**An epidemiological investigation into the risk factors associated with neck pain in the Indian population in the greater Durban area.**

**By**

**Julie Miroslava Muchna**

Dissertation submitted in partial compliance with the requirements for the Master's Degree in Technology: Chiropractic at the Durban University of Technology

I, Julie Miroslava Muchna, do declare that this dissertation is representative of my own work in both conception and execution, except where acknowledgements indicate otherwise.

_____                    _____

Julie Miroslava Muchna                                 Date

**Approved for Final Submission**

_____                    _____

Dr. P.Z. Ndlovu - Supervisor                          Date

(M.Tech: Chiropractic)

_____                    _____

Dr. C.M. Korporaal - Co-Supervisor               Date

(M.Tech: Chiropractic, CCFC, CCSP, ICCSD)

# Dedication

"The strongest single factor in prosperity consciousness is self esteem:

believing you can do it,

believing you deserve it,

believing you will get it."

(Jerry Gillies)

This dissertation is therefore dedicated to my mom and dad and family for always believing in me.

# Acknowledgements

I wish to thank the following people:

- My mom, dad and Gareth (my data collectors), for all the weekends you gave up, I really do appreciate it.

- All the participants of this study, who without, this study would not be possible.

- Dr. Z. Ndlovu for being my supervisor.

- Dr. C. Korporaal for all the help and support over the last six years.

- Mrs. P. van den Berg and Mrs. L. Twiggs for all their help and support.

- Everyone from Gillitts Medical Centre for all your words of encouragement and support.

# Abstract

**Background:**

Previous investigations on the epidemiology of neck pain in South Africa were limited to the White and Black populations to the exclusion of Indians. Thus the purpose of this study was to create a profile of neck pain and provide an overview of risk factors with particular interest to the Indian population.

**Objectives:**

These included the investigation of neck pain prevalence, neck pain clinical characteristics and risk factors for neck pain in the Indian population in the greater Durban area.

**Method:**

The first criterion for sample selection the establishment of suburbs within the greater Durban area. Secondly the three most densely populated Indian suburbs were chosen and ranked according to income potential, to ensure a balanced sample. An equal number of residents in each suburb were targeted, with a minimum of 600 respondents. Statistical Program for the Social Sciences (SPSS) version 15.0 was used to analyse the data.

**Results:**

The demographics indicated that the respondents were predominantly matriculated (40.3%), married (57.9%), men (55.7%) of active (94%) Hindu or Christian religion (43%) with a mean age of 36.7 years and a BMI of 24.8 kg/m$^2$. The prevalence of neck pain was 36.83%, with an annual incidence of 28.83%. Original neck pain lasted 8.56 years with a Numerical Rating Scale reading of 4.97. The seldom experienced pain was affected by lifting, sleeping and concentration. In contrast recent neck pain lasted 50.4 days with a Numerical Rating Scale reading of 4.02. The more frequently experienced pain was equally affected by sleeping and lifting. Common risk factors identified for neck pain generally were stress, cycling, favouring one side when carrying a heavy object and suffering from headaches, shoulder pain and / or back pain. The findings of this study supported previous studies, although there were some significant differences. These included males having had a higher prevalence (55.7%) than females (44.3%), as well as watching television being a preventative factor to neck pain.

**Conclusions and Recommendations:**

Thus the prevalence and risk factors of neck pain in the Indian population were comparable to international norms. It was however noted that stratified gender sampling should perhaps have been utilised to strengthen this study and causality of factors in relation to neck pain could not be determined. Both these limitations allow for future research opportunities.

# **Table of Contents**

## Chapter Two

## Chapter Four

## Chapter Five

## Chapter Six

# List of Tables

# List of Figures

# List of Appendices

# Definitions

**Cervical Spine**

- The Oxford Medical Dictionary (2003) defines the cervical spine as that part of the spine which relates to the neck (i.e. the first through to seventh cervical vertebrae).

**Chiropractic Manipulation**

- This is a leverage technique that is characterised by a controlled, dynamic thrust of amplitude, velocity, and direction (Bergmann *et al.,* 1993).

**Disability**

- For the purposes of this study, disability was defined as an inability to perform activities of daily living (Oxford Handbook of Clinical Medicine, 1996).

**Epidemiology**

- This is the investigation of the prevalence, allotment, and management of infectious and non-infectious diseases in populations (Oxford Medical Dictionary, 2003). For the purposes of this study the investigation involved determining the prevalence and incidence, and clinical characteristics of neck pain in the Indian population.

**Incidence**

- Incidence is defined by the Oxford Medical Dictionary, (2003) as the percentage of new people affected by a certain disease over a recent period of time. Therefore, for the purpose of this study, this will represent recent neck pain.

**Neck Pain**

- Pain located between the occiput and the third thoracic vertebrae (Cote *et al.,* 2003).

**Pain** (Weinstein *et al.,* 1995)

- *Acute pain* is defined as pain with an immediate onset and duration of less than three months.
- *Chronic pain* is defined as pain with a duration of longer than three months.
- *Subacute pain* is defined as pain with a slow or gradual onset and a duration of less than three months.
- *Local pain* is defined as pain located between the occiput and the third thoracic vertebrae.
- *Referred pain* is defined as pain located in an area that has a common embryological origin as the involved region (viscerotome, myotome, dermatone or reflex changes within the associated sclerotome).
- *Radicular pain* is defined as pain along the distribution of a spinal nerve root and may have associated sensory or motor defects.

**Prevalence**

- According to the Oxford Medical Dictionary (2003), this is the total percentage of persons affected by a certain disease. Therefore, for the purpose of this study, this will represent original neck pain.

**Skilled Workers**

- Manual labourers require no significant skill in order to perform optimally in their chosen occupation. Most manual labourers require a grade ten educational level. Skilled workers, however, require a matric education with a tertiary degree in order to perform optimally in their chosen profession.

# Chapter One

# Introduction

## 1.1   Introduction

The potentially unique factors in the Indian population which could increase their risk to developing neck pain are classified as structural differences (Gupta *et al.,* 1982; Terry *et al.,* 1985; Sunder, 2006), lifestyle differences (Kirkaldy-Willis, 1992; Gupta *et al.,* 2009), and metabolic differences (Haslett *et al.*, 2002; Wulan *et al.,* 2010).

Structural differences such as a slightly lower bone density norm (Sunder, 2006), the highest incidence of congenital abnormalities (Terry *et al.,* 1985), and different sagittal canal dimensions of the cervical spine (Gupta *et al.,* 1982) may increase the risk of developing early degenerative changes, which could possibly enhance the risk for the Indian population to developing neck pain.

Lifestyle differences, such as a rapid increase in smoking between the ages of 15 and 39 years, in the Indian population (Gupta *et al.,* 2009), could be associated with an increased risk to the development of neck pain. This could be due to smoking being a risk factor in the development of neck pain (Kirkaldy-Willis, 1992), through a process of hypoxia.

Further, metabolic differences, abdominal obesity, is higher in Indian adolescents when compared with White adolescents (Wulan *et al.,* 2010), and thus a risk factor of developing osteoarthritis (Haslett *et al.*, 2002). This may increase the risk of the Indian population developing neck pain in the long term.

Neck pain, pain located between the occiput and the third thoracic vertebrae (Cote *et al.,* 2003), has a high prevalence in different population groups (Bovim *et al.*, 1994; Cote *et al.,* 2000; Guez *et al.*, 2002; Ndlovu, 2006; Slabbert, 2010). The variation in the prevalence ranged from 67.7% of the Saskatchewan population (Cote *et al.,* 2000), to 43.0% of the Swedish population (Guez *et al.,* 2002), and 34.4% of Norwegian adults (Bovim *et al.,* 1994).

In Durban, research has shown 50.0% prevalence in the Black African population (Ndlovu, 2006) and 45.0% in the White population (Slabbert, 2010). As yet research needs to highlight the prevalence in the Coloured population. This study aims to highlight the prevalence in the Indian population.

Different ethnic groups experience pain differently (Green *et al.,* 2003; Portenoy *et al.,* 2004), which validates the difference in prevalence of low back pain in the Black (53.1%) (van der Meulen, 1997), Coloured (32.6%) and Indian race groups (45.0%) (Docrat, 1999). This may, therefore, be similar to neck pain.

These factors amongst others in the literature indicate that the prevalence of neck pain in different population groups varies significantly (Bovim *et* al., 1994; Cote *et al.,* 2000; Guez *et al.,* 2002). South Africa seems to have a higher prevalence in those populations already studied (Ndlovu, 2006 and Slabbert, 2010) when compared with international studies, but the Indian population, with its particular predisposing factors (structural, lifestyle, and metabolic), may have a different prevalence. Thus, this needs to be researched so that this population can be compared with studies done in other parts of the world and particular health care strategies can be put in place to assist this particular population group should this research show some definite trends.

Therefore, this study aims to determine the prevalence and risk factors of neck pain in the Indian population in the greater Durban area.

## 1.2   Aims and Objectives of the Study

The aim of this study was to determine the prevalence and the risk factors of neck pain in the Indian population in the greater Durban area.

The objectives of the study were as follows:
1. To determine the prevalence of neck pain in the Indian population in the greater Durban area.
2. To determine the demographic profile of the Indian population with neck pain.
3. To characterise the clinical features of neck pain.

**4.** To identify the risk factors that influence neck pain in the Indian population.

## 1.3 Rationale for the Study

- Neck pain is a common condition which affects 34.4% to 67.7% of various population groups (Bovim *et al.,* 1994; Cote *et al.,* 2000; Guez *et al.,* 2002; Ndlovu 2006; Slabbert 2010). The Indian population has structural (Gupta *et al.,* 1982; Terry *et al.,* 1985; Sunder, 2006), metabolic (Haslett *et al.,* 2002; Wulan *et al.,* 2010) and lifestyle differences (Kirkaldy-Willis, 1992; Gupta *et al.,* 2009), which could increase the risk of this population to developing neck pain. If these factors are proved to be risk factors for neck pain, then this will influence future health care expenditure for this disease in this specific population.

- Hogg-Johnson *et al.,* (2008) stated that neck pain often co-exists with low back pain, which agrees with Drews (1995). Low back pain affects 45.0% of the Indian population from Isipingo (Docrat, 1999). Therefore, the likelihood of increased prevalence of neck pain in the Indian population as compared to other populations is hypothetically possible.

- As neck pain is a common condition (Bovim *et al.,* 1994; Cote *et al.,* 2000; Guez *et al.,* 2002; Ndlovu, 2006; Slabbert, 2010), determining the prevalence, risk factors and characterising its clinical features, will help the Chiropractic field by providing a profile on neck pain of the Indian population within the greater Durban area and allow for appropriate health care measures to be put into place in order to address neck pain in this population group.

## 1.4 Limitations of the Study

As this study was based on a questionnaire, the onus was on the participants to be truthful with each answer and to answer all the questions. The respondents were asked to be as open and honest as possible in order to reflect most accurately their reality at the time of completion of the questionnaire.

Since the design of this study was cross sectional, the factors identified as associated with neck pain were not necessarily causally related factors and therefore cannot be considered in

a cause-effect relationship, but rather as co-existent factors. Thus, they are merely associated with having neck pain and may even have arisen before or after the advent of the neck pain or because of the neck pain (e.g. favouring one side when lifting a heavy object is not necessarily what caused the neck pain and may be an adaptive behaviour that occurred as a result of the neck pain).

## 1.5   Conclusion

There have been two other studies conducted in South Africa concerning the risk factors for neck pain. Ndlovu (2006) conducted a study among the Indigenous African population whereas Slabbert (2010) conducted a study among the White population. The Indian population in South Africa were chosen for this dissertation, as there is paucity of literature on this specific population in South Africa. The study hopes to identify specific risk factors different to those already found in the Indigenous African and White populations. Different ethnic groups interpret and perceive pain differently and have different predisposing factors (van der Meulen 1997; Docrat 1999; Green *et al.*, 2003; Portenoy *et al.*, 2004). Therefore, this study hopes to highlight results that differ from those of Ndlovu (2006) and Slabbert (2010) and/or agree with previous international literature, in order to determine where the risk factors associated with neck pain in the Indian population.

Chapter Two includes the literature review supporting the background to the study. The materials and methods with respect to data collections, which outlines the analysis of the data is outlined in Chapter Three. Chapter Four presents the research findings and Chapter Five discusses the research findings in the context of the literature. Chapter Six concludes the dissertation and provides recommendations for further research.

# Chapter Two

# Literature Review

## 2.1    Introduction

This chapter presents the anatomy of the cervical spine, the profile of neck pain and the factors unique to the Indian Population.  The anatomy includes the vertebrae, joints, muscles, nerves, and movements of the cervical spine.   The focus of the pathologies that are discussed in this chapter is their clinical effect on the cervical spine.  The profile of neck pain presents the epidemiology, known causative factors, presentation, treatment, and consequences of neck pain.  The unique factors of the Indian population include structural, metabolic, and lifestyle differences.

## 2.2    Anatomy of the Cervical Spine

The neck is the chief connection between the head, trunk and limbs and contains many vital structures such as the vertebral column and its related musculature, the thyroid gland, the trachea, the jugular veins and the carotid arteries (Moore and Dalley, 1999).

### 2.2.1   Vertebrae of the Cervical Spine

The spine consists of twenty-four vertebrae, which are divided into seven cervical vertebrae, twelve thoracic vertebrae, and five lumbar vertebrae (Moore and Dalley, 1999; Magee, 2006).  The structure and function of each of the above is directly related to the anatomical and physiological demands placed on them (Vernon *et al,* 1990).

The cervical spine is formed by two functionally distinct, but interacting mechanisms: - the upper cervical spine contains the occiput, atlas and axis; and

the lower cervical spine contains the third to seventh cervical vertebrae (Haldermann, 1992).

Structurally however, the first (the atlas), second (the axis) and seventh (vertebrae prominens) cervical vertebrae are atypical, as part of the body of the first cervical vertebra is transferred to the body of the second vertebra and becomes the dens or odontoid peg.  The part of the body that remains of the first cervical vertebra becomes the anterior arch.  In contrast, the third through to and including the sixth vertebrae are typical cervical vertebrae and they are concave superiorly, convex inferiorly, and are smaller and their diameter is wider.  All cervical vertebrae are characterised by the vertebral foramen, which is large and triangular; as well as transverse processes that contain the transverse foramen (which are characteristic of the cervical vertebrae and through which the sympathetic and venous plexuses, and accompanying vertebral arteries pass) (Wiesel *et al.,* 1992; Giles and Singer*.,* 1998; Moore and Dalley, 1999).

In addition, to the transverse process projections of the typical vertebrae, the superior facets are directed in a superoposterior direction while the inferior facets are directed in an inferolateral direction.  The spinous processes of the third through to fifth cervical vertebrae are short and bifid, whereas the sixth and seventh cervical vertebrae spinous processes are usually longer and show a slightly lesser tendency to a bifid shape (Wiesel *et al.,* 1992; Giles and Singer*.,* 1998; and Moore and Dalley, 1999).

Due to the uncovertebral joints, the facetal orientation, the shape of the vertebrae as they sit on top of one another, and ligamentous and muscular limitations, the adult cervical spine has a mild lordosis with an apex at the fifth cervical vertebra and an average of 34 degrees (Harrison *et al.,* 1996).

The bony structures of the cervical spine receive their innervation from the anterior or ventral rami as well as the middle and posterior branches of the posterior or dorsal rami at their corresponding level as well as from a segment above and a segment below.  The most innervated region is usually that associated with the bony elements related to the facet joints as well as the

spinous processes. It is, however, noted that all bone is covered by periosteum which is generally well innervated. Therefore, any condition that is likely to affect bone may also be a risk factor associated with neck pain (Cramer and Darby, 1995; Haslett *et al.*, 1999; Leach, 2004).

Conditions include, but may not be limited to:

### 2.2.1.1 Osteoporosis

This common disease is characterised by decreased bone mass, micro architectural deterioration of bone tissue and an increased risk of fracture. The risk for fracture increases in both men and women with increasing age. Clinically the patient presents with fragility fractures, which are most common in the forearm, the spine, and the femur (Haslett *et al.*, 2002).

### 2.2.1.2 Osteomalacia

This uncommon disease is characterised by defective bone mineralization, bone pain, muscle weakness and pathological fractures. The most common causative factor is decreased vitamin D intake. The most common metabolic defect that accompanies this disease is chronic renal failure due to failure of renal vitamin D synthesis. Patients affected by this disease present with a waddling gait and bone and muscular tenderness (Haslett *et al.*, 2002).

### 2.2.1.3 Paget's Disease

Increased, disorganised bone remodelling on a focal or multifocal basis at various sites in the skeleton characterise this bone uncommon disease. The most common sites affected are the pelvis, femur, tibia, lumbar spine, skull and scapula. The clinical signs of this disease are bone deformity and expansion, increased warmth over the affected bones, and pathological fractures. Deformity occurs primarily in the skull and weight bearing bones such as the femur and tibia.

These deformities can expand and compress the spinal cord and intervertebral foramina. This results in nerve root entrapment, spinal cord compression and spinal stenosis (Haslett *et al.*, 2002).

Osteoporosis results in pathological fractures, with vertebral fractures being common. These fractures are responsible for the pain perceived by patients with osteoporosis (Cramer and Darby, 1995; Haslett *et al.*, 1999). Osteomalacia causes a weakening of the bone due to reduced skeletal dimensions, whereas increased skeletal dimensions occur with Paget's disease. These result in biomechanical and functional abnormalities, producing pain due to these abnormal adaptations and their secondary compensations (Haslett *et al.*, 1999; Leach, 2004).

## 2.2.2  Joints of the Cervical Spine

The two joints unique to the cervical spine are the atlanto-occipital and atlantoaxial joints, both of which are classified as synovial joints. The atlanto-occipital joint occurs between the occiput and the lateral masses of the atlas. The atlantoaxial joint connects the first and second cervical vertebrae and is solely stabilized by ligaments (Giles and Singer, 1998; Moore and Dalley, 1999).

The intervertebral joints are formed by the articulating surfaces of adjacent vertebrae and are connected by an intervertebral disc and ligaments. This secondary fibrocartilagenous joint is the only joint without a capsule, but has in its place layers of lamellae orientated at 120 degrees to each other surrounding the nucleus pulposus (Leach, 2004). These intervertebral discs only occur between the second and seventh cervical vertebrae and provide shock absorption and give the cervical spine its shape (Giles and Singer, 1998; Moore and Dalley, 1999).

The zygapophyseal or facet joints are diarthroidal facet joints found between all the cervical vertebrae and are formed by the articulation between the superior and inferior articular processes of adjacent vertebrae. These joints function to direct

movements between the vertebrae as well as to protect itself and the primary fibrocartilagenous joint (Giles and Singer, 1998; Moore and Dalley, 1999).

The uncovertebral joints are formed between the uncinate processes and the bevelled surfaces of the third through to the sixth cervical vertebral bodies (Giles and Singer, 1998; and Moore and Dalley, 1999). These joints function to control both extension and lateral flexion movements. Their raised lips at the superior aspect are responsible for preventing anterior slippage of the vertebrae (Cramer and Darby, 1995).

Usually the combination of the facet joint and the disc is referred to as the three joint complex in the spine, which is the principle structure responsible for weight bearing transfer from one vertebra to the next successive vertebra down the spine (Gatterman, 1990; Cramer and Darby, 1995). Within this three joint complex, the innervation of the facet joint is greater than compared to the disc, which is minimally innervated and then only in the outer third of the lamellae (Gatterman, 1990; Cramer and Darby, 1995). Thus, conditions of the facet joints are more likely to cause pain as the disc per se. However, the protrusion or herniation of the disc may cause inflammatory responses and/or ischemia in areas that are compressed in the vertebral or intervertebral foramina, thus resulting in pain (Gatterman, 1990). The latter is normally in late stages of pathologies associated with radicular pain, whereas facetal pain is usually localised (Gatterman, 1990; Haldeman, 2005).

Conditions of the cervical spine that display the above and occur commonly include:

### 2.2.2.1 Juvenile Idiopathic Arthritis

This is defined as an inflammatory arthritis, which is unrelenting (duration greater than six weeks), develops before the age of sixteen years and for which no specific cause is found. This disease is classified into six groups according to the International League against Rheumatism (2010). They are oligoarthritis,

psoriatic arthritis, polyarthritis, enthesistis-related arthritis, systemic arthritis and other arthrotides (Haslett *et al.*, 2002).

### 2.2.2.1.1 Oligoarthritis

This is the most common form and affects young girls, mainly the knees in the lower limbs. Approximately 30% of the cases progress to severe polyarthritis. (Haslett *et al.*, 2002).

### 2.2.2.1.2 Psoriatic Arthritis

This affects older girls and boys equally. It is diagnosed by characteristic skin plagues or a family history of psoriasis (Haslett *et al.*, 2002).

### 2.2.2.1.3 Polyarthritis

This type is responsible for 40% of juvenile idiopathic arthritis cases. Young girls are mostly affected when the rheumatoid factor is negative. This results in symmetrical involvement of small and large joints in both the upper and lower limbs. The cervical spine is also commonly affected. Early cervical fusion may give rise to the stiff neck, which is characteristic in adults who have suffered from this form of arthritis. About 10% have severe joint damage, thus predisposing the patient to early degenerative joint disease (Haslett *et al.*, 2002).

### 2.2.2.1.4 Enthesistis-Related Arthritis

Older boys are usually affected and involves mainly the joints of the lower limbs (e.g. hips, knees and ankles) with enthesistis (inflammation of the tendon insertion). Commonly the disease evolves to adult ankylosing spondylitis (Haslett *et al.*, 2002).

### 2.2.2.1.5   Systemic Arthritis

This is the least common and affects boys and girls under the age of two years old.  This diagnosis is difficult, but the intermittent fever and faint pink macular rash are helpful.   Later 30% develop severe chronic polyarthritis, which is resistant to treatment and could lead to secondary amyloidosis (Haslett *et al.*, 2002).

### 2.2.2.2 Rheumatoid Arthritis

This is the most common inflammatory arthritis and has a life-long course.  Some patients experience mild symptoms while others experience more severe and debilitating symptoms (Haslett *et al.*, 2002).

A diagnosis of rheumatoid arthritis can only be made if four or more of the following criteria are met (Haslett *et al.*, 2002):
- Morning stiffness longer than one hour
- Arthritis of three or more joint areas
- Arthritis of the hand joints
- Symmetrical arthritis
- Rheumatoid nodules
- Rheumatoid factor
- Radiological changes and/or
- Duration of six or more weeks.

The neurological feature of this disease is cervical cord compression due to subluxation medical of the atlantoaxial joint.   This is a common finding in established rheumatoid arthritis as a result of erosion of the transverse ligament, which passes behind the posterior aspect of the odontoid peg.  During flexion movements this causes the odontoid peg to move posteriorly and compress the spinal cord and the patient may report symptoms of an occipital headache with parasthesia in the upper limbs (Haslett *et al.*, 2002).

The above three conditions result in an inflammatory mediated pain response. This response has three levels of involvement. The first is the tissue level response where there is swelling of the surrounding tissues with resultant compression of pressure sensitive nerve endings, causing pain. The second is the cellular level response, in which macrophages clean up the tissue debris by means of phagocytosis. This leads to increased neurological stimulation of free nerve endings by means of lysosomal enzymes, which results in pain. The final level is the biochemical response where histamine is released by the mast cells and platelets. Histamine and other inflammatory mediators (prostoglandins and interleukins) are also noxious stimulators of free nerve endings (Leach, 2004).

### 2.2.3 Muscles of the Cervical Spine

The muscles in the neck region are complex and specialised as the cervical spine is the most mobile segment of the spinal column (Wiesel *et al.,* 1992).

There are four groups of muscles in the neck, starting with the superficial muscles in the lateral aspect of the neck, which include the platysma, sternocleidomastoid and trapezius muscles. The lateral prevertebral muscles are the splenius capitis, levator scapulae, anterior scalene, middle scalene and posterior scalene muscles. The prevertebral classification muscles comprise of the erector spinae and multifidi muscles; with the muscles in the anterior triangle of the neck being divided into suprahyoid and infrahyoid muscles. The suprahyoid group include the myohyoid, geniohyoid, stylohyoid and digastric muscles. The infrahyoid muscles are the sternohyoid, omohyoid, sternothyroid and thyrohyoid muscles (Gatterman, 1990; Moore and Dalley, 1999).

According to Liebenson, (1996), when a muscle is not functioning optimally it will result in compensatory changes in its functional partners (the joint and central nervous system). Lee (1994) found that a muscle contraction will cause a force that affects the muscle, surrounding tendons, ligaments and bones, which are either anatomically (directly) or neurologically (indirectly) related. This means that an overactive muscle will transmit stress to the surrounding joints and soft tissues. Possible causes for changes within muscles and their function include, but are not

limited to biomechanical, endocrine, nutritional, infective, psychosocial, and traumatic causes (Travell and Simons, 1983).

Thus, with the muscles of the neck being supplied by the anterior and posterior rami of the cervical spinal nerves, it is likely that any muscular injury or causative agent that perpetuates muscle contraction would be likely to cause an inflammatory pain response or a pain response from hypoxia respectively (Leach, 2004).

As a result, pain in the back of the neck can be caused by any of the following muscles:  trapezius, multifidi, levator scapulae, splenius cervicus or infraspinatus. Throat and pain in the front of the neck can result from active myofascial trigger points in any of the following muscles:  sternocleidomastoid, digastric or medial pterygoid (Travell and Simons, 1983).

The muscles in the body can be divided into local and global muscles.  The function of local muscles is to control segmental stiffness, independent of the global muscles.  Global muscles provide regional stability and act on the spine without attaching to it directly.  The global muscles also evenly distribute the load stress on the spine and balance these forces.  Some muscles belong to both divisions (Lee, 1994; Giles and Singer, 1998; O'Sullivan, 2005).

Both static and dynamic posture are controlled and incorporated with the neurological innervation via the cervical nerves of the structure.  Chiefly, this is by means of the primary dorsal ramus of the spinal segmental nerve root from the first to the seventh cervical vertebrae.  These abovementioned muscles are responsible for the dynamic posture of the neck.  (Darby and Cramer, 1995; Moore and Dalley, 1999; Chaitow, *et al.,* 2000; and Agur and Dalley*,* 2005).

**Table One:  Local Muscle of the Neck**

|  | Superior Attachment | Inferior Attachment | Main Action | Symptoms |
|---|---|---|---|---|
| **Splenius Capitus** | Lower half of ligamentum nuchae and spinous processes of superior thoracic vertebrae | Outer aspect of mastoid process and outer third of upper nuchal line | Laterally flex and rotate neck to ipsilateral side | Referred pain close to vertex (uppermost point) of skull |

| | | | | |
|---|---|---|---|---|
| **Splenius Cervicus** | Ligamentum nuchae and spinous processes of 7th cervical to 3rd thoracic vertebrae | Tubercles of transverse process of 1st to 3rd cervical vertebrae | Laterally flex and rotate neck to ipsilateral side | Stiff neck with pain mostly in the neck, eye, and cranium |
| **Erector Spinae** | Posterior part of iliac crest, posterior covering of sacrum, sacral and lower lumbar spinous processes, and supraspinous ligament via a thick tendon | Iliocostalis: Travel upwards to cervical transverse processes<br><br>Longissimus: Travel upwards to transverse processes of cervical vertebrae and mastoid process of temporal bone<br><br>Spinalis: travel upwards to spinous processes of lower cervical spine and to skull | Acting individually results in lateral flexion of the spine<br><br>Acting together results in extension of the spine | Tender restricted movement of the neck with pressure on back of neck and head causing pain |
| **Multifidus** | Sacrum and ilium, transverse processes of 1st to 3rd thoracic vertebrae, and articular processes of 4th to 7th cervical vertebrae | Passes upwards and outwards to spinous process of above vertebrae (spans 2 to 4 levels) | Stabilise vertebrae during local movements of the spine | Tender restricted movements of the neck |
| **Mylohyoid** | Mylohyoid ridge of mandible | Body of hyoid bone and associated fascial raphe | During speaking and swallowing elevates hyoid bone and floor of mouth | Not evidenced in literature |
| **Geniohyoid** | Mental spine of mandible | Hyoid bone | Draws hyoid bone upward and forward, reduces the floor of the mouth, and expands the pharynx | Not evidenced in literature |
| **Stylohyoid** | Styloid process of temporal bone | Hyoid bone | Elongates floor of mouth by raising and drawing back the hyoid bone | Not evidenced in literature |
| **Digastric** | Anterior: Digastric impression of mandible<br><br>Posterior: Mastoid indentation of temporal bone | Greater horn of hyoid bone via intermediate tendon | Depresses mandible, and during swallowing and speaking elevates hyoid bone and stabilises it | Anterior: pain in lower incisor teeth region<br><br>Posterior: Sensation of lump in throat with difficulty swallowing |
| **Sternohyoid** | Manubrium of sternum and inner end of clavicle | Hyoid bone | Depresses hyoid bone after swallowing | Not evidenced in literature |
| **Omohyoid** | Upper border of scapula close to suprascapular notch | Hyoid bone | Lowers, pulls back, and stabilises hyoid bone | Through its effect on the cervical fascia attaching to the 1st rib, may result in rib dysfunction |
| **Sternothyroid** | Posterior aspect of manubrium of sternum | Thyroid cartilage | Lowers hyoid bone and larynx | Not evidenced in literature |
| **Thyrohyoid** | Thyroid cartilage | Hyoid bone | Lowers hyoid bone and raises larynx | Not evidenced in literature |

(Adapted from Moore and Dalley, 1999; Travell and Simons, 1983)

**Table Two: Global Muscles of the Neck**

| | Superior Attachment | Inferior Attachment | Main Action | Symptoms |
|---|---|---|---|---|
| **Platysma** | Lower border of mandible, skin, and superficial tissues of lower face | Fascia overlaying higher parts of pectoralis major and deltoid muscles | Responsible for downward drawn corners of mouth and widening during sadness or fright | Multiple pinprick sensation in face not of electric nature |
| **Sternocleidomastoid** | Lateral exterior of mastoid process of temporal bone and outer half of superior nuchal line | Sternal head: frontal surface of manubrium of sternum | Unilaterally, flex the head | Sternal: Pain mainly involves cheek, temporal and orbital regions |
| | | Clavicular head: upper surface of inner third of clavicle | Bilaterally flex the head | Clavicular: Frontal headaches, postural imbalances, and abnormal weight perception |
| **Trapezius** | Inner third of upper nuchal line, external occipital protuberance, ligamentum nuchae, 7th cervical -12th thoracic , lumbar, and sacral spinous processes | Outer third of clavicle, acromion, and spine of scapula | Upper fibres elevate scapula | Severe posterolateral neck pain with related temporal headache |
| | | | Middle fibres retract scapula | Fiery interscapular pain |
| | | | Lower fibres depress scapula | Neck pain with no restricted neck movements |
| **Levator Scapulae** | Posterior tubercles of 1st to 4th cervical transverse processes | Upper part of inner border of scapula | Elevate scapula | Pain at angle of neck with tender stiff neck |
| **Anterior Scalene** | Anterior tubercles of 3rd to 6th cervical transverse processes | Scalene tubercle of 1st rib, in front of subclavian artery groove | Laterally flexes and rotates neck, elevates 1st rib | Minimal reduced neck movement Numbness and tingling in hand with sudden and unexplained releasing of objects from hand |
| **Middle Scalene** | Transverse process of 2nd to 7th cervical vertebrae | Upper surface of 1st rib, behind subclavian artery groove | Laterally flexes neck, elevates 1st rib during strained inspiration | |
| **Posterior Scalene** | Posterior tubercle of transverse processes of 4th to 6th cervical vertebrae | Outer border of 2nd rib | Laterally flexes neck, elevates 2nd rid during strained inspiration | |

(Adapted from Moore and Dalley, 1999; Travell and Simons, 1983)

**Trapezius**

**Splenius Capitus**

**Splenius Cervicus**

**Levator Scapulae**

**Skull**
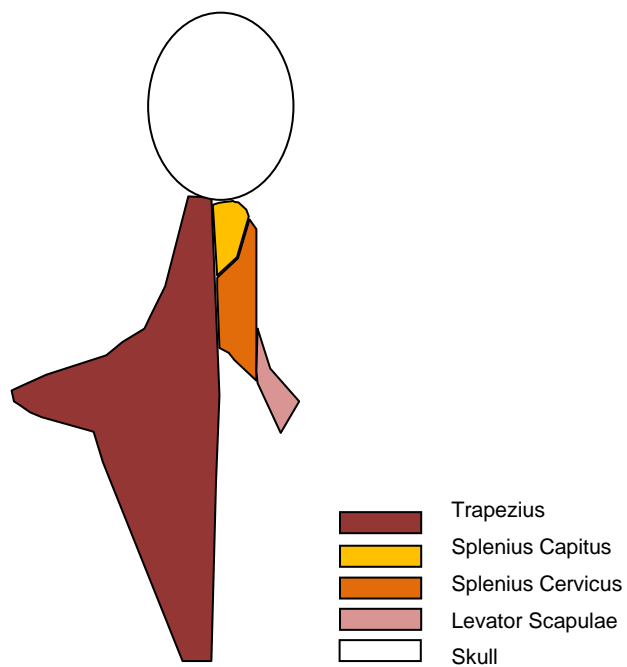
**Figure One:  Posterior Muscles of the Neck**

(Adapted from Moore and Dalley, 1999)



Sternocleidomastoid
Levator Scapulae
Middle Scalene
Anterior Scalene
Posterior Scalene
Clavicle
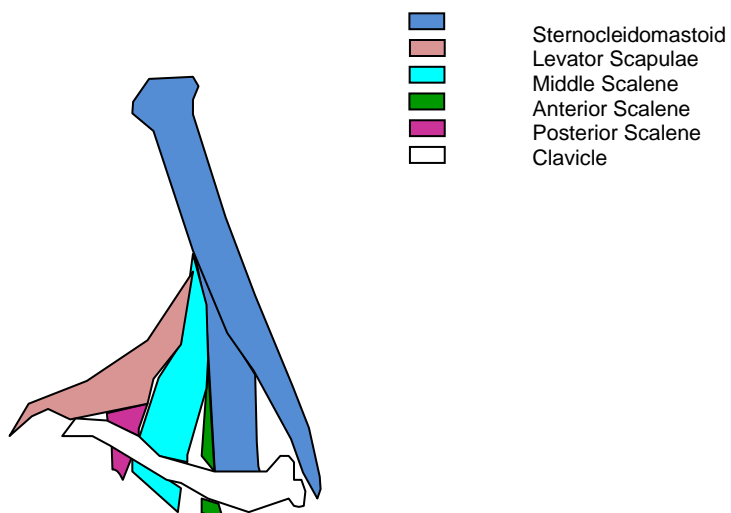
**Figure Two:  Lateral Muscles of the Neck**

(Adapted from Moore and Dalley, 1999)
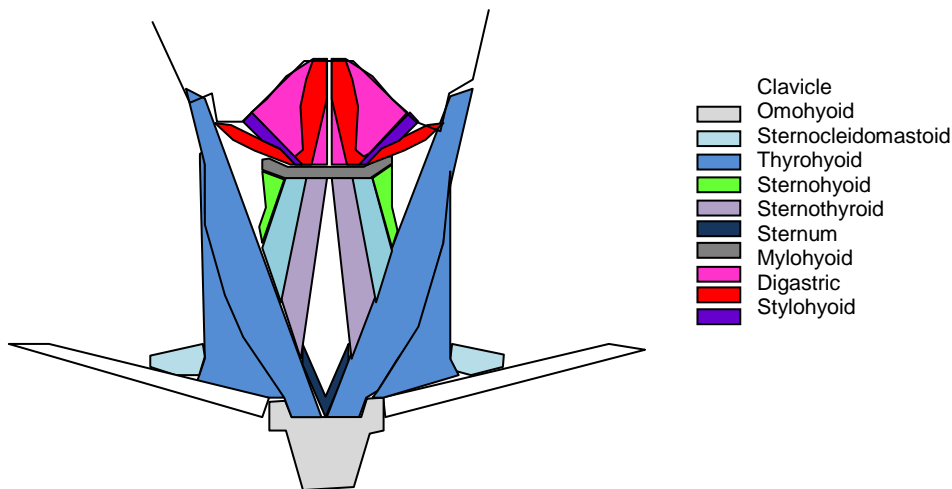
**Figure Three:  Anterior Muscles of the Neck**
(Adapted from Moore and Dalley, 1999)

In addition to the functional pathology, there are also structural pathologies, which include, but are not limited to these common pathologies:

## 2.2.3.1 Polymyalgia Rheumatica

This is a clinical syndrome with muscle pain, stiffness and typically an increased erythrocyte sedimentation rate.  It mainly affects the elderly with a mean onset of 70 years of age.  Females are more commonly affected.  The classical clinical picture is symmetrical muscle stiffness and pain affecting the proximal muscles of the neck and upper arms (Haslett *et al.*, 2002).

## 2.2.3.2 Torticollis

There two types of torticollis are congenital and spasmodic (Moore and Dalley, 1999).

### 2.2.3.2.1  Congenital

This type of toricollis may either be a result of a fibrous tissue tumour or tearing of the sternocleidomastoid muscle during a difficult birth.  The fibrous tissue tumour develops before birth and causes the infant's head to laterally

flex towards the affected side.  The tearing of the sternocleidomastoid muscle fibres causes a hematoma that traps the innervation of the sternocleidomastoid muscle.  This results in shortening of the muscle, causing the abnormal head position (Moore and Dalley, 1999).

### 2.2.3.2.2  Spasmodic

Neck pain in patients with spasmodic torticollis is due to abnormal tonicity of the sternocleidomastoid muscle that begins between 20 and 60 years of age (Moore and Dalley, 1999).

Pain in polymyalgia rheumatica is of undefined origin.  In torticollis, the pain is due to biomechanical and functional abnormalities, producing pain due to these abnormal adaptations and their secondary compensations (Haslett *et al.*, 1999; Leach, 2004).

### 2.2.4  Nerves of the Cervical Spine (Porterfield and DeRosa, 1995; Moore and Dalley, 1999; and Faiz, *et al.,* 2002)

- The first cervical nerve, the suboccipital nerve, supplies the small muscles of the suboccipital triangle (e.g. rectus capitus posterior and obliqus muscles).
- The dorsal ramus of the second cervical nerve, the greater occipital nerve, supplies sensory innervation to the skin over the occipital bone and the neck.
- The ventral rami of the second, third, and fourth cervical nerves provide muscular and sensory branches to the back, which supply the skin of the neck and the anterior muscles of the neck (e.g. longus capitus, longus colli, rectus capitus anterior, and lateralis).
- The ventral rami of the fifth, sixth, seventh and eighth cervical nerves join to form the brachial plexus

Guyton and Hall (1997) explain that pain occurs when the free nerve endings (C fibres) are stimulated chemically, mechanically or thermally.  C fibres are

unmyelinated free nerve endings and they function primarily in response to noxious stimuli (Leach, 2004).

**2.2.4.1 Cervical Spondylotic Radiculopathy**

This is compression of a nerve root due to lateral prolapse of a disc.  Clinically the patient complains of pain in the neck that may radiate along the distribution of the affected nerve.  The patient holds their neck rigidly as movements of the neck may exacerbate the pain.  There is parasthesia and sensory loss in the affected dermatomal segment (Haslett *et al.*, 2002).

**2.2.4.2 Cervical Spondylotic Myelopathy**

This is pressure on the spinal cord or the anterior spinal artery, which supplies the anterior two thirds of the cord.  This is as a result of dorsomedial herniation of a disc that may be due to a hyperextension injury.  Clinically there is sensory loss producing tingling, numbness and progressive clumsiness in the hands (Haslett *et al.*, 2002).

**2.2.5   Movements of the Cervical Spine**

The main movements that occur in the cervical spine are flexion, extension, rotation and lateral bending.  These movements are possible as a result of the abovementioned joints and the musculature of the neck.  The further down the spine the cervical joint is, the more lax the joint capsule is to allow for increased gliding movements.  An optimally functioning cervical spine has a total of 130 degrees in flexion and extension, 75 degrees of lateral flexion, and 160 degrees of rotation.  These movements and degrees decrease with increasing age and disabilities (Panjabi*,* 1992; Giles and Singer, 1998; Moore and Dalley, 1999) as well as pain and inflammation (Cramer and Darby, 1995).

Coupled movements are defined as simultaneous rotation and lateral flexion around the respective axis (Forman and Croft.*,* 1989).  At the second cervical vertebra there are two degrees of rotation for every three degrees of lateral

flexion, whereas at the seventh cervical vertebra there is only one degree of rotation for every eight degrees of lateral flexion (Panjabi, 1992).

The anatomical limits of a vertebra and the muscles that control them are closely related (Panjabi, 1992; Lee, 1994; Moore and Dalley, 1999; O' Sullivan, 2005). The movement pattern of each vertebra is directly determined by its structural design and soft tissue attachments (Forman and Croft, 1989; Panjabi, 1992; Moore and Dalley, 1999).

Decreased movement is related to a number of different factors that are associated with the joints, muscles, and nerves, and/or a combination of the three, as well as the systemic factors that impact on one or all three (Panjabi, 1992).

### 2.2.5.1 Cervical Facet Syndrome

Facet joint dysfunction in the cervical is analogous to an ankle sprain, which includes factors related to pathology of movement, muscle, nerves, vascular and/or connective tissues; the combination of which is usually determined by the injurious factor that has induced the syndrome (Gatterman, 1995; Bergman *et al.*, 1993). This is characterised by superseding of the facet joints posteriorly. Clinically, morning stiffness is a common complaint and there is radicular pain along the affected nerve with associated subjective numbness (Murphy, 2000).

### 2.2.5.2 Fibromyalgia

Fibromyalgia is a common cause of multiple regional pain and disability. There are two abnormalities that are thought to be the causative factors. They are sleep abnormality and abnormal pain processing. Patients with this disease have difficulty obtaining the delta sleep pattern, which is thought to be restorative and occurs during the first few hours of sleep. The abnormal pain processing manifests as a reduced pain threshold to pain perception and tolerance. Multiple regional pain focusing on the neck and back is the main presenting. Characteristically, the pain is unresponsive to analgesic and non-steroidal-anti-inflammatory-drug medication and physiotherapy. On examination, the principle

findings are hyperalgesia at the skin folds of the mid trapezius muscle, the interspinous ligaments of the fifth to seventh cervical vertebrae, and the mid supraspinatus area (Haslett *et al.*, 2002).

**2.2.5.3 Cervical Spondylosis**

This disease involves degeneration and secondary osteoarthrosis of the fourth, fifth, sixth, and seventh cervical vertebrae.  The fifth cervical nerve root is most commonly affected.  There two types of presentation are cervical spondylotic radiculopathy and cervical spondylotic myelopathy (Haslett *et al.*, 2002).

**2.2.5.4 Tumours**

Tumours present in a number of different ways in the cervical spine, the most common of which is via metastatic spread (haematogenous or lymphatic spread from elsewhere in the body).  Depending on the location, stage of pathogenesis, and the aggressiveness of the lesion the symptomatology associated with tumours of the cervical spine will vary from mild discomfort to severe pain, normal movement to restricted movement (e.g. torticollis), and various nuances of related clinical symptomatology (e.g. headaches and arm pain) (Bates, 1991; Haslett *et al.*, 2002; Boon *et al.*, 2006)

## 2.3    Profile of Neck Pain

### 2.3.1   Presentation of Neck Pain

Haslett *et al.*, (2002) described the most common form of neck pain as a constant, mild, deep, dull, aching pain that was made worse by physical activities involving the neck.   Neck pain is normally poorly localized, with the upper cervical nerve roots radiating pain to the face, occiput or temporal regions, while lower cervical nerve roots radiate pain to the shoulder, scapula, arm and chest wall (Haslett *et al.,* 2002).   Neck pain may also be associated with referred pain to the head, shoulders, upper extremities and anterior or posterior portions of the chest, as well as between the shoulders and the mid or low back regions (Travell and Simons*,* 1983; Chaitow *et al.,* 2000).

### 2.3.2   Epidemiology

#### 2.3.2.1 Prevalence of Neck Pain

The highest prevalence of neck pain was found in the Saskatchewan population (Cote *et al.,* 2000), where the prevalence was 67.7%.   The Swedish population had a slightly lower prevalence of 43.0% (Guez *et al.,* 2002), whereas Norway had a 34.4% prevalence of neck pain (Bovim *et al.,* 1994).   The prevalence in South Africa was 45.0% in the Indigenous African population (Ndlovu, 2006), which compares to results found abroad.   Further, Slabbert (2010) reported that 50.0% of the White population in South Africa were affected by neck pain.   This result is similar Cote *et al.*, (2000) results, where the highest recorded prevalence of neck pain was experienced when compared with other studies.

Drews (1995) found that neck pain and low back pain were equally common, which agrees with Hogg-Johnson *et al.,* (2008) that neck pain often co-exists with low back pain.   Thus, it is possible to consider neck pain prevalence to be of a similar magnitude to those of the established low back pain prevalence.   However,

when these results were compared with Ndlovu's (2006) on the Indigenous African population in Durban, which reported a 45.0% prevalence of neck pain and van der Meulen's (1997) study on the same population, which revealed a 53.0% prevalence of low back pain, it appears that the local results conflict with this argument.

## 2.3.2.2 Incidence of Neck Pain

In a study conducted by Kamwendo *et al.,* (1991), occasional neck and shoulder pain was experienced by 32% of medical secretaries and constant neck pain was experienced by 17%, of which 13% reported an associated disability. Similarly, 27% of data entry workers experienced a constant discomfort in the neck and shoulder discomfort was experienced by 10-15% (Sauter *et al.,* 1991). These studies concur with Waalen (1993), Guez *et al.,* (2002) and Cassou *et al.,* (2002).

Cassou *et al.,* (2002) found that, as neck pain increases, the resolution rate of the pain decreases with age. This leads to the development of chronic neck pain.

## 2.3.3 Causative Factors of Neck Pain

## 2.3.3.1 Demographic Factors

In a study conducted by Chiu *et al.,* (2004), 62% of females and 38% of males in Hong Kong suffer from neck pain. This higher prevalence of female suffers concurs with Bland (1994); Borghouts *et al.,* (1999); Croft *et al.,* (2001); Guez *et al.,* (2002); Ndlovu (2006); and Slabbert (2010) who found that women were more prone to developing neck pain. Based on population demographics according to Statistics South Africa, it is hypothesized that the results of this study would show a greater and prevalence and incidence favouring the female population (Statistics South Africa, 2010).

Cote *et al.,* (2008) reiterated Waalen, (1993) who stated that age is a risk factor to developing neck pain and thus neck pain increases with advancing age. As the average age of the Indian population is 30-40 years of age it compares favourably with the age ranges of international studies; thus it is anticipated that the affect of age on neck pain would be similar to the international studies (Statistics South Africa, 2010).

**2.3.3.2 Physical Factors**

Chiu *et al.,* (2002) defines poor posture as a posture in which the head is thrust forward; there are excessive spinal curves in the sagittal plane, sloping or hunched shoulders, a protruding abdomen and hyperextended knees. Giles and Singer, (1998) concluded that poor posture significantly increases the biomechanical stresses on the cervical spine, and thus is a risk factor to developing neck pain (Edmondston *et al.,* 2007).

Work postures, repetitive movements and high forces are risk factors to developing neck pain (Larsson *et al.,* 2007), which agrees with Tayyari and Smith, (1997). Ariens *et al.,* (2001) also found that lack of job control, high and low skill discretion; low job satisfaction and high quantitative job demands are risk factors to developing neck pain.

Neck pain is greater in the sedentary, overweight worker (Holmstrom *et al.,* 1992). This concurs with Croft *et al.,* (2001) who found that poor physical health is a risk factor to developing neck pain.

Depending on the occupation, there are factors that would act as enables or detractors in the development of neck pain and therefore the only comparison that can be made is between skilled and unskilled workers. Thus in light of the fact that the majority of Indians, in the South African context, are classified as skilled workers, it is anticipated that the effect of their occupational rank would be similar to international studies that report a skilled worker profile.

### 2.3.3.3 Psychosocial Factors

Linton, (2000) divides the psychological aspects into four groups, namely cognitive factors (beliefs concerning pain, disability and perceived health); emotional factors (distress, anxiety and depression); social factors (work and family issues); and behavioural factors in response to pain (coping with pain and pain behaviours). Cote *et al.,* (2004) discovered a positive relationship between neck pain and co-morbidities (such as depression, low back pain and headaches) and smoking. Separated, divorced or widowed people have a higher incidence of neck pain (Croft *et al.,* 2001).

### 2.3.3.4 Traumatic Factors

Guez *et al.,* (2002) discovered that previous neck and head trauma, as well as whiplash injuries, are risk factors to developing further neck pain. This agrees with Lau *et al.,* (1996) and Croft *et al.,* (2001) who found similar findings.

Solomon *et al.,* (1992) found that alcohol abuse increases the risk of head trauma and potentiates the resulting brain injury, whereas Bland (1994) relate alcohol to neck pain as a potential headache inducer in susceptible individuals.

This would be similar to all groups and the results would be expected to concur with the literature.

### 2.3.4 Diagnosis of Neck Pain

The patient's complaint and physical clinical examination is the most successful way for a physician to diagnose neck pain (Larsson *et al.,* 2007).

### 2.3.5  Treatment of Neck Pain

In most cases, patients who complain of general neck pain are treated with education and analgesic medication.  After two days, 30% of complaints resolve and at six weeks 85% to 90% of patients recover.  However, 10% to 15% of patients with acute pain will develop chronic pain (Haslett *et al.*, 2002).

Education regarding exercise is very important.  Sometimes medications such as non-steroidal-anti-inflammatory-drugs are required in order to improve mobility and facilitate exercise (Haslett *et al.*, 2002).  Exercise is an effective treatment plan for neck pain, particularly cervical motion if it is performed habitually several times a week (Jenson and Harms-Ringdahl, 2007; Hurwitz *et al.,* 2008).

Weisel *et al.,* (1992) stated that heat, cryotherpay, electrical modalities, traction and joint mobilisation were effective treatments for neck pain.  This was reiterated by Jenson and Harms-Ringdhal (2007) and Hurwitz *et al.,* (2008) who found transcutaneous electric nerve stimulation (TENS) or low level laser treatments (LLLT) to be effective treatments for short term symptom reduction in neck pain.

Manipulation is also a successful treatment plan for those patients who suffered from acute neck pain that lasts longer than six weeks (Haslett *et* al., 2002; Haneline, 2006).  This was supported by Hurwitz *et al.,* (2008).

Surgery is only considered in cases where there are neurological signs of radiculopathy or progressive cervical myelopathy because permanent damage could result if the pressure on the nerve is not released (Haslett *et al.*, 2002).

### 2.3.6  Consequences of Neck Pain

The known consequences of neck pain are substantial in their medical consumption, where 1% of the Netherlands health care expenses for 1996 were neck pain related; absenteeism from work, where neck pain related sick days amounted to 1,4 million (Borghouts *et al.,* 1996); and disability in the working-age

population, where 4,6% of the Saskatchewan population (Cote *et al.,* 1998) and 0,6% of the Canadian population are affected (Cote *et al.,* 2008).  Disability accounted for 50% of the total costs related to neck pain (Borghouts *et al.,* 1996). Borghouts *et al.,* (1999) also found that 2,5% of disability claims were neck pain related.

Moderate or severe residual neck pain was experienced by 32% of neck pain sufferers (Gore, 1998) and 13,8% of Norwegian adults (Bovim *et al.,* 1994).  Linton, (2000) stated that there was "difficulty in successfully treating long-term back and neck problems", which showed the chronicity of neck pain and its reoccurrence, thus it is an area of interest to determine specific risk factors and prevent the cycle from beginning.  Identifying these risk factors would help to prevent the initial onset of neck pain, and thus avoiding the high costs involved with neck pain.

## 2.4    Factors Unique to the Indian Population

Durban Investment Promotion Agency, (2010) found that Durban has the highest Indian population outside of India.  Therefore, it is an important population group to consider in terms of health economics.  In this regard unique factors, such as anatomical, lifestyle, and metabolic differences, may predispose this population to increased prevalence and/or incidence of neck pain in addition to their combination with more common risk factors that may also be unique to this population group (Bovim *et al.*, 1994; Cote *et al.,* 2000; Guez *et al.*, 2002).  Therefore this research aims to ascertain relationships between risk factors and epidemiological markers (such as prevalence and incidence) in order to form a foundation for further research in the causality effects of the neck on the risk factors and vice versa.

To this end, Portenoy *et al.,* (2004) established that pain experiences are different between different ethnic groups.  This supports Green *et al.,* (2002) who found that pain was experienced differently by different ethnic groups and the difference in prevalence of low back pain in the Black (53,1%) (van der Meulen, 1997), Coloured (32,6%) and Indian ethnic groups (45%) (Docrat, 1999).

Structurally, the Indian population have a slightly lower bone density norm (Sunder, 2006), the highest incidence of congenital abnormalities (Terry *et al.,* 1985), and different sagittal canal dimensions of the cervical spine (Gupta *et al.,* 1982).  These structural differences could possibly increase the risk to developing early degenerative changes, which could increase the risk for the Indian population to developing neck pain.

Although smoking is a risk factor attributed to developing neck pain in all ethnic groups (Kirkaldy-Willis *et* al., 1992), it has been found that because the Indian population have a greater number of people who smoke between the ages of 15 and 39 (Gupta *et al.,* 2009) it may indicate this as a risk factor to developing neck pain in this population.

Another difference unique to this population group could be abdominal obesity, which is higher in Asian Indian adolescents when compared with Caucasian adolescents (Wulan *et al.,* 2010), is risk factor to developing osteoarthritis (Haslett *et al.,* 2002).  Osteoarthritis, which is most common in the spine, hips, knees, and hands, causes stiffness and pain in the

neck or low back (Haslett *et al.,* 2002).  This could increase the risk of the Indian population developing neck pain.

## 2.5   Conclusion

Literature indicated that prevalence in different population groups varies significantly.  The Indian population in the greater Durban area, the largest population outside of Indian (Durban Investment Promotion Agency 2010), warranted research so as to compare these results to the existing studies in the Indigenous African (Ndlovu, 2006) and White populations (Slabbert, 2010), as well as globally.

# Chapter Three
# Methodology

## 3.1    Study Design

Survey research is a way of collecting information from a large and dispersed group of people (Dyer, 1997).  The primary data for this research was collected by means of a questionnaire based on similar previous studies (Ndlovu, 2006; Slabbert, 2010) and modified using a focus group to suit the population group studied (viz. the Indian population living within the selected suburbs within the greater Durban area).

This was a quantitative cross-sectional survey using a questionnaire to collect the data (Salant and Dillman, 1994).  For this study, a questionnaire was the research tool of choice, as bias is kept to a minimum, and there is a decreased chance of misinterpretation of the results (Mouton, 1996).

Based on the above design, the study was approved by the Faculty Research Ethics Committee, which indicated the research complied with the declarations of Helsinki (Appendix A) (Johnson, 2005).

## 3.2    Advertising

No advertising was required.

## 3.3    Sampling

The sampling procedure was a two-stage stratified cluster sample (Esterhuizen, 2010).  The first stage involved random selection of Indian populated areas, which were stratified into high, medium and low income (Mouton, 1996).  The second stage involved consecutive selection of participants from each of the selected areas (Esterhuizen, 2010).

### 3.3.1 Indian populated suburbs within the greater Durban area

The ethnic distributions (Appendix B) as well as the monthly income (Appendix C) of the various suburbs within the greater Durban area were obtained from Statistics South Africa (Chindaw, 2010). This information was used to establish which suburbs had a high percentage of the Indian population and the average incomes for each suburb. The suburbs were then divided into high, medium, and low-income groups. The suburbs chosen for the study were Reservoir Hills (high income and 76% Indian populated), Chatsworth (medium income and 85% Indian populated), and Phoenix (low income and 93% Indian populated).

### 3.3.2 Participants

Samples were taken from 8am to 5pm on Saturday and Sunday as this ensured most of the residents were home rather than during the week when they would be at work.

All the roads in the various suburbs were counted and divided by 200 (an even distribution of the total sample, 600 participants) to determine how many houses were approached per road. Brabys a.c.brabys (Pty) Ltd (2010) and South African Post Office (2009) were used to establish which roads fell into the Reservoir Hills, Chatsworth and Phoenix suburbs.

Reservoir Hills has 78 roads, which amounted to 2,5 houses per road. The remaining five respondents required were obtained from central houses in Reservoir Hills, different to those houses that were already approached. This meant that in every second road, 3 houses were approached (Appendix D).

Chatsworth has 386 roads, which amounted to 0,5 houses per road. The remaining seven respondents required were obtained from central houses in Chatsworth, different to those houses that were already approached. This meant that in every second road, 1 house was approached (Appendix E).

Phoenix has 792 roads, which amounted to 0,25 houses per road.  The remaining two respondents required were obtained from central houses in Phoenix, different to those houses that were already approached.  This meant that in every fourth road, 1 house was approached (Appendix F).

Numbers 1 to 200 were placed into a hat and one was drawn at each road.  This indicated the number of the house that was approached.  If the number was irrelevant for the road, another number was drawn.  If there was no answer, the researcher came back until a participant from the house was available.  If the number corresponded to a block of flats, then one random participant from the block of flats was approached and asked to participate in the study.  This ensured that the participants were random and increased the validity of the research (Mouton and Babbie, 2006).

A resident over the age of 18 at the selected house who met the inclusion criteria (see 3.3.4) was then asked to participate in the study.  If he/she accepted participation, they were asked to read and sign the Letter of Information (Appendix O), and then complete the questionnaire (Appendix P).  He/she then stood on a scale and their height was measured by the researcher to determine their body mass index (Haslet *et al.,* 2002; Oxford Medical Dictionary, 2003) before the completed questionnaire was placed in a sealed box to ensure confidentiality of the participant (Mouton, 1996).  The equation used to determine body mass index was weight divided by height squared (Haslet *et al.,* 2002; Oxford Medical Dictionary, 2003).  This is an indirect measure of a participant's health status (Haslet *et al.,* 2002; Oxford Medical Dictionary, 2003).  No particulars of the participant (e.g. name, identification number, residential address) appeared anywhere on the questionnaire, which also helped to ensure confidentiality of the participant (Mouton and Babbie, 2006).  If the participant at the selected house did not meet the inclusion criteria, the researcher then approached the house with the next ascending number.

### 3.3.3  Sample Size

Six hundred participants in total were sampled in order to detect an assumed prevalence of 50% from the population with 4% precision around the sample estimate and 95% confidence (Esterhuizen 2010).

### 3.3.4  Inclusion Criteria

The participants had to be:
- South African Indian people living in one of the selected suburbs (Reservoir Hills, Chatsworth or Phoenix) within the greater Durban area;
- Male or female over the age of 18 years, so as to avoid parental consent (Strode *et al.,* 2010).  No further age limit over 18 years was stipulated as this allowed for a wider range of potential causes of neck pain;
- Knowledgeable of English in order to complete and understand the questionnaire (Baynman, 1995; Scollen and Scollen*.,* 1995).

### 3.3.5  Exclusion Criteria

Those participants who:
- Participated in the focus group and pilot study;
- Who did not consent to the study;
- Were younger than 18 years of age (Strode *et al.,* 2010) were excluded from the study.

## 3.4  Data Collection

### 3.4.1  Process
The Letter of Information (Appendix O), explained the study to the participant.  If the participant consented, the questionnaire was then given to the participant to complete.  The time taken to answer the questionnaire was expected to be approximately five minutes per participant.

The completed questionnaire was then placed in a sealed box and the participant was thanked for their time and effort. Once all 600 completed questionnaires were collected, the information was captured and sent for statistical analysis.

### 3.4.2 Measurement Tool

Permission was obtained from Slabbert (2010) and Ndlovu (2006) to use questions from their respective studies (Appendix G and Appendix H). These questions, together with factors from the literature (Linton, 2000; Ariens *et al.*, 2001; Croft *et al.,* 2001; Guez *et al.,* 2002) were used to formulate the original questionnaire of this study (Appendix I).

### 3.4.3 Focus Group

The purpose of the focus group was to encourage the individuals to discuss the questionnaire, thereby stimulating their thinking and encouraging them to develop their thoughts about the topic (Salant and Dillman, 1994). This allowed the members of the focus group to critically assess the relevance of the questions presented in the questionnaire, and to add, delete, modify or clarify the questions presented (Salant and Dillman, 1994), in the context of the aims and objectives of the study. The focus group also contextualised the questionnaire (Salant and Dillman, 1994) to enhance its validity (Bernard, 2000), and to determine face and content validity (Dyer, 1997; Bernard, 2000; Mouton and Babbie, 2006).

The focus group consisted of the researcher, the co-supervisor, four representatives of the population group studied, two representatives from the health profession, and two representatives experienced in questionnaires. The representatives were chosen because of their knowledge of the topic and their similarities to the participants of the study (Morgan, 1997; Morgan 1998).

Each member of the focus group received the following documentation:
- Letter of Information (Appendix J)
- Informed Consent (Appendix K)

- Confidentiality Statement (Appendix L)
- Code of Conduct (Appendix M) and a
- Copy of the original Questionnaire (Appendix I).

Each member was asked to read the Letter of Information (Appendix J), following which they were asked to read and sign the Informed Consent Form (Appendix K), Confidentiality Statement (Appendix L) and Code of Conduct documents (Appendix M).  After this, they were asked to read the original Questionnaire (Appendix I).  Each question that appeared in the Questionnaire was then assessed to determine its relevance to the study and whether it was ambiguous and understandable.  Changes were made to the questions on consensus of the focus group members.

### 3.4.3.1 Changes from the Original Questionnaire (Appendix I) to the Post Focus Group Questionnaire (Appendix N)

In Section A, the following changes were made:
- The questionnaire format was changed from a coded questionnaire into an answerable format.
- Question one was reworded from, 'How old are you?' to 'What is your current age?'
- Question four became question five and question five became question four.
- Question five was reworded from, 'Number of pregnancies' to 'Number of pregnancies to full term'.
- Question six and seven were added regarding miscarriages and deceased children.
- Question seven became question nine and Tamil was removed as it is part of the Hindu religion.
- Question ten was added regarding religion.
- Question eight was moved to Section B and became question twenty-three and arthritis, scoliosis, depression, kyphosis, not applicable and other was added to the options.  Hypertension was reworded to high blood pressure.
- Question nine became question eleven.
- Question ten became question twelve.

- Question eleven became question fourteen and not applicable was added to the options.
- Question twelve became question thirteen.
- Question thirteen became question fifteen and not applicable was added to the options.
- Question seventeen was added regarding eyeglasses.
- Question eighteen and nineteen were added regarding health care sources.
- Question twenty one was added regarding smoking.
- Question twenty two was added regarding alcohol consumption.

In Section B, the following changes were made:
- Question seventeen was moved to Section A and became question sixteen and was reworded from, 'Total annual income of interviewee alone' to 'What is your total disposable annual income?.'
- Question twenty four was added and related to medication usage for question twenty three.
- Question sixteen became question twenty-five and was reworded from, 'Do you feel that your job makes you vulnerable in any way to get neck pain?' to 'In your own opinion, does your job function contribute to neck pain?'.
- Question twenty-six was added asking for further information regarding question twenty-five.
- Question eighteen became question twenty-seven and was reworded from, 'Do you worry a lot?' to 'Rate your stress levels according to the following scale'.
- Question thirty-seven became question twenty-eight.
- Question thirty-eight became question twenty-nine.
- Question thirty-nine became question thirty and not applicable was added to the options.
- Question forty-one became question thirty-one.
- Question forty became question number thirty-two.
- Question fourteen became question thirty-three and was reworded from, 'causes your neck to turn' to 'excessive movement of the head from side to side'.

- Question twenty-seven became question thirty-four and was reworded from, 'Do you hold the receiver between your shoulder and neck?' to 'Do you hold the telephone receiver between your shoulder and ear?'
- Question fifteen became question thirty-five and was reworded from, 'If you use a computer, is the monitor in line with eye level?' to 'When working at your computer, is the monitor in line with your eye level and in front of you?'
- Question thirty-six was added regarding the amount of time spent in front of the computer.
- Question thirty-three became question thirty-seven.
- Question thirty-four became question thirty-eight.
- Question thirty-nine was added regarding excessive bending during daily activities.
- Question nineteen became question forty and was reworded from, 'What type of transport do you utilize most often to get to and from work?' to 'What type of transport do you utilize in general?' Other was added to the options.
- Question forty-one was added regarding bicycle or walking as a mode of transport.
- Question twenty became question forty-two.
- Question twenty-one became question forty-three and was reworded from, 'Have you had any head or neck trauma?' to 'Rate the severity of your head or neck injury sustained from the motor vehicle accident'.
- Question forty-four was added regarding any other head or neck trauma
- Question forty-five was added regarding the severity of question forty-four
- Question twenty-four became question forty-six.
- Question twenty-five became question forty-seven and was reworded from, 'For how long have you been using the same pillow(s)?' to 'For how long have you been using your current pillow(s)?'
- Question forty-eight was added regarding the type of pillow used.
- Question twenty-eight became question forty-nine and was reworded from, 'Do you usually fall asleep in an awkward position?' to 'Which position do you usually fall asleep in?'
- Question thirty became one of the options for question forty-nine and side, back, couch, and other were also added as options.

- Question twenty-nine became question fifty and was reworded from, 'Does your bed offer enough support?' to 'Rate the density of your mattress'.
- Question twenty-six became question fifty-one and was reworded from, 'Do you normally carry items on one shoulder?' to 'Do you favour one side when carrying a heavy item?'
- Question thirty-one became question fifty-two and was reworded from, 'Do you hold your arms out to support a book?' to 'When reading, do you hold your arms out to support a book?'
- Question thirty-two became question fifty-three and was reworded from, 'Do you read in bed?' to 'How long do you read in bed?'.
- Question fifty-four was added regarding the position in which reading occurred.
- Question thirty-five became question fifty-five.
- Question thirty-six became question fifty-six.
- Question fifty-seven was added regarding position in which television was viewed.
- Question forty-two was moved to Section A and became question eighteen.
- Question forty-three was moved to Section A and became question twenty.
- Question forty-four was moved to Section C and became question fifty-eight.

In Section C, the following changes were made:
- All the questions in Section C were given an original and recent section to each question.
- Question forty-four became question sixty-two.
- Question forty-five became question sixty-three.
- Question forty-six became question sixty-four.
- Question forty-seven became question sixty-five.
- Question forty-eight became question sixty-six.
- Question forty-nine became question sixty-seven.
- Question fifty became question sixty-eight.
- Question fifty-one became question sixty-nine.
- Question fifty-two became question seventy and was reworded from, 'washing' to 'bathing' and household cleaning was added as an option.
- Question fifty-three became question seventy-one.

- Question fifty-four became question seventy-two.
- Question fifty-five became question seventy-three.
- Question fifty-six became question seventy-four.
- Question fifty-seven became question seventy-five.
- Question fifty-eight became question seventy-six.
- Question fifty-nine became question seventy-seven.
- Question sixty-three became question seventy-eight.
- Question sixty was moved to section B and became question fifty-nine.
- Question sixty-one became question sixty.
- Question sixty-two became question sixty-one.

### 3.4.4  Questionnaire Post Focus Group (Appendix N)

The questionnaire consisted of three sections.  All headings were removed prior to administration of this questionnaire, as this would decrease the questionnaire structure and participant's responses being biased by the inherent structure that headings provide (Dyer, 1997).  Section C was only answered by participants who suffered from neck pain.

### 3.4.5  Pilot Study

This study involved only a small sample of the population to which the final questionnaire was administered in order to determine the time taken to answer the questionnaire and to rule out any specific ambiguities in the questions asked (Dyer, 1997).

The questionnaire was given to five members of the representative population. This allowed the researcher to identify any problematic questions and become familiar with the possible questions participants could ask.  The problematic questions were then reassessed and changed accordingly (Fink and Koescoff, 1985; Hicks, 2004).

### 3.4.5.1 Changes from the Post Focus Group Questionnaire (Appendix N) to the Final Questionnaire (Appendix P)

- Suburb and Body Mass Index were added to the information at the top of the questionnaire.

In Section A, the following changes were made:
- Question sixteen was reworded from, 'What is your total disposable annual income?' to 'What is your total monthly income before tax?'.

In Section B, the following changes were made:
- Question twenty-four had not applicable added to the options.
- Question thirty-nine had not applicable added to the options.
- Question forty-three had not applicable added to the options.
- Question forty-five had not applicable added to the options.

In Section C, the following changes were made:
- Question seventy-one had not applicable added to the options.
- Question seventy-three had not applicable added to the options.
- Question seventy-four had none added to the options.

### 3.4.6 Final Questionnaire (Appendix P)

The final questionnaire consisted of three sections. Section A was concerned with demographic, socio-economic, and other personal data. Section B contained the specific known risk factors and other factors that are potential risk factors as per the literature. Section C was directly concerned with neck pain and the characteristics thereof.

### 3.4.7 Measurement Frequency

The final questionnaire was administered only once per participant.

## 3.5   Statistical Analysis

Statistical Program for the Social Sciences (SPSS) version 15.0 was used to analyse the data.  A $p$ value <0.05 was considered as statistically significant.  Prevalence of neck pain was reported with 95% confidence intervals.  Descriptive analysis entailed frequency tables and percentages for categorical variables and summary statistics for continuous variables. Factors influencing neck pain were assessed using Pearson's chi square tests and independent samples t-tests.  Confounding variables was controlled for using logistic regression analysis (Esterhuizen, 2010).

# Chapter Four

## Results

## 4.1 Introduction

Statistical Program for the Social Sciences (SPSS) version 15.0 (SPSS Ins., Chicago, Illinois, USA) was used to statistically analyse the data and the results are recorded in this chapter. These results of the study are presented according to each objective.

The results for the prevalence and incidence of neck pain will be discussed first, followed by the demographic profile of neck pain. Next the clinical characteristics of neck pain will be considered and finally the risk factors for neck pain will be shown.

## 4.2 Data

### 4.2.1 Primary Data

The primary data was collected from the questionnaire, which was specifically designed for this study (Appendix G).

### 4.2.2 Secondary Data

The secondary data included all information that was sourced, both in the development of the questionnaire and the write up of this dissertation. This data was sourced from books, journal articles, internet references, and government publications, but was not limited to these sources.

## 4.3    Abbreviations and Key Terms

| | | |
|---|---|---|
| *n* | = | Total number of participants (600) |
| % | = | Percentage |
| *p* value | = | Statistical significant value (*p* values of less than 0.05 were considered to be significant) |
| Odds Ratio | > | 1 indicates a risk factor for neck pain |
| Odds Ratio | < | 1 indicates a protective factor for neck pain |
| Original Neck Pain | = | Prevalence (Oxford Medical Dictionary, 2003) |
| Recent Neck Pain | = | Incidence (Oxford Medical Dictionary, 2003) |

In terms of the results it is noted that the variance in result reporting depended on which factors were applicable to the respondents and not all respondents answered all questions if they did not apply. Therefore it is possible that some response totals will not result in 600 responses.

## 4.4 Results

### 4.4.1 Objective One

The first objective was to determine the prevalence and annual incidence of neck pain in the Indian population within the greater Durban area.

The prevalence of neck pain was 36.8% with a 95.0% confidence interval from 32.9% to 40.8% (Table Three).

**Table Three: Prevalence of Neck Pain**

|       |       | Frequency | Percentage |
|-------|-------|-----------|------------|
| **Valid** | **No** | 379 | 63.2 |
|       | **Yes** | 221 | 36.8 |
|       | **Total** | 600 | 100.0 |

The annual incidence of neck pain, from October 2009 to September 2010, was 28.8 % with a 95.0% confidence interval from 25.2% to 32.6% (Table Four).

**Table Four: Annual Incidence Neck Pain**

|       |       | Frequency | Percentage |
|-------|-------|-----------|------------|
| **Valid** | **No** | 427 | 71.2 |
|       | **Yes** | 173 | 28.8 |
|       | **Total** | 600 | 100.0 |

### 4.4.1.1 Summary

Neck pain in the Indian population within the greater Durban area had a prevalence of 36.8% (Table Three) and an annual incidence of 28.8% (Table Four).

### 4.4.2  Objective Two

The second objective was to determine the demographic profile of the Indian population with neck pain.  The demographic profile of the 221 respondents with neck pain is represented here.

Those affected by neck pain were mainly male (55.7%) and married (57.9%). They mostly had matric education (40.3%), and were either actively practising (94.0%) Hindus (43.0%) or Christians (43.0%) (Table Five).

**Table Five:  Demographics of respondents affected by neck pain**

|  |  | Count | Percentage |
|---|---|---|---|
| **Gender** | **Female** | 98 | 44.3 |
|  | **Male** | 123 | 55.7 |
| **Marital Status** | **Divorced** | 7 | 3.2 |
|  | **Living Together** | 0 | 0.0 |
|  | **Married** | 128 | 57.9 |
|  | **Separated** | 2 | 0.9 |
|  | **Single** | 80 | 36.2 |
|  | **Widowed** | 4 | 1.8 |
| **Deceased Children** | **No** | 146 | 66.1 |
|  | **Yes** | 8 | 3.6 |
|  | **Not Applicable** | 67 | 30.3 |
| **Education** | **High School** | 60 | 27.1 |
|  | **Matric** | 89 | 40.3 |
|  | **No Formal** | 2 | 0.9 |
|  | **Other** | 0 | 0.0 |
|  | **Primary School** | 13 | 5.9 |
|  | **Tertiary** | 57 | 25.8 |
| **Religion** | **Christian** | 95 | 43.0 |
|  | **Hindu** | 95 | 43.0 |
|  | **Muslim** | 30 | 13.6 |
|  | **Other** | 1 | 0.5 |
| **Currently Active in Religion** | **No** | 13 | 5.9 |
|  | **Yes** | 208 | 94.1 |

### 4.4.2.1 Age and Body Mass Index (BMI)

The mean age of the respondents was 36.7 years with a standard deviation of 24 years and a range from 18.0 to 72.0 years. Their mean BMI was 24.8 kilogram per square metre with a range from 15.0 to 44.0 kilograms per square metre (Table Six).

**Table Six: Summary statistics for age and BMI**

|  |  | Body Mass Index (BMI) | Age |
|---|---|---|---|
| *N* | Valid | 221 | 221 |
|  | Missing | 0 | 0 |
| Mean | | 24.799 | 36.670 |
| Standard Deviation | | 4.7560 | 13.675 |
| Minimum | | 15.4 | 18 |
| Maximum | | 43.7 | 72 |

### 4.4.2.2 Pregnancies, Children, and Miscarriages

The females experienced an average of 1.7 pregnancies with a range from 0 to 5 (Table Seven). The average number of children in this group per household was 1.3 (Table Eight).

**Table Seven: Number of Pregnancies**

| *n* | Valid | 98 |
|---|---|---|
|  | Missing | 123 |
| Mean | | 1.680 |
| Standard Deviation | | 1.423 |
| Minimum | | 0 |
| Maximum | | 5 |

**Table Eight: Number of Children**

| *n* | Valid | 221 |
|---|---|---|
|  | Missing | 120 |
| Mean | | 1.300 |
| Standard Deviation | | 1.382 |
| Minimum | | 0 |
| Maximum | | 8 |

Of the 98 females, 9 (9.2%) had suffered a miscarriage (Table Nine).

**Table Nine:  Miscarriages**

|  |  | Frequency | Percentage |
|---|---|---|---|
| **Valid** | **1** | 9 | 9.2 |
|  | **2** | 83 | 84.7 |
|  | **3** | 6 | 6.1 |
|  | **Total** | 98 | 100.0 |

### 4.4.2.3 Occupation

Almost half (48.9%) were employed full time (Figure Four).  The unemployment rate was 15.0% (Figure Four).
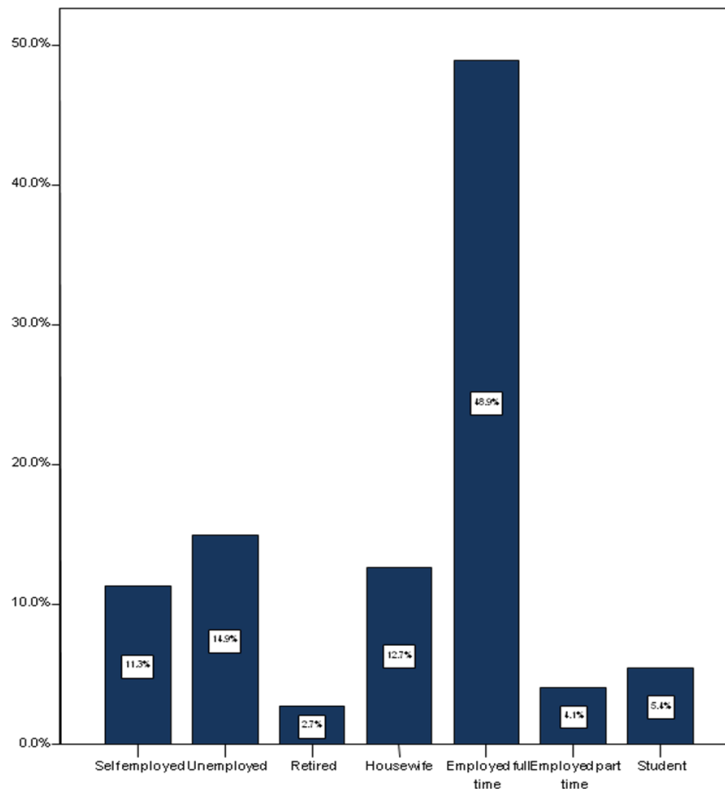


**Figure Four:  Present Occupational Status**

Skilled workers were the most common profession followed by housewife (Table Ten).

**Table Ten:  Occupation, Present and Past**

|  |  | Count | Percentage |
|---|---|---|---|
| **Occupation if Employed** | **Artisan** | 10 | 4.5 |
|  | **Businessman** | 20 | 9.0 |
|  | **Clerical** | 13 | 5.9 |
|  | **Educator** | 4 | 1.8 |
|  | **Farmer** | 0 | 0.0 |
|  | **Housewife** | 28 | 12.7 |
|  | **Labourer** | 4 | 1.8 |
|  | **Managerial** | 11 | 5.0 |
|  | **Not Applicable** | 41 | 18.6 |
|  | **Other** | 9 | 4.1 |
|  | **Professional** | 23 | 10.4 |
|  | **Salesman** | 15 | 6.8 |
|  | **Skilled Worker** | 29 | 13.1 |
|  | **Student** | 13 | 5.9 |
|  | **Sportsman** | 0 | 0.0 |
|  | **Unskilled Worker** | 1 | 0.5 |
| **Occupation if Unemployed, Retired or Recently Changed Professions** | **Artisan** | 6 | 2.7 |
|  | **Businessman** | 1 | 0.5 |
|  | **Clerical** | 6 | 2.7 |
|  | **Educator** | 0 | 0.0 |
|  | **Farmer** | 0 | 0.0 |
|  | **Housewife** | 4 | 1.8 |
|  | **Labourer** | 3 | 1.4 |
|  | **Managerial** | 2 | 0.9 |
|  | **Not Applicable** | 162 | 73.3 |
|  | **Other** | 5 | 2.3 |
|  | **Professional** | 0 | 0.0 |
|  | **Salesman** | 2 | 0.9 |
|  | **Skilled Worker** | 21 | 9.5 |
|  | **Student** | 3 | 1.4 |
|  | **Sportsman** | 0 | 0.0 |
|  | **Unskilled Worker** | 6 | 2.7 |

The longest duration of current employment was between 0-5 years (Table Eleven).

**Table Eleven:  Duration of Employment**

|  |  | Count | Percentage |
|---|---|---|---|
| **Current Occupation** | **0-5 years** | 65 | 29.4 |
| | **6-10 years** | 48 | 21.7 |
| | **11-15 years** | 24 | 10.9 |
| | **16-20 years** | 19 | 8.6 |
| | **21-25 years** | 7 | 3.2 |
| | **26-30 years** | 4 | 1.8 |
| | **> 30 years** | 15 | 6.8 |
| | **Not Applicable** | 39 | 17.6 |
| **Previous Occupation** | **0-5 years** | 29 | 13.1 |
| | **6-10 years** | 11 | 5.0 |
| | **11-15 years** | 4 | 1.8 |
| | **16-20 years** | 3 | 1.4 |
| | **21-25 years** | 3 | 1.4 |
| | **26-30 years** | 5 | 2.3 |
| | **> 30 years** | 4 | 1.8 |
| | **Not Applicable** | 162 | 73.3 |

**4.4.2.4 Income**

Almost half of the respondents (48.4%) earned from below R5 000 to R15 000 per month (Table Twelve).

**Table Twelve:  Total Monthly Income Before Tax**

| | | Frequency | Percentage | Valid Percentage | Cumulative Percentage |
|---|---|---|---|---|---|
| | **< R5 000** | 55 | 24.9 | 24.9 | 24.9 |
| | **R5 000-R15 000** | 52 | 23.5 | 23.5 | 48.4 |
| | **R15 000-R25 000** | 31 | 14.0 | 14.0 | 62.4 |
| **Valid** | **R25 000-R35 000** | 4 | 1.8 | 1.8 | 64.3 |
| | **R35 000-R45 000** | 5 | 2.3 | 2.3 | 66.5 |
| | **Not Applicable** | 74 | 33.5 | 33.5 | 100.0 |
| | **Total** | 221 | 100.0 | 100.0 | |

**4.4.2.5 Summary**

Mainly matriculated (40.3%), married (57.9%), men (55.7%) of Hindu (43.0%) or Christian (43.0%) religion and active in their religion (94.0%) were affected by neck pain (Table Five).  Their mean age was 36.7 years with a body mass index of 24.8 kilograms per square metre (Table Six).  Females experienced an average of 1.7 pregnancies (Table Seven) with an average of 1.3 children (Table Eight).  Of the 98 females, 9 (9.2%) had suffered a miscarriage (Table Nine).

The unemployment rate was 15.0% (Figure Three).  Skilled workers were the most common profession followed by housewife (Table Ten).  The longest duration of current employment was between 0-5 years (Table Eleven).  Almost half of the respondents (48.4%) earned from below R5 000 to R15 000 per month (Table Twelve).

### 4.4.3  Objective Three

The third objective was to characterise the clinical features of neck pain.

The mean age of participants first experiencing neck pain was 28.2 years with a standard deviation of 12.0 and a range from 10.0 to 67.0 years.  Participants originally experienced neck pain for an average of 8.5 years with a range from 0.0 to 46.0 years.  Recent neck pain had a mean of 50.4 days with a range from 0.0 to 336.0 days (Table Thirteen).

**Table Thirteen:  Summary statistics of age and length of time neck pain experienced**

|  |  | First Experienced (Age) | Duration Original | Duration Recent |
|---|---|---|---|---|
| *n* | Valid | 221 | 221 | 221 |
|  | Missing | 379 | 379 | 379 |
| Mean | | 28.21 | 8.56 | 50.39 |
| Standard Deviation | | 12.117 | 8.781 | 66.537 |
| Minimum | | 10 | 0 | 0 |
| Maximum | | 67 | 46 | 336 |

On a scale of 1 to 10 (with 10 being the most severe), the severity of the pain for the original occurrence was an average of 4.9 (Table Fourteen).  For recent occurrences, the level of severity dropped to 4.0 (Table Fourteen).  However, the graphs show a second peak at 8 in both original and recent neck pain (Figure Five; Figure Six).  This would indicate that patients either experienced severe or moderate pain.

**Table Fourteen: Severity of neck pain**

| | | Severity Original | Severity Recent |
|---|---|---|---|
| *n* | Valid | 221 | 221 |
| | Missing | 379 | 379 |
| Mean | | 4.97 | 4.02 |
| Standard Deviation | | 2.908 | 3.312 |
| Minimum | | 0 | 0 |
| Maximum | | 10 | 10 |
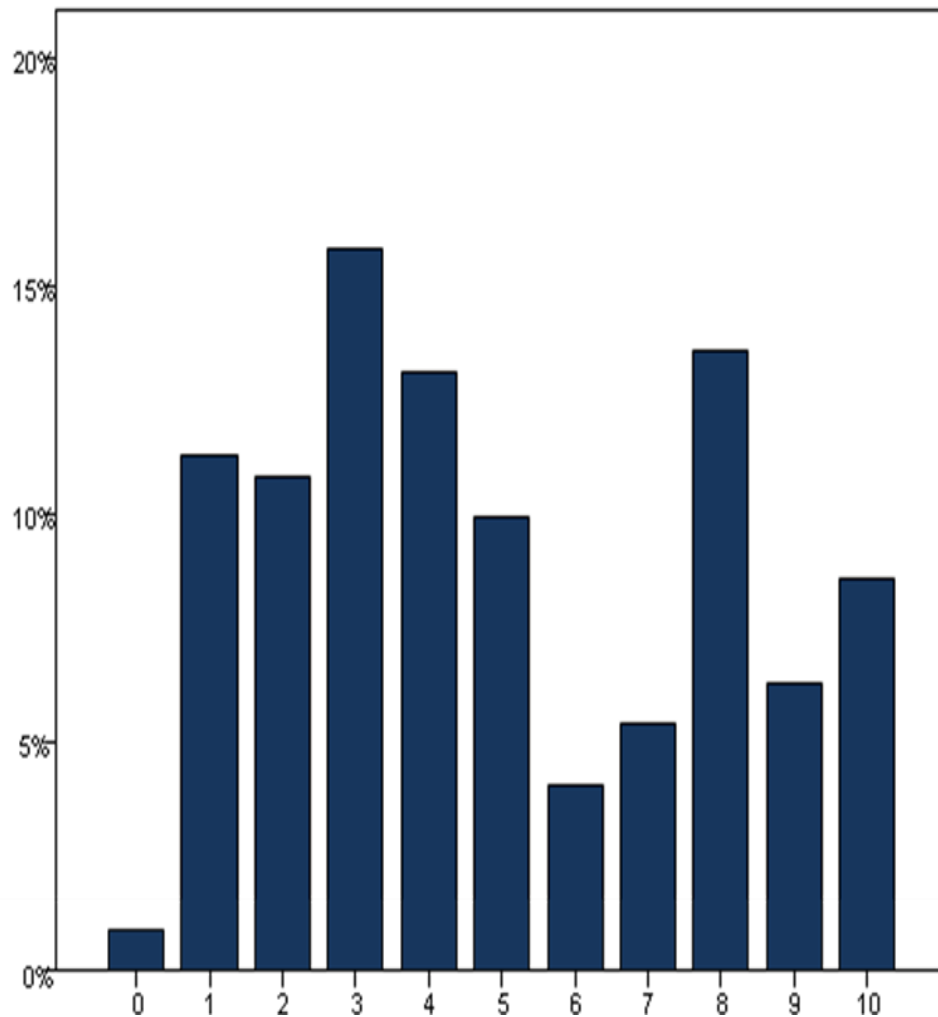


**Figure Five: Severity – Original**
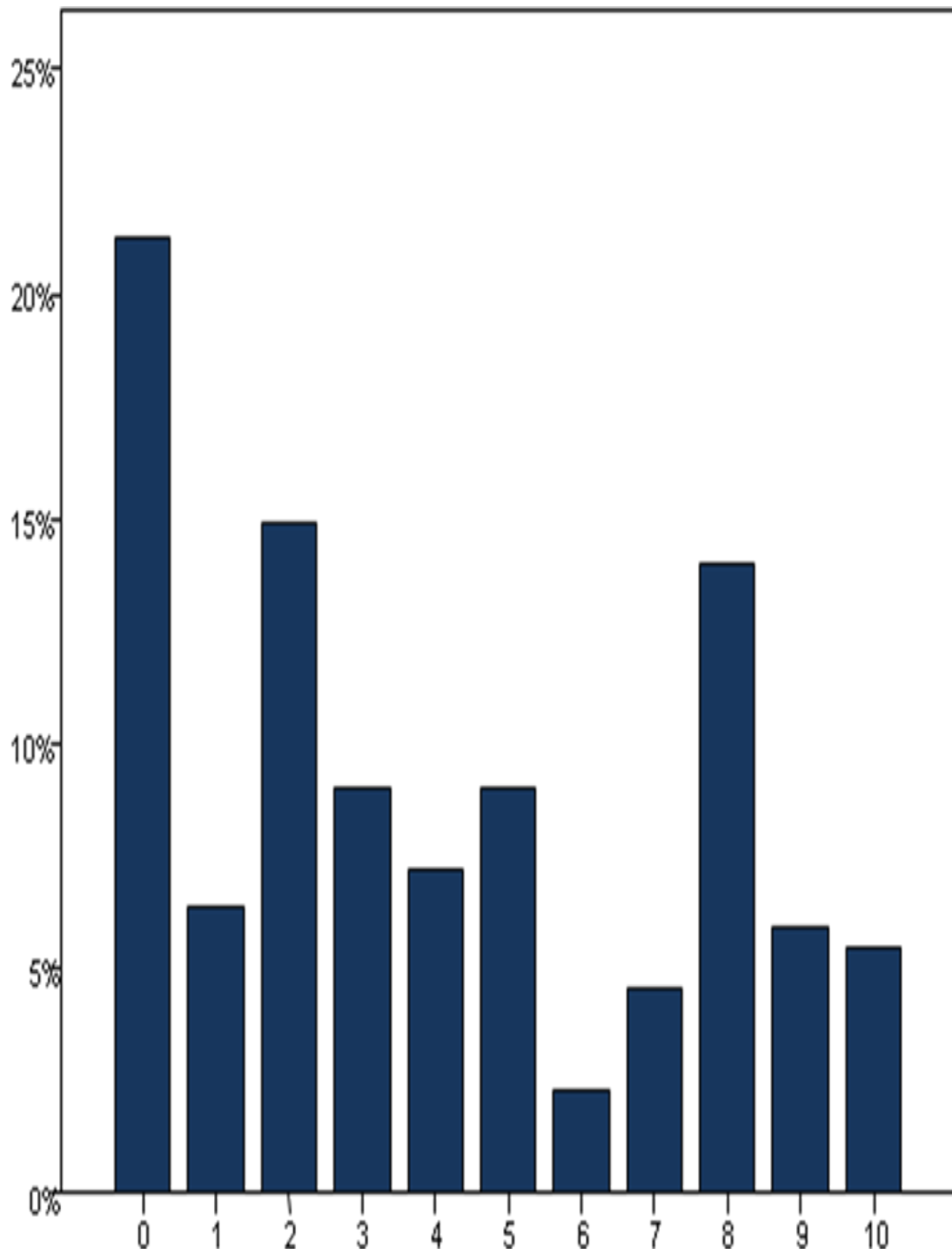
**Figure Six: Severity – Recent**

Original neck pain was both at its worst and least in the morning, whereas recent neck pain was at its worse in the evening and at its least in the morning (Table Fifteen).

**Table Fifteen:  Frequency of time of day when pain is worst and least.**

|  | Morning | | Afternoon | | Evening | | Night | | Activity Related | | Not Applicable | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | *n* | *%* | *n* | *%* | *n* | *%* | *n* | *%* | *n* | *%* | *n* | *%* |
| **Pain Worst Original** | 61 | 27.9 | 41 | 18.7 | 54 | 24.7 | 44 | 20.1 | 19 | 8.7 | 0 | 0 |
| **Pain Worst Recent** | 40 | 23.0 | 41 | 23.6 | 30 | 17.2 | 43 | 24.7 | 20 | 11.5 | 0 | 0 |
| **Pain Least Original** | 104 | 47.5 | 52 | 23.7 | 25 | 11.4 | 31 | 14.2 | 6 | 2.7 | 1 | 5 |
| **Pain Least Recent** | 89 | 51.1 | 36 | 20.7 | 17 | 9.8 | 23 | 13.2 | 8 | 4.6 | 1 | 6 |

The results from Table Sixteen highlight that most respondents only 'seldom' reported original neck pain, whereas most respondents 'frequently' reported recent neck pain.

**Table Sixteen:  Frequency of neck pain**

|  | Seldom | | Frequently | | Constantly | | Intermittently | |
|---|---|---|---|---|---|---|---|---|
|  | *n* | *%* | *n* | *%* | *n* | *%* | *N* | *%* |
| **Pain Experienced Original** | 94 | 42.9 | 79 | 36.1 | 25 | 11.4 | 21 | 9.6 |
| **Pain Experienced Recent** | 60 | 34.5 | 70 | 40.2 | 21 | 12.1 | 23 | 13.2 |

Table Fifteen highlights that both original and recent neck pain began gradually without injury in most cases (Table Seventeen).

**Table Seventeen:  Onset of neck pain**

|  | Gradually without injury | | Gradually after injury | | Abruptly without injury | | Abruptly after injury | | Unsure | |
|---|---|---|---|---|---|---|---|---|---|---|
|  | *n* | % | *n* | % | *N* | % | *n* | % | *n* | % |
| **Original Onset** | 91 | 41.6 | 31 | 14.2 | 16 | 7.3 | 31 | 14.2 | 50 | 22.8 |
| **Recent Onset** | 64 | 36.8 | 23 | 13.2 | 18 | 10.3 | 21 | 12.1 | 48 | 27.6 |

The results highlighted in Table Eighteen, showed that for most respondents, there was no progression of neck pain.

**Table Eighteen:  Progression of neck pain**

|  | Getting worse | | Getting better | | Staying the same | | Unsure | |
|---|---|---|---|---|---|---|---|---|
|  | *n* | % | *n* | % | *n* | % | *n* | % |
| **Progression Original** | 43 | 19.6 | 33 | 15.1 | 94 | 42.9 | 49 | 22.4 |
| **Progression Recent** | 30 | 17.2 | 27 | 15.5 | 73 | 42.0 | 44 | 25.3 |

Lifting was the activity most affected by original neck pain, followed by sleeping and concentration (Figure Seven).  For those who experienced recent neck pain, sleeping and lifting were equally affected (Figure Eight).
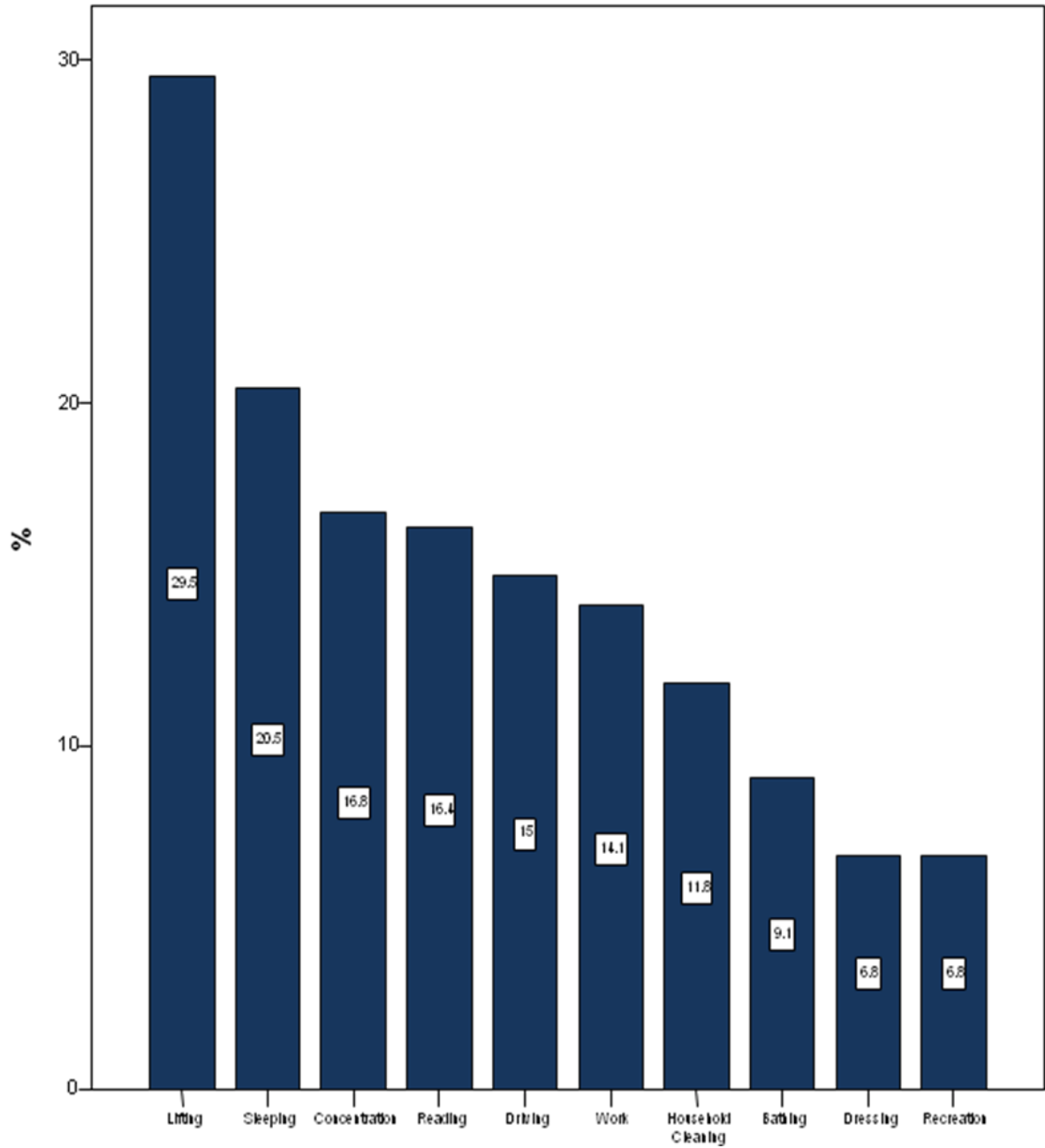


**Figure Seven:  Activities affected by original neck pain**
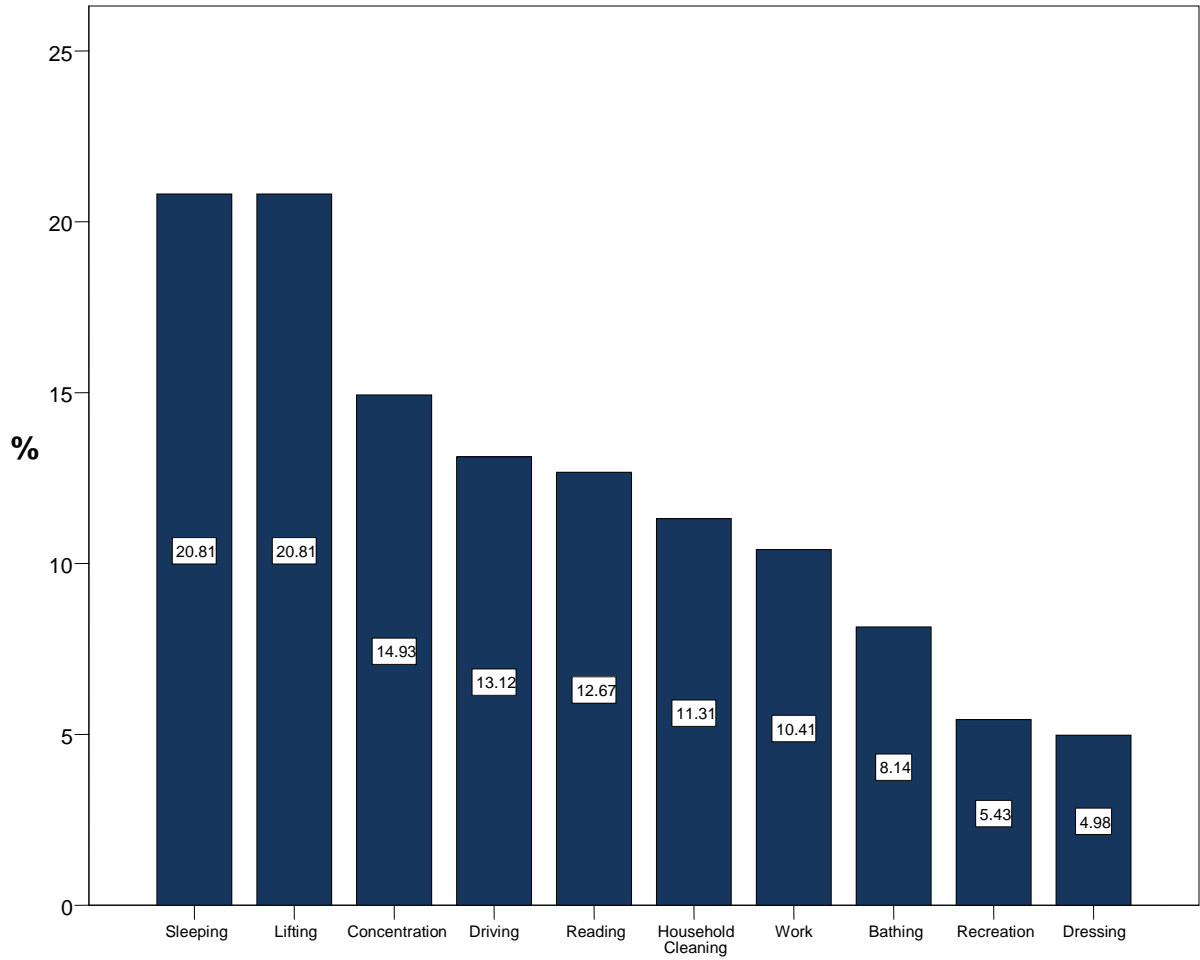
**Figure Eight:  Activities affected by recent neck pain**

Table Nineteen revealed that most respondents did not rate their neck pain as a disability.

**Table Nineteen:  Disability associated with neck pain**

|  | None | | Mild | | Moderate | | Severe | |
|---|---|---|---|---|---|---|---|---|
|  | *n* | *%* | *n* | *%* | *n* | *%* | *n* | *%* |
| **Overall Disability Original** | 70 | 32.0 | 73 | 33.3 | 52 | 23.7 | 24 | 11.0 |
| **Overall Disability Recent** | 54 | 30.9 | 52 | 29.7 | 51 | 29.1 | 18 | 10.3 |

Most respondents were not absent from work due to neck pain (Table Twenty (a)).

**Table Twenty (a):  Absenteeism resulting from neck pain**

|  | Yes | | No | |
|---|---|---|---|---|
|  | Count | Percentage | Count | Percentage |
| **Absenteeism Original** | 67 | 30.6 | 152 | 69.4 |
| **Absenteeism Recent** | 46 | 26.3 | 129 | 73.7 |

For those who were absent from work, the period of absence usually lasted for less than one week (Table Twenty (b)).

**Table Twenty (b):  Duration of absenteeism due to neck pain**

|  | 0-1 week | | 1-2 weeks | | 2-3 weeks | | 3-4 weeks | | >4 weeks | | Not Applicable | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | *n* | *%* | *N* | *%* | *n* | *%* | *n* | *%* | *n* | *%* | *n* | *%* |
| **Duration Original** | 49 | 22.4 | 6 | 2.7 | 1 | 0.5 | 6 | 2.7 | 5 | 2.3 | 152 | 69.4 |
| **Duration Recent** | 33 | 18.9 | 6 | 3.4 | 1 | 0.6 | 4 | 2.3 | 3 | 1.7 | 128 | 73.1 |

Most respondents were never bed ridden due to neck pain (Table Twenty-One (a)).

**Table Twenty-One (a):  Were you ever bedridden due to neck pain?**

|  | Yes | | No | |
|---|---|---|---|---|
|  | **Count** | **Percentage** | **Count** | **Percentage** |
| **Bedridden Original** | 25 | 11.4 | 194 | 88.6 |
| **Bedridden Recent** | 15 | 8.6 | 160 | 91.4 |

For those respondents who were bedridden, their stay in bed was less than one week (Table Twenty-One (b)).

**Table Twenty-One (b):  What duration were you bedridden for due to neck pain?**

|  | 0-1 week | | 1-2 weeks | | 2-3 weeks | | 3-4 weeks | | >4 weeks | | Not Applicable | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | *n* | % | *n* | % | *n* | % | *n* | % | *n* | % | *n* | % |
| **Duration Original** | 16 | 7.3 | 1 | 0.5 | 0 | 0.0 | 4 | 1.8 | 4 | 1.8 | 194 | 88.6 |
| **Duration Recent** | 12 | 6.9 | 1 | 0.6 | 0 | 0.0 | 1 | 0.6 | 3 | 1.7 | 158 | 90.3 |

Most sufferers used either no medication or self medication. Chiropractic was only used by a small percentage (7.2%) of participants (Figure Nine).
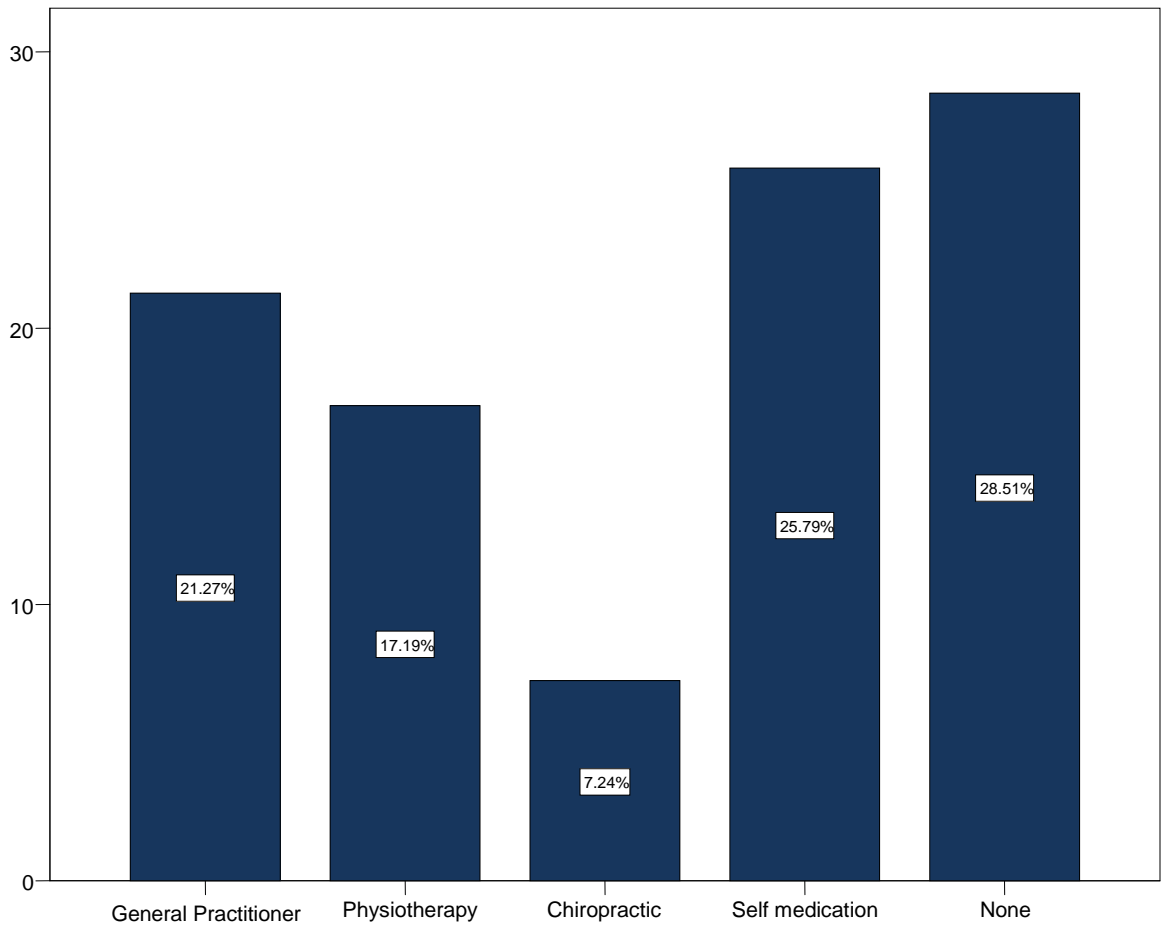


**Figure Nine:  Treatment modality used for neck pain**

There were very few other activities (religious customs and social activities) associated with neck pain (Table Twenty-Two).

**Table Twenty-Two:  Do you associate your neck pain with any other activities (e.g. customs, social activities)?**

|  | Frequency | Percentage |
|---|---|---|
| **Exercise** | 1 | 0.2 |
| **Housework and Caring for Children** | 2 | 0.3 |
| **No** | 29 | 4.8 |
| **Pillows** | 2 | 0.3 |
| **Position sleeping in** | 1 | 0.2 |
| **Religious Customs** | 4 | 0.7 |
| **Social Activities** | 1 | 0.2 |
| **Studying** | 2 | 0.3 |
| **Weather** | 1 | 0.2 |
| **Work** | 6 | 1.0 |

### 4.4.3.1 Summary

Participants first experienced neck pain at 28.2 years of age (Table Thirteen).  In most cases the pain began gradually without injury (Table Eighteen).  For most participants there was no progression of neck pain and they did not rate their neck pain as a disability (Table Nineteen).  Few respondents were absent from work due to neck pain (Table Twenty (a)), but for those who were absent form work, the period of absence usually lasted for less than one week (Table Twenty (b)).  This is congruent with the reporting that most respondents were never bedridden due to neck pain (Table Twenty-One (a)) and for those that were bedridden, their stay in bed was less than one week (Table Twenty-One (b)).  Interestingly most sufferers used either no medication or self medicated (Figure Eight).

Overall, there were very few other activities (religious customs and social activities) associated with neck pain (Table Twenty-Two).  Some participants found work to be associated with their neck pain, in this section it was highlighted

that work was related to neck pain; as a result factors pertaining to work specifically are discussed in the next section (See section 4.4.4).

Original neck pain had a duration of 8.5 years (Table Thirteen) and a severity of 4.9 on a scale of 1 to 10 (with 10 being the most severe) (Table Fourteen). The participants 'seldom' experienced neck pain (Table Sixteen). The activities most affected were lifting, sleeping, and concentration (Figure Eight).

Recent neck pain had a duration of 50.4 days (Table Thirteen) and a severity of 4.0 on a scale of 1 to 10 (with 10 being the most severe) (Table Fourteen). The participants 'frequently' experienced neck pain (Table Sixteen). Sleeping and lifting were equally affected (Figure Nine).

### 4.4.4 Objective Four

The fourth objective was to identify the risk factors that influence neck pain in the Indian population.

Logistic regression determines the predictable capability of independent variables and is used to give a descriptive relationship. The variables, such as body mass index in this study are proxy indicators for factors like health (Dallal, 2001). These factors that were used for this statistical procedure were determined from the literature used in both this documentation and in the formulation of the questionnaire.

### 4.4.4.1 Original neck pain

The following were identified as independent risk factors to developing original neck pain. The risk was 2.1 times higher in the female gender when compared with the male gender. With every one unit increase in stress levels, the risk increased by 1.0 times. Cycling was a preventative factor, with those who did not cycle being at a 13 time higher risk. Those whose occupation involved lifting heavy objects had a 1.9 times higher risk. Sitting without back and arm support increased the risk by 1.7 times. Those participants who had been in a motor vehicle accident had a 1.7 times higher risk. Participants who favoured one side when carrying something heavy almost doubled the risk. Headache suffers had an increased risk of 1.8 times. Participants who had shoulder pain and back pain had an increased risk of 3.4 times and 4.5 times respectively. Activities such as working on a computer or watching the television were also identified as independent risk factors to developing original neck pain (Table Twenty-Three).

**Table Twenty-Three: Logistic regression analysis of factors associated with original neck pain**

|  |  | Significance | Odds Ratio | 95.0% C.I. for OR | |
|---|---|---|---|---|---|
|  |  |  |  | Lower | Upper |
| Step 10(a) | Gender (female versus male) | 0.003 | 2.111 | 1.281 | 3.480 |
|  | Stress levels | 0.078 | 1.070 | 0.992 | 1.154 |
|  | Cycling | 0.021 | 13.119 | 1.477 | 116.547 |
|  | Lifting heavy objects | 0.009 | 1.942 | 1.180 | 3.198 |
|  | Sitting without back support | 0.068 | 1.575 | .968 | 2.562 |
|  | Sitting without arm support | 0.035 | 1.650 | 1.035 | 2.629 |
|  | Been involved in a motor accident | 0.029 | 1.658 | 1.055 | 2.607 |
|  | Favour one side when carrying a heavy item | 0.001 | 1.998 | 1.303 | 3.062 |
|  | Hours a day in front of the computer | 0.032 | 1.083 | 1.007 | 1.165 |
|  | Hours per day watching television | 0.003 | 1.224 | 1.070 | 1.401 |
|  | Suffer from headaches | 0.010 | 1.857 | 1.156 | 2.982 |
|  | Suffer from shoulder pain | <0.001 | 3.400 | 2.101 | 5.503 |
|  | Suffer from low back pain | <0.001 | 4.510 | 2.708 | 7.512 |
|  | Constant | <0.001 | 0.006 |  |  |

a  Variable(s) entered on step 1: BMI, Q1, Q2, Q6, Q20, Arthritis, Depression, Q27, Cycling, Q33, Q34, Q37, Q38, Q39A, Q42, Q51A, Q52, Q36, Q56, Q58, Q59, Q60.

**4.4.4.2 Recent neck pain**

The following were observed to be independent risk factors to developing recent neck pain.  Depression increased the risk by 2.8 times.  With every one unit increase in stress levels, the risk increased by 1.08 times.  Cycling was a preventative factor and those who did not cycle had an 18 times higher risk.  Any occupation carried out in an air conditioned room had a 2.2 times higher risk. Sitting without arm support increased the risk by 2.4 times.  Participants who favoured one side when carrying something heavy almost doubled the risk. Headache suffers had an increased risk of 2.1 times.  Participants who had shoulder pain and back pain had an increased risk of 2.3 times and 4.5 times respectively.  Those participants who did not or do not watch the television had a 73% reduction in the risk (Table Twenty-Four).

**Table Twenty-Four:  Logistic regression analysis of factors associated with recent neck pain**

| | | Significance | Odds Ratio | 95.0% C.I. for OR | |
|---|---|---|---|---|---|
| | | | | Lower | Upper |
| | **Depression** | 0.050 | 2.749 | 1.001 | 7.548 |
| | **Stress levels** | 0.045 | 1.079 | 1.002 | 1.162 |
| | **Cycling** | 0.003 | 17.798 | 2.702 | 117.228 |
| | **Working in an air-conditioned room** | 0.002 | 2.165 | 1.335 | 3.512 |
| | **Sitting without arm support** | 0.000 | 2.395 | 1.555 | 3.691 |
| **Step 12(a)** | **Favour one side when carrying a heavy item** | 0.002 | 1.951 | 1.282 | 2.970 |
| | **Watch television** | 0.017 | 0.267 | 0.090 | 0.793 |
| | **Suffer from headaches** | 0.003 | 2.061 | 1.282 | 3.314 |
| | **Suffer from shoulder pain** | 0.001 | 2.248 | 1.378 | 3.668 |
| | **Suffer from low back pain** | <0.001 | 4.484 | 2.579 | 7.794 |
| | **Constant** | <0.001 | 0.048 | | |

a    Variable(s) entered on step 1: Q2, Osteoporosis, Arthritis, Depression, Q27, Q28, Cycling, Answering the Telephone, Working with Arms Overhead, Q34, Q37, Q38, Q39A, Q51A, Q52, Q55, Q58, Q59, Q60, Q1, Q53.

### 4.4.4.3    Summary

The common risk factors identified for both original and recent neck pain were stress, cycling, favouring one side when carrying a heavy object, and suffering from headaches, shoulder pain and back pain.  The unique factors associated with original neck pain are female gender, an occupation involving lifting heavy objects, sitting without back and arm support, being involved in a motor vehicle accident, and working on a computer or watching the television (Table Twenty-Three).  The significant factors associated with recent neck pain were depression, an occupation in an air conditioned room, and sitting without arm support (Table Twenty-Four).  Watching the television was a protective factor for recent neck pain (Table Twenty-Four).

## 4.5   Conclusion

The prevalence of neck pain amongst the Indian population in the greater Durban area was 36.8%, with an annual incidence of 28.8%.

Mainly matriculated (40.3%), married (57.9%), men (55.7%) of either Hindu (43.0%) or Christian religion (43.0%) and active in their religion (94.0%) with a mean age of 36.7 years and a body mass index of 24.8 unit were affected by neck pain.

Original neck pain lasted 8.5 years with a severity of 4.9 on a scale of 1 to 10, with 10 being the most severe.  The pain was 'seldom' experienced and was affected by lifting, sleeping and concentration.  Recent neck pain lasted 50.4 days with a severity of 4.0 on a scale of 1 to 10.  The pain was experienced 'frequently' and equally affected by sleeping and lifting.

The common risk factors identified for both original and recent neck pain were stress, cycling, favouring one side when carrying a heavy object, and suffering from headaches, shoulder pain and back pain.

# Chapter Five
# Discussion

## 5.1 Introduction

This chapter will include a discussion of the results and the limitations of the study.

## 5.2 Prevalence and Incidence of Neck Pain in the Indian Population within the greater Durban area

The prevalence of neck pain in the Indian population within the greater Durban area was 36.8% (Table Three). This was lower than the 50.0% prevalence in the Black African population (Ndlovu, 2006) and 45.0% in the White population (Slabbert, 2010) within the greater Durban area. However, this study's results are comparable with the Norwegian population, 34.4% prevalence (Bovim *et al.,* 1994) and the Scandinavian population, 36.0% prevalence (Grieve, 1998). This shows that there is a similarity between the Indian population within Durban and the Nordic populations, which.

Possible reasons that similarities exist between the Indian and Nordic populations are unlikely to be related to cultural activities and more likely to be related to occupational, gender, and/or recreational activities. These will be furthered explored in this discussion to ascertain the level of relevance to neck pain in the Indian population.

The annual incidence of neck pain, from August 2009 to September 2010, in the Indian population within the greater Durban area was 28.8% (Table Four).

## 5.3 Demographic Profile of the Indian Population Affected by Neck Pain

The average age of those affected by neck pain was 36.7 years of age, of normal weight (mean body mass index of 24.8) (Table Six), mainly male (55.7%), married (57.9%) and with an average of 1.3 children (Table Eight).  The majority had completed their matric (40.3%), practised either Christianity (43.0%) or the Hindu religion (43.0%) and were currently active in their religion (94.0%) (Table Five).

### 5.3.1 Age

The mean age of participants first experiencing neck pain was 28.2 years (Table Thirteen).  The mean age of participants currently affected by neck pain was 36.7 years (Table Six).  The mean age of participants was 36 years of age, with a range between 33 and 43 years (Bovim *et al.,* 1994).  This coincides with Hogg-Johnson *et al.,* (2008), who found that neck pain peaked in the middle years of life (30-40 years of age).

### 5.3.2 Gender

Neck pain affected more Indian males (55.7%) than Indian females (44.3%).  Significantly more males (417 or 69.5%) than females (183 or 30.5%) completed this questionnaire.  The Korean culture is male dominated, where the female is subservient to the male (Lee, 2001).  Although the Korean is associated with the Muslim religion, the cultural values of the Korean are followed by all religious dominations (Reddy, 2010).  In 1994, Bovim *et al.,* reported that the gender in their study was predominately male, which would concur with the male predominance in this study.  This could be a reason for the similarities in prevalence of neck pain.  This may appear to contradict previous literature, which found that females had a significantly higher prevalence of neck pain (Croft *et al.,* 2001; Guez *et al.,* 2002; Chiu *et al.,* 2004; Ndlovu, 2006; and Slabbert, 2010).

Therefore, if we look specifically at the percentile responses within those gender groups that had neck pain, females were twice as likely to develop neck pain when compared with males.  This would agree with Croft *et al.,* 2001; Guez *et al.,* 2002; Ndlovu, 2006 and Larsson *et al.,* 2007, who also found females to be at a higher risk than their male counterparts.  However, Walker-Bone *et al.,* (2004) found that gender had a weak association to neck pain, which does not support the results of previous research.

It is acknowledged that the discrepancy between this study and international studies may be related to the cultural practices within the Indian population, such that there was a greater likelihood of a male respondent as opposed to a female respondent.  If more females had participated in the study, it is hypothesised that the prevalence and incidence of neck pain would have been higher than what was found.  Therefore research needs to consider methodological strategies in order to allow for equal gender representations in future studies.

### 5.3.3  Pregnancy

The females in this study had experienced an average of 1.7 pregnancies (Table Seven) with an average of 1.3 children per respondent (Table Eight).  This agrees with Croft *et al.,* (2001) who determined that the number of children increases the risk of developing neck pain.  Of the 98 female participants, 9 (9.2%) had suffered a miscarriage (Table Nine).  Due to the higher male response, it is unlikely that these results would impact on previous literature.

### 5.3.4  Religion

Most respondents affected by neck pain practised the Hindu religion (43.0%) and were currently active in their religion (94.0%).  Bovim *et al.,* (1994) does not comment on this.  However, impact is perceived as negligible due to the similarities based on age and gender.

### 5.3.5  Employment

Almost half of the respondents with neck pain, (48.9%) were employed full time.   The unemployment rate was 15.0% amongst neck pain sufferers (Figure Four).   This supports Guez *et al.,* (2002) who found that neck pain was higher in the unemployed and blue collared workers.   This did not concur with the literature (Carroll, Cassidy and Cote, 2003) that indicates that a significant risk factor to developing both original and recent neck pain is stress and depression (Table Twenty-Three).   Both of these predominate in persons with unemployment, whereas employed persons are usually depressed to a lesser degree if at all, even though they are stressed (Linton, 2000).   The type of occupation may, therefore, be playing an overriding role in this present study.

The above in conjunction with the similarities in age and gender established in section 5.3.1 and 5.3.2 respectively, postulated that the Nordic population studied by Bovim *et al.,* (1994) and the outcomes of this study would be similar, particularly as Byfuglien and Stensrud*.,* (2002) statistics seem to support this postulation.

It was found that skilled workers were the most common profession followed by housewife (Table Ten).   This would concur with Lau *et al.,* (1996), who found that neck pain was more frequent among managers and professionals.   Thus, this may be the reason why this study had more employed respondents with neck pain than those who were unemployed.

This would further be supported by the fact that almost half of the respondents (48.4%) earned from below R5 000 to R15 000 per month (Table Twelve), which may have increased the stressors for the employed during the period of the recent recession, thus influencing the outcome of this study.

Additionally, factors such as an occupation involving lifting of heavy objects was a risk factor to developing original neck pain, whereas working in an air-

conditioned room was a risk factor to developing recent neck pain. Sitting without arm support was more significant to recent neck pain. However, sitting without back support was more significant to developing original neck pain. These findings are consistent with the profile of earnings and therefore support the presence of neck pain in the particular population in this study. These findings support Larsson *et al.,* (2007). Computer work was also shown to be instrumental in developing original neck pain, which coincides with Cote *et al.,* (2008).

## 5.4 Clinical Characteristics of Neck Pain in the Indian Population

Neck pain began gradually without injury (Table Sixteen) and most respondents who experienced neck pain did not rate their neck pain as a disability (Table Nineteen). No medication or self-medication was used to treat their neck pain, with only a small percentage who sought chiropractic treatment (Figure Nine).

Most people did not have to take time off from work due to neck pain (Table Twenty (a)). If neck pain did cause a stay away from work, the extent of such time off was usually less than a week (Table Twenty (b)).

Most respondents who experienced neck pain were never bedridden due to neck pain (Table Twenty-Two (a)). For those who were bedridden, the extent of such time in bed was usually less than a week (Table Twenty-One (b)).

The first common independent risk factor for both original and recent neck pain was stress (Table Twenty-Five), which agrees with Linton, (2000) and Cote *et al.,* (2004). Another risk factor was cycling (Table Twenty-Five), with a 13% increased risk for original neck pain and an 18% increased risk for recent neck pain, which does not support Larsson *et al.,* (2007) who found exercise to reduce the risk to developing neck pain (Wilber *et al.*, 1995). The difference in results could be the biomechanical position that is required for cycling. The last risk factor was favouring one side when carrying a heavy object, which doubled the risk to developing neck pain (Table Twenty-Five).

Headaches were more likely to predispose a person to recent neck pain, whereas shoulder pain was more likely to lead to original neck pain (Table Twenty-Three; Table Twenty-Four). Low back pain was an equal risk factor for both original and recent neck pain. This supports Linton, (2000) and Cote *et al.,* (2004) who both discovered a positive relationship between neck pain and co morbidities (such as depression, low back pain, and headaches).

### 5.4.1 Original Neck Pain

Original neck pain was experienced for an average of 8.56 years (Table Thirteen), had an average severity rating of 5.0 on a scale of 1-10 (with 10 being the most severe), with a second peak at 8.0 (Table Fourteen). The pain was 'seldom' experienced (Table Fifteen) and lifting activities were most affected, followed by sleeping and concentration (Figure Five).

Motor vehicle accidents increased the risk to developing original neck pain. This is similar to Guez *et al.,* (2002) who found that previous head and neck, as well as whiplash injuries, increase the risk to developing neck pain.

### 5.4.2 Recent Neck Pain

Recent neck pain had a mean duration of 50.4 days (Table Thirteen) and an average severity rating of 4.0 on a scale of 1-10 (with 10 being the most severe), with a second peak at 8.0 (Table Fourteen). The pain was experienced 'frequently' (Table Fifteen) and sleeping and lifting activities were equally affected (Figure Six).

Previous studies have found that not watching television prevented the development of recent neck pain (Slabbert, 2010).

## 5.5 Limitations

Since the design of this study was cross sectional, the factors identified as associated with neck pain were not necessarily pre-existing factors and therefore cannot be considered as risk factors specifically. They are merely associated with having neck pain and may even have arisen after the advent of the neck pain or as a consequence of the neck pain (e.g. favouring one side when lifting a heavy object is not necessarily what caused the neck pain and may be an adaptive behaviour that occurred as a result of the neck pain).

## 5.6 Review of the Objectives

### 5.6.1 Objective One

The first objective was to determine the prevalence of neck pain in the Indian population in the greater Durban area. The results were that neck pain in the Indian population within the greater Durban area had a prevalence of 36.8% (Table Three) and an annual incidence of 28.8% (Table Four). These results are comparable with the international literature (Bovim *et al.*, 1994; Guez *et al.*, 2002).

### 5.6.2 Objective Two

The second objective was to determine the demographic profile of the Indian population with neck pain. Mainly matriculated (40.3%), married (57.9%), men (55.7%) of either Hindu (43.0%) or Christian religion (43.0%) and active in their religion (94.0%) were affected by neck pain (Table Five). Their mean age was 36.7 years with a mean body mass index of 24.8 (Table Six). The females experienced an average of 1.7 pregnancies (Table Seven) with an average of 1.3 children (Table Eight). Of the 98 females, 9 (9.2%) had suffered a miscarriage (Table Nine). These results are comparable with the literature (Croft *et al.*, 2001).

Almost half (48.9%) were employed full time (Figure Five). The unemployment rate was 15.0% (Figure Six). Skilled workers were the most common profession followed by housewife (Table Ten). The longest duration of current employment was between 0-5 years (Table Eleven). Almost half of the respondents (48.4%) earned from below R5 000 to R15 000 per month (Table Twelve). These results are comparable with the literature (Lau *et al.*, 1996; Guez *et al.*, 2002).

These results compare favourably with Bovim *et al.,* (1994) with regards to age, gender and occupation. Other factors such as pregnancy and religious beliefs have a lesser influence if at all and are therefore unlikely to be related to neck pain.

### 5.6.3 Objective Three

The third objective was to determine the clinical features of neck pain. Participants first experienced neck pain at 28.2 years of age (Table Thirteen). In most cases the pain began gradually without injury (Table Seventeen). For most respondents, there was no progression of neck pain (Table Eighteen). Most respondents did not rate their neck pain as a disability (Table Nineteen). Few respondents were absent from work due to neck pain (Table Twenty (a)). For those who were absent form work, the period of absence usually lasted for less than one week (Table Twenty (b)). Most respondents were never bedridden due to neck pain (Table Twenty-One (a)). For those respondents who were bedridden, their stay in bed was less than one week (Table Twenty-One (b)). Most sufferers used either no medication or self medicated (Figure Nine). There were very few other activities (e.g. religious customs and social activities) associated with neck pain (Table Twenty-Two).

Original neck pain had a duration of 8.5 years and a severity of 4.9 on a scale of 1 to 10 (with 10 being the most severe) (Table Thirteen; Table Fourteen). The pain was 'seldom' experienced (Table Fifteen; Table

Sixteen).    The activities most affected were lifting, sleeping, and concentration (Figure Seven).

Recent neck pain had a duration of 50.4 days and a severity of 4.0 on a scale of 1 to 10 (with 10 being the most severe) (Table Thirteen; Table Fourteen).    The pain was experienced 'frequently' (Table Fifteen; Table Sixteen).  Sleeping and lifting were equally affected (Figure Eight).

## 5.6.4 Objective Four

The fourth objective was to identify the risk factors that influence neck pain in the Indian population.

**Table Twenty-Five:  Summarised Comparison of Original and Recent Factors for Neck Pain**

| Original Independent Factors | Recent Independent Factors |
|---|---|
| - Female | – Depression |
| – Stress | – Stress |
| – Cycling | – Cycling |
| – Occupation involving lifting heavy objects | – Occupation in an air conditioned room |
| – Sitting without back and arm support | – Sitting without arm support |
| – Motor vehicle accident | – Favouring one side when carrying something heavy |
| – Favouring one side when carrying something heavy | – Watching TV |
| – Working on a computer or watching TV | – Headaches |
| – Headaches | – Shoulder pain |
| – Shoulder pain | – Back pain |
| – Back pain | |
| (Table Twenty-Three) | (Table Twenty-Four) |

Due to the poor female response in this study, the resultant risk calculation for either original or recent neck pain would be skewed and therefore not comparable with other studies. Depression as a risk factor for the development of recent neck pain and not original neck pain could be due to an underlying event such as the current recession. Exercise is thought to be protective against the development of neck pain (Larsson *et al.,* 2007). However, cycling is a risk factor to the development of neck pain (Wilber *et al.,* 1995). Headache, shoulder pain, and low back pain were common risk factors to both original and recent neck pain, which concurs with Hogg-Johnson *et al.,* (2008). The remaining risk factors were related to occupation.

## 5.7 Conclusion

Age, gender and occupation were comparable between Bovim *et al.,* (1994) and the current study, as a similar prevalence of neck pain was reported. It can also be seen that occupation plays a significant role in the development of neck pain, as can be seen by the higher number of activities related to occupation in Table Twenty-Three. Also, the trend in South Africa seems to indicate is that manual labourers are at a higher risk to the development of neck pain (Ndlovu, 2006) when compared with skilled workers, who are less likely to be affected (Table Ten). This seems to be supported when the results are compared to Bovim et al., (1994), Guez *et al.,* (2002) and Cote *et al.,* (2000) studies, where Cote *et al.,* (2000) seems to have a larger labourer profile compared to Bovim et al., (1994) and Guez *et al.,* (2002). This comparison is however, a hypothesis and would therefore require further research.

# Chapter Six
# Conclusion and Recommendations

## 6.1    Introduction

This chapter will review the objectives of this study, which were set out in chapter one, with respect to their outcomes.

## 6.2    Conclusion

There were some significant differences noted in this study.  Firstly, males had a higher prevalence (55.7%) than females (44.3%) (Table Five), which could be due to the higher male response (69.5%).  Secondly, those who do not watch television had a 73.0% less risk of developing neck pain (Table Twenty-Four).   Skilled workers were the most common profession in this study (Table Ten) and thus the type of employment is important as neck pain is higher in managers and professionals (Lau *et al.,* 1996).

## 6.3    Recommendations

- During the data collection process it was noted that more males completed the questionnaire.  A suggestion for this is possibly their cultural up bringing. The Korean culture is male dominated, where the female is subservient to the male (Lee, 2001).  Although the Korean is associated with the Muslim religion, the cultural values of the Korean are followed by all religious dominations (Reddy, 2010).  This could be addressed in future research by the use of gender stratification (See section 5.3.2).

- The potential risk factors that were in the questionnaire (e.g. carrying heavy objects on one side) need to be reassessed to determine if they were present before the neck pain began or if they are a consequence of neck pain.

- If this questionnaire is used in further research, the specificity of certain questions should be looked at (e.g. disability should be defined so participants have a common perception instead of a personal perception).

- The relationship between neck pain and back pain needs to be researched further as this study and previous literature seems to support a relationship between the two.

- Further exploration of the similarities between the Nordic and Indian population groups needs to be investigated in order to improve health care budgetary allocations to allow for the more effective and efficient care of neck pain.

# References

Agur, R., Dalley, F. 2005. *Grant's atlas of anatomy*. 11<sup>th</sup> ed. Philadelphia: Lippincott Williams & Wilkins.

Ariens, G., Bongers, P., Douwes, M., Miedema, M., Hoogendoorn, W., van der Wal, G., Bouter, L., van Mechelen, W. 2001. Are neck flexion, neck rotation, and sitting at work risk factors for neck pain? Results of a prospective cohort study. *Occupational and Environmental Medicine,* 58: 200-207.

Bates, B. 1991. *A Guide to Physical Examination and History Taking.* 5<sup>th</sup> ed. Pennsylvania: Lippincott Company.

Baynman, M. 1995. *Literacy Practices: Investigating Literacy in Social Contexts*. London: Longman.

Bergmann, T., Peterson, D., Lawrence, D. 1993. *Chiropractic Technique.* United States of America: Churchill Livingstone.

Bernard, H. 2000. *Social research methods: qualitative and quantitative approaches*. California: Sage Publications Inc.

Bland, E. 1994. *Disorders of the Cervical Spine Diagnosis and Medical Management*. 2<sup>nd</sup> ed. Philadelphia: B. Saunders Company.

Boon, N., Colledge, N., Walker, B. 2006. Davidson's Principles and Practice of Medicine. 20<sup>th</sup> ed. India: Churchill Livingstone.

Borghouts, J., Bart, W., Vondeliing, H., Bouter, L. 1999. Cost-of-illness of neck pain in The Netherlands in 1996. *Pain*, 80(1999): 629-636.

Bovim, G., Schrader, H., Sand, T. 1994. Neck Pain in the General Population. *Spine*, 19(12): 1307-1309.

*Brabys.* 2010. 23<sup>rd</sup> ed. Pinetwon: Brabys a.c.brabys (Pty) Ltd (2010)

Byfuglien, J., Stensrud, J. 2002. Structural indicators for comparing Norway with the EU. *Economic Survey*, 4 (2002).

Cassou, B., Derriennic, F., Monfort, C., Norton, J., Touranchet, A. 2002. Chronic neck and shoulder pain, age, and working conditions: longitudinal results from a large random sample in France. *Occupational and Environmental Medicine,* 59: 537-544.

Chaitow, L., DeLany, J. 2000. *Clinical application of neuromusculoskeletal technigues.* Edinburgh: Harcourt Publishers.

Chindaw, S. 25 May 2010. Statistics Required. E-mail to J. M. Muchna (juliemuchna@hotmail.com) [Accessed 25 May 2010].

Chiu, T., Lee, M., Sum, W., Wan, W., Wong, C., Yuen, C. 2004. A Study on the Prevalence of and Risk Factors for Neck Pain Among University Academic Staff in Hong Kong. *Journal of Occupational Rehabilitation*, 12(2): 77-91.

Cote, P., Cassidy, J., Carroll, L. 2000. The Factors Associated With Neck Pain and Its Related Disability in the Saskatchewan Population. *Spine*, 25(9): 1109-1117.

Cote, P., Cassidy, J., Carroll, L., Kristman, V. 2003. The annual incidence and course of neck pain in the general population: a population-based cohort study. *Pain*, 112(2004): 267-273.

Cote, P., van der Velde, G., Cassidy, J., Carroll, L., Hogg-Johnson, S., Holm, L., Carragee, E., Haldeman, S., Nordin, M., Hurwitz, L., Guzman, J., Peloso, P. 2008. The Burden and Determinants of Neck Pain in Workers. Results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *European Spine Journal*, 17 (Supplement 1): S60-S74.

Cramer, D., Darby, S. 1995. *Basic and Clinical Anatomy of the Spine, Spinal Cord, and ANS.* Missouri: Mosby-Year Book, Inc.

Croft, P., Lewis, M., Papageorgiou, A., Thomas, E., Jayson, M., Macfarlane, G., Silman, A. 2001. Risk factors for neck pain: a longitudinal study in the general population. *Pain*, 93(2001): 317-325.

Docrat, A. 1999. *A comparison of the epidemiology of low back pain in Indian and Coloured communities in South Africa.* MD Chiropractic. Durban University of Technology. Unpublished.

Durban Investment Promotion Agency 2010

Dyer, C. 1997. *Beginning Research in Psychology: A practical guide to research methods and statistics.* Oxford: Blackwell Publishers Ltd.

Edmondston, S., Chan, H., Ngai, G., Warren, M., Williams, J., Glennon, S., Netto, K. 2007. Postural neck pain: An investigation of habitual sitting posture, perception of 'good' posture and cervicothoracic kinaesthesia. *Manual Therapy*, 12(2007): 363-371.

Esterhuizen, T. 9 October 2010. Statistical Analysis. E-mail J. M. Muchna (juliemuchna@hotmail.com) [Accessed 9 October 2010].

Faiz, O., Moffat, D. 2002. *Anatomy at a glance.* Blackwell Science Ltd.

Fink, A., Koescoff, J. 1985. *How to conduct a survey: a step by step guide.* California: Sage Publications.

Foreman, S., Croft, A. 1995. *Whiplash injuries: The cervical acceleration/deceleration syndrome.* 2nd ed. Maryland: Williams & Wilkins.

Gatterman, M. 1990. *Chiropractic Management of Spine Related Disorders.* Maryland: Williams & Wilkins

Gatterman, M. 1995. *Foundations of Chiropractic Subluxation.* United States of America: Mosby-Year Book, Inc.

Giles, L., Singer, K. 1998. *Clinical anatomy and management of cervical spine pain.* Volume 3. Butterworth Heinemann.

Gore, D. 1998. The Epidemiology of Neck Pain [online]. Availabe at www.digital-doc.com/neckpain.htm [Accessed 20 May 2010].

Green, C., Baker, T., Sato, Y., Washington, L., Smith, E. 2002. Race and Chronic Pain: A Comparative Study of Young Black and White Americans Presenting for Management. *The Journal of Pain*, 4(4): 176-183.

Grieve, G. 1998. *Common Vertebral Joint Problems.* 2nd ed. United Kingdom: Churchill Livingstone.

Guez, M., Hildingsson, C., Nilsson, M., Toolanen, G. 2002. The prevalence of neck pain. A population-based study from northern Sweden. *Acta Orthopedic Scandenavia*, 73(4): 455-459.

Gupta, S., Roy, R., Srivastava, A. 1982. Sagittal diameter of the cervical canal in normal Indian adults. *Clinical Radiology,* 33(6)*: 681-685.

Gupta, R., Misra, A., Vikram, N., Kondal, D., Gupta, S., Agrawal, A., Pandey, R. 2009. Younger escalation of cardiovascular risk factors in Asian Indian subjects. *BMC Cardiovascular Disorders* 5(9): 28.

Guyton, A., Hall, E. 1997. *Human Physiology and Mechanisms of Disease.* 6th ed. Philadelphia: W.B Saunders.

Halderman, S. 1992. *Principles and Practice of Chiropractic.* 3rd ed. United States of America: McGaw-Hill Companies, Inc.

Haneline, M. 2006. Symptomatic Outcomes and Perceived Satisfaction Levels of Chiropractic Patients with a Primary Diagnosis Involving Acute Neck Pain. *Journal of Manipulative and Physiological Therapeutics*, 29(4): 288-296.

Harrison, D., Janik, T., Troyanovich, S., Holland, B. 1996. Comparisons of Lordotic Cervical Spine Curvatures to a Theoretical Ideal Model of the Static Sagittal Cervical Spine. *Spine*, 21(6): 667-675.

Haslett, C., Chilvers, E., Boon, N., Colledge, N. 2002. *Davidson's Principles and Practice of Medicine.* 19th ed. India: Churchill Livingstone.

Hicks, C. 2004. *Research methods for clinical therapists.* 4th ed. China: Churchill Livingstone.

Hogg-Johnson, S., van der Velde, G., Carroll, L., Holm, L., Cassidy, J., Guzman, J., Cote, P., Haldeman, S., Ammendolia, C., Carragee, E., Hurwotz, E., Nordin, M., Peloso, P. 2008. The Burden and Determinants of Neck Pain in the General Population. Results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Journal of Manipulative and Physiological Therapeutics*, 32(Supplement 2): S46-S60.

Holmstrom, E., Lindell, J., Moritz, U. 1992. Low back and neck/shoulder pain in construction workers: occupational workload and psychosocial factors. *Spine*, 7(6): 672-677.

Hurwitz, E., Carragee, E., van der Velde, G., Carroll, G., Nordin, M., Guzman, J., Pelosos, P., Holm, L., Cote, P., Hogg-Johnson, S., Cassidy, J., Haldeman, S. 2008. Treatment of Neck Pain: Noninvasive Interventions. Results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *European Spine Journal*, 17(Supplement 1): S123-S152.

Jenson, I., Harms-Ringdahl, K. 2007. Neck pain. *Best Practice and Research Clinical Rheumatology*, 21(1): 93-108.

Johnson, C. 2005. On the Subject of Human Subjects. *Journal of Manipulative and Physiological Therapeutics*, 28: 79-80.

Kamwendo, K., Linton, J., Moritz, U.  1991.  Neck and shoulder pain in medical secretaries.  *Scandanavian Journal of Rehabilitation Medicine*, 23:  127-133.

Kirkaldy-Willis, W., Burton, C.  1992.  *Managing low back pain*.  3rd ed.  New York:  Churchill Livingstone Inc.

Larsson, B., Sogaard, K., Rosendal, L.  2007.  Work related neck-shoulder pain:  a review on magnitude, risk factors, biochemical characteristics, clinical picture and preventative interventions.  *Best Practice and Research Clinical Rheumatology*, 21(3):  447-463.

Lau, E., Sham, A., Wong, K.  1996.  The Prevalence of and Risk Factors for Neck Pain in Hong Kong.  *Chinese Journal of Public Health Medicine*, 18(6):  396-399.

Leach, R.  2004.  *The Chiropractic Theories:  A textbook of scientific research*.  4th ed.  United states of America:  Lippincott Williams & Wilkins.

Lee, P.  1994.  The economic impact of musculoskeletal disorders.  *Quality of Life Research*, 3(1):  S85-S91.

Lee, J.  2001.  Confucian Thought Affecting Leadership And Organizational Culture Of Korean Higher Education.  *Radical Pedagogy* (2001).

Liebenson, G.  1996.  Rehabilitation of the spine:  A practitioner's manual.  Pennsylvania:  Williams & Wikins.

Linton, S.  2000.  A Review of Psychological Risk Factors in Back and Neck Pain.  *Spine*, 25(9):  1148-1156.

Magee, D.  2006.  *Orthopedic Physical Assessment.*  Philadelphia:  W.B. Saunders Company.

Moore, K., Dalley, A.  1999.  *Clinically orientated anatomy*.  4th ed.  Canada:  Lippincott Williams & Wilkins.

Morgan, D.  1997.  *Focus Group As Qualitative Research*.  2nd ed.  United States of America:  Sage Publications.

Morgan, D.  1998.  *The Focus Group Guidebook.*  United States of America:  Sage Publications.

Mouton, J.  1996.  *Understanding social research*.  Pretoria:  Van Schaik Publishers.

Mouton, J., Babbie, E. 2006. *The practice of social research*. South African ed. Oxford: University Press.

Ndlovu, Z. 2006*. A case control study investigating factors associated with neck pain in the indigenous African population in the greater Durban area*. MD Chiropractic, Durban University of Technology. Unpublished.

O'Sullivan, P. 2005. Classification of lumbopelvic pain disorders - Why is it essential for management? *Manual Theraphy*, 11(2006): 169-170.

*Oxford Handbook of Clinical Medicine.* 1996*.* Oxford: University Press.

*Oxford Medical Dictionary*. 6th ed. 2003. Oxford: University Press.

Panjabi, M. 1992. The Stabilizing System of the Spine. Part I. Function, Dysfunction, Adaptation, and Enhancement. *Journal of Spinal Disorders*, 5(4): 383-389.

Portenoy, R., Urgate, C., Fuller, I., Haas, G. 2004. Population-based survey of pain in the United States: differences among White, African, American, and Hispanic subjects. *Pain Medicine*, 5(6): 317-328.

Porterfield, J., DeRosa, C. 1995. *Mechanical Neck Pain*: Perspectives in Functional Anatomy. Philadelphia: W.B. Saunders Company.

Salant, P., Dillman, D. 1994. *How to Conduct Your Own Survey*. New York: John Wiley & Sons, Inc.

Sauter, S., Schleifer, L., Knuston, S. 1991. Work posture, workstation design, and musculoskeletal discomfort in a VDT data entry task. *Human Factors*, 33(2): 151-167.

Scollen, R., Wong Scollen, S. 1995. *Intercultrual Communication*. Massachusetts: Blackwell.

South African Post Office. 2009. *Postcodes 2009 2nd ed*. South Africa:

Slabbert, W. 2010. *An epidemiological investigation of neck pain in the white population in the greater Durban area*. MD Chiropractic, Durban University of Technology. Unpublished.

Strode, A., Slack, C., Essack, Z. 2010. Child consent in South African law: implications for researchers, service providers and policy-makers. *South African Medical Journal*, April 2001.

Sunder, R. 2006. *A determination of normal reference ranges for bone mineral density for Indian women of varying age groups in KZN: the impact of local data on the diagnosis of osteoporosis.* Unpublished.

Tayyari, F., Smith, J. 1997. *Occupational ergonomics: principles and applications. Manufacturing Systems Engineering Series.* Volume 3. London: Williams & Wilkins.

Terry, P., Bissenden, J., Condie, R., Mathew, P. 1985. Ethnic differences in congenital malformations. *Arch Disorders of Child,* 60: 866-868

Travell, J., Simons, D. 1983. *Myofascial Pain and Dysfunction: The Trigger Point Manual: The Upper Extremities.* Maryland: Williams & Wilkins.

van der Meulen, A. 1997. *An epidemiological investigation of low back pain in a formal Black South African township.* MD Chiropractic, Durban University of Technology. Unpublished.

Vernon, H., Mior, S. 1990. The Neck Disability Index: A Study of Reliability and Validity. *Journal of Manipulative and Physiological Therapeutics,*14(7): 409-415.

Waalen, D., Waalen, J. 1993. Differences by gender in the Incidence of Cervical and Lumbar complaints of chiropractic patients at the Canadian Memorial Chiropractic College. *Journal of Canadian Chiropractic Association*, 37: 145-150.

Walker-Bone, K., Reading, I., Coggon, D., Cooper, C., Palmer, K. 2004. The anatomical pattern and determinants of pain in the neck and upper limbs: an epideiolgic study. *Pain*, 109(2004): 45-51.

Weinstein, J., Rydevik, B., Sonntag, V. 1995. *Essentials of the spine.* New York: Raven Press.

Wiesel*,* S., Boden, S., Borenstein, D., Feffer, H. 1992. *Neck Pain.* 2nd ed. The Michie Company.

Wilber, C., Holland, G., Madison, R., Loy, S. 1995. Epidemiological analyses of overuse injuries among recreational cyclists. *Inj Sports Medicine*, 3(16): 201-206.

Wulan, S., Westerterp, K., Plasqui, G. 2010. Ethnic differences in body composition and the associated metabolic profile: A comparative study between Asians and Caucasians. *Maturitas 13*

## ETHICS CLEARANCE CERTIFICATE

| Student Name | Julie Miroslava Muchna | Student No | 20300547 |
|---|---|---|---|
| Ethics | 027/10 | Date of FRC Approval | 16/05/2010 |
| Qualification | M.Tech : Chiropractic | | |
| Research Title: | An epidemiological investigation into the risk factors associated with neck pain in the Indian population in the greater Durban area. | | |

*In terms of the ethical considerations for the conduct of research in the Faculty of Health Sciences, Durban University of Technology, this proposal meets with Institutional requirements and confirms the following ethical obligations:*

1. The researcher has read and understood the research ethics policy and procedures as endorsed by the Durban University of Technology, has sufficiently answered all questions pertaining to ethics in the DUT 186 and agrees to comply with them.
2. The researcher will report any serious adverse events pertaining to the research to the Faculty of Health Sciences Research Ethics Committee.
3. The researcher will submit any major additions or changes to the research proposal after approval has been granted to the Faculty of Health Sciences Research Committee for consideration.
4. The researcher, with the supervisor and co-researchers will take full responsibility in ensuring that the protocol is adhered to.
5. **The following section must be completed if the research involves human participants:**

| | YES | NO | N/A |
|---|---|---|---|
| ❖ Provision has been made to obtain informed consent of the participants | ✓ | | |
| ❖ Potential psychological and physical risks have been considered and minimised | ✓ | | |
| ❖ Provision has been made to avoid undue intrusion with regard to participants and community | ✓ | | |
| ❖ Rights of participants will be safe-guarded in relation to: <br>   - Measures for the protection of anonymity and the maintenance of Confidentiality. | ✓ | | |
|   - Access to research information and findings. | ✓ | | |
|   - Termination of involvement without compromise | ✓ | | |
|   - Misleading promises regarding benefits of the research | ✓ | | |

_____  
SIGNATURE OF STUDENT/RESEARCHER

18 August 2010  
DATE

_____  
SIGNATURE OF SUPERVISOR/S

18 August 2010  
DATE

_____  
SIGNATURE OF HEAD OF DEPARTMENT

18/8/2010  
DATE

_____  
RESEARCH ETHICS COMMITTEE

24/08/10  
DATE

30

# APPENDIX B

# RACE DISTRIBUTIONS OF THE SUBURBS IN THE GREATER DURBAN AREA

**Statistics South Africa**

**Labour Force - South Africa by Province and Municipality**

**Table One**

**Gender and Geography by Population group for Person weighted**

|  | Black African | Coloured | Indian or Asian | White | Total |
|---|---|---|---|---|---|
| Male |  |  |  |  |  |
| Chatsworth | 9234 | 393 | 55305 | 66 | 64998 |
| Phoenix | 3075 | 530 | 55734 | 60 | 59399 |
| Verulam | 5599 | 194 | 12457 | 30 | 18280 |
| Stanger | 21995 | 445 | 7924 | 356 | 30721 |
| Isipingo | 231 | - | - | - | 231 |
| Reservoir Hills | 1335 | 86 | 5269 | 33 | 6723 |
| Female |  |  |  |  |  |
| Chatsworth | 10265 | 625 | 61300 | 27 | 72217 |
| Phoenix | 3936 | 700 | 60003 | 39 | 64678 |
| Verulam | 6590 | 250 | 13459 | 15 | 20314 |
| Stanger | 24133 | 512 | 8792 | 276 | 33711 |
| Isipingo | 250 | - | - | 3 | 253 |
| Reservoir Hills | 1885 | 158 | 5791 | 26 | 7860 |

**Created on 06 April 2010**

**Space-Time Research Web page:  www.str.com.au**

**Space-Time Research Online support:  support@str.com.au**

*SuperCROSS.  Copyright © 1993-2010  Space Time Research Pty Ltd.  All rights reserved.*

# APPENDIX C

# MONTHLY INCOMES OF THE SUBURUBS IN THE GREATER DURBAN AREA

**Statistics South Africa**
**Labour Force - South Africa by Province and Municipality**
**Table One**
**Gender and Geography by Population group for Person weighted**

| | Chatsworth | Phoenix | Verulam | Stanger | Isipingo | Reservoir Hills | Total |
|---|---|---|---|---|---|---|---|
| **Male** | | | | | | | |
| No income | 23416 | 20819 | 7268 | 14402 | 132 | 2115 | 68151 |
| R1-R400 | 1825 | 1193 | 737 | 1911 | 69 | 169 | 5903 |
| R401-R800 | 6199 | 5230 | 1707 | 4230 | 15 | 346 | 17727 |
| R801-R1 600 | 8263 | 9662 | 2259 | 4246 | 6 | 487 | 24293 |
| R1 601-R3 200 | 12387 | 12769 | 2684 | 2941 | 9 | 965 | 31755 |
| R3 201-R6 400 | 8715 | 7152 | 2106 | 1841 | - | 1202 | 21016 |
| R6 401-R12 800 | 3217 | 2096 | 1276 | 865 | - | 919 | 8373 |
| R12 801-R25 600 | 709 | 329 | 177 | 194 | - | 337 | 1745 |
| R25 601-R51 200 | 159 | 114 | 45 | 61 | - | 96 | 475 |
| R51 201-R102 400 | 63 | 21 | 15 | 12 | - | 45 | 156 |
| R102 401-R204 800 | 36 | 6 | 3 | 6 | - | 33 | 84 |
| R204 801 or more | 9 | 9 | 3 | 12 | - | 9 | 42 |
| **Female** | | | | | | | |
| No income | 41007 | 37569 | 12009 | 20429 | 193 | 4071 | 115277 |
| R1-R400 | 2911 | 1755 | 1040 | 3345 | 42 | 427 | 9521 |
| R401-R800 | 8661 | 6490 | 2268 | 4832 | 9 | 774 | 23034 |
| R801-R1 600 | 7537 | 8859 | 1859 | 2300 | - | 506 | 21063 |
| R1 601-R3 200 | 6793 | 6415 | 1486 | 1388 | 3 | 735 | 16820 |
| R3 201-R6 400 | 3902 | 2738 | 1142 | 1085 | - | 770 | 9637 |
| R6 401-R12 800 | 1163 | 665 | 453 | 248 | 6 | 450 | 2985 |
| R12 801-R25 600 | 160 | 111 | 27 | 51 | - | 63 | 412 |
| R25 601-R51 200 | 48 | 57 | 21 | 15 | - | 39 | 180 |
| R51 201-R102 400 | 21 | 12 | 9 | 15 | - | 18 | 75 |
| R102 401-R204 800 | 9 | 3 | - | 3 | - | 6 | 21 |
| R204 801 or more | 6 | 3 | - | - | - | - | 9 |

# APPENDIX D

# MAP OF RESERVOIR HILLS

# APPENDIX E
# MAP OF CHATSWORTH
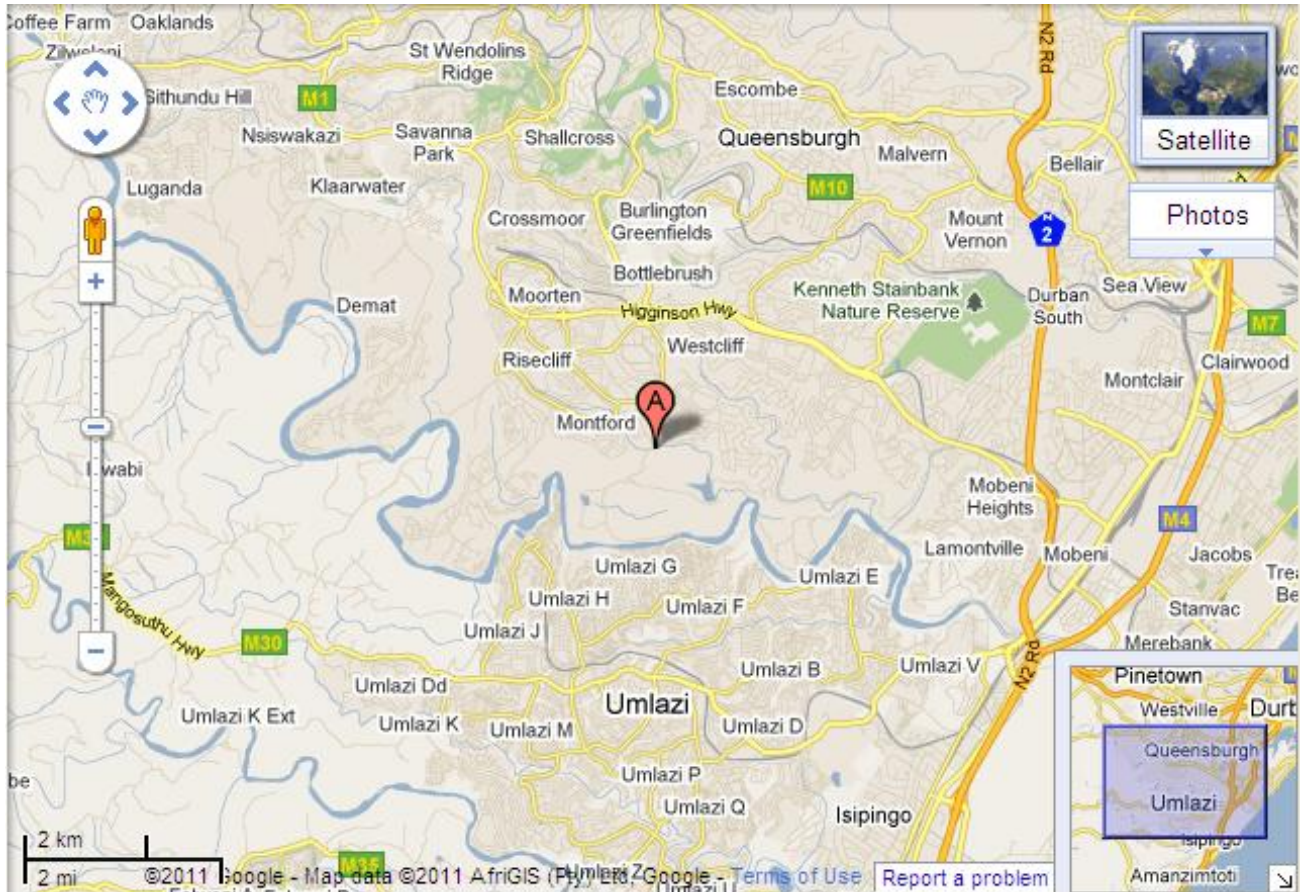
# APPENDIX F

# MAP OF PHOENIX
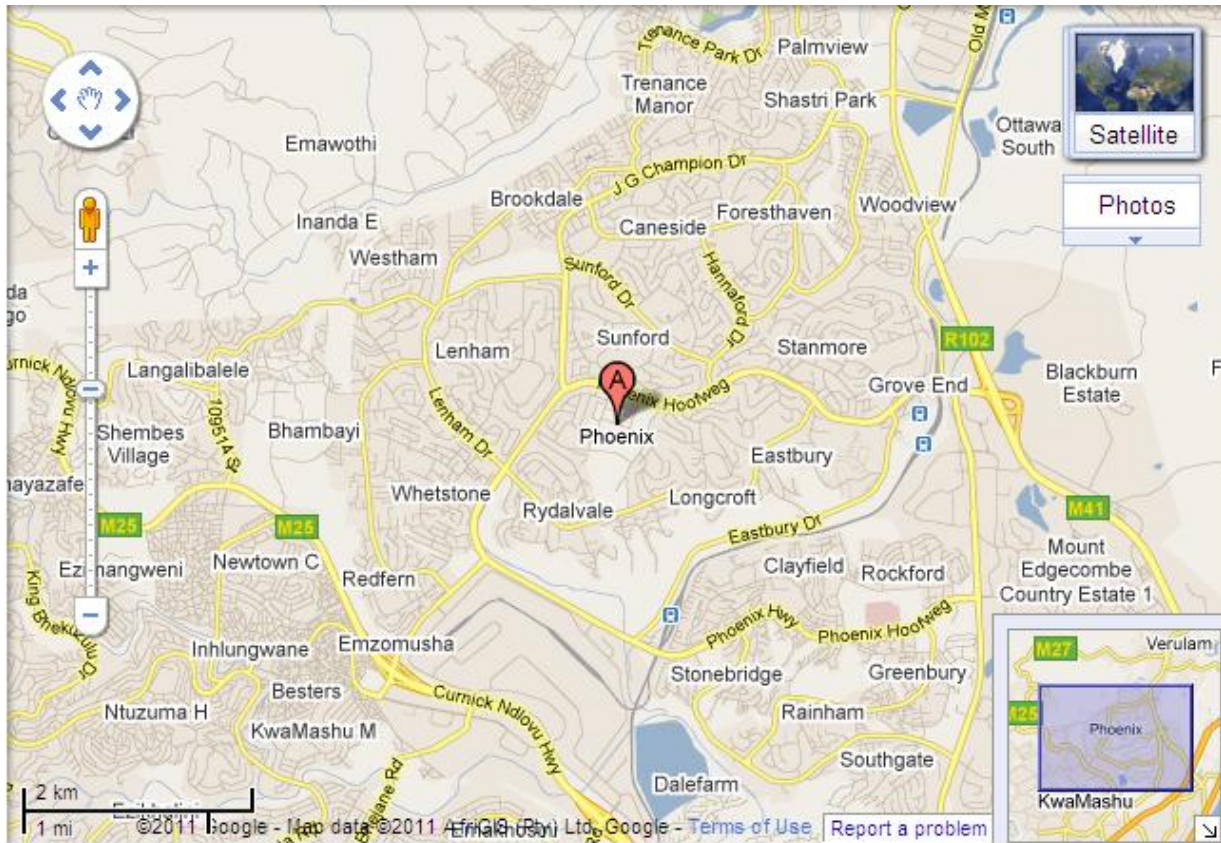
# APPENDIX G
# LETTER OF PERMISSION-SLABBERT

Dear Dr. W Slabbert

RE: Permission for the use and modification of your questionnaire developed for your research study.

**The title of my research project is:**
An epidemiological investigation into the risk factors associated with neck pain in the Indian population in the greater Durban area.

I have listed below the aim and objectives of my study so that you may understand what my study entails.  The aim of this investigation is to determine the prevalence and the risk factors of neck pain in the Indian population in the Greater Durban area.

The objectives of my study are:
- To determine the prevalence of neck pain in the Indian population in the greater Durban area.
- To determine the demographic profile of the Indian population with neck pain.
- To characterise the clinical features of neck pain.
- To identify the risk factors that influence neck pain in the Indian population.

**For this study I will be requiring the use and modification of your questionnaire developed for your research study.  As the only difference between our research studies is the population group, most of the risk factors to developing neck pain would be experienced by both population groups (i.e. the White and Indian population groups in the greater Durban area). The information require from both population groups would also be similar, and as you have already developed your research questionnaire it would help me if I could use and modify your research questionnaire to the Indian population.**

If you have any further questions please contact me on 031 765 1720 or my supervisor on 031 373 6312 or my co supervisor on 031 373 2611.

Yours sincerely,

Julie Muchna                     Dr Prisca Zandile Ndlovu              Dr Charmaine Korporaal
(Researcher)                     (Supervisor)                         (Co Supervisor)

# APPENDIX H
# LETTER OF PERMISSION-NDLOVU


Dear Dr. Z. Ndlovu


RE: Permission for the use and modification of your questionnaire developed for your research study.


**The title of my research project is:**
An epidemiological investigation into the risk factors associated with neck pain in the Indian population in the greater Durban area.


I have listed below the aim and objectives of my study so that you may understand what my study entails.  The aim of this investigation is to determine the prevalence and the risk factors of neck pain in the Indian population in the Greater Durban area.

The objectives of my study are:
-   To determine the prevalence of neck pain in the Indian population in the greater Durban area.
-   To determine the demographic profile of the Indian population with neck pain.
-   To characterise the clinical features of neck pain.
-   To identify the risk factors that influence neck pain in the Indian population.


**For this study I will be requiring the use and modification of your questionnaire developed for your research study.  As the only difference between our research studies is the population group, most of the risk factors to developing neck pain would be experienced by both population groups (i.e. the Black African and Indian population groups in the greater Durban area).  The information require from both population groups would also be similar, and as you have already developed your research questionnaire it would help me if I could use and modify your research questionnaire to the Indian population.**


If you have any further questions please contact me on 031 765 1720 or my co supervisor on 031 373 2611.


Yours sincerely,


Julie Muchna                                        Dr Charmaine Korporaal
(Researcher)                                        (Co Supervisor)

# APPENDIX I

# ORIGINAL QUESTIONNAIRE

**An epidemiological investigation into the factors associated with neck pain in the Indian population in the greater Durban area**

**Background Information - Identifying Information**

Questionnaire Number_____

Date of Interview (____/____/____)

## (A) Demographics

1. How old are you? (Years)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 18-20 | (_1_) | 21-25 | (_2_) | 26-30 (_3_) | 31-35 | | (_4_) |
| 36-40 | (_5_) | 41-45 | (_6_) | 46-50 (_7_) | 51-55 | | (_8_) |
| 56-60 | (_9_) | | | | | | |

2. Gender                 Male (_1_)        Female (_2_)

3. Marital status

| | | | | | |
|---|---|---|---|---|---|
| Married | (_1_) | Single | (_2_) | Divorced | (_3_) |
| Separated | (_4_) | Widowed | (_5_) | Staying together | (_6_) |

4. Number of children

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| N/A | (_1_) | 1 | (_2_) | 2 | (_3_) | 3 | (_4_) | |
| 4 | (_5_) | 5 | (_6_) | 6 | (_7_) | 7 | (_8_) | |
| 8 | (_9_) | 9 | (_10_) | 10 | (_11_) | >10 | (_12_) | Twins |
| (_13_) | | | | | | | | |

5. Number of pregnancies

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| N/A | (_1_) | 1 | (_2_) | 2 | (_3_) | 3 | (_4_) | |
| 4 | (_5_) | 5 | (_6_) | 6 | (_7_) | 7 | (_8_) | |
| 8 | (_9_) | 9 | (_10_) | 10 | (_11_) | >10 | (_12_) | Twins |
| (_13_) | | | | | | | | |

6. Highest level of education

Primary school    (_1_)    High school    (_2_)    Matriculated (_3_)    No formal education  (_4_)    Tertiary    (_5_)    Other (_6_)

7. Religion

Hindu    (_1_) Tamil    (_2_) Muslim    (_3_) Christian (_4_)

8. Do you suffer with any of the following?

Hypertension (_1_) Diabetes    (_2_) Osteoporosis (_3_) Cholesterol    (_4_)

9. Present occupational status

Self-employed  (_1_)       Unemployed  (_2_)       Retired (_3_)    Housewife (_4_)
        Employed (full-time)  (_5_)   Employed (part-time)  (_6_)                   Student
(_7_)

10.  If employed, what is your occupation?
Liberal profession (_1_)      Businessman       (_2_)       Artisan       (_3_)
Farmer            (_4_)       Unskilled worker    (_5_)       Housewife    (_6_)
Salesman         (_7_)    Managerial          (_8_)       Clerical       (_9_)
Labourer         (_10_)    Skilled worker      (_11_)       Student       (_12_)
Educator         (_13_)    other             (_14_)

11.  For how long have you been in this occupation? (years)
0-5      (_1_)          6-10   (_2_)           11-15 (_3_)          16-20   (_4_)
2 1-25 (_5_)         26-30 (_6_)          >30   (_7_)

12.  If unemployed or retired, what occupation were you in for the longest period previously?
Liberal profession (_1_)            Businessman (_2_)         Artisan       (_3_)
Farmer            (_4_)            Unskilled worker (_5_)       Housewife    (_6_)
Salesman         (_7_)            Managerial       (_8_)        Clerical        (_9_)
Labourer         (_10_)           Skilled worker    (_11_)      Student       (_12_)
Educator         (_13_)           other             (_14_)

13.  What was the duration of the above occupation? (years_)
0-5      (_1_)          6-10   (_2_)           11-15 (_3_)          16-20   (_4_)
2 1-25 (_5_)         26-30 (_6_)          >30   (_7_)

**(B) Risk Factors**

14.  Does your occupation involve any of the following?
Lifting heavy objects  (_1_)          Sitting for long periods         (_2_)
Driving for long hours (_3_)          Causes your neck to turn         (_4_)
Answering telephone      (_5_)        Working on a computer         (_6_)
Working with arms overhead   (_7_) Working in an air-conditioned room (_8_)

15.  If you use a computer, is the monitor in line with eye level?
Yes     (_1_)            No     (_2_)

16.  Do you feel that your job makes you vulnerable in any way to get neck pain?
Yes     (_1_)          No     (_2_)           Unsure   (_3_)

17.  Total annual income of interviewee alone?
R1       -R5000          (_1_)          R5000 - R15000        (_2_)
R15000 - R25000     (_3_)          R25001-R35000    (_4_)
R35001 -R45000      (_5_)          R45001 –R55000      (_6_)
R55001 –R65000      (_7_)          R66001 –R75000      (_8_)
R75001 – R85000     (_9_)          R85001 - R95000      (_10_)
>R95000            (_11_)          N/A                 (_12_)

18.  Do you worry a lot?                          Yes (_1_)      No (_2_)

19 What type of transport do you utilize most often to get to and from work?
Own Car (_1_)                Bus (_3_)             Bicycle (_4_)
Taxi (_2_)                Walking more than 5 km (_5_)

20.  Have you been involved in a motor vehicle accident?   Yes (_1_)  No (_2_)

21. Have you had any head or neck trauma?          Yes (_1_)      No (_2_)

22. Do you lean or bend over a desk?          Yes (_1_)      No (_2_)

23. If yes for how many hours?
0-2 (_1_)      2-4 (_2_)      4-6 (_3_)      6-8 (_4_)      8-10 (_5_)      >10 (_6_)

24. How many pillows do you use?
None (_1_)          One          (_2_)
Two          (_3_)          Three          (_4_)
>3          (_5_)

25. For how long have you been using the same pillow/s?
0-1 year      (_1_)      1-2 years      (_2_)      2-3 years      (_3_)      3-4 years      (_4_)
4-5 years      (_5_)      >5 years      (_6_)

26. Do you normally carry items on one shoulder?          Yes (_1_)      No (_2_)

27. Do you hold the receiver between your shoulder and neck?   Yes (_1_)      No (_2_)

28. Do you usually fall asleep in an awkward position?    Yes (_1_)      No (_2_)

29. Does your bed offer enough support?          Yes (_1_)      No (_2_)

30. Do you sleep on your tummy?          Yes (_1_)      No (_2_)

31. Do you hold your arms out to support a book?          Yes (_1_)      No (_2_)

32. Do you read in bed?          Yes (_1_)      No (_2_)

33. Do you sit without back support?          Yes (_1_)      No (_2_)

34. Do you sit without arm support?          Yes (_1_)      No (_2_)

35. Do you watch television?          Yes (_1_)      No (_2_)

36. If yes then how many hours per day?
0-1 (_1_)      1-2 (_2_)      2-3 (_3_)      3-4 (_4_)      4-5 (_5_)      >5 (_6_)

37. Do you consider yourself an emotional person?          Yes (_1_)      No (_2_)

38. Do you do any exercise?          Yes (_1_)      No (_2_)

39. What type of exercise do you do most of the time?
Running          (_1_)          Swimming          (_7_)          Squash          (_13_)
Soccer          (_2_)          Cricket          (_8_)          Aerobics          (_14_)
Rugby          (_3_)          Tennis          (_9_)          Yoga          (_15_)
Fishing          (_4_)          Cycling          (_10_)          Gymnastics          (_16_)
Boxing          (_5_)          Martial arts      (_11_)          Walking          (_17_)
Badminton      (_6_)          Weight training (_12_)          Other (_18_) _____

40. Number of exercise sessions per week/ combined if more than one sport is played.
1      (_1_)  2      (_2_)  3      (_3_)          4          (_4_)
5      (_5_)          6      (_6_)          7      (_7_)          >7      (_8_)

41. What is the total amount of time spent each week doing exercise? (Hours)
<1 (_1_)     1-3 (_2_)     4-6  (_3_)      7-9  (_4_)      >10  (_5_)

42. Do you have a medical cover?  (_1_)     Do you have a hospital scheme?  (_2_)
        N/A (_3_)

43. Do you feel that you have sufficient access to health services?     Yes (_1_)    No (_2_)

44. What was your age when you first experienced neck pain? (Years)
0-10   (_1_)           11-15  (_2_)          16-20  (_3_)          21-25  (_4_)
26-30  (_5_)           31-35 (_6_)           36-40 (_7_)           41-45  (_8_)
46-50  (_9_)           51-55  (_10_)         56-60 (_11_)          61-65   (_12_)
66-70   (_13)

## (C) Clinical (only participants with neck pain can answer this section)

45. How long have you had neck pain? (Recent episode)
1 month   (_1_)      1-6 months (_2_)      6-12 months (_3_)       1-2 yrs     (_4_)
2-3 yrs  (_5_)       3-4 yrs       (_6_)        4-5 yrs      (_7_)      5-10 yrs   (_8_)
11-15 yrs (_9_)     16-20 yrs (_10_)      20 yrs       (_11_)

46. How severe is the pain?      Mild (_1_)      Moderate (_2_)      Severe (_3_)

47. At what time of the day is the pain worst?
Morning        (_1_)            Afternoon          (_2_)           Evening          (_3_)
Night           (_4_)            Activity related      (_5_)           N/A              (_6_)

48. At what time of the day is the pain at its least?
Morning (_1_)      Afternoon (_2_)      Evening (_3_)       Night (_4_)       N/A (_5_)

49. How often do you experience neck pain?
Seldom (_1_)       Frequently (_2_)       Constantly (_3_)      Intermittently (_4_)

50. How did your neck pain begin?
Gradually without injury        (_1_)    Gradually after injury  (_2_) Abruptly without injury
        (_3_)          Abruptly after injury          (_4_)    Unsure                    (_5_)

51. Progression of neck pain?
Getting worse          (_1_)            Getting better          (_2_)
Staying the same             (_3_)    Unsure                         (_4_)

52. Do you have trouble in doing any of the following things because of neck pain?
Dressing               (_1_)            Washing          (_2_)
Lifting                  (_3_)            Reading          (_4_)
Concentration          (_5_)            Work             (_6_)
Driving                 (_7_)            Sleeping         (_8_)
Recreation              (_9_)

53. How would you rate your overall disability because of your neck pain?
None           (_1_)            Mild           (_2_)
Moderate      (_3_)            Severe         (_4_)

54. Have you ever had to stay away from work because of your neck pain?
Yes (_1_)       No (_2_)

55.  If 'Yes', for how long?
0-1 week      (_1_)  >1-2 weeks    (_2_)
>2-3 weeks   (_3_)            >3- 4 weeks   (_4_)
>4 weeks      (_5_)

56.  Have you ever been bed ridden because of neck pain?  Yes (_1_)  No (_2_)

57.  If 'Yes', for how long?
0-1 week      (_1_)  >1-weeks       (_2_)
>2-3 weeks   (_3_)            >3- weeks      (_4_)
>4 weeks      (_5_)

58.  Have you ever been demoted (_1_), medically boarded (_2_), or fired (_3_) because of neck pain?

59.  What treatment have you sought for your neck pain?
GP     (_1_)  Physiotherapy (_2_)  Chiropractic              (_3_)  Self Medication
       (_4_)

60.  Do you suffer from headaches?                      Yes (_1_)   No (_2_)

61.  Do you suffer from shoulder pain?                  Yes (_1_)   No (_2_)

62.  Do you suffer from low back pain?                  Yes (_1_)   No (_2_)

63. Do you associate your neck pain with any other activities (e.g. customs, social activities)?
_____
_____
_____

# APPENDIX J

# LETTER OF INFORMATION-FOCUS GROUP

Dear Participant,

I would like to welcome you and thank you for participating in my study.

**The title of my research project is:**

An epidemiological investigation into the factors associated with neck pain in the Indian population in the greater Durban area.

Name of Supervisor: **Dr Prisca Zandile Ndlovu; M.Tech Chiropractic**

Name of Co Supervisor: **Dr Charmaine Korporaal; M.Tech Chiropractic, CCFC, CCSP, ICSSD**

Name of Researcher: **Julie Miroslava Muchna**

Name of Institution: **Durban University of Technology**

I have listed below the aim and objectives of my study so that you may understand what my study entails. The aim of this investigation is to determine the prevalence and the risk factors of neck pain in the Indian population in the Greater Durban area.

The objectives of my study are:
- To determine the prevalence of neck pain in the Indian population in the greater Durban area.
- To determine the demographic profile of the Indian population with neck pain.
- To characterise the clinical features of neck pain.
- To identify the risk factors that influence neck pain in the Indian population.

**In this study, you will be required to complete a questionnaire, which will include demographical and clinical information, as well as factors that affect neck pain. I will be present during the completion of the questionnaire, so if there are any misunderstandings or queries, please feel free to consult me on the issue.**

**I appreciate your input. Your comments and contributions will be kept confidential. The results of this focus group will be used for research purposes only.**

If you have any further questions please contact me or my co supervisor.

Yours sincerely,


Julie Muchna                    Dr Prisca Zandile Ndlovu           Dr Charmaine Korporaal
(Researcher)                    (Supervisor)                       (Co Supervisor)

# APPENDIX K

# INFORMED CONSENT-FOCUS GROUP

## (TO BE COMPLETED BY THE PARTICIPANTS OF THE FOCUS GROUP)

**Date:** _____

**Title of Research Project:**
An epidemiological investigation into the factors associated with neck pain in the Indian population in the greater Durban area.

**Name of Supervisor:**
Dr. Prisca Zandile Ndlovu

**Name of Co Supervisor:**
Dr. Charmaine Korporaal

**Name of Research Student:**
Julie Muchna

### Please circle the appropriate answer

| | | | |
|---|---|---|---|
| 1. | Have you read the research information sheet? | Yes | No |
| 2. | Have you had an opportunity to ask questions regarding this study? | Yes | No |
| 3. | Have you received satisfactory answers to your questions? | Yes | No |
| 4. | Have you had an opportunity to discuss this study? | Yes | No |
| 5. | Have you received enough information about this study? | Yes | No |
| 6. | Do you understand the implications of your involvement in this study? | Yes | No |

7.  Do you understand that you are free to:

    a) Withdraw from this study at any time?            Yes   No

    b) Withdraw from the study at any time, without reasons given.   Yes   No

    c) Withdraw from the study at any time without affecting your future health

    care or relationship with the Chiropractic day clinic at the Durban University

    of Technology.            Yes   No

8.  Do you agree to voluntarily participate in this study?     Yes   No

9.  Who have you spoken to regarding this study?  _____

**If you have answered NO to any of the above, please obtain the necessary information from the researcher and / or supervisor before signing. Thank you.**

Please print in block letters:

Focus Group Member: _____ Signature: _____

Witness Name: _____ Signature: _____

Researcher's Name: _____ Signature: _____

Co Supervisor's Name: _____ Signature: _____

# APPENDIX L

# CONFIDENTIALITY STATEMENT-FOCUS GROUP

## DECLARATION

**Important Notice:**
**This form is to be read and filled in by every member participating in the focus group before the focus group meeting convenes.**

1. All information contained in the research documents and any information discussed during the focus 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. The returned questionnaires will be coded and kept anonymous in the research process.

3. None of the information shall be communicated to any other individual or organisation outside of this specific focus group as to the decisions of this focus group.

4. The information from this focus group will be made public in terms of a journal publication, which will in no way identify any participants of this research.

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

| Member represents | Member's Name | Signature | Contact Details |
|---|---|---|---|
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# APPENDIX M

# CODE OF CONDUCT-FOCUS GROUP

## DECLARATION

**Important Notice:**
**This form is to be read and filled in by every member participating in the focus group before the focus group meeting convenes.**

1. All information contained in the research documents and any information discussed during the focus 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. The returned questionnaires will be coded and kept anonymous in the research process.

3. None of the information shall be communicated to any other individual or organisation outside of this specific focus group as to the decisions of this focus group.

4. The information from this focus group will be made public in terms of a journal publication, which will in no way identify any participants of this research.

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

| Member represents | Member's Name | Signature | Contact Details |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# APPENDIX N

# POST FOCUS GROUP QUESTIONNAIRE

**An epidemiological investigation into the factors associated with neck pain in the Indian population in the greater Durban area**

Questionnaire Number_____

Completion of Questionnaire (_____/_____/_____)

## (A) Demographics

1. What is your current age? _____ (Yrs)

2. What is your gender?   Male ☐   Female ☐
   (Please tick appropriate box)

3. Marital Status?
   (Please tick appropriate box)

   Married ☐   Single ☐   Divorced ☐

   Separated ☐   Widowed ☐   Living Together ☐

4. Number of pregnancies to full term?

   Number _____   Multiple (e.g. Twins/Triplets) _____   N/A _____

5. Number of children?

   Number _____   N/A _____

6. Did you ever suffer any miscarriages?
   (Please tick appropriate box)

   Yes ☐   No ☐

7. Are any of your children deceased?
   (Please tick appropriate box)

   Yes ☐   No ☐

8. Highest level of education
   (Please tick appropriate box)

   No Formal Education ☐   Primary School ☐   High School ☐

   Matriculated ☐   Tertiary ☐   Other ☐

9. Religion
(Please tick appropriate box)

Hindi ☐     Muslim ☐     Christian ☐     Other ☐

10. Are you currently active in your religion?
(Please tick appropriate box)

Yes ☐          No ☐

11. Present occupational status
(Please tick appropriate box)

Self -employed ☐     Unemployed ☐     Retired ☐     Housewife ☐

Employed (full-time) ☐     Employed (part-time) ☐     Student ☐

12. If employed, what is your occupation?
(Please tick appropriate box)

| | | | | | |
|---|---|---|---|---|---|
| Professional | ☐ | Businessman | ☐ | Artisan | ☐ |
| Farmer | ☐ | Unskilled worker | ☐ | Housewife | ☐ |
| Salesman | ☐ | Managerial | ☐ | Clerical | ☐ |
| Labourer | ☐ | Skilled worker | ☐ | Student | ☐ |
| Educator | ☐ | Sportsman | ☐ | Other | ☐ |

13. If unemployed or retired, or changed professions, what occupation were you in for the longest period previously?
(Please tick appropriate box)

| | | | | | |
|---|---|---|---|---|---|
| Liberal profession | ☐ | Businessman | ☐ | Artisan | ☐ |
| Farmer | ☐ | Unskilled Worker | ☐ | Housewife | ☐ |
| Salesman | ☐ | Managerial | ☐ | Clerical | ☐ |
| Labourer | ☐ | Skilled Worker | ☐ | Student | ☐ |
| Educator | ☐ | Other | ☐ | | |

14. For how long have you been in your current occupation? (Years)
(Please tick appropriate box)

0-5 ☐     6-10 ☐     11-15 ☐     16-20 ☐

21-25 ☐     26-30 ☐     >30 ☐     N/A ☐

15. What was the duration of your previous occupation? (Years)
(Please tick appropriate box)

0-5 ☐          6-10 ☐          11-15 ☐          16-20 ☐

2 1-25 ☐          26-30 ☐          >30 ☐          N/A ☐

16. What is your total disposable annual income?
    (Please tick appropriate box)

| | | | |
|---|---|---|---|
| <R5000 | ☐ | R5000 - R15000 | ☐ |
| R15000 -- R25000 | ☐ | R25001-R35000 | ☐ |
| R35001 -- R45000 | ☐ | R45001 –R55000 | ☐ |
| R55001 – R65000 | ☐ | R66001 –R75000 | ☐ |
| R75001 – R85000 | ☐ | R85001 - R95000 | ☐ |
| >R95000 | ☐ | N/A | ☐ |

17. Do you wear glasses?

Yes ☐          No ☐

If yes, are they prescription glasses or reading glasses?
(Please tick appropriate box)

Prescription ☐          Reading Glasses ☐

18. Do you have a medical cover?

Yes ☐          No ☐

If Yes, What is the extent of your cover?

Day to Day Expenses ☐          Hospital Plan ☐

19. What type of health care services do you access?

Private ☐          Government Clinics ☐

20. Do you feel that you have sufficient access to health care services?

Yes ☐          No ☐

21. Do you smoke?

Yes ☐          No ☐

22. Do you drink alcohol?

Yes ☐          No ☐

If yes, please specify your consumption per week _____ N/A

# (B) Risk Factors

23. Have you been diagnosed with any of the following?
    (Please tick appropriate box, you can tick more than one)

    Diabetes ☐          Osteoporosis ☐          Cholesterol ☐          Arthritis ☐

    High Blood Pressure ☐     Scoliosis ☐     Depression ☐     Kyphosis ☐

    N/A ☐     Other ☐     Specify_____

24. Are you taking any medication for the above condition(s)?

    Prescribed ☐          Over the Counter ☐          Herbal ☐

25. In your own opinion, does your job function contribute to neck pain?
    (Please tick appropriate box)

    Yes ☐          No ☐          Unsure ☐

26. In what way do you believe you are vulnerable in suffering from neck pain?

    _____

    _____

    _____

27. Rate your stress levels according to the following scale...
    (1 being no stress, 10 being extremely stressed)

    1 ☐     2 ☐     3 ☐     4 ☐     5 ☐
    6 ☐     7 ☐     8 ☐     9 ☐     10 ☐

28. Do you consider yourself an emotional person?   Yes ☐     No ☐

29. Do you do any exercise?   Yes ☐     No ☐

30. What type of exercise do you do most of the time?
    (Please tick appropriate box)

    Running ☐          Swimming ☐          Squash ☐
    Soccer ☐           Cricket ☐           Aerobics ☐
    Rugby ☐            Tennis ☐            Yoga ☐
    Fishing ☐          Cycling ☐           Gymnastics ☐
    Boxing ☐           Martial arts ☐      Walking ☐
    Badminton ☐        Weight training ☐   Other ☐

31. What is the total amount of time spent each week doing exercise?_____(Hours)

32. Number of exercise sessions per week (combined if more than one sport is played)
    1 ☐          2 ☐          3 ☐          4 ☐
    5 ☐          6 ☐          7 ☐          >7 ☐

33. Does your occupation involve any of the following?
    (Please tick appropriate box)

| | | |
|---|---|---|
| Lifting heavy objects | Sitting for long periods ☐ | ☐ |
| Driving for long periods | Excessive movement of the head from side to side | ☐ |
| Answering telephone ☐ | Working on a computer | ☐ |
| Working with arms overhead ☐ | Working in an air-conditioned room | ☐ |

34. Do you hold the telephone receiver between your shoulder and ear? Yes ☐ No ☐

35. When working at your computer, is the monitor in line with your eye level and in front of you?
    (Please tick appropriate box)

    Yes ☐          No ☐          N/A ☐

36. How many hours a day do you spend in front of your computer? _____ (Hrs)

37. Do you sit without back support?          Yes ☐     No ☐

38. Do you sit without arm support?          Yes ☐     No ☐

39. During your daily activities, do you bend over excessively?   Yes ☐   No ☐

    If yes, for how many hours? _____

40. What type of transport do you utilize in general?  (more than one choice possible)

Car ☐          Bus ☐          Bicycle ☐          Taxi ☐

Walking more than 5 km ☐          Other (e.g. fly) ☐

41. If you answered bicycle or walking is it by choice?

Yes ☐          No ☐

42. Have you been involved in a motor vehicle accident? (Car, Motorbike, Quad Bike, Truck)

Yes ☐          No ☐

43. Rate the severity of your head or neck injury sustained from the motor vehicle accident.

| | | | | |
|---|---|---|---|---|
| 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ | 5 ☐ |
| 6 ☐ | 7 ☐ | 8 ☐ | 9 ☐ | 10 ☐ |

44. Have you had any other head or neck trauma?          Yes ☐          No ☐

45. Rate the severity of your injury.

| | | | | |
|---|---|---|---|---|
| 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ | 5 ☐ |
| 6 ☐ | 7 ☐ | 8 ☐ | 9 ☐ | 10 ☐ |

46. How many pillows do you use under your head while sleeping?

None ☐        One ☐
Two ☐        Three ☐
>3 ☐

47. For how long have you been using your current pillow(s)?

0-1 year ☐        1-2 years ☐        2-3 years ☐

3-4 years ☐        4-5 years ☐        >5 years ☐

48. What type of pillow do you use?

Buckweed ☐        Latex ☐        Feather ☐

Foam ☐        Sponge ☐        Other ☐

49. Which position do you usually fall asleep in?

Side ☐        Tummy ☐        Back ☐        Couch ☐        Other ☐

50. Rate the density of your mattress

1 ☐        2 ☐        3 ☐        4 ☐        5 ☐

6 ☐        7 ☐        8 ☐        9 ☐        10 ☐

51. Do you favour one side when carrying a heavy item?        Yes ☐ No ☐

If yes, how often?

Once a day ☐        Once a week ☐        Once a month ☐

> Once a day ☐        > Once a week ☐        >Once a month ☐

52. When reading, do you hold your arms out to support a book?        Yes ☐ No ☐

52. How long do you read in bed?        _____ Min.

53. What position do you read in?

Side ☐        Stomach ☐        Back ☐        Sitting up ☐ Other ☐

54. Do you watch television?  Yes ☐        No ☐

55. If yes then how many hours per day?

0-1 ☐        1-2 ☐        2-3 ☐        3-4 ☐        4-5 ☐        >5 ☐

56. What position do you watch television in?

Lying on Side ☐ Lying on Back ☐ Lying on Tummy ☐

Sitting Up ☐ Other ☐

57 Do you suffer from headaches?

Yes ☐ No ☐

58 Do you suffer from shoulder pain?

Yes ☐ No ☐

59 Do you suffer from low back pain?

Yes ☐ No ☐

## (C) Clinical
### (Only participants with neck pain can answer this section)

What was your age when you first experienced neck pain?
_____Years

How long have you had neck pain?
Original_____Days/months/years

Recent_____Days/months/years

How severe is the pain?
Original

| 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ | 5 ☐ |
| 6 ☐ | 7 ☐ | 8 ☐ | 9 ☐ | 10 ☐ |

Recent

| 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ | 5 ☐ |
| 6 ☐ | 7 ☐ | 8 ☐ | 9 ☐ | 10 ☐ |

At what time of the day is the pain worst?

Original
Morning ☐ Afternoon ☐ Evening ☐
Night ☐ Activity related ☐ N/A ☐

Recent
Morning ☐ Afternoon ☐ Evening ☐
Night ☐ Activity related ☐ N/A ☐

At what time of the day is the pain at its least?

Original

| | | | | | |
|---|---|---|---|---|---|
| Morning | ☐ | Afternoon | ☐ | Evening | ☐ |
| Night | ☐ | Activity related | ☐ | N/A | ☐ |

Recent

| | | | | | |
|---|---|---|---|---|---|
| Morning | ☐ | Afternoon | ☐ | Evening | ☐ |
| Night | ☐ | Activity related | ☐ | N/A | ☐ |

How often do you experience neck pain?

Original

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Seldom | ☐ | Frequently | ☐ | Constantly | ☐ | Intermittently | ☐ |

Recent

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Seldom | ☐ | Frequently | ☐ | Constantly | ☐ | Intermittently | ☐ |

How did your neck pain begin?

Original

| | | | | | | |
|---|---|---|---|---|---|---|
| Gradually without injury | ☐ | Gradually after injury | ☐ | Abruptly without injury | ☐ |
| Abruptly after injury | ☐ | Unsure | ☐ | | |

Recent

| | | | | | | |
|---|---|---|---|---|---|---|
| Gradually without injury | ☐ | Gradually after injury | ☐ | Abruptly without injury | ☐ |
| Abruptly after injury | ☐ | Unsure | ☐ | | |

Progression of neck pain?

Original

| | | | |
|---|---|---|---|
| Getting worse | ☐ | Getting better | ☐ |
| Staying the same | ☐ | Unsure | ☐ |

Recent

| | | | |
|---|---|---|---|
| Getting worse | ☐ | Getting better | ☐ |
| Staying the same | ☐ | Unsure | ☐ |

Do you have trouble in doing any of the following things because of neck pain?

Original

| | | | |
|---|---|---|---|
| Dressing | ☐ | Bathing | ☐ |
| Lifting | ☐ | Reading | ☐ |
| Concentration | ☐ | Work | ☐ |
| Driving | ☐ | Sleeping | ☐ |
| Recreation | ☐ | Household Cleaning | ☐ |

Recent

| | | | |
|---|---|---|---|
| Dressing | ☐ | Bathing | ☐ |
| Lifting | ☐ | Reading | ☐ |
| Concentration | ☐ | Work | ☐ |
| Driving | ☐ | Sleeping | ☐ |
| Recreation | ☐ | Household Cleaning | ☐ |

How would you rate your overall disability because of your neck pain?

Original

| None | ☐ | Mild | ☐ |
| Moderate | ☐ | Severe | ☐ |

Recent

| None | ☐ | Mild | ☐ |
| Moderate | ☐ | Severe | ☐ |

Have you ever had to stay away from work because of your neck pain?

Original

Yes ☐          No ☐

Recent

Yes ☐          No ☐

If 'Yes', for how long?

Original

| 0-1 week | ☐ | >1-2 weeks | ☐ | >2-3 weeks | ☐ | >3- 4 weeks | ☐ |
| >4 weeks | ☐ | N/A | ☐ | | | | |

Recent

| 0-1 week | ☐ | >1-2 weeks | ☐ | >2-3 weeks | ☐ | >3- 4 weeks | ☐ |
| >4 weeks | ☐ | N/A | ☐ | | | | |

Have you ever been bed ridden because of neck pain?

Original

Yes ☐          No ☐

Recent

Yes ☐          No ☐

If 'Yes', for how long?

Original

| 0-1 week | ☐ | >1-2 weeks | ☐ | >2-3 weeks | ☐ | >3- 4 weeks | ☐ |
| >4 weeks | ☐ | | | | | | |

Recent

| 0-1 week | ☐ | >1-2 weeks | ☐ | >2-3 weeks | ☐ | >3- 4 weeks | ☐ |
| >4 weeks | ☐ | | | | | | |

Have you ever been demoted ☐ medically boarded ☐ or fired ☐ because of neck pain?

N/A ☐

What treatment have you sought for your neck pain?

GP ☐          Physiotherapy ☐          Chiropractic ☐          Self Medication ☐

None ☐

Do you associate your neck pain with any other activities (e.g. customs, social activities)?

_____

_____

____

# APPENDIX O
# LETTER OF INFORMATION

Dear Participant,

I would like to welcome you and thank you for participating in my study.

**The title of my research project is:**
An epidemiological investigation into the risk factors associated with neck pain in the Indian population in the greater Durban area.

Name of Supervisor:  **Dr Prisca Zandile Ndlovu; M.Tech Chiropractic**
Name of Co Supervisor: **Dr Charmaine Korporaal; M.Tech Chiropractic, CCFC, CCSP, ICSSD**
Name of Researcher:  **Julie Miroslava Muchna**
Name of Institution:  **Durban University of Technology**

I have listed below the aim and objectives of my study so that you may understand what my study entails.  The aim of this investigation is to determine the prevalence and the risk factors of neck pain in the Indian population in the Greater Durban area.

The objectives of my study are:
- To determine the prevalence of neck pain in the Indian population in the greater Durban area.
- To determine the demographic profile of the Indian population with neck pain.
- To characterise the clinical features of neck pain.
- To identify the risk factors that influence neck pain in the Indian population.

In this study, you will be required to complete a questionnaire, which will include demographical and clinical information, as well as factors that affect neck pain.  I will also require your weight and height to determine your general health status.  I will be present during the completion of the questionnaire, so if there are any misunderstandings or queries, please feel free to consult me on the issue.

I appreciate your input.  Your comments and contributions will be kept confidential.  The results of this focus group will be used for research purposes only.

If you have any further questions please contact me on 031 765 1720 or my supervisor on 031 373 6312 or my co supervisor on 031 373 2611.

Yours sincerely,

Julie Muchna                        Dr Prisca Zandile Ndlovu              Dr Charmaine Korporaal
(Researcher)                        (Supervisor)                          (Co Supervisor)

# APPENDIX P

# FINAL QUESTIONNAIRE

**An epidemiological investigation into the risk factors associated with neck pain in the Indian population in the greater Durban area**

Questionnaire Number _____

Completion of Questionnaire (____/____/____)

Suburb _____

Body Mass Index _____

## (A) Demographics

1. What is your current age?  _____ (Yrs)

2. What is your gender?   Male ☐    Female ☐
(Please tick appropriate box)

3. Marital Status?
(Please tick appropriate box)

Married ☐     Single ☐     Divorced ☐

Separated ☐     Widowed ☐     Living Together ☐

4. Number of pregnancies to full term?

Number _____     Multiple (e.g. Twins/Triplets) _____     N/A ☐

5. Number of children?

Number _____     N/A ☐

6. Did you ever suffer any miscarriages?
(Please tick appropriate box)

Yes ☐     No ☐     N/A ☐

7. Are any of your children deceased?
(Please tick appropriate box)

Yes ☐     No ☐     N/A ☐

8. Highest level of education
(Please tick appropriate box)

No Formal Education ☐     Primary School ☐     High School ☐

Matriculated ☐     Tertiary ☐     Other ☐

9. Religion
(Please tick appropriate box)
Hindu ☐     Muslim ☐     Christian ☐     Other ☐

10. Are you currently active in your religion?
(Please tick appropriate box)

Yes ☐     No ☐

11. Present occupational status
(Please tick appropriate box)

Self -employed ☐     Unemployed ☐     Retired ☐ Housewife ☐

Employed (full-time) ☐     Employed (part-time) ☐     Student ☐

12. If employed, what is your occupation?
(Please tick appropriate box)

Professional ☐     Businessman ☐     Artisan ☐
Farmer ☐     Unskilled worker ☐     Housewife ☐
Salesman ☐     Managerial ☐     Clerical ☐
Labourer ☐     Skilled worker ☐     Student ☐
Educator ☐     Sportsman ☐     Other ☐
N/A ☐

13. If unemployed or retired, or changed professions, what occupation were you in for the longest period previously?
(Please tick appropriate box)

Liberal profession ☐     Businessman ☐     Artisan ☐
Farmer ☐     Unskilled Worker ☐     Housewife ☐
Salesman ☐     Managerial ☐     Clerical ☐
Labourer ☐     Skilled Worker ☐     Student ☐
Educator ☐     Other ☐     N/A ☐

14. For how long have you been in your current occupation? (Years)
(Please tick appropriate box)

0-5 ☐     6-10 ☐     11-15 ☐     16-20 ☐

21-25 ☐     26- ☐     >30 ☐     N/A ☐

15. What was the duration of your previous occupation? (Years)
(Please tick appropriate box)

0-5 ☐          6-10 ☐          11-15 ☐          16-20 ☐

21-25 ☐          26-30 ☐          >30 ☐          N/A ☐

16. What is your total monthly income before tax?
(Please tick appropriate box)

| | | | |
|---|---|---|---|
| <R5000 | ☐ | R5000 - R15000 | ☐ |
| R15000 -- R25000 | ☐ | R25001-R35000 | ☐ |
| R35001 -- R45000 | ☐ | R45001 –R55000 | ☐ |
| R55001 – R65000 | ☐ | R66001 –R75000 | ☐ |
| R75001 – R85000 | ☐ | R85001 - R95000 | ☐ |
| >R95000 | ☐ | N/A | ☐ |

17. Do you wear glasses?

Yes ☐          No ☐

If yes, are they prescription glasses or reading glasses?
(Please tick appropriate box)

Prescription ☐          Reading Glasses ☐          N/A ☐

18. Do you have a medical cover?

Yes ☐          No ☐

If Yes, What is the extent of your cover?

Day to Day Expenses ☐          Hospital Plan ☐     N/A ☐

19. What type of health care services do you access?

Private ☐          Government Clinics ☐

20. Do you feel that you have sufficient access to health care services?

Yes ☐          No ☐

21. Do you smoke?

Yes ☐          No ☐

22. Do you drink alcohol?

Yes ☐          No ☐

If yes, please specify your consumption per week_____     N/A ☐

## (B) Risk Factors

23. Have you been diagnosed with any of the following?
(Please tick appropriate box, you can tick more than one)

Diabetes ☐          Osteoporosis ☐          Cholesterol ☐          Arthritis ☐

High Blood Pressure ☐          Scoliosis ☐          Depression ☐     Kyphosis ☐

N/A ☐          Other ☐ Specify_____

24. Are you taking any medication for the above condition(s)?

Prescribed ☐               Over the Counter ☐               Herbal ☐     N/A ☐

25. In your own opinion, does your job function contribute to neck pain?
(Please tick appropriate box)

Yes ☐               No ☐               Unsure ☐

26. In what way do you believe you are vulnerable in suffering from neck pain?

_____

_____

_____

27. Rate your stress levels according to the following scale...
(1 being no stress, 10 being extremely stressed)

1 ☐          2 ☐          3 ☐          4 ☐          5 ☐
6 ☐          7 ☐          8 ☐          9           10

28. Do you consider yourself an emotional person?     Yes ☐          ☐ No

29. Do you do any exercise?     Yes ☐          ☐ No          N/A ☐

30. What type of exercise do you do most of the time?
(Please tick appropriate box)

Running ☐          Swimming ☐          Squash ☐
Soccer ☐          Cricket ☐          Aerobics ☐
Rugby ☐          Tennis ☐          Yoga ☐
Fishing ☐          Cycling ☐          Gymnastics ☐
Boxing ☐          Martial arts ☐          Walking ☐
Badminton ☐          Weight training ☐          Other ☐

31. What is the total amount of time spent each week doing exercise? (Hours)

32. Number of exercise sessions per week (combined if more than one sport is played)

| 1 | ☐ | 2 | ☐ | 3 | ☐ | 4 | ☐ |
|---|---|---|---|---|---|---|---|
| 5 | ☐ | 6 | ☐ | 7 | ☐ | >7 | ☐ |

33. Does your occupation involve any of the following?
(Please tick appropriate box)

| Lifting heavy objects | ☐ | Sitting for long periods | ☐ |
|---|---|---|---|
| Driving for long periods | ☐ | Excessive movement of the head from side to side | ☐ |
| Answering telephone | ☐ | Working on a computer | ☐ |
| Working with arms overhead | ☐ | Working in an air-conditioned room | ☐ |

34. Do you hold the telephone receiver between your shoulder and ear?

Yes ☐    No ☐

35. When working at your computer, is the monitor in line with your eye level and in front of you?
(Please tick appropriate box)

Yes ☐        No ☐        N/A ☐

36. How many hours a day do you spend in front of your computer? _____ (Hrs)

37. Do you sit without back support?

☐ Yes        ☐ No

38. Do you sit without arm support?

☐ Yes        ☐ No

39. During your daily activities, do you bend over excessively?

☐ Yes        ☐ No

If yes, for how many hours? _____    N/A ☐

40. What type of transport do you utilize in general? (more than one choice possible)

☐ Car        ☐ Bus        ☐ Bicycle        ☐ Taxi

☐ Walking more than 5 km        ☐ Other (e.g. fly)

41. If you answered bicycle or walking is it by choice?

☐ Yes        ☐ No

42. Have you been involved in a motor vehicle accident? (Car, Motorbike, Quad Bike, Truck)

Yes ☐        No ☐

43. Rate the severity of your head or neck injury sustained from the motor vehicle accident.
(1 being mild, 10 being extremely severe)

1 ☐   2 ☐   3 ☐   4 ☐   5 ☐

6 ☐   7 ☐   8 ☐   9 ☐   10 ☐

N/A ☐

44. Have you had any other head or neck trauma?   Yes ☐   No ☐

45. Rate the severity of your injury.
(1 being mild, 10 being extremely severe)

1 ☐   2 ☐   3 ☐   4 ☐   5 ☐

6 ☐   7 ☐   8 ☐   9 ☐   10 ☐

N/A ☐

46. How many pillows do you use under your head while sleeping?

None ☐            One ☐
Two ☐             Three ☐
>3 ☐

47. For how long have you been using your current pillow(s)?

0-1 year ☐         1-2 years ☐         2-3 years ☐

3-4 years ☐        4-5 years ☐         >5 years ☐

48. What type of pillow do you use?

Buckweed ☐        Latex ☐            Feather ☐

Foam ☐            Sponge ☐           Other ☐

49. Which position do you usually fall asleep in?

Side ☐       Tummy ☐       Back ☐       Couch ☐       Other ☐

50. Rate the density of your mattress
(1 being soft, 10 being extremely hard)

1 ☐   2 ☐   3 ☐   4 ☐   5 ☐

6 ☐   7 ☐   8 ☐   9 ☐   10 ☐

51. Do you favour one side when carrying a heavy item?

Yes ☐    No ☐

If yes, how often?

Once a day ☐          Once a week ☐          Once a month ☐

> Once a day ☐        > Once a week ☐        >Once a month ☐

52. When reading, do you hold your arms out to support a book?

Yes ☐    No ☐

53. How long do you read in bed?    _____ Min.

54. What position do you read in?

Side ☐    Stomach ☐    Back ☐    Sitting up ☐ Other ☐

55. Do you watch television?

Yes ☐    No ☐

If yes then how many hours per day?

0-1 ☐    1-2 ☐    2-3 ☐    3-4 ☐    4-5 ☐    >5 ☐

56. What position do you watch television in?

Lying on Side ☐        Lying on Back ☐        Lying on Tummy ☐

Sitting Up ☐            Other ☐

57. Do you suffer from headaches?

Yes ☐            No ☐

58. Do you suffer from shoulder pain?

Yes ☐            No ☐

59. Do you suffer from low back pain?

Yes ☐            No ☐

# (C) Clinical
## (Only participants with neck pain are to answer this section)

60. What was your age when you first experienced neck pain?
_____Years

61. How long have you had neck pain?
Original_____Days/months/years

Recent_____Days/months/years

62. How severe is the pain?
Original

1 ☐   2 ☐   3 ☐   4 ☐   5 ☐

6 ☐   7 ☐   8 ☐   9 ☐   10 ☐

Recent

1 ☐   2 ☐   3 ☐   4 ☐   5 ☐

6 ☐   7 ☐   8 ☐   9 ☐   10 ☐

63. At what time of the day is the pain worst?
Original
Morning ☐   Afternoon ☐   Evening ☐
Night ☐   Activity related ☐   N/A ☐

Recent
Morning ☐   Afternoon ☐   Evening ☐
Night ☐   Activity related ☐   N/A ☐

64. At what time of the day is the pain at its least?
Original
Morning ☐   Afternoon ☐   Evening ☐
Night ☐   Activity related ☐   N/A ☐

Recent
Morning ☐   Afternoon ☐   Evening ☐
Night ☐   Activity related ☐   N/A ☐

65. How often do you experience neck pain?
Original
Seldom ☐   Frequently ☐   Constantly ☐   Intermittently ☐

Recent
Seldom ☐   Frequently ☐   Constantly ☐   Intermittently ☐

66. How did your neck pain begin?
Original
Gradually without injury ☐   Gradually after injury ☐   Abruptly without injury ☐
Abruptly after injury ☐   Unsure ☐

Recent
Gradually without injury ☐   Gradually after injury ☐   Abruptly without injury ☐
Abruptly after injury ☐   Unsure ☐

67. Progression of neck pain?
Original
Getting worse ☐ Getting better ☐
Staying the same ☐ Unsure ☐

Recent
Getting worse ☐ Getting better ☐
Staying the same ☐ Unsure ☐

68. Do you have trouble in doing any of the following things because of neck pain?
Original
Dressing ☐ Bathing ☐
Lifting ☐ Reading ☐
Concentration ☐ Work ☐
Driving ☐ Sleeping ☐
Recreation ☐ Household Cleaning ☐

Recent
Dressing ☐ Bathing ☐
Lifting ☐ Reading ☐
Concentration ☐ Work ☐
Driving ☐ Sleeping ☐
Recreation ☐ Household Cleaning ☐

69. How would you rate your overall disability because of your neck pain?
Original
None ☐ Mild ☐
Moderate ☐ Severe ☐

Recent
None ☐ Mild ☐
Moderate ☐ Severe ☐

70. Have you ever had to stay away from work because of your neck pain?
Original
Yes ☐ No ☐

Recent
Yes ☐ No ☐

71  If 'Yes', for how long?
Original
0-1 week ☐ >1-2 weeks ☐ >2-3 weeks ☐ >3- 4 weeks ☐
>4 weeks ☐ N/A ☐

Recent
0-1 week ☐ >1-2 weeks ☐ >2-3 weeks ☐ >3- 4 weeks ☐
>4 weeks ☐ N/A ☐

72  Have you ever been bed ridden because of neck pain?

Original
Yes ☐                    No ☐

Recent
Yes ☐                    No ☐

73  If 'Yes', for how long?

Original
0-1 week ☐    >1-2 weeks ☐    >2-3 weeks ☐    >3- 4 weeks ☐
>4 weeks ☐

Recent
0-1 week ☐    >1-2 weeks ☐    >2-3 weeks ☐    >3- 4 weeks ☐
>4 weeks ☐

74  Have you ever been demoted ☐    medically boarded ☐ or fired ☐    because of
neck pain?

N/A ☐

75  What treatment have you sought for your neck pain?
GP ☐          Physiotherapy ☐    Chiropractic ☐    Self Medication ☐
None ☐

76  Do you associate your neck pain with any other activities (e.g. customs, social
activities)?

_____
_____

**If you wish to know the outcomes of this research study, please indicate so to the researcher.  Alternatively you could find the abstract on the DUT internal repository website after completion of the research study.**