shown that patients using amitriptyline have noticed a decrease in peri-cranial tenderness, which is believed to be caused by the reduction in central sensitisation due to the peripheral anti-nociceptive effect of the drug (Ashina, Bendtsen and Ashina, 2005). Tricyclic's are contraindicated in patients with cardiac arrhythmias (Starling, 2018) and should always be used with restraint in the elderly due to the

potential for anticholinergic side effects such as confusion, sedation, hypertension and urinary retention (Crystal and Grosberg, 2009). The use of non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen should also be used sparingly as it increases the risk of gastrointestinal ulceration (Crystal and Grosberg, 2009; Starling, 2018).

2.11.2 Migraine type headache

Specific guidelines in the treatment of MTH in the elderly are not available, therefore, treatment should be chosen sensibly and based on the individual preference of the patient (van Oosterhout, Cheung and Haan 2016).

Any obvious precipitating causes such as diet, lack of sleep and environmental factors should be addressed first to help prevent attacks (Rudra, Chatterjee and Ray, 2015). It is known that patients who have high body mass index (BMI) are more likely to suffer from MTH, therefore, weight modification should be considered in the management protocol (Hershey and Bednarczyk, 2012). Studies have shown that exercise has also been beneficial in MTH as it helps with weight reduction and decreases the frequency of the headache (Hershey and Bednarczyk, 2012). A cross-sectional, community-based study revealed a significantly lower migraine associated disability between those who practiced regularly exercise to those who did no exercise (Domingues *et al, 2011*). Advantages of using exercise as a prophylactic for certain headaches is that it is available to most people in low-and-middle-income countries, such as South Africa, it costs nothing or very little, and it has general health benefits and should be performed by everyone (Amin *et al,* 2018).

Manual therapies such as spinal manipulation, craniosacral techniques or myofascial manipulation, which a chiropractor can perform, have been proven to be effective mediations in the treatment of chronic MTH (Espí-López, Bermell-Salvador and Cortés-Amador, 2017). In a systemic review of randomised control tests, Chaibi (2011) found that manual therapies might be equally effective as anti-convulsants and beta-blockers in the preventative management of MTH. Several studies have assessed chiropractic spinal manipulative therapy (CSMT) as a therapy for migraine. The evidence includes three systematic reviews, two randomized controlled trials, a controlled trial, and three case studies. These studies suggest CSMT to be effective in treating migraineurs (Chaibi, 2011).

Even though there is a lack of evidence and consensus (Van Oosterhout, Cheung and Haan, 2016), pharmacological treatment for MTH usually begins with triptans as first-line medications in all persons, even the elderly (Starling, 2018). Somatriptan, which is most commonly used, is a potent vasoconstrictor of extracranial muscles; therefore, it is contraindicated in patients with ischemic heart disease and uncontrolled hypertension (Rudra, Chatterjee and Ray, 2015).

In acute MTH, treatment should be started from the onset with over the counter medications such as soluble aspirin and paracetamol, which is often combined with an antiemetic such as domperidone (Ahmed, 2012; Rudra, Chatterjee and Ray, 2015). Other acute treatment options for migraine are non-specific and include NSAIDs, combination analgesic agents as well as opioid and barbiturate prescriptions (Starling, 2018).

Prophylactic treatment is required when the frequency or duration of attacks seriously interferes with the individual's lifestyle thus decreasing their quality of life (Rudra, Chatterjee and Ray, 2015). First-line preventive treatments include beta-blockers such as propranolol, tricyclic anti-depressants such as amitriptyline and the anti-convulsants such as topiramate (Ahmed, 2012; Starling, 2018).

Migraine attacks have been associated with low levels of magnesium in the brain, Cerebral spinal fluid and serum; this deficiency causes promotion of cortical spreading depression in the brain (Sun-Edelstein and Mauskop, 2009). Regarding migraine prophylaxis, a study showed that supplementation with oral magnesium citrate resulted in a significant reduction in migraine frequency and severity (Sun-Edelstein and Mauskop, 2009).

A newly recognised prophylactic treatment for chronic migraine is onabotulinum toxin A (Botox) which is now endorsed by the National Institute of Clinical Excellence to patients who have unsuccessfully responded to at least three preventative treatment methods for MTH (Ahmed, 2012).

2.11.3 Cluster type headache

A combination of patient education, symptomatic treatment and prophylactic regimens are the crucial cornerstones of effective treatment in CTH (Benoliel, 2012).

Currently, there is no evidence of the effectiveness of non-pharmacological treatment regimens in general (van Oosterhout, Cheung and Haan, 2016). Therefore, education is vital as individuals need to be instructed to avoid daytime naps, alcoholic beverages and other triggers like volatile materials such as paint (Benoliel, 2012).

Verapamil, which is a calcium-channel blocker is the first line treatment for both episodic and chronic CTH (Leroux and Ducros, 2008; Ahmed 2012) and has a proven prophylactic efficiency (Rudra, Chatterjee and Ray, 2015). Verapamil side-effects include gingival hyperplasia, constipation, fatigue and conduction heart block (Leroux and Ducros, 2008; Rudra, Chatterjee and Ray, 2015).

In CTH, pain has a rapid onset and is excruciating; therefore, patients require medication that is fast acting (Leroux and Ducros, 2008). Sumatriptan by subcutaneous injection has an effective rapid onset and has no evidence of tachyphylaxis (Rudra, Chatterjee and Ray, 2015). Sumatriptan is a vasoconstrictor which affects the blood vessels and central brainstem receptors; it efficiently relieves pain and improves the management of CTH (Leroux and Ducros, 2008). Sumatriptan is contraindicated in patients with coronary artery disease, peripheral artery disease and stroke (Leroux and Ducros, 2008).

Oxygen inhalation is an effective treatment in acute CTH attacks (Ahmed, 2012). Oxygen is useful as it can be administered in hospital as well as at home. It is hugely advantageous in the elderly as it can be administered several times a day without causing any adverse effects (Leroux and Ducros, 2008; Rudra, Chatterjee and Ray, 2015).

If medication is ineffective, patients may lean towards nerve blocks or surgical interventions. Surgical procedures should be considered with caution because no reliable long-term observational data on the benefit is available and it may induce trigeminal neuralgia or anaesthesia dolorosa (May, 2005). Surgery is only indicated in patients with medically resistant cluster headache, which occurs in 10% to 20% of patients and in patients who respond to medical treatment but suffer unbearable side-effects (Benoliel, 2012).

Surgical approaches like trigeminal section, thermocoagulation of gasserian ganglion, glycerol rhizotomy and radiosurgery of the trigeminal nerve have revealed variable outcomes usually associated with irreversible complications (Leroux and Ducros, 2008).

Deep brain stimulation (DBS), is an effective and innocuous treatment of CTH (Franzini *et al*, 2004). The researchers have shown convincing benefit in a series totalling eight participants who suffered from chronic CTH; however, according to Leroux and Ducros (2008) DBS can be completely inefficient and has potentially serious complications.

2.12 Secondary headaches

2.12.1 Introduction

Secondary headache is classified as a headache with a demonstrable cause which is usually of a sinister nature (Starling, 2018) and accounts for 5% of headache appearances in general practice (Kernick, 2011). The prevalence of secondary headaches is shown to increase with age as it constitutes up to 30% of headache complaints in the elderly (Tanganelli, 2010).

Secondary headache is a serious disorder when compared to primary headaches as they can lead to serious complications (Lowth, 2015). The most common secondary headaches include space-occupying lesions (SOL) such as intracranial tumours, infections such as meningitis or encephalitis, subarachnoid haemorrhage and giant-cell arteritis (Ahmed, 2012).

2.12.2 Presentation

Individuals who commonly experience primary headaches are more vulnerable to the development of a headache with an organic cause; these headaches change in the pre-existing presentation rather than developing a new presentation and increase in severity and frequency (Green, 2012). The possibility of developing a secondary headache is greater in older patients, who often experience polypharmacy and drug interactions (Melville, 2005).

Secondary headache is suspected when the headache reaches full intensity rapidly, is progressive in intensity and duration and is associated with atypical neurological signs, or presents as a new onset after the age of 50 years (Green, 2012).

2.12.3 Diagnosis and management

When assessing the older patient with new onset headache or a change in headache pattern, one must first rule out serious secondary causes of headache (Tanganelli, 2010; Starling, 2018). The most crucial aspect of headache diagnosis is history taking noting red flags, as most individuals, including those with common secondary headaches, have no signs (Ahmed, 2012). This approach is no different in older adults, especially because age is a risk factor for secondary headache disorders (Starling, 2018). As a result, in the elderly there is a lowered threshold for ordering tests if the history justifies it, particularly if the headaches are of recent onset, are uncharacteristic or are associated with neurological findings (Tanganelli, 2010). Depending on the history and presenting of red flags, diagnostic testing will vary but should include blood tests, erythrocyte sedimentation rate and neurovascular imaging to look for a vascular or SOL (Starling, 2018). Management of such headaches is dependent on prognosis and involves a combination of pharmacological treatment and surgical interventions.

2.13 Burden of headaches in the elderly

Headache conditions are among the most prevalent, burdensome and exorbitant diseases in the world and there is a serious need for response, education and scientific interest. The burden of headaches is a major public health issue the scale of which has not fully been recognised, and which has possibly a greater effect in low and middle-income countries (Jensen and Stovner, 2008; Rao *et al.*, 2012). Headaches are ranked as being one of the 10 most disabling conditions for males and in the top five for females (Stovner *et al*., 2007). On the individual level, headaches cause disability, suffering and loss of quality of life that is on a par with other chronic disorders (Jensen and Stovner, 2008).

In South Africa, inequalities exist such as land deprivation and limited access to education, which manifest through high levels of unemployment and underdevelopment in all the regions of the country (Makiwane and Kwizera, 2006).

These inequalities affect socioeconomic status, resulting in sufficient healthcare being unable to be provided to all. Thus, the poorer communities suffer more from illness and disease such as headaches which cannot be diagnosed and managed appropriately (Ataguba, 2011). Socioeconomic factors have an influence on an individual's access and perception of healthcare. Their socioeconomic status directly affects the environments they live and work in, which may then put their health at risk. Their health promoting or opposing behaviours, which can be as a result of a lack of knowledge and education of disease, may affect their utilisation of health care services when it is needed (Katterl, 2011).

Comorbidity is defined as a medical condition that exists simultaneously but independently with another condition (Jensen and Stovner, 2008). The elderly are a vulnerable population and can have psychiatric morbidity such as depression and anxiety caused by many conditions, one such condition being headaches (Page, 2004). In general, headache disorders and particularly migraine, have been linked to various illnesses including well defined disorders such as stroke, diabetes mellitus, hypertension, obesity and asthma (Jensen and Stovner, 2008). Psychiatric and physical comorbidities may contribute to the burden thus conferring a worse prognosis. Therefore, treatment needs to address both headache and associated diagnoses in order to be effective (Crystal and Robbins, 2010).

Headache sufferers, particularly migraineurs, experience a substantially reduced health related quality of life that is comparable to chronic illnesses such as hypertension, diabetes and congestive heart failure (Robbins and Lipton, 2010). Not only is the burden physiological and psychological, it is costly as well. The direct costs (medication, investigations, consultations and hospitalisation) accounted for one billion dollars annually in the United States of America (Jensen and Stover, 2008).

Recognition of the burden of headache and increased scientific interest have led to a better understanding of the risk factors and greater insight into the pathogenic mechanisms which might lead to improved prevention strategies and the early identification of patients who are at risk (Jensen and Stovner, 2008).

2.14 Conclusion

Virtually everyone will experience headaches at some point in their lifetime (MacGregor *et al.*, 2009). Although headache prevalence is lower in the elderly, it is still a common complaint in this population (Fowler, Capobianco and Dodick, 2004).

Primary headaches can be separated into various sub-types. These include TTH, MTH, TACs and other primary disorders (Stover *et al.*, 2007; IHS, 2018). Studies suggest that TTH has a higher prevalence in the elderly compared to the other primary headaches (Tai *et al.*, 2012). In the case of a new onset headache, the diagnosis of a primary headache syndrome should be made after a systematic diagnostic workup, including neuro-imaging, blood work, and cerebrospinal fluid analysis, to eliminate the underlying causes of secondary headaches (Semenov, 2015).

According to Green (2012), a secondary headache reflects underlying neurologic or systemic disease. Importantly, secondary headache is more common in the elderly, constituting up to 30% of headache complaints (Tanganelli, 2010) and are further distressing as they can result in grave complications (Lowth, 2015).

The burden of headaches is under-rated, under-recognised and under-treated (Jensen and Stovner, 2008). Many studies have shown that the burden headaches impose include pain, disability, reduced quality of life, marked impairment of participation in work and social activities and heavy financial costs (Yu *et al.*, 2012). Yu *et al.* (2012) further state that appropriate health care can alleviate these burdens, but unfortunately many health systems, like that in South Africa, often fail to reach those who need it.

Chapter 3 will outline the research methodology and describe the study design, questionnaire development and participant sampling methodology.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology used in this study. It provides detailed descriptions of the study design, questionnaire development and data collection process.

3.2 Study design

This was a quantitative study using a cross sectional survey which is a type of observational study design where the investigator measures the outcome and the variables in the study participants at the same time (Setia 2016).

3.3 Study population

The study population included individuals of all genders and ethnicities who met the inclusion criteria for the study and resided in The Association for the Aged (TAFTA), KwaZulu-Natal, life rights buildings.

3.4 Study location

The researcher approached the head of TAFTA in KwaZulu-Natal for permission (Memorandum of Agreement) to conduct the study at their premises (Appendix A). The Association for the Aged is a registered non-profit organisation, offering multiple types of care and accommodation; including but not limited to sheltered housing, wellness centres, frail care, dementia care, outreach, awareness and educational programmes for the aged, to alleviate distress and promote welfare. At the time of the study, TAFTA had 11 elderly care facilities in KwaZulu-Natal and granted the researcher access to four life rights buildings.

3.5 Sampling

The study population included individuals who met the inclusion criteria and who resided in the life rights TAFTA buildings, KwaZulu-Natal. The Association for the Aged allowed the researcher access to four of these facilities (Table 3.1). To gain

access to these buildings a letter of information and informed consent (Appendix B) was required to be signed by the building manager.

Table 3.1: Study population and minimum response rate required from each of the life rights TAFTA buildings

Buildings	Residents	Minimum response rate (70%)
Building one	39	27
Building two	31	21
Building three	78	55
Building four	26	21
	Total: 174	Total: 122

In the four life rights facilities, there were a total of 174 residents. Three of the residents participated in the pilot study and therefore could not participate in the main study. To make the study generalisable, approximately 70% of 171 or 119 participants of the population were required to complete and return the questionnaire to ensure statistical validity of the results (Esterhuizen, 2018). The final sample size was 123, which is a response rate of 72%.

3.6 Sample characteristics

3.6.1 Inclusion criteria

- Participants had to be considered an older person, therefore they had to be 60 years of age or older. This is in accordance with the definition provided by the UN (United Nations, 2015).
- Participants had to be full-time residents at one of the TAFTA life rights buildings.
- Participants who signed a letter of information and informed consent, either by themself or a legal guardian, could participate (Appendix C).

3.6.2 Exclusion criteria

- Participants in frail care, which is care of older person in need of 24 hour care due to a physical or mental condition which renders him/her incapable of caring for himself/herself.
- Participants who refused to participate.

3.7 Measurement tool

3.7.1 Questionnaire development

The measurement tool was a descriptive, cross sectional questionnaire used to gain knowledge and data about primary headaches in the study population (Appendix D). All participants were given the approved questionnaire (Appendix I) which is divided into three sections (Table 3.2).

Table 3.2: Sections of the questionnaire

➢ Section A relates to participant demographics and familial, social and medical histories	Prangley (2010)
➢ Section B addressed the participant's headache history (presentation, frequency and location)	Boardman (2003); Stiener and Martelletti (2007)
➢ Section C addressed how the headache affect the participant's activities of daily living	Prangley (2010); Crestani (2015); Basdav (2016)

3.8 Research procedure

3.8.1 Focus group

A focus group is a type of in-depth discussion accomplished in a collection of people who cover different areas of expertise (Gill *et al*, 2008). The main use of such a group is for interaction within the group. Focus groups are used for generating information on collective views and the meanings that lie behind those views (Gill *et al*, 2008). This interaction within the group allows for any flaws and/or inconsistencies noted in the questionnaire to be corrected.

3.8.2 Focus group procedure

The researcher contacted individuals with an interest in a study of this nature. These individuals included a chiropractor with experience in research, fellow students completing their master's degrees in Chiropractic and a member of the sample population. The researcher informed the group of a location, time and duration of the meeting. All members of the focus group were given a letter of information and informed consent (Appendix E), code of conduct and confidentiality statement (Appendix F). The focus group meeting was completely confidential. All queries and suggestions were discussed and adhered to when assessing the pre-pilot questionnaire (Appendix G), the questionnaire was then developed according to the recommendations and alterations made during the focus group discussion.

3.8.3 Inclusion criteria for focus group

- A qualified chiropractor.
- Two students current completing their master's degrees in chiropractic, as they are familiarised with the research process.
- The participants included the researcher, research supervisor and the research assistant.
- Participants who read and signed the letter of information and informed consent (Appendix E) and code of conduct (Appendix F).

3.8.4 Outcome of focus group

Following the focus group discussion, the questionnaire was amended accordingly in terms of content, grammar and sectioning. An association between questionnaire and the aim and objectives were aligned, indicating that the questions in the questionnaire were relevant to the study.

The hand-out consisted of a seven-page questionnaire consisting of three sections which incorporated the following sub-sections: demographics, social history, medical history, headache history, headache characteristics and the burden of headaches. These subsections were arranged in a rational and comprehensible sequence.

The following were changes suggested as an outcome from the focus group exercise:

- All questions need to be numbered to allow for more accurate data capturing.
- All questions must be in alphabetical order as it is easier to read and is aesthetically pleasing.
- All questions must be uniform (in terms of nouns, verbs and adjectives used) and easy to understand.
- It was suggested that in certain questions blocks be added to allow the participant to tick the most relevant answer, which would make the questionnaire easier to fill in and to capture.
- A cover page with the title and heading should be included with instructions on how to complete the questionnaire.

The following were changes suggested for section A:

- Under the sub-section “demographics”:
    - The date of birth should be removed as the following question on age will provide enough information. Age should also be an open-ended question allowing the participant to write their age as this is more specific for statistical purposes.

- Under the sub-section “social history”:
    - The sub-heading “sleeping habits” was repeated and therefore one was removed. Both “night” and “day” should be made bold to clearly indicate what time the participant is sleeping.
    - Under the sub-heading “exercise” it was suggested that (a) and (b) be combined to form one question.
    - Under the sub-heading “caffeinated drinks” only questions related to coffee and tea were asked. It was suggested take specific amounts be added for easier data capturing.
    - Under the sub-heading “stress” it was suggested that the question be reworded to ask if they consider themselves under stress, and then providing forms of treatment they may be participating in.

- Under the sub-section “medical history”:
    - It was suggested that healthcare practitioners be provided as options to allow participants to choose when answering who they have received treatment for a head injury from.

- It was suggested that specific medical tests be provided as options to allow participants to choose which tests they have undertaken in the last three months.

The following were changes suggested for section B:

- Under the sub-section “headache history”:
  - Headache warning symptoms should be included as options for participants to select when answering.
  - Headache types should be included as options for participants to select when answering which headache they have been diagnosed with.
  - Medication types should be included as options for participants to select when answering which medication they use for headaches.

- Under the sub-section “headache characteristics”:
  - Under the sub-heading “location” a more accurate and easier to understand illustration should be used which already indicates where the pain is being experienced on the face or head.
  - Under the sub-heading “associated signs and symptoms” it was suggested that the “severe” column be removed as it is irrelevant and complicates the question.
  - Under the sub-heading “frequency” the questions were reworded for a better understanding.

The following were changes suggested for section C:

- Under the sub-heading “the burden of headaches”:
  - It was suggested that the option “other” be removed from both headache experience questions as it would complicate the data capture process.

3.8.5 Pilot study

A pilot study is a trial run done before the main study. It can also be a specific pre-testing of research instruments, including questionnaires or interview schedules (Calitz, 2009). It allows the questionnaire to be used on the relevant study population, similar to that used in the main study.

3.8.6 Pilot study procedure

After ethical approval, the researcher recruited three elderly individuals to participate in the pilot. These participants were from one of the TAFTA life rights buildings. After they had read and signed the letter of information and informed consent (Appendix C), they received the pre-pilot questionnaire (Appendix G). The researcher remained with the group to help answer any questions they may have had.

3.8.7 Pilot study Inclusion criteria

- Participants are required to be 60 years or older.
- Have completed and signed the letter of information and informed consent.

3.8.8 Exclusion criteria for pilot study

- Participants that are unwilling to sign the letter of information and informed consent

3.8.9 Outcome of pilot study

All three participants were able to complete the study without assistance. It was noted that the questionnaire was clear, precise and easily understood. It was suggested by a participant that the main questionnaire be printed back-to-back, to limit the amount of paper used and in doing so, the questionnaire will look shorter and less intimidating.

3.8.10 Main study

Once ethical clearance from the Institutional Research Ethical Committee (3/18) (Appendix H) had been granted and permission had been obtained from TAFTA to use the selected elderly care facilities the researcher begun distributing the questionnaire to the participants who had signed the letter of information and informed consent (Appendix C) and who fitted the inclusion criteria.

Due to the use of different TAFTA life rights buildings, not all questionnaires were completed on the same day. However, in each location the questionnaire was completed on the same day as the letter of information and informed consent was signed.

The researcher had an assistant who was a chiropractic student that was familiar with the research process helped in the distribution of the questionnaire and assisted in answering any questions the participants may have had about the study. This assistant signed a confidentiality agreement form (Appendix J) and had been trained on the research procedure for this study. Concessions had been made for the possibility of a language barrier between the researcher and the participant. A worker from TAFTA who spoke the same language as the participant helped translate the informed consent, letter of information and questionnaire but did not assist in filling it out.

3.9 Ethical considerations

Participants had a choice whether or not to participate in the study. The participants did not have to share any personal information. Those that agreed were required to sign a letter of information and informed consent (Appendix C). The participants answered the survey individually without the influence of the researcher or assistant as well as other participants. Participants' names were not included in the study, instead a number was assigned to each questionnaire to be used in the study to help maintain confidentiality. Once collected, the questionnaires and letter of information were placed in separate ballot boxes which were only opened off the premises and evaluated by the researcher alone. The following ethical principles had to be met to achieve ethical clearance:

1. The participants name will not be used on the data sheets; they will be given a code. The research data will be kept in a safe place in the Chiropractic Programme for a period of five years, after which, it will be shredded.
2. Informed consent will be obtained from each participant, in line with the ethical principle of autonomy. Participants will be free to leave the study should they wish to do so without prejudice.
3. There will be no intentional harm done to the participant. This is in keeping with the principle non-maleficence in research.
4. All participants meeting the study inclusion criteria will be invited to participate in line with the ethical principle of justice whereby there will be no discrimination in terms of race, gender or age.

5. The study will be of benefit to the participant as well as for the benefit as well as others who present with headaches. This is in keeping with the principle of beneficence with regards to research.

3.10 Statistical analysis

All data from the questionnaires were captured on a Microsoft Excel spreadsheet and forwarded to the statistician for analysis. IBM SPSS version 24 was used by the statistician to analyse the data.

According to Esterhuizen (2018), to determine the prevalence of headaches the proportion of participants reporting headaches needed to be tabulated and expressed as a percentage of the total. A 95% confidence interval around this prevalence estimate was calculated and reported. In order to investigate selected risk factors (smoking, alcohol, family history, current medication, sex and sleep patterns) that are associated with headaches in an elderly population, the groups with and without headaches were compared with respect to the listed factors using either t-tests (for continuous predictors) or chi square tests (for categorical predictors) at the 95% level of significance. To determine the impact of headaches on the daily activities of the elderly, responses to this part of the questionnaire were tabulated and graphed in those participants reporting headaches (Esterhuizen, 2018).

3.11 Conclusion

The study was an epidemiological, cross sectional survey of headaches with expressive and analytical components. The study population included individuals who resided in the TAFTA, KwaZulu-Natal, life rights buildings and all the elderly who met the inclusion criteria were invited to participate. Participants had a choice whether or not to participate in the study. The participant's personal information was not shared and remained private as they were given a number to maintain their autonomy. The questionnaire was developed using similar headache study questionnaires and then modified and corrected during the focus group and pilot study.

Chapter 4 will present the results obtained from the data collection with the use of the questionnaire and will include the prevalence of headaches and the association of headache types with activities of daily living and quality of life.

CHAPTER 4: RESULTS

4.1 Introduction

Chapter 4 presents the information on the results gathered from the questionnaire used in this study.

4.2 Sample size and response rate

The sample size required for this study was a minimum of 119 participants. A total of 123 questionnaires were handed out and all questionnaires and informed consent forms were returned. If all the questionnaires were handed-out and received, which was usable then the response rate is 100%. However the response rate was 72% representative of the demographics of the larger population size with a minimum of 70% being required to ensure validity of the study. All 123 questionnaires were analysed for statistical purposes.

4.3 Demographics

4.3.1 Age

The mean age of participants was 79.5 years with a standard deviation of seven years and a range from 60 to 101 years (Table 4.1).

Table 4.1: Age of participants

Age	
Mean age	79.46
Std. deviation	7.139
Minimum age	60
Maximum age	101

4.3.2 Gender

Of the 123 elderly participants who participated in the study, 93 (76%) were female and 30 (24%) were male. The ratio was approximately three female participants for every male participant (3:1) (Table 4.2).

Table 4.2: Gender of participants

Gender	Count	Percentage
Female	93	75.6%
Male	30	24.4%
Total	**123**	**100%**

4.3.3 Ethnicity

The most common ethnicity was White (72.4%) with the second largest being Coloured (13.8%) followed by the Indian (12.2%) and Black (1.6%) (Table 4.3).

Table 4.3: Ethnicity of participants

Ethnicity	Number	Percentage
Black	2	1.6%
Coloured	17	13.8%
Indian	15	12.2%
Other	0	0%
White	89	72.4%
Total	**123**	**100%**

4.4 The prevalence of headaches in the sample

Headache pain was experienced by 56 (45.5%) elderly participants within the sample population (p=0.3). Of the total sample (n=123), 36 (29.3%) participants sustained primary headaches, while 20 (16.3%) were suspected of secondary headaches and 67 individuals (54.5%) did not suffer from headaches (p<0.001) (Table 4.4)

Table 4.4: Prevalence of headaches in the elderly

Headache	Number	Percentage
No headache	67	54.5%
Primary headache	36	29.2%
Secondary headache	20	16.3%
Total	**123**	**100.0%**

Of the total sample, 36 (29.3%) suffered from primary headache. Of these, 21 (17.1%) participants suffered from a TTH, 9 (7.3%) from a MTH and 3 (2.4%) from a CTH. Three (2.4%) participants experienced headaches that were not able to be classified under the three main headache types and were therefore classified as 'other primary headaches' (Table 4.5) ($p<0.001$).

Table 4.5: Prevalence of primary headaches in the elderly

	Headache	Number	Percentage
Primary headaches	Tension Type	21	17.1%
	Migraine	9	7.3%
	Cluster	3	2.4%
	Other Primary	3	2.4%
	Total	**36**	**29.2%**

4.5 Headache history

Of the 56 participants classified with headaches (both primary and secondary), all completed the questions on the characteristics of headaches. The responses to all the questions for those with headaches are summarised here. The mean age of a participant when they started to experience headaches was 40 years of age. The youngest age that a participant was when they experienced their first headache was 10 years of age and the oldest onset of a participant's first headache was 84 years of age (Table 4.6).

Table 4.6: Age at which elderly participants first experienced headaches

	Number
Mean age	40.11
Std. Deviation	19.560
Minimum	10
Maximum	**84**

The 56 participants who suffered from headaches were asked to explain how, since suffering their initial headache, their headache experience had changed. Of the participant sample, 14 (25%) responded that their headaches were more frequent. Therefore, 42 (75%) of the participants did not select "more frequent" as an explanation (Table 4.7).

Table 4.7: Changes in headache experienced in the elderly

	Count	Percentage
More frequent	14	25.0%
Less frequent	38	67.9%
More severe	8	14.3%
Less severe	22	39.3%
More continuous	2	3.6%
Less continuous	8	14.3%
More predictable	2	3.6%
Less predictable	7	12.5%
Longer duration	3	5.4%
Shorter duration	1	1.6%
No changes	2	3.6%

Those that suffered from headaches then distinguished how often they experienced those headaches either on one side or both sides of the head (Table 4.8).

Table 4.8: Location of headaches in the elderly

	Never		Sometimes		Most of the time		Always	
	Count	%	Count	%	Count	%	Count	%
Headache over **one** side of the head	16	32.1%	21	37.5%	13	23.2%	4	7.1%
Headache over **both** sides of the head	15	27.3%	19	34.5%	18	32.7%	3	5.5%

The participants with headaches indicated that the majority of their headaches happened haphazardly, as 47 (87.5%) occurred at no specific time of the day, and only six (12.5%) presented with some form of day to day repetition (Table 4.9).

Table 4.9: Daily rhythmicity of headaches in the elderly

		Count	Percentage
Specific time of the day	Yes	6	12.5%
	No	47	87.5%

The participants who suffered from headaches indicated whether or not they experienced any warning symptoms before the headache occurred. Of the sample, 20 (35.7%) indicated that they experienced neck stiffness before a headache compared to 36 (64.3%) that did not experience any neck stiffness before the headache began. Table 4.10 reflects the participants who indicated that they experienced symptoms prior to the initiation of their headaches. The percentage reflected is based on the sample of 56 participants that experienced headaches.

Table 4.10: Warning symptoms experienced by the elderly

Warning Symptoms	Count	Percentage
Blurred vision	11	19.6%
Flickering lights	7	12.5%
Irritability	16	28.6%
Nausea	8	14.3%
Neck stiffness	20	35.7%
Numbness	2	3.6%
Watery eyes	9	16.1%

The highest visited health practitioner was a general practitioner (GP) who was seen by 22 (39.3%) participants experiencing headache compared to 34 (60.7%) participants who did not visit a GP. A chiropractor and neurologist were both visited by two (5.4%) participants compared to 54 (94.6%) participants who did not seek help from either profession and a sangoma and homeopath were visited by one (1.8%) participant compared to 55 (98.2%) participants who did not seek help from either profession. No participants went to an acupuncturist for assistance in headache treatment. The total number of participants that sought treatment for headaches was 28 (50%) out of the 56 participants with headaches. Table 4.11 indicates the number of participants that received treatment from a health practitioner for headaches.

Table 4.11: Health practitioners seen by the elderly for the treatment of headaches

Health practitioners	Count	Percentage
Acupuncturist	0	0%
Chiropractor	2	7.1%
General Practitioner	22	78.6%
Homeopath	1	1,7%
Neurologist	2	7.1%
Sangoma	1	1.7%
Total	28	100.0%

Of the 56 participants experiencing headaches, six were diagnosed with cervicogenic and MTH, five with TTH and 38 unknown and one participant did not answer (idiopathic) (p<0.0001) (Table 4.12).

Table 4.12: Diagnosis of headaches made by health practitioner

Diagnosis	Count	Percentage
Cervicogenic headache	6	10.7%
Cluster	0	0.0%
Migraine	6	10.7%
Serious Headache	0	0.0%
Tension-type headache	5	8.9%
Unknown	38	69.7%
Total	56	100.0%

The majority of participants with headaches used medication to try lower to the symptoms of a headache. A painkiller was used by 41 (73.2%) participants, 12 (21.4%) used anti-inflammatories and two (3.6%) participants took no medication when experiencing a headache (p<0.001) (Table 4.13).

Table 4.13: Medication used for headaches in the elderly

Medication	Count	Percentage
Painkillers	41	73.2%
Anti-inflammatories	13	23.2%
No medication	2	3.6%
Total	56	100.0%

The medication taken by the participants had certain effects on their headaches. A decrease in pain was experienced by 40 participants. A decreased intensity of headache was experienced by 10 participants, while one participant had less frequent headaches and seven participants' headaches were less throbbing. One participant had other changes not described in the questionnaire and 10 participants had no changes when taking medication (p<0.001) (Table 4.14).

Table 4.14: Effects of medication on elderly participants with headaches

Effects of medication	No		Yes	
	Count	Percentage	Count	Percentage
Decreased pain	16	28.6%	40	71.4%
Decreased intensity	45	80.4%	10	17.9%
Less frequent	55	98.2%	1	1.8%
Less throbbing	49	87.5%	7	12.5%
Other changes	54	96.4%	1	1.8%
No changes	45	80.4%	10	17.9%

Of the sample, 10 (17.9%) participants had a family member who suffered from headaches, whereas 31 (55.4%) participants did not have a family history of headaches (p=0.001). Fifteen (26.7%) participants are unsure whether their family members suffer with headaches (p=0.001) (Table 4.15).

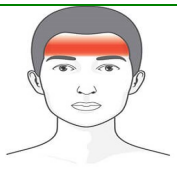
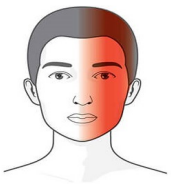
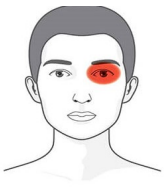
Table 4.15: Elderly with family members who suffer from headaches

Family members with headaches	Count	Percentage
Yes	10	17.9%
No	31	55.4%
Unknown	15	26.8%
Total	56	100.0%

4.6 Headache characteristics

Of the 56 participants with headaches, 34 (60.7%) presented with frontal head pain, 19 (33.9%) presented with unilateral head pain and three (5.4%) presented with localised orbital pain (p<0.001) (Table 4.16).

Table 4.16: Headache pain location

Location	Count	Percentage
 Tension	34	17.9%
 Migraine	19	55.4%
 Cluster	3	26.8%
Total	56	100.0%

Source: https://bodypaintips.com/types-headaches-symptoms-chart/

The 56 participants with headache graded their pain experienced right now: generally, at its best, and at its worst (Table 4.17). Each participant was able to grade their pain on a scale from zero (no pain) to 10 (worst possible pain).

Table 4.17: Headache pain experience

	Current pain	General pain	Best pain	Worst pain
Valid entries	56	56	56	56
Mean	0.54	3.89	1.64	6.32
Std. Deviation	1.629	2.051	1.242	2.010
Minimum	0	0	0	1
Maximum	8	10	5	10

Participants used certain explanations to help describe the type of pain that was experienced during their headaches. Of the 56 participants with headaches, 35 (62.5%) participants experienced pressure over their head during their headache, whereas only one (1.8%) participant's headache had a shooting character. The statistics of the other characteristics of pain is presented in Table 4.18.

Table 4.18: Characteristics of pain during a headache experienced in the elderly

Character of pain	Count	Percentage
Pounding	7	12.5%
Pressure	35	62.5%
Pulsating	7	12.5%
Sharp	4	7.1%
Shooting	1	1.8%
Stabbing	9	16.1%
Squeezing	6	10.7%
Throbbing	12	21.4%
Tightness	17	30.4%

Certain elements and activities trigger/bring about headaches in the elderly population. Of the 56 participants with headaches, 26 (46.4%) consider stress and tension as a cause of their headaches, while 17 (30.4%) participants indicated that fatigue resulted in an onset of their headache. Trigger factors are presented in Table 4.19.

Table 4.19Trigger factors of headaches experienced in the elderly

Headache triggers	Count	Percentage of participants with headache
Alcohol	2	3.6%
Bending over	6	10.7%
Change in weather	13	23.3%
Chewing	2	3.6%
Smells	4	7.1%
Time of day	3	5.4%
Caffeinated drinks	3	5.4%
Exercise	1	1.8%
Fatigue	17	30.4%
Hunger	4	7.1%
Lack of sleep	9	16.1%
Medications	1	1.8%
Over sleeping	1	1.8%
Skipping meals	2	3.6%
Sinus	10	17.9%
Stress and Tension	26	46.4%

Aggravating factors are what increases the intensity or worsens the headache in the elderly population. Stress is a large contributor to headache aggravation in the elderly as one can see in the results of this study which shows that it affects 20 (35.7%) of the 56 participants with headaches. However, sexual activity does not have a negative effect on the participants. The aggravating factors are presented in Table 4.20.

Table 4.20: Aggravating factors for headaches in the elderly

Aggravating factors	Count	Percentage of participants with headaches
Bending over	8	14.3%
Bright light	14	25.0%
Lack of sleep	7	12.5%
Loud noises	9	16.1%
Lying down	3	5.4%
Reaching overhead	1	1.8%
Sexual activity	0	0.0%
Sneezing	9	16.1%
Sitting	6	10.7%
Standing	1	1.8%
Stress	20	35.7%
Weather changes	8	14.3%
Walking	2	3.6%

The relieving factors are stimuli or activities that decrease or eliminate headaches. Of the sample, 46 (82.1%) participants with headaches stated that medication relieved their headaches, while all 56 (100%) participants agreed that compression and exercise had no beneficial effect on their headaches (Table 4.21).

Table 4.21: Relieving factors for headache in the elderly

Headache relievers	Count	Percentage of participants with headache
Ice	1	1.8%
Compression	0	0.0%
Eating	1	1.8%
Exercise	0	0.0%
Heat	5	8.9%
Lying down	9	16.1%
Massage	4	7.1%
Medication	46	82.1%
Moving	5	8.9%
Relaxing	16	28.6%
Sleep	8	14.3%
Sitting	3	5.4%
Standing	1	1.8%
Stretching	2	3.6%
Vomiting	1	1.8%

Participants were required to categorise the signs and symptoms they experienced into the time they most endured such symptoms. These categorise were “before the headache,” “during the headache” or “before and during the headache” (Table 4.22).

Table 4.22: Signs and symptoms associated with headaches in the elderly

Associated signs and symptoms	Do not experience sign or symptom		Before		During		Both	
	Count	%	Count	%	Count	%	Count	%
Anxiety	48	85.7%	6	10.7%	1	1.8%	1	1.8%
Balance problems	53	94.6%	0	0.0%	2	3.6%	1	1.8%
Dizziness	53	94.6%	3	5.4%	0	0.0%	0	0.0%
Jaw pain	54	96.4%	2	3.6%	0	0.0%	0	0.0%
Nausea	46	82.1%	5	8.9%	3	5.4%	2	3.6%
Neck/back pain	46	82.1%	1	1.8%	8	14.3%	1	1.8%
Neck/back stiffness	31	55.4%	18	32.1%	3	5.4%	4	7.1%
Numbness of face/head	53	94.6%	0	0.0%	3	5.4%	0	0.0%
Sensitivity to light	37	66.1%	8	14.3%	7	12.5%	4	7.1%
Sensitivity to smell	52	92.9%	3	5.4%	1	1.8%	0	0.0%
Sensitivity to sound	46	82.1%	3	5.4%	5	8.9%	2	3.6%
Sweating	56	100.0%	0	0.0%	0	0.0%	0	0.0%
Tiredness	35	62.5%	11	19.6%	9	16.1%	1	1.8%
Visual changes	49	87.5%	3	5.4%	3	5.4%	1	1.8%
Vomiting	54	96.4%	0	0.0%	1	1.8%	1	1.8%
Weakness	51	91.1%	3	5.4%	1	1.8%	1	1.8%

Of the sample, five (8.9%) participants suffered daily headaches, 14 (25%) experienced headaches weekly, 29 (51.8%) suffered headaches monthly and only eight (14.3%) experienced a headache once or so a year (Table 4.23).

Table 4.23: Headache frequency in the elderly

Headache frequency	Number	Percentage
Daily	5	8.9%
Weekly	14	25%
Monthly	29	51.8%
Yearly	8	14.3%
Total	56	100.0%

Headache intensity, which is the strength, power and force of a headache, ranges from mild to severe. Of the 56 participants with headache, 30 (53.6%) experienced a mild intensity, 22 (39.3%) moderate intensity and four (7.2%) severe headache (p<0.001) (Table 4.24).

Table 4.24: Headache intensity in the elderly

Headache intensity	Number	Percentage
Mild	30	53.6%
Moderate	22	39.3%
Severe	4	7.2%
Total	56	100.0%

Headaches are able to cause affliction for a minute or two or hours and even days. Participants were asked to state their general headache period from start to finish. Of the sample, 20 (35.7%) participants' headaches lasted one hour. No participants experienced a headache that lasted longer than a day. The duration of headaches is presented in Table 4.25.

Table 4.25: Headache duration in the elderly

Headache Duration	Number	Percentage
< 30 mins	7	12.5%
< 1 hour	20	35.7%
1-2 hours	19	33.9%
2-4 hours	3	5.4%
< 12 hours	1	1.8%
within a day	6	10.7%
2-3 days	0	0.0%
> 3 days	0	0.0%
Total	56	100.0%

4.7 The burden of headaches

In the elderly, a headache can be taxing and burdensome. It has the ability to affect an individual's quality of life, financial wellbeing, day to day activities, and social life.

One of the greater burdens of a headache is its ability to affect your relationships with families and friends, as well as stop you from performing daily activities such as

cooking and cleaning. Of the sample, 51 (91.1%) participants stated they did not miss any days with family and friends, while 53 (94.6%) participants were able to perform their daily activities with headaches. Those that missed days because of the headaches can be seen in Table 4.26.

Table 4.26: Days missed in the last three months as a result of headache burden

Days missed with family, friends etc.	Number	Percentage
0	51	91.1%
2	1	1.8%
3	2	3.6%
4	1	1.8%
20	1	1.8%
Total	56	100.0%
0	53	94.6%
2	1	1.8%
7	1	1.8%
20	1	1.8%
Total	56	100.0%

Headaches are experienced both at home and while out of the house. Of the sample, when experiencing a headache at home, 12 (21.4%) participants continue as normal compared to nine (16.1%) who take medication and 35 (62.5%) participants who stop to rest. When out of the house and experiencing a headache, 36 (64.3%) continue as normal, whereas 15 (26.8%) participants take medication and five (8.9%) stop to rest (Table 4.27).

Table 4.27: Actions taken to relive headache at home compared to out the house

	Continue as normal		Take medication		Stop and rest	
	Count	%	Count	%	Count	%
What do you do if you experience headache **out of the house**	36	64.3%	15	26.8%	5	8.9%
What do you do if you have a headache **at home**	12	21.4%	9	16.1%	35	62.5%

Headaches in the elderly have the ability to decrease that individual's productivity throughout the day. This lack of productivity and strain on other factors in their lives

can diminish the elderly individual's quality of life. Table 4.28 depicts how the productivity and quality of life of the 56 elderly participants with headaches were affected.

Table 4.28: Changes in productivity and quality of life as a result of headaches in the elderly

	Not at all		Slightly		Moderately		Severely	
	Count	%	Count	%	Count	%	Count	%
Decrease in productivity	31	55.4%	17	30.4%	7	12.5%	1	1.8%
Decrease in quality of life	39	69.6%	12	21.4%	4	7.1%	1	1.8%

4.8 The association between headaches in the participants and selected risk factors

4.8.1 Social history

There are bivariate associations between social history, categorical risk factors and primary headaches (compared to participants with no headache) using chi square or Fisher's exact tests. The findings indicated that females were more likely to have headaches, particularly those who wake up at night with discomfort. Although this is not a risk factor, perhaps it is a consequence of the headaches (Table 4.29).

Table 4.29: Bivariate associations between social history, categorical risk factors and primary headaches

		Primary				*p* value
		No headache		Primary headache		
		Count	Percentage	Count	Percentage	
Gender	Male	23	34.3%	5	13.9%	0.026
	Female	44	65.7%	31	86.1%	
Race	White	43	64.2%	29	80.6%	0.118
	Black	1	1.5%	1	2.8%	
	Indian	13	19.4%	1	2.8%	
	Coloured	10	14.9%	5	13.9%	
	Other	0	0.0%	0	0.0%	
Alcohol	1-5 glasses	22	32.8%	12	33.3%	0.586
	6-10	6	9.0%	2	5.6%	
	11-15	2	3.0%	0	0.0%	
	>16	2	3.0%	0	0.0%	

How many cups Caffeinated tea/coffee a day	I do not drink alcohol	35	52.2%	22	61.1%	0.672
	1-2	26	38.8%	11	30.6%	
	3-4	28	41.8%	14	38.9%	
	4-6	7	10.4%	6	16.7%	
	>6	3	4.5%	2	5.6%	
	Do not drink caffeine	3	4.5%	2	5.6%	
How many days a week do you exercise	1 day	9	13.4%	5	13.9%	0.202
	2 days	15	22.4%	11	30.6%	
	3 days	6	9.0%	8	22.2%	
	4 days	4	6.0%	0	0.0%	
	>4 days	10	14.9%	3	8.3%	
	Do not exercise	23	34.3%	9	25.0%	
Regular sleeping pattern	yes	45	67.2%	21	58.3%	0.373
	no	22	32.8%	15	41.7%	
Reason to wake up at night	bathroom	39	58.2%	21	58.3%	0.013
	insomnia	4	6.0%	4	11.1%	
	headache	0	0.0%	1	2.8%	
	uncomfortable	2	3.0%	6	16.7%	
	Don’t wake up	22	32.8%	4	11.1%	
Grind teeth	yes	3	4.5%	2	5.6%	0.783
	no	62	92.5%	32	88.9%	
	Do not know	2	3.0%	2	5.6%	
Smoking	1-4	1	1.5%	0	0.0%	0.493
	10-14	0	0.0%	1	2.8%	
	>20	2	3.0%	1	2.8%	
	Do not smoke	64	95.5%	34	94.4%	
Lot of stress	yes	23	34.3%	17	47.2%	0.200
	no	44	65.7%	19	52.8%	

Table 4.30 is a t-test comparison of quantitative social history variables between those with and without primary headaches. Findings indicated that there was no difference in mean age or hours slept between those with and without headaches.

Table 4.30: T-test comparison of quantitative social history variables between those with and without primary headaches

Group Statistics						
	Headache	**Count**	**Mean**	**Std. Deviation**	**Std. error mean**	***p* Value**
Age	no headache	67	79.66	7.200	.880	0.524
	primary headache	36	78.72	6.802	1.134	
Hours slept at night	no headache	67	7.16	1.533	.187	0.226
	primary headache	36	6.75	1.842	.307	
Hours slept in day	no headache	67	.69	.857	.105	0.965
	primary headache	36	.69	.856	.143	

4.8.2 Medical history

Chi square or Fisher's exact tests were conducted to compare medical history between the elderly with headaches against those without headaches (Table 4.31). The findings indicated that there was a higher likelihood of anaemia in the sample with headaches. These 56 participants were also shown to have a higher rate of anti-inflammatory use.

Table 4.31: Chi Square test comparing medical history between the elderly with headaches against those without headaches

						***p* Value**
		No Headache		**Headache**		
		Count	**Column %**	**Count**	**Column %**	
Anaemia	no	67	100.0%	32	88.9%	0.013
	yes	0	0.0%	4	11.1%	
Depression	no	59	88.1%	34	94.4%	0.488
	yes	8	11.9%	2	5.6%	
Diabetes	no	54	80.6%	32	88.9%	0.405
	yes	13	19.4%	4	11.1%	
Heart disease	no	53	79.1%	27	75.0%	0.633
	yes	14	20.9%	9	25.0%	
High blood pressure	no	31	46.3%	15	41.7%	0.654

	yes	36	53.7%	21	58.3%	
Low back pain	no	64	95.5%	34	94.4%	1.000
	yes	3	4.5%	2	5.6%	
Seizures	no	66	98.5%	35	97.2%	1.000
	yes	1	1.5%	1	2.8%	
Thyroid	no	62	92.5%	31	86.1%	0.313
	yes	5	7.5%	5	13.9%	
Head injury	yes	2	3.0%	5	13.9%	0.093
	no	64	97.0%	31	86.1%	
GP	no	64	95.5%	34	94.4%	0.625
	yes	2	3.0%	2	5.6%	
Neurologist	no	67	100.0%	35	97.2%	0.350
	yes	0	0.0%	1	2.8%	
Chiropractor	no	67	100.0%	36	100.0%	0.0
	yes	0	0.0%	0	0.0%	
Homoeopath	no	67	100.0%	36	100.0%	0.0
	yes	0	0.0%	0	0.0%	
Physiotherapist	no	67	100.0%	36	100.0%	0.0
	yes	0	0.0%	0	0.0%	
No treatment	no	65	97.0%	33	91.7%	0.340
	yes	2	3.0%	3	8.3%	
Blood pressure medication	no	29	43.3%	15	41.7%	0.874
	yes	38	56.7%	21	58.3%	
Hormone replacement therapy	no	64	95.5%	36	100.0%	0.550
	yes	3	4.5%	0	0.0%	
Blood thinners	no	44	65.7%	25	69.4%	0.698
	yes	23	34.3%	11	30.6%	
Anti-inflammatories	no	64	95.5%	29	80.6%	0.031
	yes	3	4.5%	7	19.4%	
Painkillers	no	60	89.6%	29	80.6%	0.204
	yes	7	10.4%	7	19.4%	
Blood taken	no	39	58.2%	16	44.4%	0.182
	yes	28	41.8%	20	55.6%	
CAT scan	no	65	97.0%	33	91.7%	0.228
	yes	2	3.0%	3	8.3%	
MRI	no	65	97.0%	36	100.0%	0.295
	yes	2	3.0%	0	0.0%	
X-ray	no	58	86.6%	31	86.1%	0.949
	yes	9	13.4%	5	13.9%	
No tests	no	31	46.3%	23	63.9%	0.088
	yes	36	53.7%	13	36.1%	

4.9 Conclusion

In summary, the predisposing factors with primary headaches in the elderly were participants of a female gender, those waking up at night with discomfort, being anaemic and taking anti-inflammatory medication.

Chapter 5 will discuss the results that were attained and presented in Chapter 4 and compare them to studies of a similar nature. This includes the sample size and the response rate, the prevalence headaches in the elderly, associated risk factors and the effect on activities of daily living.

CHAPTER 5: DISCUSSION

5.1 Introduction

Chapter 5 will discuss the results of the study as presented in Chapter 4. It will include the sample size of the study, the prevalence of headaches in the elderly, demographic factors related to headaches, factors that influence the prevalence of these headaches and the association of the headaches with activities of daily living and productivity.

5.2 Sample size and response rate

The sample size was drawn from residents of four elderly life rights facilities in the KwaZulu-Natal region, with a total population of approximately 174 elderly residents, which included three participants in the pilot study. Before the study commenced the initial sample size required was 180 participants (Esterhuizen, 2018), but when data collection begun, only 171 residents were available as some had left TAFTA or unfortunately passed away. If all the questionnaires (n=171) were handed out and returned the response rate would be 100%, however in total, 123 questionnaires were handed out and returned making the response rate 72% representative of the demographics of the larger population size.

Similar studies have had larger sample sizes. Prencipe *et al.* (2001) had approximately 1147 eligible participants aged 65 years or older with a sample size of 833. A study of this magnitude is almost five times larger than this study, however it had a similar response rate of 72.6%. In Northern China, a study noted 5248 participants aged 60 years or older, with a sample size of 5038 (97%) in the study (Zhang *et al.,* 2016).

5.3 Demographics

5.3.1 Age of participants

In this study, the mean age of a participant was 79.5 years with a standard deviation of seven years and a range from 60 to 101 years of age (Table 4.1). The minimum

age requirement for this study was 60 years and older. Most of the similar studies considered an individual over 65 years of age to be an elderly person. The mean age and standard deviation was considerably higher in this study compared to that of Lisotto *et al.* (2004) in which 282 (6.4%) of the 4417 participants were 65 years of age and older with a mean age of 68.9 years and a standard deviation of 5.4 years. A study conducted in South Korea involving 152 participants over the age of 65 years also had a lower mean age of 72.6 years and standard deviation of 5.8 years (Song *et al.,* 2016). This may be due to TAFTA only allowing persons over the age of 60 into their buildings. As well as South African's living longer in their homes before moving into retirement settings.

5.3.2 Gender of participants

Of the 123 elderly participants in this study, 93 (75.6%) were female and 30 (24.4%) were male, thus making the gender ratio approximately 3:1 (Table 4.2). Other studies conducted with similar population characteristics had similar gender distributions where there were more female participants than male participants. A study conducted by Ruiz *et al*. (2014) involving 262 participants had 189 (72.1%) women and 73 (27.9%) men. In South Korea, a study of 152 elderly headache patients had 106 (69.7%) women and 46 (30.3%) men (Song *et al.,* 2016). A study conducted by Tai *et al.* (2012) involving 165 participants had 46 (65.7%) women and 24 (34.3%) men.

Contrary to the findings referred to in the previous paragraph, studies with larger population sizes have more equal gender distributions. In the study conducted by Prencipe *et al.* (2001) there were 833 participants, of which 470 (56.4%) were women and 363 (43.6%) were men. A study conducted in Northern China had a much larger sample size of 5038, of which 2671 (53%) were women and 2366 (47%) were men (Zhang *et al.,* 2016). In general, women are in the majority of the elderly population. According to Helme and Gibson (2001), by the year 2020 approximately 73% of the global elderly population will be female.

5.3.3 Ethnicity of participants

Within the population of 123 elderly participants, the majority of the ethnicity was White (72.4%) with the second largest being Coloured (13.8%) followed by Indian

(12.2%) and Black (1.6%) (Table 4.3). The lack of diversity in the study can be a result of the TAFTA buildings being predominately in urban areas. In South Africa, more traditional populations can be found living in multi-generational households rather than elderly care facilities (Makiwane and Kwizera, 2006).

As South Africa is so culturally diverse, very few studies with a similar aim are able to reach participants from so many different ethnical backgrounds. In South-East Asia, a study included ethnic backgrounds such as Malay (22.9%), Chinese (38.6%), Indian (37.1%) and Others (1.4) in the sample of 70 elderly participants (Tai *et al*, 2012). Many other studies such as Rao *et al.* (2012), Zhang *et al.* (2016) and Song *et al. (*2016) did not include ethnicity in their demographics but rather speak of the population as a whole being Indian, Chinese and Korean respectively.

5.4 The prevalence of headaches in the sample

The prevalence of headache in the sample under study was 45.5%, as 56 elderly participants out of 123 presented with headaches (Table 4.4). Of the headache sample, 36 (64.3%) had primary headache, while 20 (35.7%) presented with suspected secondary headaches (Table 4.4). This is in keeping with the study conducted by Rudra, Chatterjee and Ray (2015) where the researcher stated that headache prevalence in the elderly population ranges from 5% to 50%.

A similar study conducted in Spain found that primary headaches, accounted for 62.2% of the study's headache total, whereas 16% were coded as secondary headaches (Ruiz *et al*., 2014). The reason that the researcher has more than double the amount of secondary headaches than in the study by Ruiz *et al*. (2014) could be a result of different versions of The International Classification of Headache Disorders being used in the studies.

5.4.1 Prevalence of primary headaches

Of those that suffered from primary headaches, 21 (17.1%) participants suffered from a TTH, nine (7.3%) suffered from a MTH and three (2.4%) from a CTH (Table 4.5). The results of this study are consistent and comparable to other studies conducted on headaches in the elderly.

A study with similar population characteristics conducted in South-East Asia found that out of 70 elderly participants, 32 (45.7%) presented with TTH, 13 (18.6%) with MTH and one (1.4%) with CTH (Tai *et al*., 2012). Similar patterns are shown in this study whereby there were 152 elderly participants with headaches and of those participants 55.6% presented with TTH, 13.4% with MTH and no participants suffered from CTH (Song *et al.*, 2016).

The studies mentioned have similair traits in that the highest primary headaches prevalence in these studies are found to be TTH followed by MTH. This is in keeping with a statement made by Ruiz *et al.* (2014) that most headaches diagnosed in elderly individuals are primary headaches, mainly TTH and MTH.

5.5 The headache history of the participants

5.5.1 Age at first experience of headaches

In this study, the mean age of a participant when they started to experience headaches was 40 years of age (Table 4.6). Song *et al.* (2016) confirms this statement by testifying that TTH have a higher frequency in the elderly compared to that in the younger age group. This is in contrast to similar studies such as Capobianco (2003) and Starling (2018) which indicate that the rate of headache occurrence tends to decrease after the age of 40 years.

The oldest onset of a participant's first headache in the study was 84 years of age (Table 4.6). Fowler, Capobianco and Dodick (2004) state that approximately 33% of patients with MTH will continue to suffer recurrent attacks into their elderly years and a minority of individuals may even have their first migraine attack after the age of 60.

5.5.2 Changes in headache experience

The elderly participants that experienced headaches stated that their current headaches are generally less frequent, less severe, less continuous, less predictable and of a longer duration (Table 4.7). This is in keeping with the literature which states that primary headaches may attenuate over time or alter in presentation as a population ages (Capobianco, 2003). Van Oosterhout, Cheung and Haan (2016) agree by stating that headaches experienced by the elderly tend to present in a different manner with altered features.

5.5.3 Location of headaches

Those that suffered from headaches had to distinguish between how often they experienced headaches either on one side or both sides of the head (Table 4.8). This study found that majority of participants (37.5%) “sometimes” experienced unilateral or one-sided head pain during a headache. This presentation is generally suggestive of a MTH, as the term “migraine” originally comes from the Greek word *hemicranias* meaning “half the head” (Weatherall, 2006).

This is inconsistent with the study findings of TTH (17.1%) having the highest prevalence in this population. This may be a result of migraine characteristics changing with growing older as attack severity decreases, headaches become less frequent and less throbbing or pulsating, which makes it difficult to distinguish MTH from TTH (van Oosterhout, Cheung and Haan, 2016).

5.5.4 Rhythmicity of headaches

The participants who suffered headaches indicated that the majority of their headaches happened irregularly, as 47 (87.5%) occurred at no specific time of the day (Table 4.9). Only six (12.5%) presented with some form of day to day repetition (Table 4.9). This is in keeping with the findings of the study, as this section was used to differentiate CTH from other primary headaches. A cardinal feature of CTH is the unique circadian (daily intervals) and circannual (intervals of one year) rhythmicity of the headache (Benoliel, 2012). Therefore, those suffering from CTH (2.4%) and other rhythmic headaches, such as hypnic headaches, make up the total (12.5%) of the daily cadenced headaches. There is a scarcity of literature on this topic and therefore comparisons with other studies were unable to be made.

5.5.5 Warning symptoms experienced

The participants who suffered from headaches indicated whether or not they experienced any warning symptoms before the headache occurred. The symptom with the highest prevalence was neck stiffness as 20 (35.7%) participants indicated that they experienced neck stiffness before a headache occurred (Table 4.10). This is in keeping with the findings of the study that TTH has the highest prevalence of primary headaches as peripheral myofascial nociception is a part of TTH pathophysiology (Fumal and Schoenen, 2008). The lack of literature in this area did

not allow for the researcher to make accurate comparisons with other headache studies.

5.5.6 Health practitioners seen by the participants for the treatment of headaches

The total number of participants that sought treatment for headaches was 28 (50%) out of the 56 participants with headaches. The highest visited health practitioner was a GP who was seen by 22 (39.3%) participants experiencing headache. A chiropractor and neurologist were both visited by three (5.4%) participants compared to a sangoma and homeopath who were visited by one (1.8%) participant. No participants went to an acupuncturist for assistance in headache treatment (Table 4.11).

The high number of GP visits may be a result of the elderly only seeking treatment once the emergence of other more serious problems arose, therefore making a GP a more suitable choice for treatment (Rudra, Chatterjee and Ray, 2015). A GP may also be more easily assessable as there are 46 091 practicing GP's in South Africa (Health Practitioners Council of South Africa, 2018).

However, this is contrary to several studies which show a higher benefit from manual therapy, such as chiropractic, which show a decline in frequency, intensity, analgesic use and increase in quality of life in patients with TTH (Lozano Lopez *et al*., 2016). The sparsity of chiropractic visits may be a result of the lack of integration into mainstream healthcare as chiropractors are unable to work in certain areas such as hospitals. The elderly might also prefer going to the GP as it gives them the opportunity to have the practitioner assess other complaints as well as renew scripts for medication unrelated to headaches.

The low number of neurologist visits is a result of the need for a referral to see a specialist in South Africa and that the majority of headaches in this study are not of a serious nature which would require a neurologist's attention. The low attendance for homeopaths and sangomas may be because there is a lack of understanding of these practitioners in the elderly population used in this study and that they are not generally considered when a headache is concerned.

Only practitioners who have studied acupuncture for six years are able to practice it in South Africa, which generally makes them an expensive form of headache treatment which may be the reason no participants received acupuncture in this study. There are also so few that it may be difficult to locate an acupuncturist in the surrounding areas. According to the Allied Health Professionals Council of South Africa (2018) there are 54 registered acupuncturists in South Africa.

5.5.7 Diagnosis of headaches of the participants

Of the 56 participants with headaches, six (10.7%) were diagnosed by a health practitioner with cervicogenic headaches, six (10.7%) with MTH and five (8.9%) with TTH. Of the sample, 38 (67.9%) participants did not receive a diagnosis or were unsure of what the diagnosis was (Table 4.12).

Most headaches diagnosed in elderly individuals are primary headaches, mainly TTH and MTH (Ruiz *et al,* 2014). Cervicogenic headaches was not included in that study finding as it is considered to be a secondary headache (IHS, 2018).

The high number of cervicogenic headaches in this population is directly the cause of the higher prevalence of secondary headaches in this study. This may be a result of practitioners using the outdated version of the IHS classification of headaches. On the other hand, as a result of headache features having an altered presentation in the elderly, misdiagnosis often occurs in this age group (van Oosterhout, Cheung and Haan, 2016).

5.5.8 Medication used for headaches

The majority of participants with headaches in this study used medication to try to reduce the symptoms of a headache. The number of participants using painkillers was 41 (73.2%), with 12 (21.4%) using anti-inflammatories and only two (3.6%) taking no medication when experiencing a headache (Table 4.13). A similar study conducted on 1672 participants found that 152 participants suffered from headache of which 23.5% experienced medication overuse headaches as a result of analgesics (36.4%) and NSAID (27.3%) use (Song *et al*., 2016*)*. Prencipe *et al.* (2001), indicated that of the 425 participants with headache involved with the study 12.2% had not taken drugs for their headache attacks in the previous year, 45.9% had taken them regularly and the remaining 178 (41.9%) had taken them only when

the headache pain interfered with activities that could not be postponed. This high use of drug therapy is a result of painkillers and anti-inflammatories being readily available to the public as over-the-counter medication. This increases the risk of poly-pharmacy and medication overuse which can also result in medication overuse headaches (Crystal and Grosberg, 2009; Castien *et al*., 2011). The use of drugs as a treatment method increases the risk of drug interactions especially in the elderly who are often on many different medication regimens, which increases the possibility of a secondary headache developing in older patients (Melville, 2005).

5.5.9 Effects of medication on participants' headaches

The medication taken by the participants had certain effects on their headaches. A decrease in pain was experienced by 40 participants. A decreased intensity of headache was experienced by 10 participants; seven participant's headaches were less throbbing while one participant had less frequent headaches. One participant had other changes not described in the questionnaire and 10 participants had no changes to their headache when taking medication (Table 4.14).

Literature indicates that certain primary headaches such as TTH should always be treated with non-pharmacological therapies in the elderly, as in this age group, careful consideration must be taken when prescribing the use of medication (Capobianco, 2003). Pharmacological treatment should be limited to two days a week or less, as extended use of drugs in this age group is a risk factor for medication overuse which can also result in a medication overuse headache developing (Crystal and Grosberg, 2009; Castien *et al*., 2011). Due to the lack of literature on this topic, the research was unable to make comparisons with other studies in this field.

5.5.10 Participants with family members who suffer from headaches

Of the sample, 10 (17.9%) participants had a family member who suffered from headaches, whereas 31 (55.4%) participant's families do not have any headaches. Fifteen (26.7%) participants were unsure whether their family members suffer headaches (Table 4.15).

This is in keeping with the literature as a study conducted in Northern China on 5038 elderly participants, of whom 519 suffered from headaches, found that 61 (11.75%)

participants indicated that there was a similar headache attack in their family history, while 369 (71.10%) made no correlation and 89 (17.15%) were undecided (Zhang *et al.,* 2016). In both studies the higher percentage is that of no familial association of headaches.

Contrary to these findings, there is literature that presumes that the presences of genetic factors may increase an individual's susceptibility to MTH (Sun-Edelstein and Mauskop, 2009; Noseda and Burstien, 2013). Although CTH is not thought to be genetic, it has been shown to have a positive familial history. Studies using large twin registries have revealed that monozygotic twins present a higher concordance rate for CTH (2/12 pairs) than dizygotic twins (0/25 pairs), therefore, signifying the existence of genetic factors (Leroux and Ducrous, 2008).

5.6 Headache characteristics of the participants

5.6.1 Location of the headache

The location of the headache is also an indication of the type of headache experienced by the participant. Of those with a headache, 34 (60.7%) presented with frontal head pain, 19 (33.9%) presented with unilateral head pain and three (5.4%) presented with localised orbital pain (Table 4.16).

Contrary to these findings a study conducted by Zhang *et al.* (2016) found that the majority (48.95%) of participants experienced unilateral pain whereas 34.87% experienced bilateral (frontal) pain and 16.18% were undecided, even though TTH had a higher prevalence then MTH. As mentioned previously, this may be due to headache characteristics changing with age making diagnosis and differentiation of MTH and TTH very difficult (van Oosterhout, Cheung and Haan, 2016). Blanda (2017a) goes on to explain that other types of headaches such as rhinosinusitis, which is a secondary headache, has a location of pain similar to that of a TTH, i.e. frontal pain. This may be the reason why frontal head pain was so high in comparison to other headache locations in this study.

As discussed before, the name 'migraine' originally comes from the Greek word *hemicranias*, meaning 'half of the head', representing one of the most striking features of the condition (Weatherall, 2006). Therefore, MTH would make up the

majority of the headaches that presented unilaterally. Other headaches such as hemi-crania continua may also fall into this category as it presents similar to that of a migraine with unilateral head pain that is often associated with nausea, vomiting, photopobia and phonophobia (Freidman *et al*., 2013).

Localised orbital pain is most likely a result of CTH pain, as CTH has a trigeminal nerve distribution of pain which covers the eyebrow, upper and lower eyelid, lateral forehead and side of the nose (May, 2005). Other headaches, such as paroxysmal hemi-crania which overlaps in clinical criteria with CTH, may also fall into the orbital pain category (Leroux and Ducros, 2008).

5.6.2 Pain experienced during a headache

The 56 participants with headache graded their pain experienced right now, generally at its best and at its worst (Table 4.17). Each participant was able to grade their pain on a scale from zero (no pain) to ten (worst possible pain). The worst possible pain coded in this study was a ten. These headaches were most likely CTH, as the pain is of an excruciating severity which is generally rated as eight or higher out of ten on the numerical pain rating scale (Benoliel, 2012). Migraine type headache is usually moderate to severe in intensity (IHS, 2018), but may fall below the mean in worst pain experienced because, according to van Oosterhout, Cheung and Haan (2016), migraine severity decreases, becomes less frequent and less throbbing or pulsating as an individual reaches old age. This may be the why the worst pain experienced has a mean of 6.32 which in some cases may be considered low.

In general, the headache pain in this study was around 3.89, which this age group finds bearable and usually not debilitating. Therefore, they are able to carry on with their daily activities. As literature on this topic is sparse, the researcher was unable to make comparisons with other studies.

5.6.3 Characteristics of pain during a headache

Participants used certain explanations to help describe the type of pain that was experienced during their headaches. Of the 56 participants with headaches, 35 (62.5%) participants experienced pressure over their head during their headache (Table 4.18). This is in keeping with the findings of the study that TTH is the highest

prevalent headache, as TTH has a pressing or tightening (non-pulsating) character of pain during a headache (IHS, 2018).

Seven (12.5%) participants described their pain as pulsating, which is distinguishing factor of a MTH (IHS, 2018). This is less than the number of participants that presented with a MTH. However, some participants may have confused the pain with "throbbing" which 12 (21.4%) participants chose as their headache description. This is usually associated with CTH pain which is non-specific and may vary between bouts as either throbbing, stabbing or shooting pain (Benoliel, 2012).

5.6.4 Trigger factors of headaches

Certain elements and activities trigger/bring about headaches in the elderly population. In this study, stress and tension were the most common triggers of a headache, followed by fatigue, changes in weather, sinus issues and lack of sleep (Table 4.19). Tai *et al*. (2012), found different triggers stating that sun exposure was the most common trigger in the elderly followed by sleep deprivation, weather, missing a meal and stress.

However, in accordance with this study, stress and tension have been reported to be the leading trigger in TTH as there is a positive correlation between the two (Ashina, Bendtsen and Ashina, 2005).

5.6.5 Aggravating factors of headaches

Aggravating factors were those that increased the intensity or worsened the headache in the participants. Stress is a large contributor to headache aggravation in the elderly as it affects 20 (35.7%) of the 56 participants with headaches followed by bright lights, weather changes, bending over and lack of sleep (Table 4.20).

Rudra, Chatterjee and Ray (2015) go on to speak of "external triggers" for MTH such as flickering lights, noise and even certain types of weather changes (Stiener and Martelletti, 2007).

5.6.6 Relieving factors of headaches

Relieving factors were those stimuli or activities that decreased or eliminated the headaches in the participants. Of the sample, 46 (82.1%) participants with

headaches stated that medication relieved their headaches (Table 4.21). Current literature does not support overuse of pharmaceuticals in the elderly for the treatment of headaches, and those receiving pharmaceutical treatment should be limited to two days a week or less (Crystal and Grosberg, 2009; Castien *et al*., 2011).

In some cases, like that of a TTH, non-pharmacological therapies should be the first choice of treatment (Capobianco, 2003).

5.6.7 Signs and symptoms associated with headaches

Participants were required to categorise the signs and symptoms they experienced into the time they most encountered such symptoms. These categories were “before the headache,” “during the headache” or “before and during the headache.” Before the headache the majority of participants experienced neck/back stiffness, followed by tiredness, sensitivity to light and anxiety. During the headache the majority of participants experienced tiredness, neck/back pain, sensitivity to light, and sensitivity to sound (Table 4.22). Both neck and back stiffness and sensitivity to light were experienced before and during four participant’s headaches.

Studies have shown that neck and back stiffness may be a result of peripheral mechanisms leading to increased activity of the peri-cranial muscle tissues which is commonly associated with TTH and if left untreated will cause the release of neurotransmitters in the myofascial tissues resulting in neck and back pain (Fernández-de-Las-Peñas, Cuadrado and Pareja, 2007; Singh, 2015). This symptom may also be present in MTH as well as secondary headaches such as cervicogenic headaches or viral meningitis which is considered more serious (IHS, 2018).

Specific symptomology such as anxiety, which was the fourth highest symptom before a headache, has been confirmed to be comorbid with MTH (Lampl *et al.,* 2016) and sensitivity to light (photophobia), is a key feature of MTH (IHS, 2018) which indicates that the majority of participants that experienced signs and symptoms before a headache were probably experiencing precursor symptomology for MTH, almost like migraine aura.

5.6.8 Headache frequency

The majority of the sample (51.8%) suffered headaches on a monthly basis, while 8.9% suffered daily headaches, 25% experienced headaches weekly and eight 14.3% experienced a headache once or so a year (Table 4.23).

Contrary to this study's findings, Tai *et al*. (2012) stated that the relative frequency of chronic TTH in the elderly is greater when compared to MTH in the young. Song *et al.* (2016) confirms this statement by testifying that TTH has a higher frequency in the elderly compared to that in the younger age group. This may be a result of an increase in major life events such as loss of a friend, financial issues and inability to do basic tasks which has been associated with increased CTH frequency in the elderly (Ashina, Bendtsen and Ashina, 2005).

5.6.9 Headache intensity

Headache intensity, which is the strength, power and force of the headache ranges from mild to severe. Of the 56 participants with headache, 30 (53.6%) experienced a mild intensity, 22 (39.3%) a moderate intensity and four (7.2%) a severe intensity (Table 4.24).

A similar study conducted on 70 elderly participants found that 28 (40%) experienced a mild headache, 19 (27.1%) a moderate headache, and 23 (32.9%) a severe headache (Tai *et al*., 2012). The high number of severe headaches in that study directly correlates with the number of participants in the study suffering from MTH, CTH and trigeminal neuralgias. Migraine is usually moderate to severe intensity and is associated with nausea and/or photophobia and phonophobia (IHS, 2018). In the current study, 7.2% of the participants with severe headache intensity are most likely those suffering from CTH, as CTH intensity ranges from severe to unbearable with some patients even contemplating suicide (Benoliel, 2012).

Generally, those suffering from a TTH will have a pain intensity that ranges from a mild to a moderate severity (Rudra, Chatterjee and Ray, 2015). This is in keeping with the findings of the current study as well as that of Tai *et al*. (2012) that TTH has the highest prevalence, and mild pain intensity having the highest prevalence.

5.6.10 Headache duration

Headaches can inflict pain and discomfort for as short as a minute or two or one or two hours, and as long as days. Participants were asked to state their general headache period from start to finish. Seven (12.5%) experienced a headache for less than 30 mins, 20 (35.7%) for one hour, three (5.4%) for two to four hours, one (1.8%) up to 12 hours and six (10.7%) up to a day. No participants experienced a headache that lasted longer than a day (Table 4.25).

A study involving 519 elderly participants stated that 64 (12.33%) participants suffered from a headache less than 30 mins long, 142 (27.36%) from 30 mins to four hours, 43 (8.29%) from four hours to three days and 48 (9.25%) for longer than three days, and 222 (42.77%) were unsure of the duration of their headache (Zhang *et al,* 2016).

The literature indicates that TTH and CTH generally last for less than an hour (IHS, 2018), therefore, fall into the category of one hour or less (35.7%). However, if left untreated, CTH can last up to three hours and TTH even longer, possibly lasting seven days or more. Migraine headache attacks can four to 72 hours if left untreated or unsuccessfully treated (IHS, 2018). A majority (96.4%) of participants took medication, which may have drastically shortened the length of the headaches.

5.7 The burden of headaches on the participants

In the elderly, a headache can be taxing and burdensome. Of the sample, 51 (91.1%) of the participants stated they did not miss any days with family and friends while 53 (94.6%) participants were able to perform their daily activities with headaches (Table 4.26).

Zhang *et al.* (2016) found that of the 519 elderly participants, 267 (51.45%) went about their daily life as normal, 201 (38.72%) had a part of their daily life affected by headache and 51 (9.83%) could not do anything during a headache. Although both studies found that the majority of participants could continue with their daily life being, the percentage of Zhang *et al*. (2016) is considerably lower, which may be a result of the higher sample size or the fact the study was conducted in China where headaches may have a higher burden on daily living.

5.7.1 Actions taken to relieve headache at home compared to out of the house

Headaches are experienced both at home and while out of the house. Regarding experiencing a headache at home, 12 (21.4%) participants responded that they continue as normal, compared to nine (16.1%) who take medication and 35 (62.5%) participants who stop to rest. When out of the house and experiencing a headache, 36 (64.3%) continue as normal, whereas 15 (26.8%) participants take medication and five (8.9%) stop to rest (Table 4.27).

This drastic change between the two may be due to participants not having access to medication when they are out the house and perhaps not feeling safe enough to stop and rest, therefore carrying on until they are home where these options are available. The lack of literature on this topic did not allow for the researcher to make comparisons with other studies.

5.7.2 Changes in productivity and quality of life as a result of headaches

Headaches in the elderly have the ability to decrease that individual's productivity throughout the day. This lack of productivity, and strain on other factors in their lives, can diminish the individual's quality of life. Of the participants with headaches, 55.4% believe there are no changes to their productivity because of headaches, and 69.6% of the participants believe their quality of life has not been affected by headaches (Table 4.28).

Headache studies conducted on university students show that the majority of students report decreased productivity with regard to daily tasks in the event of experiencing a headache as it affected their energy levels (Basdav, Haffejee, and Puckree, 2016).

A study conducted in China showed that there was a negative impact on quality of life from all headache types, people with headache scored significantly lower than in those without on the World Health Organisation quality of life scale (Zhang *et al,* 2016).

Therefore, the findings in this study are not congruent with those of a similar nature (Yu *et al*., 2011; Basdav, Haffejee and Puckree, 2016). This may be a result of

participants increased use of medication or their living circumstances, but majority are quite content and productive.

5.8 The association between headaches in the participants and selected risk factors

5.8.1 Social history

There are bivariate associations between social history, categorical risk factors and primary headaches (compared to participants with no headache). The findings indicated that females were more likely to have headaches, particularly those who wake up at night due to the discomfort, although this is not a risk factor but perhaps a consequence of the headache itself.

This is in keeping with the literature as Prencipe *et al*. (2001) found elderly women to have a higher TTH and migraine prevalence then elderly men. Headaches are even ranked higher in terms of disability in females as it is in the top five disabling disorders for females and only top 10 disabling disorders for males (Stovner *et al*., 2007).

5.8.1.1 Quantitative social history variables between those with and without primary headaches

Findings indicated that there was no difference in mean age or hours slept between those with and without headaches.

This may be a result of the medications that the participants took as these may cause drowsiness, therefore sleep is generally unaffected by those suffering from headaches. Another deduction may be that participants are also woken up by other ailments such as musculoskeletal disorders which cause pain and discomfort affecting sleeping patterns similarly to those suffering from headaches. There is limited literature available to make a comparison with other studies regarding this topic.

5.8.2 Medical history

Chi square or Fisher's exact tests were conducted to compare medical history between the elderly with headaches and those without headaches. The findings

indicated that there was a higher likelihood of a history of anaemia in the sample with headaches. These 56 participants were also shown to have a higher frequency of anti-inflammatory use.

The most common form of anaemia is iron deficiency anaemia; low levels of haemoglobin in red blood cells mean that not enough oxygen reaches the brain. As a result, blood vessels in the brain can swell, causing pressure and headaches (Brown, 2017). This may be the link between headaches in the elderly and a higher prevalence of anaemia. Perhaps iron supplementation may decrease the frequency of headaches in this age group.

The greater anti-inflammatory use is contradictory to most literature as it should have the effect of decreasing headache pain. Non-steroidal anti-inflammatory drugs such as ibuprofen are used in the treatment of TTH but should be used sparingly as their use increases the risk of gastrointestinal ulceration (Crystal and Grosberg, 2009; Starling, 2018). The sparsity of literature on this topic precluded the researcher from making a comparison with other studies.

5.9 Conclusion

In summary, participants' headache characteristics tend to change as they become older. Female participants had a higher prevalence of headache compared to male participants. Waking up at night with discomfort and being anaemic were associated with headaches in this age group as well as taking anti-inflammatory medication.

Chapter 6 will discuss the conclusions of the study, the limitations, as well as recommendations for future studies.

CHAPTER 6: CONCLUSION

6.1 Introduction

In this chapter the conclusions of the study will be presented, the limitations encountered will be discussed, and recommendations for future studies in the field of headaches and the elderly will be put forward.

6.2 Conclusion

The prevalence of headache in the elderly population is in keeping with the literature as 56 (45.5%) participants out of 123 presented with headaches (p=0.3). Of the headache sample, 36 (64.3%) had primary headache, and 20 (35.7%) presented with suspected secondary headaches and 67 individuals (54.5%) did not suffer from headaches (p<0.001). The suspected secondary headaches were a higher proportion than found in similar studies, although majority of these headaches were not serious and included eight participants with cervicogenic headaches (40%) and eight participants with rhinosinusitis headaches (40%).

The most prevalent primary headache was a TTH, which affected 21 (17.1%) participants. Migraine type headache was second affecting nine (7.3%) participants and CTH was third with three (2.4%). This is congruent with current literature indicating that TTH has the highest effect on the elderly population.

The most statistically significant predisposing factors for headaches in the elderly are female gender, who wake up at night with discomfort, had stress and tension in their lives and were anaemic with an increased use of anti-inflammatory medication. Waking up at night with discomfort was considered to not be a risk factor but perhaps a consequence of the headaches.

The majority of the elderly participants reported mild pain intensity with the most common aggravating factors being stress and tension followed by fatigue, changes in weather, sinus issues and lack of sleep. An indication of which headaches these factors may have triggered could not be deduced in this study. Medication, relaxing, lying down and sleep were the most common forms of pain relief used by the

participants. Of the 56 elderly participants who were experiencing headaches, only 5.4% reported that the headache affected their activities of daily living.

The findings of this study have contributed to the current literature on the prevalence, risk factors and impact of headaches in the elderly and, more importantly, added new information within a South African context. This study has contributed to a greater understanding of the headaches experienced by the elderly and the impact of these headaches on their daily lives. Focus needs to be placed on effective healthcare so that the correct diagnosis can be made and effective management can be implemented. Patient as well as practitioner education in this field is vital for the improvement of headache treatment in this age group which can only enhance the quality of life of the elderly population.

With regards to the hypotheses that were set at the onset of the study:

Null Hypothesis (HO) 1 is accepted. The hypothesis stated that the prevalence of headaches in the elderly is not significantly associated with risk factors such as smoking, family history, stress and tension, current medication and sleep patterns. Family history could not be tested as it was only asked of those suffering from headaches in the study. The hypothesis has still been proven as true. Thus, the Alternate Hypothesis (HA) 1 is rejected.

Null Hypothesis (HO) 2 is accepted. The hypothesis stated that headache does not have an impact on the activities of daily living in the elderly population. Thus, the Alternate Hypothesis (HA) 2 is rejected.

6.3 Limitations

The reliability of the results depended on the honesty of the participants when completing the questionnaire. Participants with mental illness were able to participate in the study and were not excluded. Participants with psychological deficits potentially report information that is untrue which has a direct effect on the results of the study.

The reliability of this study also depended on the validity of the criteria that were used (the diagnostic criteria of the third beta edition of the International Classification of Headache disorders), which was the most appropriate at the time of the study.

This study was conducted at the KwaZulu-Natal TAFTA elderly care facilities and does not include information on headaches the elderly experience in rural communities of South Africa.

6.4 Recommendations

Future studies are a necessity in the fields of headache rhythmicity, practitioners seen for headaches, warning symptoms, effects of medication on headaches, and actions taken to relieve headache in and out of home. Studies in the elderly should aim to have larger population sizes and a greater diversity of ethnic groups so as to increase the accuracy and specificity of findings in the study. Future studies should also try refining the variables in their target population as certain variables such as nutrition and exercise may play a major role in headache prevalence. Focus in future studies should be placed on frequency of taking anti-headache medication, to shed light on medication dependency issues and medication overuse headaches. Studies should also move from urban areas and conduct headache research in rural areas of South Africa, as to allow for a comparison to be made.

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APPENDICES

Appendix A: Memorandum of agreement with TAFTA

tafta
Inspiring active ageing

MEMORANDUM OF AGREEMENT

Between
The Association for the Aged
(TAFTA)
And

KEEGAN HUGHES
(Full name) (Hereinafter referred as the Applicant)

Performing research on human subjects, and in particular elderly participants, is a privilege and should therefore be conducted with due regard for the highest ethical and professional standards. Researchers must be cognizant of the fragile physical and mental health status of many residents and research methodologies should reflect knowledge, sensitivity and accommodation for their general and specific health (physical, mental, emotional, spiritual, social, cultural) needs.
Primum non nocere–first, do no harm

1. **Purpose of the Agreement:**
   Whereby TAFTA (hereinafter referred as the Organization), provides research opportunity to the applicant for academic purposes in terms of the following conditions:

1.1 The purpose and scope of the research is declared in full by submission of a full research protocol.
1.2 The research bears relevance to the organization and is shown to potentially directly or indirectly benefit the organization and or its clients.
1.3 The completed research protocol is to be made available to the organization after verification by the academic institution and approval from a bona fide research ethics committee.
1.4 Research may only commence after TAFTA's research committee reviews the requested documents-see annexure list-and provides written consent.

1.5 Consent to conduct research does not automatically equate to individual consent by clients/residents/staff of Tafta; obtaining individual written informed consent from study participants shall remain the responsibility of the researcher/s.

1.6 All persons who will be engaged in the field work will be identified to Tafta, will at all times be identifiable to staff and residents and will conduct themselves in a professional and ethical manner within Tafta premises.

1.7 All researchers conduct their research at their own risk and Tafta will not be liable for any damages or injuries sustained on Tafta's premises or inflicted by Tafta residents.

1.8 Upon completion of the project or at any relevant time during the research, researchers may be called upon to present their findings to the Tafta research or other relevant sub/committee/s.

1.9 As far as is possible, research projects should include long term and sustainable benefits for Tafta/residents. A section in your submission should position the social responsibility dimension of the planned research project. As research benefits are often futuristic, it is required that researchers discuss ways with Tafta in which their expertise can benefit residents or clients immediately and a copy of the completed research be given to Tafta.

1.10 Scientific or other publications emanating from the research conducted with Tafta may not be published without prior written consent by the Organization. Identification and or acknowledgement of TAFTA in any publication may only be done after prior informed consent from the research committee of Tafta.

1.11 Media coverage relating to the study that makes reference to Tafta or uses audio-visual material related to property/staff/clients of Tafta will require additional a priori written authorization.

1.12 No financial or other compensation will be exchanged in respect of this research study without prior written agreement.

2. Roles and Responsibilities:

2.1 Tafta agrees to make relevant resources and information required for the completion of the specified research available to the Applicant.

2.2 A minimum of six weeks is required to process/respond to requests relating to the research project.

2.3 As the staff of Tafta are otherwise engaged, minimum reliance should be placed on Tafta staff for the implementation of the project. Staff will avail themselves in a supportive capacity, at their convenience and subject to adequate advance notice.

2.4 The Applicant agrees to comply with the regulations and restrictions in regard of the Protection of Personal Information Act no.4 of 2013.

2.5 The Applicant agrees to conduct the research in an ethical manner with respect and consideration for all parties concerned and the Organizations' limited resources.

2.6 All ethical principles governing the conduct of research in general and with human subjects in particular are adhered to. In particular, the personal identities of staff and or clients/residents will

remain confidential except in exceptional circumstances at which time special written consent will be obtained by mutual agreement.

3. Duration of the Agreement

This agreement will be in effect from (start date) ____________ to (end date) ____________ and may be updated at any time through written request. Either party can terminate the agreement with 30 days written notice.

For longer term research, periodic / 6 monthly progress reports will be required and annual renewal of permission should research be delayed.

4. This Agreement constitutes the whole Agreement in respect of this research study.

I, Keegan Hughes identity Document Number [illegible]

Registered to study at Durban University of Technology student number [illegible]

having read and understood the contents of this Agreement agree to accept and abide by the terms of the Agreement.

Applicant signature: ____________ Witness: ____________

Signed at Durban on the [illegible] day of May year [illegible]

On behalf of TAFTA:

F. B Sharam
Name

CEO
Designation

Signature

13.06.2018.
Date

ANNEXURES

1. Copy of research protocol
2. Copy of research ethics approval letter
3. Copy of GCP ethics certificate of all researchers who will be engaging directly with Tafta/residents
4. Contact details of at ~~least two~~ persons involved in the research, including that of the supervisor

Hod:

2018 -05- 2 8

Faculty [illegible] Dean:

30/05/2018

Appendix B: Letter of information and informed consent for TAFTA representative

Dear representative of TAFTA Elderly Home
Welcome to my research study

Title of the Research Study: The epidemiology of headaches in an elderly population within the life rights buildings of an elderly care facility in KwaZulu-Natal.

Principal Investigator/researcher: Keegan Hughes, B.Tech: Chiropractic
Co-Investigator/supervisor: Dr. D. Varatharajullu, M.Tech: Chiropractic

Brief Introduction and Purpose of the Study:
The number of Elderly experiencing headaches has not been well documented in South Africa. Foreign studies have shown that headaches in the elderly can affect their quality of life. Therefore the aim of this study is to investigate the prevalence of headaches and the factors that influence these headaches such as nutrition, exercise and medication by means of a questionnaire.

Outline of the Procedures: All willing participants who have completed the informed consent (see below) are encouraged to complete the questionnaire which will be hand delivered to the Home. Participation in the study will not interrupt participants as it will take 10-15 minutes to complete and hand in. The researcher will be present while questionnaire is being completed so that any questions or queries can be addressed. Participants are free to withdrawn from the study at any point, even while completing the questionnaire, if they feel any discomfort at any stage.

Risks or Discomforts to the Participant: There are no foreseeable risks or adverse consequences to the participant if they chose to partake in completing the questionnaire. The questionnaire includes sensitive questions relating to alcohol consumption, cigarette smoking, drug usage but participants are able to withdraw from the study if they wish not to complete the questionnaire.

Benefits: This study will aim to add to the existing body of knowledge in relation to headaches in the elderly in a South African context. This will aid in developing a more scientific based treatment for the elderly and provide a better understanding of headaches which is valuable for both health care professionals and patients.

Reason/s why the Participant May Be Withdrawn from the Study: The participant is free to withdraw for the study at any time. However once the questionnaire is completed and placed into a sealed box it may not be reopened as this will infringe on the confidentiality of the study.

Remuneration: Participation in the study is voluntary and no remuneration will be awarded to the participants.

Costs of the Study: There in no cost associated with participating in the study

Confidentiality: All answers are confidential and will not be linked to the participants. The informed consent and questionnaires will be kept in separate sealed boxes as to ensure that no questionnaire can be linked to a participant. The questionnaire will be analysed by a statistician and all information will only be used for research purposes.

Research-related Injury: Participants are only required to fill in a questionnaire and therefore there is no risk of injury.

I kindly ask for permission to proceed with the study. Before the study can take place permission will be sort from the Matron of TAFTA as well as the participating elderly or legal guardian of said elderly. Your assistance is vital to the research and is greatly appreciated.

Persons to Contact in the Event of Any Problems or Queries:

Supervisor: Dr. D. Varatharajullu	Tel: 031 3732533
Principle investigator: Keegan Hughes	Cell: 083 321 1861
Institutional Research Ethics administrator	Tel: 031 373 2375
Acting Director of Research and Postgraduate Support: Prof CE Napier	Tel: 031 373 2577
	Email:carinn@dut.ac.za

✂----------✂

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Keegan Hughes, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____.
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full name of the participant	**Date**	**Time**	**Signature**

I, Keegan Hughes, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full name of the Researcher	**Date**	**Signature**

_____	_____	_____
Full name of the Witness	**Date**	**Signature**

Appendix C: Letter of information and informed consent to elderly participant

Letter of Information and Informed Consent to Participants

A research study is a special way to find out information about a particular subject. I, Keegan Hughes, am trying to find out more about headaches that geriatric's (elderly) experience on a day to day basis. Your help in my study is the most important part. This study will allow me to obtain a master's degree in chiropractic.

WHAT IS INVOLVED IN THE STUDY?
If you want to be in the study, you will need to sign this form and complete the questionnaire that will ask you questions about your headache.

WHAT ARE THE RISKS OF THE STUDY?
There are NO risks involved if you decide to fill in the questionnaire. The questionnaire includes sensitive questions relating to alcohol consumption, cigarette smoking, drug usage but you are allowed to withdraw from the study if you wish not to complete the questionnaire.

ARE THERE BENEFITS TO TAKING PART IN THE STUDY? Older persons experience headaches but there is not a lot of information on the headaches that you experience, especially here in South Africa. With your help this study can add to the information so that medical professionals can treat headaches the elderly more effectively.

WHAT OTHER OPTIONS ARE THERE?
You do not have to complete the questionnaire if you do not wish to, and therefore cannot participate in the study at any given point in time.

WHAT ABOUT CONFIDENTIALITY?
Every reasonable effort will be made to keep your questionnaire private. All the questionnaires filled in by you will be placed in a closed box as soon as you have completed the questionnaire. Your name will not be written on the questionnaire. Only I, the researcher and my supervisor will read the questionnaire once completed.

WHAT ARE THE COSTS?
It is free to take part in the study and fill in the questionnaire.

WILL YOU GET PAID TO BE IN THIS STUDY?
You will not be paid to fill in the questionnaire but your help will be greatly appreciated.

WHAT ARE YOUR RIGHTS AS A RESEARCH SUBJECT?
Being in this study is voluntary. You don't have to be in this study if you don't want to or you can stop being in the study at any time. Your decision will not result in any punishment or penalty.

AGREEMENT TO BE IN THE STUDY

Your signature below means that you have read the above information about the study and have had a chance to ask questions to help you understand what you will do in this study. Your signature also means that you have been told that you can change your mind later if you want to. By signing this Assent/consent form you are not giving up any of your legal rights.

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Keegan Hughes, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: 3/18.
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____
Name of Participant	Signature	Date
_Keegan Hughes_____	_____	_____
Name of researcher	Researcher Signature	Date

Persons to Contact in the Event of Any Problems or Queries:

Supervisor: Dr. D. Varatharajullu	Tel: 031 3732533
Principle investigator: Keegan Hughes	Cell: 083 321 1861
Institutional Research Ethics administrator	Tel: 031 373 2375
Acting Director of Research and Postgraduate Support: Prof CE Napier	Tel: 031 373 2577
	Email:carinn@dut.ac.za

Appendix D: Pre-focus group questionnaire

SECTION A							
Demographics: *Please fill in or tick where relevant*							
1.	a. Date of birth:						
	b. Age:	60-65	66-70	71-75	75-80	81-85	86-above
	c. Gender:	Male			Female		
	d. Race:	White	Black	Indian	Coloured	Other	

Social History:					
1.Exercise	b. Do you have a regular exercise programme E.g. gym, running?	Yes		No	
	c. If yes, how many days per week do you exercise?	1 day	2 days	3 days	4 and above
2.Sleeping habits	a. How many hours do you sleep a day on average?	_____hours per day			
	b. How many hours do you sleep a night on average?	_____hours a night			
	c. Do you have a regular sleeping pattern?	Yes		No	
	d. how often do you wake up a night?	_____ times			
	e. Do you grind your teeth while you sleeping?	Yes	No	Unknown	
	f. Do you currently have difficulty sleeping e.g. insomnia, waking up in the	Yes		No	

	middle of the night?				
3.Alcohol consumption	a. Do you drink alcohol?	Yes			No
	b. If yes, how much of the following do you drink per week?	_____units of beer/wine/cider/spirits			
4.Caffeinated drinks	a. Do you drink the following? *(you may tick more than 1 box)*	1)Coffee	2)Tea	3)Soft Drinks e.g. coke	4)Caffeinated drinks e.g. Red Bull, Monster
	b. If yes for the above, how many cup/glasses (250ml) per day?	_____per day			
5.Smoking	a. Do you smoke cigarettes/pipes/ cigars?	Yes	No	Ex-smoker	
	b. If yes, how many per day	1-5	6-10	11-15	16-20	more than 20
6.Social drugs	a. Do you use social drugs? e.g. marijuana /dagga	Yes		No	
7.Sleeping habits	a. How many hours do you sleep a day on average?	_____hours per day			
	b. How many hours do you sleep a night on average?	_____hours a night			
	c. Do you have a regular sleeping pattern?	Yes		No	
	d. how often do you wake up a night?	_____ times			
		Yes	No	Unknown	

	e. Do you grind your teeth while you sleeping?			
8.Stress	a. Do you consider yourself as being under a lot of stress (mental or physical) in the last 3 months?	Yes	No	
	b. Are you currently receiving treatment, counselling or are on medication for anxiety, stress or depression?	Yes	No	

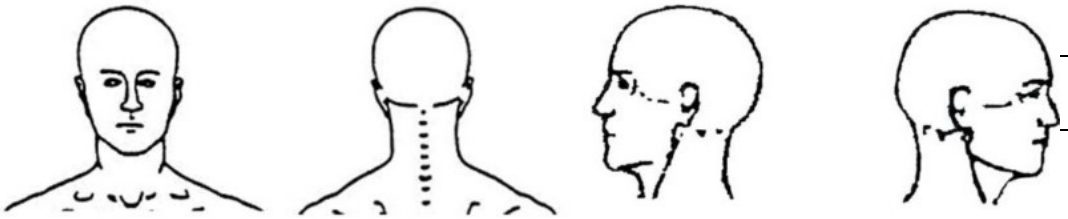
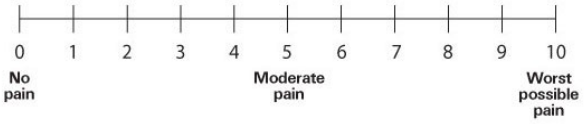
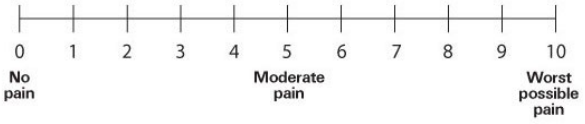
Medical History:			
9.Please tick the appropriate boxes if you have a history of or have been diagnosed with any the following: *(you may tick more than 1 box)*	a. Anaemia	e. Seizures	
	b. High blood pressure	f. Depression	
	c. Low blood pressure	g. Diabetes	
	d. Thyroid disease	h. Other	
	h. Have you had a head injury in the last 6 months?	Yes	No
	i. If yes, did you receive any medical help for this head injury?	Yes	No
	j. If yes, who did you get treatment from? _____		
	k. Do you have any other significant medical condition/s which are under medical care? Please list condition/s : 1)_____ 2)_____ 3)_____		

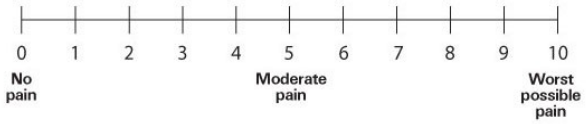
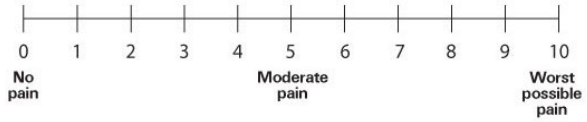
	4)_____		
	l. Are you currently taking any medication/s? If yes, please tick which types of medication/s	Yes	No
	a. Blood pressure medication		
	b. Hormone replacement therapy		
	c. Blood thinners (Asprin, warfarin etc)		
	d. Anti-Inflammatories		
	e. Pain Killers (myprodol, panado)		
	j. Have you had a CAT scan or MRI of you head, neck and/or brain?	Yes	No

SECTION B			
Headache History			
10.	Have you experienced any Headache since the age of 60?	Yes	No
	If yes, please answer the rest of the questionnaire. If no, you may hand in your questionnaire.		

11.	a. At what age did you start to experience headaches for the first time?	_____ years old.			
	b. since experiencing these headaches, have their patterns changed in any way?	Yes		No	
	c. If yes, my headaches are…. *(please tick the appropriate box and answer 1-10)*	1) More frequent		Yes	No
		2) Less frequent		Yes	No
		3) More severe		Yes	No
		4) Less severe		Yes	No
		5) More continuous		Yes	No
		6) Less continuous		Yes	No
		7) More predictable		Yes	No
		8) Less predictable		Yes	No
		9) Of longer duration		Yes	No
		10) Shorter than previously		Yes	No
	d. Is your headache ever felt over one side of your head only?	Never	Sometimes	Most of the time	Always
	e. Is your headache ever felt over both sides of your head?	Never	Sometimes	Most of the time	Always
	f. Does your headache normally	Yes		No	

	occur at a specific time of day?		
	g. Do you have warning symptoms that alert you that you are going to experience a headache soon?	Yes	No
	h. If yes, please list these warning symptoms.	1)_____ 2)_____ 3)_____ 4)_____ 5)_____	
	i. Have you ever seen a health Practitioner for your headaches?	Yes	No
	j. If yes, who did you see?	a. GP	d. Sangoma
		b. Chiropractor	e. Homeopath
		c. Neurologist	f. Acupuncturist
	k. Please state what the doctor Diagnosed you with (if known)?	1)_____ 2)_____ 3)_____ 4) Unknown □	
	m. What medication have you used in the past for your		

	headache? E.g. Panado, Grandpa, Myprodol			
	n. What effect did the medication have on your headache? You may tick more than one.	a. Decreased pain b. Decreased intensity c. Less frequent d. Less throbbing/pounding e. Other effects f. No Changes to headache		
	o. Do you have family members who suffer with headaches?	Yes	No	Unknown
	p. If yes, are they?	1) Male relative/s	Yes	No
		2) Female relative/s	Yes	No
Headache Characteristics				
12. Location	 Please shade in the area on the diagram above of where you most often feel your headache.			
13. Pain	a. Do you have a headache right now? If yes, please rate your pain on the scale provided.			
	b. How painful is your typical headache? Please rate your pain on the scale provided.			

	c. What would you rate the pain at its best? Please rate your pain on the scale provided	
	d. What would you rate your pain at its worst? Please rate your pain on the scale provided	

14. Character of the pain? Please tick the appropriate box which best describes how your headache/s feel? You may tick more than one box.	a. Pressure	g. Squeezing
	b. Pulsating	h. Shooting
	c. Sharp	i. Tightness
	d. Throbbing	j. Pounding
	e. Stabbing	k. Other

15. Trigger Factors	Which of the following, if any, seem to trigger/bring about your headache? Please tick the box/s that most apply to you (you may tick more than 1 box)	
	a. Fatigue/exertion	j. Chewing/clenching teeth
	b. Lack of sleep	k. Exercise
	c. Bending over	l. Stress/tension
	d. Alcohol	m. Sinus problems
	e. Certain smells	n. Medications
	f. Change in weather/seasons	o. Skipping meals
	g. Certain time of day	p. Hunger
	h. Drinks containing caffeine	q. Other
	I. Over sleeping	
16. Aggravating Factors	Are your headache/s aggravated/made worse by any of the following? Please tick the box/s that most apply to you *(you may tick more than 1 box).*	
	a. Weather changes	h. Bright light
	b. Sneezing/Coughing	i. Sitting
	c. Walking	j. Stress/Tension
	d. Loud noises	k. Sexual activity
	e. Lying down	l. Bending over
	f. Reaching overhead	m. Standing
	g. Lack of sleep	n. Other
17. Relieving factors	Are your headache/s relieved/made to feel better by any of the following? Please tick the box/s that most apply to you *(you may tick more than 1 box).*	
	a. Vomiting	i. Stretching
	b. Eating	j. Heat

	c. Massage	k. Medication
	d. Standing	l. Sitting
	e. Applying Ice/something cold	m. Sleep
	f. Moving around/walking	n. Lying down
	g. Compression	o. Relaxing
	h. Exercise	p. Other

18. Associated signs and symptoms

Please tick the symptoms you have experienced with your headache. If you ticked the corresponding yes box please tick the relationship that symptom has to your headache.

E.g. I have Anxiety(tick) during my headache(tick) or I do not have nausea (no further ticks)

Sign or Symptom	Yes?	Before Headache	During Headache	When headache Is severe
a. Anxiety	□			
b. Balance problems	□			
c. Dizziness	□			
d. Jaw pain	□			
e. Nausea	□			
f. Neck/ back pain	□			
g. Neck/back stiffness	□			
h. Numbness of face/head	□			
i. Sensitivity to light	□			
j. Sensitivity to smell	□			
k. Sensitivity to sound	□			
l. Sweating	□			

	m. Tiredness	□			
	n. Visual changes	□			
	o. Vomiting	□			
	p. Weakness	□			
	q. Other: _____	□			
	r. Other:_____	□			

19. Frequency	a. How many times per day/week/month does your headache occur?(e.g. 3 times/week)	____ per day □ /week □/ month □/year□ *(e.g. if you have 4 mild headaches a month, fill in 4 on line provided and tick the box next to month)*
	b. How many mild/moderate headaches do you experience on average?	____ per day □ /week □/ month □/year□ *(e.g. if you have 4 mild headaches a month, fill in 4 on line provided and tick the box next to month)*
	c. How many severe headaches do you experience on average?	____ per day □ /week □/ month □/year□ *(e.g. If you have 1 severe headache a year, fill in 1 on he line provided and tick the box next to year)*
20. Duration	a. How long does your headache usually last if you do not take medication for the headache? Please tick the box that most apply to you.	

	1) Less than 30 minutes	5) Less than 12 hours
	2) Less than 1 hour	6) Finishes within a day
	3) 1-2 hours	7) 2-3 days
	4) 2-4 hours	8) more than 3 days

SECTION C			
The Burden of Headaches			
	a. How many days have you missed family, social, sports or leisure activities in the last 3 months?	_____days.	
	b. How many days in the last 3 months has your headache decreased your ability to do activities of daily life? E.g. bathing, cooking, shopping.	_____days.	
	d. What do you do if you experience a headache while you are out the house *(please tick the appropriate box)*	1) Continue as normal	3) Stop what you are doing and try rest
		2)Take medication and continue as normal	4) other: if yes, please comment : _____
	e. What do you do when you have a headache at home?	1) Continue as normal	3) Stop what you are doing and try rest
		2)Take medication and continue as normal	4) other: if yes, please comment : _____

	f. How much does your productivity decrease when you have a headache?	1) Not at all	3) Moderately
		2) Slightly	4) Severely
	g. On average, in the last 3 months, how much did your headache decrease your overall functionality?	1) Not at all	3) Moderately
		2) Slightly	4) Severely

Thank you for your time!

Appendix E: Letter of information and informed consent for members of the focus group

Dear Participant
I welcome you to my research study

Title of the Research Study: The epidemiology of headaches in an elderly population within the life rights buildings of an elderly care facility in KwaZulu-Natal.
.

Principal Investigator/researcher: Keegan Hughes, B.Tech: Chiropractic
Co-Investigator/supervisor: Dr. D. Varatharajullu, M.Tech: Chiropractic

Brief Introduction and Purpose of the Study: The number of Elderly experiencing headaches has not been well documented in South Africa. Foreign studies have shown that headaches in the elderly can affect their quality of life. Therefore the aim of this study is to investigate the prevalence of headaches and the factors that influence these headaches such as nutrition, exercise and medication by means of a questionnaire.

Study objectives:

1. To determine the prevalence of primary headaches in a specific elderly population.
2. To investigate selected risk factors that are associated with primary headaches in an elderly population.
3. To determine the impact of primary headaches on the daily activities of the elderly.

Outline of the Procedures: Please read and complete the informed consent letter and the code of conduct and confidentiality statement prior to commencement of the expert group meeting. Each member of the expert group will receive a copy of the questionnaire before the discussion begins. During the expert group meeting, each question will be discussed in a sequential order. As a member of the expert group please feel free to make your opinion or suggestions known to the researcher as every comment made can contribute to the validity of the questionnaire. The expert group meeting will be recorded in order for the researcher to reflect on the comments made during the expert group meeting.
Risks or Discomforts to the Participant: There are no foreseeable risks, discomforts or adverse consequences to the expert group participants.

Benefits: The expert group is valuable in ensuring validity of the questionnaire.

Reason/s why the Participant May Be Withdrawn from the Study: You may withdraw from the study at any time.

Remuneration: Participation in the study is voluntary and no remuneration will be awarded to the participants in the expert group.

Costs of the Study: There are no costs associated with participating in the study
Confidentiality: All information discussed during the expert group meeting will be kept confidential and used for research purposes only.

Research-related Injury: Not applicable to this study as it is a questionnaire based study.

Persons to Contact in the Event of Any Problems or Queries:

Supervisor: Rd. D. Varatharajullu Tel: 031 3732533
Principle investigator: Keegan Hughes Cell: 083 321 1861
Institutional Research Ethics administrator Tel: 031 373 2375
Acting Director of Research and Postgraduate Support: Prof CE Napier Tel: 031 373 2577
Email:carinn@dut.ac.za

CONSENT

Statement of Agreement to Participate in the Research Study:
I……., ID number……., have read this document in its entirety and understand its contents. Where I have had any questions or queries, these have been explained to me by…… to my satisfaction. Furthermore, I fully understand that I may withdraw from this study at any stage without any adverse consequences and my future health care will not be compromised. I, therefore voluntarily agree to participate in this study.

_____	_____	_____	_____
Full name of the participant	**Date**	**Time**	**Signature**

I, Keegan Hughes, hereby confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full name of the Researcher	**Date**	**Signature**

_____	_____	_____
Full name of the Witness	**Date**	**Signature**

Appendix F: Code of conduct and confidentiality agreement

This form needs to be completed by every member of the expert group prior to the commencement of the expert group meeting.

<u>As a member of this committee I agree to abide by the following conditions:</u>

1. All information contained in the research documents and any information discussed during the expert group meeting will be kept private and confidential. This is especially binding to any information that may identify any of the participants in the research process.
2. None of the information shall be communicated to any other individual or organisation outside of this specific expert group as to the decisions of this expert group.
3. The information gathered from this expert group by the researcher will be made public in terms of a dissertation and journal publication. The researcher will ensure that any participants in the expert group and research remain anonymous and confidential.
4. The expert group may be either voice or video recorded, as a transcript of the proceedings will need to be made. The data will be stored securely under password protection.
5. All data generated from this expert group (including the recording) will be kept for 15 years in a secure location at Durban University of Technology and thereafter will be destroyed.

Once this form has been read and agreed to, please fill in the appropriate information below and sign to acknowledge agreement.

_____	_____
Full name of the participant	**Signature**
_____	_____
Full name of the Witness	**Signature**
_____	_____
Full name of the Researcher	**Signature**
_____	_____
Full name of Supervisor	**Signature**

Appendix G: Pre-pilot questionnaire

The epidemiology of headaches in an elderly population.

Dear participant,

Thank you for taking the time to complete the questionnaire.

Please note:

Under each heading there will be instructions on how the questions need to be answered.

All information in the questionnaire will be kept private, only the researcher and supervisor will have access to your information.

You do not have to finish the questionnaire if at any time you feel uncomfortable answering any of the questions.

Please feel free to ask any questions regarding the questionnaire.

SECTION A						
Demographics: *Please fill in or tick where relevant*						
1.	a. Age:	_____ years				
	b. Gender:	Male	Female	Other		
	c. Race	White	Black	Indian	Coloured	Other

Social History:			
2. Alcohol consumption	a. If you consume alcohol, how many glasses do you drink per **week**?	□1-5 □ 6-10 □ 11-15 □ more than 16 □ I do not drink alcohol	
3. Caffeinated drinks	a. If you consume caffeinated drinks for the, how many cup/glasses (250ml) do you consume a day per **day**? e.g. tea or coffee?	□ 1-2 □ 3-4 □ 4-6 □ more than 6 □ I do not drink caffeinated drinks like tea or coffee	
4. Exercise	a. Do you exercise regularly? If so how many days per week do you exercise? e.g. gym, running?	□ 1 day □ 2 days □ 3days □4days □ more than 4 days □ I do not exercise	
5. Sleeping habits	a. How many hours of sleep do you get a **night**?	_____hours per **night**	
	b. How many hours of sleep do you get a **day**?	_____hours per **day**	
	c. Do you have a regular sleeping pattern?	Yes	No

	d. Do you wake up often at night? If yes, tick the relevant reason.	□ needing the bathroom □ insomnia □ headache □ being uncomfortable □ I do not wake up at night		
	e. Do you grind your teeth while you are sleeping?	Yes	No	Unknown
6. Smoking	a. Do you smoke? If yes, how many a day?	□ 1-4 □5-9 □10-14 □15-19 □ more than 20 □ I do not smoke		
7. Social drugs	a. Do you use social drugs? e.g. marijuana /dagga	Yes	No	
8. Stress	a. Do you consider yourself as being under a lot of stress in the last 3 months?	Yes	No	
	b. If yes, are you currently receiving treatment for anxiety, stress or depression and what type of treatment are you receiving?	□ counselling □ medication □ meditation □ I am no receiving treatment		

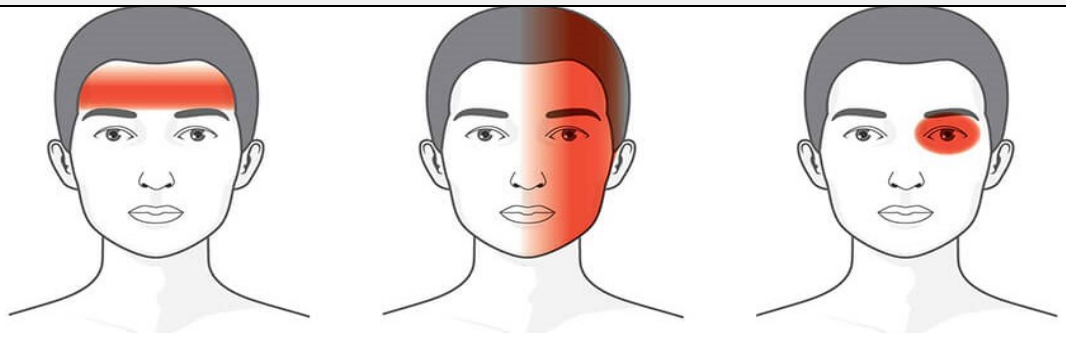
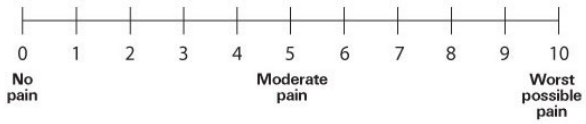
Medical History:			
9.Please tick the appropriate box/es if you have a history of or have been diagnosed with any the following: *(you may tick more than 1 box)*	9.a) Anaemia □	High blood pressure □	
	Depression □	Low blood pressure □	
	Diabetes □	Seizures □	
	Heart disease □	Thyroid disease □	
	b. Have you had a head injury in the last 6 months?	Yes	No

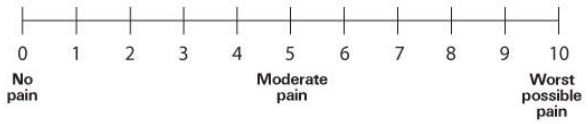
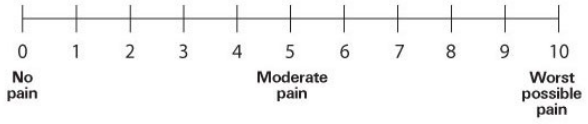
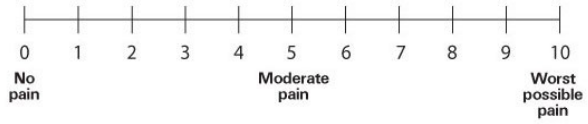
	c. If yes, who did you receive medical help from for this head injury?	□ General Practitioner □ Neurologist □ Chiropractor □ Homeopath □ Physiotherapist □ I did not receive treatment
	d. Are you currently taking any medication/s? If yes, please tick which types of medication/s *You may tick more than one box.*	
	Blood pressure medication ☐ Hormone replacement therapy ☐ Blood thinners (e.g Asprin, warfarin) ☐ Anti-Inflammatories (e.g voltaren, celebrex) ☐ Pain killers (e.g myprodol, panado) ☐	
	e. Have you had any of the following tests done in the last 3 months? *You may tick more than one box*	□ Blood taken □ CAT scan □ MRI □ X-Ray □ No tests performed

SECTION B					
Headache History					
10.	Have you experienced any headache since the	Yes		No	
11.	a. At what age did you start experiencing headaches for the age of 60?	_____ years old.			
	first time? I*f yes, please answer the rest of the questionnaire.* *If no, you may hand in your questionnaire*.				
	b. Since experiencing the headaches, have they become ...	More frequent □		Less predictable □	
	You may tick more than one box	Less frequent □ More sever □ Less severe □ More continuous □ Less continuous □ More predictable □		Of longer duration □ Shorter than previously □ No changes □	
	c. Is your headache ever felt over one side of your head only?	Never	Sometimes	Most of the time	Always
	d. Is your headache ever felt over both sides of your head?	Never	Sometimes	Most of the time	Always
	e. Does your headache normally	Yes		No	

	occur at a specific time of day?		
	f. Do you have warning symptoms that alert you that you are going to experience a headache soon? If so, tick which symptoms you suffer with. *You may tick more than one box* .	Blurred vision □ Neck Stiffness □ Flickering lights, spots □ Numbness/tingling □ or lines Irritability □ Watery eyes □ Nausea □	
	g. Have you ever seen a health practitioner for your headache/s? If yes, who did you see?	GP □	Sangoma □
		Chiropractor □	Homeopath □
		Neurologist □	Acupuncturist □
	h. Please tick what the doctor diagnosed you with (if known)?	1) Cervicogenic Headache □ 2) Cluster Headache □ 3) Migraine □ 4) Serious Headache" (Tumour, Infection") □ 5) Tension-Type Headache □ 6) Unknown □	
	i. What medication have you used in the past for your headache?	Painkillers □ No medication □ Anti-inflammatories □	

	j. What effect did the medication have on your headache? *You may tick more than one.*	Decreased pain ☐ Less throbbing/pounding ☐ Decreased intensity ☐ Other effects ☐ Less frequent ☐ No Changes to headache ☐		
	k. Do you have family members who suffer with headaches?	Yes	No	Unknown

Headache Characteristics		
12. Location	 *https://bodypaintips.com/types-headaches-symptoms-chart/* Please circle the area on the diagram above of where you most often feel your headache.	
13. Pain	a. Do you have a headache right now? If yes, please rate your pain on the scale provided.	

	b. How painful is the headache you generally experience? Please rate your pain on the scale provided.	
	c. What would you rate the pain at its best? Please rate your pain on the scale provided.	
	d. What would you rate your pain at its worst? Please rate your pain on the scale provided.	

14. Character of the pain? Please tick the appropriate box/es which best describe how your headache/s feel?	Pounding ☐	Stabbing ☐
	Pressure ☐	Squeezing ☐
	Pulsating ☐	Throbbing ☐
	Sharp ☐	Tightness ☐
	Shooting ☐	

You may tick more than one box.		
15. Trigger Factors	Which of the following, if any, seem to trigger/bring about your headache/s? Please tick the box/es that most apply to you *(you may tick more than 1 box)*	
	Alcohol ☐	Fatigue/exertion ☐
	Bending over ☐	Hunger ☐
	Change in weather/seasons ☐	Lack of sleep ☐
	Chewing/clenching teeth ☐	Medications ☐
	Certain smells ☐	Over sleeping ☐
	Certain time of day ☐	Skipping meals ☐
	Drinks containing caffeine ☐	Sinus problems ☐
	Exercise ☐	Stress/tension ☐
16. Aggravating Factors	Are your headache/s aggravated/made worse by any of the following? Please tick the box/es that most apply to you *(you may tick more than 1 box).*	
	Bending over ☐	Sneezing/Coughing ☐
	Bright light ☐	Sitting ☐
	Lack of sleep ☐	Standing ☐
	Loud noises ☐	Stress/Tension ☐
	Lying down ☐	Weather changes ☐
	Reaching overhead ☐	Walking ☐
	Sexual activity ☐	

17. Relieving factors	Are your headache/s relieved/made to feel better by any of the following? Please tick the box/es that most apply to you *(you may tick more than 1 box).*	
	Applying Ice/something cold □	Moving around/walking □
	Compression □	Relaxing □
	Eating □	Sleep □
	Exercise □	Sitting □
	Heat □	Standing □
	Lying down □	Stretching □
	Massage □	Vomiting □
	Medication □	

Please tick if you experience any of these symptoms either before or during your headache/s:

	Sign or Symptom	Before Headache	During Headache
18. Associated signs and symptoms	a. Anxiety		
	b. Balance problems		
	c. Dizziness		
	d. Jaw pain		
	e. Nausea		
	f. Neck/back pain		
	g. Neck/back stiffness		
	h. Numbness of face/head		
	i. Sensitivity to light		
	j. Sensitivity to smell		
	k. Sensitivity to sound		

	l. Sweating		
	m. Tiredness		
	n. Visual changes		
	o. Vomiting		
	p. Weakness		
19. Frequency	a. How often do yo from headaches?	Daily □ Monthly □ Weekly □ Yearly □	
	b. In general, how is the headache?	Mild □ Moderate □ Severe □	

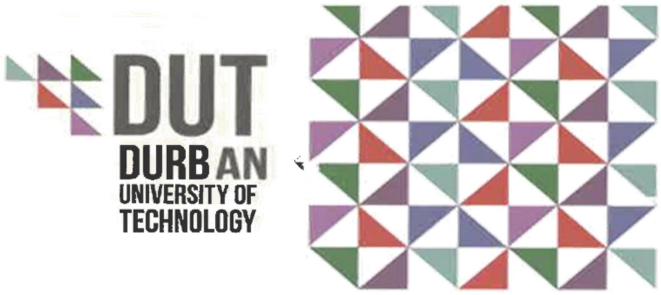
20. Duration	a. How long does your headache/s usually last if you do not take medication for the headache *Please tick the box that most apply to you.*	
	Less than 30 minutes □	Less than 12 hours □
	Less than 1 hour □	Finishes within a day □
	1-2 hours □	2-3 days □
	2-4 hours □	More than 3 days □

SECTION C		
The Burden of Headaches		
	a. How many days have you missed family, social, sports or leisure activities in the last 3 months?	_____days.
	b. How many days in the last 3 months has your headache decreased your ability to perform activities of daily living? e.g. bathing, cooking, and shopping.	_____days.
	c. What do you do if you experience a headache while you are out of the house *(please tick the appropriate box/es)*	Continue as normal □ Take medication and continue as normal □ Stop what you are doing and try rest □
	d. What do you do when you have a headache at home? *(please tick the appropriate box/es)*	Continue as normal □ Stop what you are doing and try rest □ Take medication and continue as normal □

	e. How much does your productivity decrease when you have a headache?	1) Not at all	3) Moderately
		2) Slightly	4) Severely
	f. On average, in the last 3 months, how much did your headache decrease your overall quality of life?	1) Not at all	3) Moderately
		2) Slightly	4) Severely

Thank you for your time!

Appendix H: Ethical clearance



Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

19 July 2018

Mr K Hughes
82 Cotswold Drive
Dawncliffe
Westville
3629

Dear Mr Hughes

The epidemiology of headaches in an elderly population within the life rights buildings of an elderly care facility in KwaZulu-Natal

The Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool.

Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the IREC acknowledges receipt of your gatekeeper permission letter (MoU).

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely,

Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY
2018 -07- 19
INSITUTUTIONAL RESEARCH ETHICS COMMITTEE
P O BOX 1334 DURBAN 4000 SOUTH AFRICA

Appendix I: Final questionnaire

The epidemiology of headaches in an elderly population.

Dear participant,

Thank you for taking the time to complete the questionnaire.

Please note:

Under each heading there will be instructions on how the questions need to be answered.

All information in the questionnaire will be kept private, only the researcher and supervisor will have access to your information.

You do not have to finish the questionnaire if at any time you feel uncomfortable answering any of the questions.

Please feel free to ask any questions regarding the questionnaire.

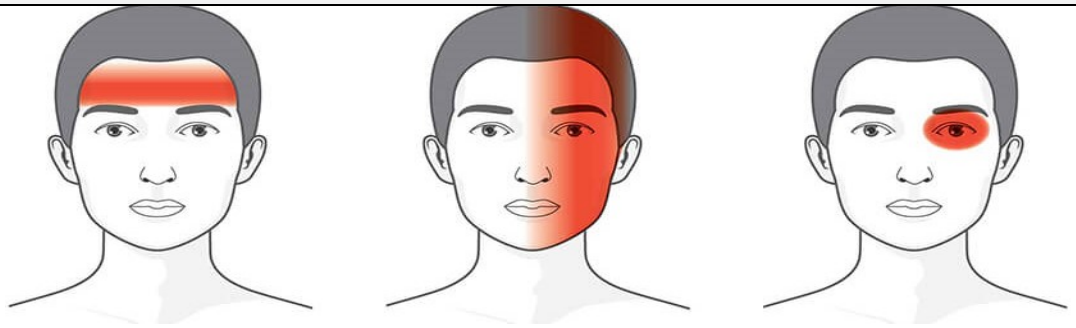
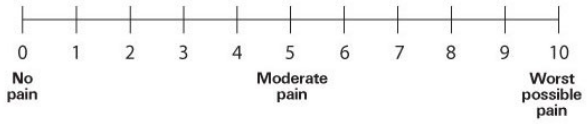
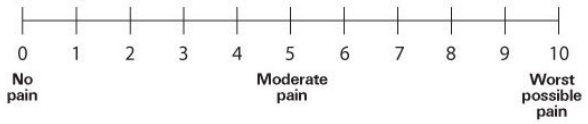
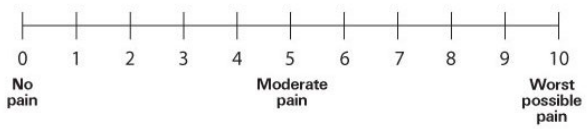
SECTION A							
Demographics: *Please fill in or tick where relevant*							
1.	a. Age:	_____ years					
	b. Gender:	Male		Female		Other	
	c. Race	White	Black	Indian		Coloured	Other

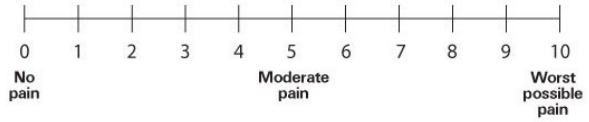
Social History:				
2. Alcohol consumption	a. If you consume alcohol, how many glasses do you drink per **week**?	□1-5 □ 6-10 □ 11-15 □ more than 16 □ I do not drink alcohol		
3. Caffeinated drinks	a. If you consume caffeinated drinks for the, how many cup/glasses (250ml) do you consume a day per **day**? e.g. tea or coffee?	□ 1-2 □ 3-4 □ 4-6 □ more than 6 □ I do not drink caffeinated drinks like tea or coffee		
4. Exercise	a. Do you exercise regularly? If so how many days per week do you exercise? e.g. gym, running?	□ 1 day □ 2 days □ 3days □4days □ more than 4 days □ I do not exercise		
5. Sleeping habits	a. How many hours of sleep do you get a **night**?	_____hours per **night**		
	b. How many hours of sleep do you get a **day**?	_____hours per **day**		
	c. Do you have a regular sleeping pattern?	Yes	No	
	d. Do you wake up often at night? If yes, tick the relevant reason.	□ needing the bathroom □ insomnia □ headache □ being uncomfortable □ I do not wake up at night		
	e. Do you grind your teeth while you are sleeping?	Yes	No	Unknown
6. Smoking	a. Do you smoke? If yes, how many a day?	□ 1-4 □5-9 □10-14 □15-19 □ more than 20 □ I do not smoke		
7. Social drugs	a. Do you use social drugs? e.g. marijuana /dagga	Yes	No	
8. Stress	a. Do you consider yourself as being under a lot of stress in the last 3 months?	Yes	No	
	b. If yes, are you currently receiving treatment for anxiety, stress or depression and what type of treatment are you receiving?	□ counselling □ medication □ meditation □ I am no receiving treatment		

Medical History:				
9.Please tick the appropriate box/es if you have a history of or have been diagnosed with any the following: *(you may tick more than 1 box)*	9.a) Anaemia	☐	High blood pressure	☐
	Depression	☐	Low blood pressure	☐
	Diabetes	☐	Seizures	☐
	Heart disease	☐	Thyroid disease	☐
	b. Have you had a head injury in the last 6 months?	Yes	No	
	c. If yes, who did you receive medical help from for this head injury?	☐ General Practitioner ☐ Neurologist ☐ Chiropractor ☐ Homeopath ☐ Physiotherapist ☐ I did not receive treatment		
	d. Are you currently taking any medication/s? If yes, please tick which types of medication/s *You may tick more than one box.*			
	Blood pressure medication ☐ Hormone replacement therapy ☐ Blood thinners (e.g Asprin, warfarin) ☐ Anti-Inflammatories (e.g voltaren, celebrex) ☐ Pain killers (e.g myprodol, panado) ☐			
	e. Have you had any of the following tests done in the last 3 months? *You may tick more than one box*	☐ Blood taken ☐ CAT scan ☐ MRI ☐ X-Ray ☐ No tests performed		

SECTION B				
Headache History				
10.	Have you experienced any headache since the age of 60?	Yes	No	
	I*f yes, please answer the rest of the questionnaire.* *If no, you may hand in your questionnaire*.			
11.	a. At what age did you start experiencing headaches for the first time?	_____ years old.		
	b. Since experiencing the headaches, have they become ... *You may tick more than one box*	More frequent ☐ Less frequent ☐ More sever ☐ Less severe ☐ More continuous ☐ Less continuous ☐ More predictable ☐	Less predictable ☐ Of longer duration ☐ Shorter than previously ☐ No changes ☐	
	c. Is your headache ever felt over one side of your head only?	Never	Sometimes	Most of the time / Always
	d. Is your headache ever felt over both sides of your head?	Never	Sometimes	Most of the time / Always
	e. Does your headache normally occur at a specific time of day?	Yes	No	
	f. Do you have warning symptoms that alert you that you are going to experience a headache soon? If so, tick which symptoms you suffer with. *You may tick more than one box* .	Blurred vision ☐ Flickering lights, spots or lines ☐ Irritability ☐ Nausea ☐	Neck Stiffness ☐ Numbness/tingeling ☐ Watery eyes ☐	
	g. Have you ever seen a health practitioner for your headache/s? If yes, who did you see?	GP ☐ Chiropractor ☐ Neurologist ☐	Sangoma ☐ Homeopath ☐ Acupuncturist ☐	
	h. Please tick what the doctor diagnosed you with (if known)?	1) Cervicogenic Headache ☐ 2) Cluster Headache ☐ 3) Migraine ☐ 4) Serious Headache" (Tumor, Infection") ☐ 5) Tension-Type Headache ☐ 6) Unknown ☐		

	i. What medication have you used in the past for your headache?	Painkillers ☐ No medication ☐ Anti-inflammatories ☐		
	j. What effect did the medication have on your headache? *You may tick more than one.*	Decreased pain ☐ Less throbbing/pounding ☐ Decreased intensity ☐ Other effects ☐ Less frequent ☐ No Changes to headache ☐		
	k. Do you have family members who suffer with headaches?	Yes	No	Unknown

Headache Characteristics		
12. Location	 https://bodypaintips.com/types-headaches-symptoms-chart/ Please circle the area on the diagram above of where you most often feel your headache.	
13. Pain	a. Do you have a headache right now? If yes, please rate your pain on the scale provided.	
	b. How painful is the headache you generally experience? Please rate your pain on the scale provided.	
	c. What would you rate the pain at its best? Please rate your pain on the scale provided.	

	d. What would you rate your pain at its worst? Please rate your pain on the scale provided.	

14. Character of the pain? Please tick the appropriate box/es which best describe how your headache/s feel? *You may tick more than one box.*	Pounding	☐	Stabbing	☐
	Pressure	☐	Squeezing	☐
	Pulsating	☐	Throbbing	☐
	Sharp	☐	Tightness	☐
	Shooting	☐		

15. Trigger Factors	Which of the following, if any, seem to trigger/bring about your headache/s? Please tick the box/es that most apply to you *(you may tick more than 1 box)*			
	Alcohol	☐	Fatigue/exertion	☐
	Bending over	☐	Hunger	☐
	Change in weather/seasons	☐	Lack of sleep	☐
	Chewing/clenching teeth	☐	Medications	☐
	Certain smells	☐	Over sleeping	☐
	Certain time of day	☐	Skipping meals	☐
	Drinks containing caffeine	☐	Sinus problems	☐
	Exercise	☐	Stress/tension	☐
16. Aggravating Factors	Are your headache/s aggravated/made worse by any of the following? Please tick the box/es that most apply to you *(you may tick more than 1 box).*			
	Bending over	☐	Sneezing/Coughing	☐
	Bright light	☐	Sitting	☐
	Lack of sleep	☐	Standing	☐
	Loud noises	☐	Stress/Tension	☐
	Lying down	☐	Weather changes	☐
	Reaching overhead	☐	Walking	☐
	Sexual activity	☐		

17. Relieving factors	Are your headache/s relieved/made to feel better by any of the following? Please tick the box/es that most apply to you *(you may tick more than 1 box).*			
	Applying Ice/something cold	☐	Moving around/walking	☐
	Compression	☐	Relaxing	☐
	Eating	☐	Sleep	☐
	Exercise	☐	Sitting	☐
	Heat	☐	Standing	☐
	Lying down	☐	Stretching	☐
	Massage	☐	Vomiting	☐
	Medication	☐		

Please tick if you experience any of these symptoms either before or during your headache/s:

	Sign or Symptom	Before Headache	During Headache
18. Associated signs and symptoms	a. Anxiety		
	b. Balance problems		
	c. Dizziness		
	d. Jaw pain		
	e. Nausea		
	f. Neck/back pain		
	g. Neck/back stiffness		
	h. Numbness of face/head		
	i. Sensitivity to light		
	j. Sensitivity to smell		
	k. Sensitivity to sound		
	l. Sweating		
	m. Tiredness		
	n. Visual changes		
	o. Vomiting		
	p. Weakness		

19. Frequency	a. How often do you suffer from headaches?	Daily	☐	Monthly	☐
		Weekly	☐	Yearly	☐
	b. In general, how intense is the headache?	Mild	☐	Moderate ☐	Severe ☐

20. Duration	a. How long does your headache/s usually last if you do not take medication for the headache *Please tick the box that most apply to you.*			
	Less than 30 minutes	☐	Less than 12 hours	☐
	Less than 1 hour	☐	Finishes within a day	☐
	1-2 hours	☐	2-3 days	☐
	2-4 hours	☐	More than 3 days	☐

SECTION C			
The Burden of Headaches			
	a. How many days have you missed family, social, sports or leisure activities in the last 3 months?	_____days.	
	b. How many days in the last 3 months has your headache decreased your ability to perform activities of daily living? e.g. bathing, cooking, shopping.	_____days.	
	c. What do you do if you experience a headache while you are out of the house *(please tick the appropriate box/es)*	Continue as normal □ Take medication and continue as normal □ Stop what you are doing and try rest □	
	d. What do you do when you have a headache at home? *(please tick the appropriate box/es)*	Continue as normal □ Stop what you are doing and try rest □ Take medication and continue as normal □	
	e. How much does your productivity decrease when you have a headache?	1) Not at all	3) Moderately
		2) Slightly	4) Severely
	f. On average, in the last 3 months, how much did your headache decrease your overall quality of life?	1) Not at all	3) Moderately
		2) Slightly	4) Severely

Thank you for your time!

Appendix J: Assistant contract and confidentiality agreement

I, _____, agree to assist the researcher with this study by assisting with the distribution of questionnaires and answering of any questions from the participants. I agree to maintain full confidentiality when performing these tasks.

I agree to:

1. Keep all research information shared with me confidential by not discussing or sharing the information in any form or format with anyone other than the primary investigator.
2. not make copies of any raw data in any form or format
3. Keep all raw data that contains identifying information in any form or format (Consent forms, questionnaires) secure while it is in my possession.
4. To place all completed questionnaire in the sealed ballot box, to not allow any other persons to read any questionnaire but their own.
5. To answer all question asked of me by the participating individuals.

Provide the following contact information for research assistant:

Printed name of research assistant_____

Identification number (ID):_____

Cellphone number: _____

Signature of research assistant_____ Date _____

Printed name of Researcher_____

Signature of Researcher_____ Date_____