

**A SURVEY OF PERCEIVED DISABILITY AND
CONTRIBUTING RISK FACTORS TO WORK-RELATED LOW
BACK PAIN AMONGST NURSES IN RWANDA**

BY

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KEY WORDS

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Low back pain

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ABSTRACT

Nursing is worldwide regarded as a high risk occupation for the development of work-related low back pain (WRLBP). LBP is one of the most common causes of disability, creating an important socio-economic problem in modern society. Studies report that more than 80% of workers suffer from WRLBP once in their occupational lives. Among nurses, the lifetime prevalence has been found to be higher, varying up to 90% of a nursing population. The current study aimed at determining the prevalence, perceived disability and contributing/risk factors to WRLBP among nurses in Rwanda, identifying the perceived contributing risk factors of WRLBP and intervention strategies received by those nurses.

A descriptive quantitative cross-sectional survey using convenience sampling was used to gather data with a self-administered questionnaire on a sample of 226 nurses. The study population included all registered nurses of Kabgayi District Hospital and Nyanza District Hospitals and their respective health centers. To be included, the nurses had to have suffered from WRLBP during the previous 6 months before data collection. The Nordic Back Pain Questionnaire, the Oswestry Disability Index and an open-ended questionnaire regarding perceived risk factors have been used. Descriptive statistics to summarize data and inferential statistics such as chi-square test to test the relationship between different variables of the study have been studied at 5% levels. Correlation coefficients in terms of cross-tabulation were also studied at 1% level of significance.

The current study highlights one-month prevalent rates of 70.4%, and one-week prevalent rates of 54.4%. WRLBP among nurses has been found to be significantly associated with gender according to the p-value of 0.007 among the studied variables, and good correlation coefficients

between disability scores, together with the length of WRLBP and BMI with 0.0001, 0.0030 respectively.

Nurses in the current study reported WRLBP as a result of a wide range of factors related to their work, manual handling being the major physical work activity exposing them to WRLBP. The perceived risk factors for WRLBP reported in this study were classified into 4 categories. The first category included work positional factors such as standing, sitting, bending, and awkward work postures. The second group included work-related nursing tasks such as lifting patients and items at work, repositioning and transferring patients, bed making, washing patients, and many others. In the third group, psychosocial factors like poor relationship with colleagues, work pressure and reduced job satisfaction have been listed. Finally, some non-occupational factors such as aging, pregnancy, menstruation, history of back pain, being female and body built have also been perceived as contributing factors to WRLBP. The Oswestry Disability Index demonstrated a mild to moderate disability due to WRLBP in this group of nurses. WRLBP has a negative impact in health services due to activity limitation, lost time and lowered productivity.

The study concludes that nurses must be protected from ergonomic work stressors, and improvement of awareness of nurses with regards to ergonomic stressors seems to be crucial. However, an effort by different parties concerned with the problem at all levels in Rwanda is needed. The government of Rwanda, through the Ministry of Health in particular, will be recommended to put strategies in place for the management, reduction and prevention of WRLBP amongst health workers, especially in the nursing population.

DECLARATION

I hereby declare that “A survey of perceived disability and contributing risk factors for low back pain amongst nurses in Rwanda” is my own work, that it has not been submitted for any degree or examination at any other university, and that all sources I have used or quoted have been indicated and acknowledged by complete references.

Pierre Claver NDAGIJIMANA

Signature

Dr Ina DIENER

A handwritten signature in cursive script that reads "Ina Diener".

DEDICATION

The fruit of this study work is faithfully dedicated to:

The Lord Almighty of whom the eye kept on me has been for the greatest power upon my weaknesses.

My beloved parents NEMEYE Mathias and NYIRABAGENZI Cecilia for their invaluable love, patience and encouragement during difficult times.

To my beloved late grandmother, NYIRAGASOZI and KANTAMA for their special care kept during my early childhood, I will always appreciate and remember what they did for me.

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To my beloved late sister MUKAMURARA Beatrice. You left us when we were still in need of you. I will always remember your advice, encouragement and your prayers.

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ACRONYMS AND ABBREVIATIONS

WRLBP: Work Related Low Back Pain

LBP: Low Back Pain

WHO: World Health Organization

USA: United States of America

CLBP: Chronic Low Back Pain

OLBP: Occupational Low Back Pain

MLBP: Mechanical Low Back Pain

BLS: Bureau of Labour and Statistics

OSHA: Occupational Safety Health Administration

ANA: American Nurses Association

RAMA: La Rwandaise d' Assurance Maladie

MMI: Military Medical Insurance

BMI: Body Mass Index

ROM: Range of Motion

WMSDs: Work Musculoskeletal Disorders

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MEANING OF WORDS AND PHRASES USED IN THIS STUDY

Risk factors = Contributing factors

Personal factors = individual factors or non-occupational factors

Management = intervention strategies

Sick leave days = days off work or work absence duration

Assistive devices = assistive equipment or working aids

Bed bound= being always in bed because of exaggerated back pain symptoms

Nursing aids = nursing assistants/ auxiliaries/ orderlies

CHAPTER ONE

INTRODUCTION

Work-related low back pain (WLBP) is known as one of the most common health conditions reported by the working population worldwide (Cilliers, 2007; Burdolf & Jansen, 2005; Omokhodion & Sanya, 2003), due to its global burden affecting economy, societies and public health sectors (Louw, Morris & Grimmer-Sommers, 2007). Healthcare workers and especially hospital nurses represent an important number of LBP sufferers in the total workforce (Malone, 2000; Smedley, Egger, Couper & Coggon, 1995; Jansen, 1987). The lifetime prevalence of LBP in the nursing population has been reported to vary up to 90% in several countries like Netherlands, England, Switzerland, Japan, Nigeria and Turkey (Sikiru & Hanifa, 2010; Kumar, 2004; Smith, Wei, Kang and Wang, 2004; Smedley, Inskip, Trevlyan, Cooper, & Coggon, 2003; Smedley et al., 1995; Maul, Laubli, Klipstein & Krueger, 2003; Ando et al., 2000; Knibbe & Friele, 1996). Furthermore, studies suggest that LBP is prevalent in almost all ages (Hills; 2010; Roupa et al, 2008; Van Tulder et al., 2006; Shaw, Feuistein & Huang, 2002).

Alarmingly, Buchbinder, Jolly and Wyatt (2001) found that the number of people with disability from LBP has risen rapidly in the last 50 years of the 19th century. LBP is a costly musculoskeletal condition worldwide (Woolf & Pfleger, 2003), especially in developed countries (WHO, 2002). LBP is the most frequent cause of absenteeism and activity limitation (WHO, 2002; Gardner, 2002), and has long been described by authors as an important public health challenge in terms of social relations and financial consequences (Cunningham, Flynn & Blake, 2006; Mounce, 2002; Shaw et al., 2002). The economic burden from LBP is evident in several

studies that pain disability of about 5% of LBP sufferers accounts for 75% of all costs related to LBP (Chou et al., 2007). These figures confirm LBP to be the second leading cause of work absenteeism after common cold and flu in the USA (Chou et al., 2007), and the third next to colds and flu in South Africa (Belot, 2005).

In Africa and the rest of the developing world there is a lack of information about LBP prevalence. Only 8% of studies regarding prevalence of LBP were conducted in developing countries, with only 1% carried out in Africa (Walker, 2000). A systematic review by Louw et al. (2007) showed a one year prevalence of 14-72% and lifetime prevalence of 28-74% in Africa. LBP has been one of the leading causes of disability and time off work in the work places of mining industry in Zambia (Kunda, 2008), and a prevalent health condition in African nurses (Sikiru & Shmaila, 2009; Cilliers, 2007; Clarke, 2003; Omokhodion, Umar & Ugunnowo, 2000).

Most cases of LBP are non-specific with no identified etiology. Krismer and Van Tulder (2007) argued that only 10% of LBP causes can be identified. However, contributing factors to WRLBP, studied in various occupational settings, confirmed a link between musculoskeletal disorders (MSDs) and work-related factors (Maul et al., 2003). Charney and Hudson (2003) identified nursing as a high risk occupation among hospital employees to develop WRLBP, while Garg and Owen (1992a) stated that nursing present the highest rate of back injuries associated with manual handling. This is confirmed by Hedge (2009) when he identified a WRLBP prevalence of 75.9% among Australian nurses. Several daily tasks and activities exposing nurses to WRLBP have been noticed in a number of studies (Karahan, Kav, Abbasoglu & Dorgan, 2009; Van Niewenhuyse et al., 2009; Vieira, Kumar & Narayan, 2006; Yip, 2004; Soeker, 2004, Ehrlich, 2003; Vingard, 2000; Tsauo, Chen & Wang, 1998; Engels, Van Der Beek

& Van Der Gulden, 1998; Smedley et al., 1997, 1995; Buckle, 1987; Harber et al., 1985). Both environmental and individual factors have also been suggested to play a role in the development of WRLBP (Smedley et al., 1995). One can thus conclude that WRLBP is a major health challenge in the working population all over the world especially in the nursing profession. There should be an effort towards prevention of WRLBP. It is also crucial to implement control of risk factors commonly leading to WRLBP in the nursing profession (Vieira et al., 2006).

Although programs aimed at reducing incidences of back injuries among nurses have been assessed (Daynard et al., 2001), only few positive outcomes of the intervention programs have been reported (Hartivingsen, Lauritzen & Lings, 2005; Maher, 2000). Nurses' knowledge about back injuries and prevention techniques are important factors in the implementation of effective intervention programs ((Punnet & Wegman cited by Kunda, 2008). These writers assumed that a better description and understanding of the effects of exposure profiles of the work force, based on the results of epidemiological studies and investigations, might be required. Among health care professionals who can intervene in the process of LBP prevention and management, physiotherapists are believed to play a key role (Gardner, 2002) since LBP patients visiting the physiotherapy outpatient department for care dominate the number of patients for other health conditions (Waweru, 2005).

Comparing the developing nations and developed countries, the incidence rates of occupational injuries in developing countries are reported to be higher due to the inability to determine and analyze injury risk factors (Miller et al., 2006). Occupational risk assessment to plan for intervention and prevention is thus necessary. Although most people attempt to limit disability from WRLBP by modification of occupational risk factors or dealing with the problem once it

has been developed, LBP sufferers' attitudes and beliefs play an important role in the development of this chronic disabling condition (Buchbinder et al., 2001). Improvement in knowledge, beliefs and attitudes in health care workers should be part of the management of LBP (Buchbinder et al., 2001).

Though an unpublished study of Mutimura, Murego, Murenzi and Nyaruhirira (2003) on predictors of LBP highlighted a high increase of LBP among the general population of Rwanda, no other research has been conducted on the prevalence, disability and risk factors of WRLBP amongst nurses in Rwanda. There is thus a need for a research study on the prevalence and perceived disability resulting from WRLBP. Knowledge of the perceived risk factors amongst nurses could facilitate interventions to be implemented as preventive strategy.

The next chapter reviews the literature regarding the prevalence and impact of WRLBP, as well as measurement of and interventions for WRLBP.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Low back pain (LBP) is worldwide regarded as a common condition among nurses (Yip, 2004). Work related musculoskeletal disorders (WMSDs) particularly LBP is a major health and socio-economic problem in modern society (Maul et al., 2003; Trinkoff, Brady & Nielsen, 2003). LBP as an occupational problem is considered as one of the common reasons for disability and physician consultation globally, and its consequences impact negatively in work places (Hills, 2010, Anderson, 1999). This chapter aims to review and discuss relevant literature with regard to work-related low back pain (WRLBP), and the contributing factors with emphasis on the nursing population, and possible management and intervention strategies.

A literature search was performed using the following databases: Medline, Pub-Med, and CINAHL, then, Google and Google scholar search engines. The search was limited to include articles in English. The key words for the search included “*Rwanda*”, “*work related low back pain*”, “*low back pain*”, “*nurses*”, “*risk factors/contributing factors*”, “*prevalence*”, “*disability*”, “*management/ intervention*” and “*prevention*” as well as possible combination of some of the above-mentioned.

2.2 PREVALENCE OF LBP

LBP is a prevalent condition worldwide. It has been shown that 60-80% of the general population suffers from LBP at some stage in their life (Frimoyer, 1998; Biering & Sorensen,

1983). According to results of number of epidemiological studies, the lifetime prevalence of LBP is up to 84% (Maul et al., 2003). In addition, after the initial episode of LBP, global estimates predict that 44-78% people will suffer from relapses of pain while 26-37% will report recurrent work absence (Airaksinen et al., 2006). The established prevalence of recurrence of LBP is however 23% of the population, while 11% to 12% become disabled because of LBP (Airaksinen et al., 2006). In the United States for instance, data from a national survey by National Arthritis Workgroup reported that 15% of all adults experience frequent back pain lasting two weeks and more every year (Punnett et al., 2005). Furthermore, other studies report that about 25% of adult people experienced LBP in the past three months and 7.6% of them have suffered one episode of acute LBP in the previous years (Barclay, 2007). Also in Finland, 80% of people aged 30 years and above have experienced back pain. Half of them had pain more than five times in a lifetime (Hakala et al., 2005). A varying prevalence rate between 26.4% and 79.2% has been reported in industrialized countries such as United States and Australia (Louw et al., 2007).

In sub-Saharan Africa, statistics show that LBP has been the main cause of people to visit a rheumatologist with a prevalence rate of 30% to 40%, while the one year prevalence for the whole continent ranged from 14% to 72% (Maniadakis & Gray, 2000). In their literature review, Louw et al. (2007) found that 63% of African studies were done in South Africa and Nigeria, thus indicating a lack of information on LBP in other African countries. The information about the prevalence and risk factors of low back pain are thus limited (Omokhodion & Sanya, 2003). This does however, not exclude Africa from facing the burden of LBP even though there is an assumption that the prevalence of LBP in Africa is lower compared to developed countries. It has then been predicted to rise over the next decades (Louw et al., 2007).

2.2.1 THE PREVALENCE OF WRLBP

Global estimates reveal that 37% of LBP is work-related (Punnett et al., 2005), and the prevalence of WRLBP is generally high in working populations (Omokhdion & Sanya, 2003; Frimoyer, 1998; Biering-Sorensen, 1983). In the United States of America (USA), low back injuries are major causes of disability in industrial workers and 2% of the workforce is reported to have been affected because of back injuries (Dillingham, 1998). Also, in Canada, WRLBP is the cause of all 27% compensable injuries when compared with other occupational health problems (Chou et al., 2007). Although the rate of musculoskeletal conditions among healthcare workers in the USA generally seems to have come down since 1991, the rate of low back injury has continued to increase (National Labor Assembly, 2006). The prevalence of LBP in Africa has also been investigated and a prevalence of 73.7% has been reported among clinical nurses in Tanzania (Mwilia, 2008). The prevalence of WRLBP amongst healthcare workers thus seems to be a worldwide occupational problem.

2.2.2 WRLBP IN THE NURSING POPULATION

Studies report that WRLBP is more prevalent among healthcare workers than other hospital and industrial workers (Yip, 2004; Omokhdion et al., 2000; Malone, 2000; Ono, Shimaoka & Hiruta, 1997). Nurses seem to report a higher prevalence of WRLBP than other health care employees/workers (Tinubu, Chidozie, Oyeyemi & Fabunmi, 2010; Karahan, Kav, Abbasoglu & Dogan, 2009; Vieira, Kumar, Narayan, 2008, 2006; Lorusso, Bruno & L' Abbate, 2007; Smith et al., 2006; Smith, Mihashi, Adashi, Koga & Ishitake, 2006; Smith et al., 2004; Maul et al., 2003; Smith, Ohmura, Yamagata & Minai, 2003; Smith, Kondo, Tanaka, Hirasawa & Yamagata, 2003, Smedley, Inskip, Trevelyan, Cooper & Coggon, 2003b; Josephson & Vingard, 1998; Smedley,

Cooper & Coggon, 1995). A summary of the prevalence of WRLBP in several countries can be seen in Table 2.1. These confirm the results of Frimoyer (1998) that estimated a worldwide lifetime prevalence of 60-80% in musculoskeletal conditions with a high rate of LBP in the working population.

Table 2.1 Prevalence of WRLBP in the nursing population

Study	Prevalence findings	Country
Tinubu et al. (2010)	84.2% experienced musculoskeletal disorders with high rate attributed to LBP	Nigeria
Karahan, Kav, Abbasoglu and Dogan (2009)	77.1% lifetime prevalence incidence in nursing population	Turkey
Vieira et al. (2008)	65% and 58% of lifetime prevalence incidences in orthopedic and ICU departments respectively.	Greece
Lorusso et al. (2007)	Prevalence rates ranging between 33% and 86% have been reported across 25 studies from 1990-2007.	Italy
Vieira, Kumar and Narayan (2006)	70% to 75 % of point prevalence	Canada
Smith et al.(2006)	71.3% annual prevalence	Japan
Smith et al. (2004)	59% in a nursing population and 71.4%. in a group working in surgical department	Japan
Maul et al. (2003)	Annual prevalence of 73-76%	Switzerland
Smith, Ohmura, Yamagata and Minai (2003)	Lifetime prevalence 59%	Japan
Smith, Kondo, Tanaka, Tanaka, Hirasawa & Yamagata (2003)	Low back pain prevalence was high with 82.6% among other MSDs	Japan
Smedley et al. (2003b)	Lifetime prevalence varied between 59%	Netherlands
Smedley et al. (1995)	45% annual prevalence and 60% lifetime prevalence	England

In Africa, WRLBP is also prevalent and its burden affects the nursing populations much as in the developed world. A study by Clarke (2003) in Ghana reported that nurses were 21.5 times more likely to suffer from LBP than teachers. In Nigeria, Omokhodion et al. (2000) found comparable results in a cross-sectional study among Nigerian nurses with a prevalence rate of 69%. In addition, Sikiru & Shmaila (2009) stated 70.87%, while Tinubu et al. (2010), also in Nigeria, reported that LBP was ranked on top with a comparable 12 month's prevalence of 44.1%. Videman, Ojajarvi, Riihimaki and Troup (2005) asserted a prevalence rate between 31% and 72% in students still at nursing school in Australia. Truthfully, WRLBP is a considerable occupational problem among nurses not only in developing countries but also in the developed world. As a consequence, WRLBP, especially in Africa, may have been given less consideration in research, compared to other diseases.

2.3 THE RESULTS AND IMPACT OF WRLBP

The impact of WRLBP in general and particularly amongst nurses includes work absenteeism and the risk of developing chronic LBP (Van Niewenhuyse, 2006). A study in USA reported that 12% of nurses leave the profession every year because of back injuries (Vaughan, 2005). The Occupational Safety and Health Administration (2009) reported that 38% of nurses experienced severe back injuries needing days off work. LBP causes an important social and economic burden on the individual's life and on society (Ekman et al., 2005; Bekkering et al., 2003a). Nurses may also leave their profession as a result of musculoskeletal injuries (ANA, 2010).

In Nigeria, 0.8 % of nurses surveyed during a study on musculoskeletal disorders, suggested that they consider leaving the nursing profession to pursue another career because of work-related musculoskeletal disorders (WRMSD's) (Tinubu et al., 2010). As an integral part in the

development of individual's self-esteem, work plays an important role in the maintenance of the society and culture (Soeker, 2004). Soeker (2004) proposes that individual's needs of economic security, socialization, status, creativity and self-expression are negatively affected by disabling chronic LBP, resulting in a feeling of not contributing to his society and becoming a dysfunctional member. According to Smedley et al. (1997), when the injured nurse has to leave the work as a result of WRLBP, it is not only the loss of a valuable and experienced personnel, but also the stability, efficiency and quality of services offered to clients that are affected by the replacement of injured staff. Injuries related to WRLBP in nurses acquire great expenses to governments. South Africa spent an estimate cost of 20 million dollars on healthcare related LBP (Van Vuuren, 2006), USA assumed to spend 100 billion dollars every year because of LBP (Hills, 2010) while Sweden spent 1860 million Euro in 2001 (Ekman et al., 2005).

WRLBP causes a tremendous increase of socio-economic and labor impacts problems due to the epidemic disability of industrial societies (Zavala-Gonzalez, Correa-De la Cruz, Popoca-Flores & Posada-Arevalo, 2010), and constitutes an important cause of healthcare environment problems (Edlich, Winters, Hudson, Britt & Long, 2004). In Canada, a study done by Williams, Westmorland, Lin, Schmuck & Creen (2007) found that, from 1997-2001, approximately 30-40% of all workplace absences were due to WRLBP, with an average of 45 days per year absence from work. Hospital workers in Turkey have reported the impact of WRLBP in their occupational life. This report shows that 53.6 % WRLBP affected their work, and 48.1% reported that it decreased their performance. The authors proved also that amongst others, in 21.0% workers, WRLBP limited their movements during their work while 5.7% reported having difficulty in doing their job as a result of WRLBP (Karahan et al., 2009).

WRLBP has been reported as an independent predictor for sick leave or work absenteeism among general support workers and nursing staff in Ireland hospitals (Cunningham, 2006). It is also a costly health disaster amongst the nursing population (Yip, 2001). This confirms the opinion of Murat et al., (2009) that WRLBP is an occupational dilemma amongst the nursing population in particular.

According to Sikiru and Hanifa (2010), 43.34% nurses reported mild pain, not disturbing their daily activities while 38.66% reported moderate pain and 18% reported severe pain preventing them to work. In those with moderate LBP, 53% have been limited from going to work while 63% reported only restriction in work activities. Also, Cilliers (2007) established 83% absenteeism among nurses that work in the gynecologic department of Makwane Hospital in South Africa, while Belot (2005) stated that 80% of all workplaces in South Africa face severe consequences resulting from LBP. He also reported that 6 billion rand were spent on workers due to LBP. In contrast to the conclusion of Sikiru and Shimaila (2009) that WRLBP is not a major cause of illness-related absenteeism, it has become a major consequence of WRLBP the world over (Williams et al., 2007; Cilliers, 2007; Belot, 2005).

Disability from WRLBP can be seen in a study of Rehabasa (2002) cited by Soeker (2004) among 58 workers who received back rehabilitation in Cape Town (multidisciplinary back rehabilitation). Among these, 74.2% returned to their previous work, 5.2% claimed for insurance rehabilitation, 10.3% stopped their daily work, 1.7% required alternative work positions at the same employer, and 3.4% required further medical intervention. Lastly, 5.2% were negotiating for alternative employment as a result of WRLBP. The above study demonstrates how much WRLBP contributes to disability in the South African population.

Although most back pain is self-limiting (Porter, 2003, Hall, 1999), large numbers of prevalence rates and lifetime prevalence as well as LBP disability have been presented in different studies (Vieira et al., 2006; Edlich, Winters, Hudson, Britt & Long, 2004; Yip, 2004). However, these studies confirmed the foremost place occupied by nurses among other health care personnel in experiencing back injuries. According to Smedley et al. (1995), sick leave was a serious problem of nurse's absence from work in England as 10% of the participants (nurses) had a cumulative period exceeding 4 weeks of work absence. The prevalence rates reported by the study were similar for both sexes although fewer men had physician visits. Similar findings have also been reported in Netherlands (Roupa et al., 2008). Most LBP sufferers carry on their normal activities after some days, but about 7% of cases have persisting pain limiting their daily work activities (Vieira et al., 2006). The authors mentioned also that about 70% of workers require compensation related to LBP and sick leave from work, lasting 6 months or longer. Several studies handle LBP as an occupational hazard of the world where 10% of sufferers become chronic cases and have disability that exceeds more than 3 months (Shaw, Pransky, Petterson & Winters, 2005, Vergillo, 2005). In addition, 80% of all medical and indemnity costs are attributed to WRLBP, and Shaw et al. (2002) classified LBP among the first top 10 common causes of occupational injuries.

According to Murat et al. (2009), the mean number of pain-related disability from LBP has been reported to be more significant among nurses working in Emergency and ICU rather than in other departments (mean: 5.4). However, in about 69% of LBP sufferers, 10% of them have been absent from work for an extended period exceeding four weeks (Smedley et al., 1995). Nursing aids and orderlies ranked the uppermost across all jobs for back injuries acquiring sick leave from work in private industry in United States as stated by bureau of labour and statistics (BLS)

(2002) and were more affected by back pain than other Italian healthcare workers (Lorusso, Bruno & L'Abbate, 2007). About 80% of these nursing aids claimed back injuries in Australia (Lynchi & freund, 2000). This was because of being more prone to heavy physical work such as patient transfers, heavy lifting patients and boxes, pulling, pushing, laundry services and others in this line of workers.

Soucy, Truchon and Cote (2006) concluded that in a workplace, LBP is a costly and incapacitating musculoskeletal disorder. Although, identification of pain and impairment are used to predict the ability of the person to perform a task, Denis et al. (2007) indicates that the relationship between pain, impairment and disability still appears to be weak and indirect. They see LBP as a disabling condition in nursing. They found 36 nurses out of every 100 with either modified work hours or off work resulting from LBP. They further reported that 59 nurses had been limited to work because of LBP. These authors also added that in their study, the worst disability and pain severity was associated with increased limitation at work. On the other hand, limitations were associated with shorter hold times for trunk endurance tests. Similarly, the study findings also demonstrated that overworked nurses are more likely to be disabled, and able to return to work (RTW) with relatively lower pain and disability compared to those who were on less physically demanding jobs. These stressful tasks in bad postures which nurses usually face, lead them to relapses of LBP, causing them to be hesitant to return to work after injury. In his study of nurses in Hong Kong, Yip (2004) found that the majority of nurses (53.6%) scored their pain disability as 5 out of 10, which is considered as intolerable pain. One point on the scale indicated minimal pain. The author further added that the duration (for the majority of nurses who presented an incident of LBP by range) was 1-13 days.

In conclusion, if we consider the study results of high prevalence and impact of WRLBP among nurses, it is clear that WRLBP often results in socio-economic disability not only to the sufferer, but also to the community. Health services are also affected due to healthcare costs and loss of productivity due to the absence of WRLBP sufferers. It should thus be a priority by researchers to investigate preventive measures to reduce the burden of WRLBP in working populations.

2.4 RISK FACTORS FOR DEVELOPMENT OF WRLBP AMONGST NURSES

A review of the literature showed that workplace factors of low back disorders can have multifactorial causes, such as the interplay of genetic, physical, psychological and personal or behavioural variables (Morris, 2006). The results of a recent study by Sikiru and Hanifa, (2010) listed the possible causes of LBP in nurses as physical factors such as poor posture or twisting of the torso during patient mobilizing activity, inadequate lifting techniques; and psychological factors such as personality, education and inherent psychological characteristics. In the following paragraphs common occupational risk factors to WRLBP will be discussed in three main categories, namely physical, psychological/social and non-occupational factors.

2.4.1. PHYSICAL CONTRIBUTING FACTORS TO WRLBP

Physical factors can be classified in three groups, namely daily stressful positions and activities (especially lifting), being a woman, and longstanding service as a nurse.

Nurses have jobs requiring physical factors that expose them to uncomfortable work postures when performing their daily tasks. Apart from working in standing position, frequent lifting patients and other heavy objects, and heavy physical workload, frequent sitting for long period of

time at work with lack of short breaks, are the major sources of back injuries. This can seriously affect the person's working performance as a result of occupational dysfunction (Soeker, 2004).

According to Minematsu (2007), the foremost contributing factors of occupational LBP also include: static work postures, forceful movements, pushing and pulling movements, bending and twisting, same work repetitions and even whole body vibration. Based on these factors, the increase of LBP in actual working conditions of health care settings, especially nurses, cannot be surprising. The shortage of nurses, their irregular working hours and also extra work-time are further influence of their risk of LBP. Furthermore, nurses are frequently prone to daily activities requiring risky positions, postures and tasks (Minematsu, 2007). Nurses are more prone to LBP because their working environment is often stressful due to personal relations. The lack of co-operation between team workers can later also contribute to LBP. Thus, as healthcare workers, nurses are not excluded from physical, psychosocial and work organizational factors, known to be LBP drivers of their occupational hospital setting (Spengler et al., 1986).

Mukaruzima (2010) argues that injury of the spine related to overload of soft tissues such as muscles, ligaments, tendons and joints of the back especially in lifting may lead to disc prolapse that may also cause impingement of spinal nerves. This is also supported by the suggestion of Denis et al. (2007) that being frequently in stooped work postures, nurses put high stresses on their trunk muscles and place them on high risk for LBP. Additionally, Nelson-Wong and Callaghan (2010), indicate in their conclusion that, even if previous studies suggested the role of gluteus muscle co-activation as dominant pattern in the development of LBP among individual workers exposed to 2 hours of standing, there was also a significant association between hip

abductor muscles co-activation and the starting of the development of LBP during upright position.

However, Minematsu (2007) in Japan highlighted also that patient transfers, lack of exercise, and lack of proper care skills were the factors which contributed to LBP among nurses. Half-sitting postures and prolonged work position make it worse. Most of the time nurses' duties are performed in forward bending posture which also contributes to WRLBP (Denis et al., 2007). In addition, a study on WRLBP in Tanzania, found that lifting and shifting heavy objects have also been confirmed as the most contributing/ risk factors to LBP among clinical nurses (Mwilia, 2008). Furthermore, heavy lifting and whole body vibration are seen as main factors causing LBP in men because of riskier occupations in which they are often engaged (Punnett et al., 2005). Hall (1999) buttressed this point in his review of literature by recommending lifting avoidance especially when it is associated with twisting, as the position places about three times more stress than doing the same task in sagittal plane. According to Retsas and Pinikahan (2000) in Australian nursing study, lifting is taken as a direct patient care activity exposing nurses to WRLBP.

Even though the nature of association between nursing and WRLBP remains unclear, nurses are prone to self-reported occupational physical workload considered as a major predictor of WRLBP and related disability (Videman et al., 2005). However, according to Vieira et al. (2006), nurses counteract many problems in their workplace that limit them to give up back stressors and suggested some of them as: staff shortage, lack of encouragement to request for help, small rooms, heavy patients with unexpected movements, working with inexperienced

nurses, lack of training on lifting and patients transfer techniques, manual handling of heavy bags, lack of lifting devices, lack of appropriate equipments and low bed rails.

According to Edlich et al. (2004), the American Nursing Association (ANA) believes that manual patient handling is unsafe and directly responsible for musculoskeletal disorders encountered in nurses. Back, neck and shoulders were identified as the most injured parts of the human body, especially in nurses (Edlich et al., 2004; Smedley et al., 2003b). While mostly associated with dependant patient care, the risk for musculoskeletal injury secondary to manual patient care crosses all specialty areas of nursing where abnormal postures taken during their working tasks expose them to more susceptible occupational back injuries (Edlich et al., 2004).

In Canada, Vieira and colleagues (2006) confirmed that nurses' job of taking care of patients, raise their risk of having WRLBP. They added also that nurses often hurt their backs when turning patients in bed, transferring them from bed to bed or from bed to chairs, especially those working in the Intensive Care Unit (ICU) and in orthopedic or surgical wards. That is 58% in ICU and 65% in orthopedic wards have been reported to develop debilitating WRLBP in their working years.

Several studies have also been conducted to highlight the relationship between WRLBP and contributing physical factors among nurses. Research results indicate a number of factors commonly associated with WRLBP (Tinubu et al., 2010; Howard, 2010; Hedge, 2009; Karahan et al., 2009; Cilliers, 2007; Van Tulder, 2006; Vieira et al., 2006; Hoffman, Stossel, Michael, Nubling & Siegel, 2002; Mounce, 2002; Vingard, 2000; Shoko et al., 1999; Burdorf & Sorock, 1997). These physical factors include patient transfers, lifting and moving/ making beds (Sikiru & Shmaila, 2009; Hedge, 2009; Mwilia, 2008; Vieira et al., 2006; Shoko et al., 1999), heavy or

repetitive lifting and lifting without aid, positioning patients, bending, twisting, awkward and static posture (Tinubu et al., 2010; Karahan et al., 2009; Denis et al., 2007; Burton, 2004; Mounce, 2002; Smedley et al., 1995), work posture of the nurses (Yip, 2004; Shoko et al., 1999), prolonged standing and sitting, forward bending (Van Nieuwenhuysse et al., 2004; Mounce, 2002; Josephson & Vingard, 1998) and high or heavy workload (Eriksen, Bruugaard & Knardahl, 2004). However, no significant association was found between WRLBP and to the use of mechanized patient transfers in nurses (Smedley et al., 1995).

According to Tinubu et al. (2010), LBP as one of the most prevalent musculoskeletal disorders with high incidences among nurses, is closely related to physical factors. Their study indicated that work-related musculoskeletal disorders (WMSDs) including LBP amongst nurses is significantly associated with working in the same positions for extended time (55.1%), lifting or transferring dependent patients (50.8%). Also, taking care on an extreme number of patients in one day (44.9%) were the most perceived job risk factors for WMSDs.

Perceived physical nursing job risk factors to WRLBP have also been investigated in Africa especially in a study among clinical nurses in Tanzania. The majority (96%) of the nurses revealed that their back problems are mainly associated with their physical job activities. Among them, the majority (69.6%) reported that back injuries in nurses are due to direct patient care services like manual patient transfer, frequency of patients lifting, pulling and pushing techniques, turning or positioning patient in bed, bed making, bed bath, patient feeding, drug distribution and then participating in work tasks of assisting surgical interventions or dressing wounds and many others (Mwilia, 2008). These factors confirm the results of Ando et al. (2000) which reported bed making, helping patients to bath, frequent bending or prolonged sitting,

standing and lifting patients as predictors of WRLBP in nurses. Smedley et al. (1995) indicate that at least 36% of back injuries in nurses are related to these caring techniques. Most studies thus link WRLBP and WRMSD's in nurses to direct manual patient handling (ANA, 2010; Karahan et al., 2009; Lorusso et al., 2007; Yip, 2004; Vingard, 2000; Shoko et al., 1999; Josephson & Vingard, 1998; Smedley et al., 1997; Hignett, 1996).

Even though patient handling is an inevitable part of a nurse's job, contributing factors seem to play a role. A number of times per day patient lifting, methods of lifting, position of the lifter, overweight and fitness and previous back injury have been investigated (Mitchell et al., 2009; OSHA, 2006; Vieira et al., 2006; Van Niewenhuyse et al., 2004; Yip, 2004; Smedley, et al., 1995). Years of work in the profession also seems to be a risk factor (Lorusso et al., 2007). Tinubu et al. (2010) reported that nurses with more than 20 years of work were 4 times at higher risk of developing work related musculoskeletal disorders than those with 11-12 years.

Additionally, LBP among nurses may sometimes be school-based. Videman, Ojajarvi, Riihimaki and Troup (2005) reported that nurses still at school meet the burden and consequences of LBP from a prevalence of 31% when starting, and the prevalence may rise up to 72% at the end of their nursing studies. However, experienced nurses are thought to have greater chance to avoid hurtful physical stressors more than younger nurses, and indicating that LBP decreases as the work experience in the profession increase. This indicates that as the nurse goes on in the profession, he/she acquires more knowledge of how to prevent back injuries and avoids harmful tasks and spinal movements. And this would compensate cumulative effects of putative risk factors (Maul et al., 2003).

2.4.2 PSYCHOLOGICAL/SOCIAL RISK FACTORS CONTRIBUTING TO WRLBP

A relationship between psychological/social risk factors and WRLBP has also been investigated in several studies and found to be risk factors. The following are the results of this relationship: Poor relationship at work between colleagues, perceived work stress, low job satisfaction, lack of support and encouragement at work, work demands and monotonous work have been related to WRLBP. In addition, poor rating by supervisor, emotionally stressful work, high work demands, low control, poor work place social environment, physical work stress, marital conflict, fear and beliefs, night shifts, insomnia & depression have all been listed from different studies (Van Nieuwenhuysse et al., 2009; Cilliers, 2007; Morris, 2006; Soucy et al., 2006; Eriksen et al., 2004; Burton, 2004; Yip, 2004; Ehrlich, 2003; Salford, Bullock-Saxton & Markwell, 1999; Engels, Van Der Beek & Van Der Gulden, 1998; Josephson & Vingard, 1998; Spector, 1997; Smedley et al., 1997, 1995; Buckle, 1987; Howard et al., 1986; Harber et al., 1985). However, the psychosocial evidence of risk factors from different studies proves how strong they can predict to musculoskeletal disorders and particularly WRLBP in nurses (Smith et al., 2006).

According to Eriksen et al. (2004), psychological and social factors such as night shifts, lack of support and encouragement from the superiors in the work unit are the major contributing factors of increased and intensive LBP symptoms in nurses. In addition, Soucy et al. (2006) argue that perceived work stress and fear avoidance beliefs influence the worker's RTW status. Even if the exact mechanism indicating the relationship of high work stress to LBP in nurses is not well understood, it might be that stress increase muscle tension or cause a sensation of pain similar to that of LBP (Bigos et al., 1986). Furthermore, Woolf and Pfleger (2003) proved that due to negative attitudes towards strenuous activities, and leisure pursuits of LBP sufferers, pain of the

back can be based on fear avoidance beliefs. Also, Karahan et al. (2009) indicated that work stress is highly associated with WRLBP in health workers and particularly amongst nurses.

LBP patients are often prone to mental and psychosocial disturbances that further result in insomnia, irritability, anxiety and depression (Bener et al., 2006). Depression and job dissatisfaction have a direct link with LBP as indicated by some studies (Woolf & Plefger, 2003; Smedley et al., 1997). Additionally, it is perceived to be a key psychosocial factor not only because of being the basic maladaptation of stress and pain, but also the influence of the ability of the individual to execute daily work tasks (Soeker, 2004). Similar to work stress, Denis and colleagues (2007) realized also in another study that even being in a stressful location like hospital environment expose nurses to heavy work demands of which they cannot control over, and these further result in restructuring, nursing shortage and casual workers. The above authors still perceived that lack of empathy from government or their direct authorities further lead later alone to LBP. Nonetheless, having poor relationship with co-workers and having occasional headache can predispose a nurse to LBP (Yip, 2004).

According to Porter (2003), psychosocial risk factors are known to be strongly associated with the risk of developing chronic low back pain (CLBP) and even affect its prognosis during management and treatment. Therefore, in managing CLBP in workplace, social factors such as low social support, whether from employers, employees, co-workers, or from the family of the worker must not be ignored (Morris, 2006; Soeker, 2004).

2.4.3 PERSONAL CONTRIBUTING RISK FACTORS TO WRLBP

A relationship between LBP and personal factors contributing to WRLBP has also been on interest in research. Some studies have shown that a number of these factors may play an important role in exposing nurses to LBP. The identified factors are as follows: educational status, history of pain, age, alcohol and drug abuse, family history, gender, previous back injury, overweight or obesity, lack of physical fitness, inappropriate materials, and smoking (Van Niewenhuysen et al., 2009; Vieira et al., 2006; Eriksen et al., 2004). A history of back pain is often taken as a powerful risk indicator for a new episode (Burton, 2004). Although personal factors have proven difficult to be identified as contributors of LBP, they are thought to play an important role in a biopsychosocial nature of LBP (Mitchell et al. (2009).

LBP sometimes starts when nurses are still in training. Targeting physical, psychosocial and personal factors in nursing students may help improve and further prevent the impact of LBP in nurses when they are employed in a health or hospital setting (Mitchell et al., 2008). Woolf and Pflieger (2003) validated the link of some personal factors and LBP. Studies prove that factors such as age, obesity, lack of physical exercises, smoking and lack of strength of back and abdominal muscles can really contribute to LBP. Similar findings have also been put out by Mwilia (2008) that reported a link between LBP, obesity and many other non- occupational work factors. However, Smedley et al. (1995) highlighted that LBP in nurses can also be associated with height of the nurses especially those who have no history of musculoskeletal symptoms.

Moreover, Safford et al. (1999) acknowledge that besides the risk factors related to work (eg: in nurses), LBP has also been shown to be more frequent in pregnant women since the majority of nurses are female the world over (Smith et al., 2009). Even if the prevalence of LBP among

pregnant women is assumed to be insignificant, it is also believed to be inevitable among female population. The cause of LBP among pregnant women results from the change of the posture following this period of pregnancy. The existence of a close relationship between the presence of LBP in pregnant women and certain aspects of postures has been suggested in reviews with recommendations for further research about the topic. On the contrary, no association has been reported between pain incidence and the degree of lordosis or kyphosis during pregnancy (Sapford et al., 1999).

According to Dumas et al. as cited in Sapford et al. (1999), a positive association has been shown after checking different parameters between the severity of LBP and the change in lordosis during gestation period up to the post-partum. However, investigation concluded that the greater the increase in lordosis during pregnancy, the more is the severity of back pain to the pregnant mother. Apart from pregnancy, increasing evidence now suggested that menstrual disorders considered as a gender specific health issue may also influence the development of LBP in female nurses of reproductive ages.

The importance of menstruation as an occupational health issue cannot be underestimated. Menstrual disorders affect a number of females worldwide in which the majority of nurses are counted (Smith et al., 2009). According to their study among Japanese nurses, a wide range of nurses reported symptoms such as pain, breast tenderness, stomach pain, light headedness, and fatigue both prior and during menstruation. Their study shows that 75% of nurses experienced at least one episode of LBP in the previous 12-months. In addition, those who reported breast tenderness during menstruation were almost twice as likely to suffer from LBP that interfered with their daily activities (Smith et al., 2009).

2.4.4 THE LINK BETWEEN PHYSICAL, PSYCHOSOCIAL AND PERSONAL RISK FACTORS TO WRLBP

Although the outline of this review dichotomizes workplace factors into physical and psychosocial factors, many studies have investigated the link between WRLBP and physical factors, while others linked it to psychosocial factors or studied the inter-relationship between physical and psychosocial factors. However, a number of studies indicating a relationship between all these risk factors (physical, psychosocial, personal or individual factors) and LBP are important. Devereux, Buckle, and Vlachonikolis (1999) demonstrated how physical and psychosocial factors can be linked to LBP in a work setting. According to their study, occupational physical factors include heavy manual workload, frequent lifting, or carrying, whole body vibration, frequent bending and twisting and static work postures.

On the other side, psychosocial factors include perceived high pressure on time and workload, low job control, job dissatisfaction, monotonous work, and low support from co-workers. Although the relative role of physical and psychological risk factors for some studies has not been established, others investigated this relationship with back disorders. Each set of factors has been studied by identifying the effects. However, investigations reported that these factors potentially interact to increase the risk of having LBP (Devereux et al., 1999). Manchicanti (2000) agrees that such a link between physical factors, psychological/social and individual factors (heredity, age, sex or gender, posture, body weight and height, smoking and physical fitness and sports) and LBP is significant. According to this author, smoking is considered as a habit of an individual that can predispose people to LBP. Nevertheless, cigarette smoking has been found to increase the risk of having LBP, by reducing perfusion, and malnutrition of soft tissues in and around the spine and that can cause tissues to negatively respond to mechanical

stress (Eriksen, Nativig & Bruugaard, 1999). This puts smokers at high risk of developing LBP more than non-smokers.

Although Rogers (2003) concludes that work-related physical factors such as heavy physical work load, lifting and forceful movements, awkward postures and whole body vibration accounts 28% to 50% of the US workforce, researchers agreed and identified personal factors that contribute to LBP. These recognized factors are like age, gender, antropometric characteristics (height, body build), previous history of LBP, spinal abnormalities (non-modifiable factors), as well as modifiable factors such as weight, physical fitness, smoking and some aspects of spinal flexibility, trunk muscle strength and hamstrings elasticity have been remarked as reliable predictors of LBP.

Mitchell et al. (2009) also confirmed this link between physical, psychosocial factors and personal factors in a multivariate analysis where work stress, physical activity, spinal kinematics and age of nurses and LBP have been proven to be independently significant. Back related risk factors are numerous and are thus all considered predictors of LBP particularly amongst nurses.

We can conclude by saying that WRLBP is frequent among nurses and it is essential to evaluate work related risk factors that may expose them to WRLBP. This may facilitate in the formulation of intervention strategies to help the employer setting activities, to improve protective measures at work, limiting risk factors of WRLBP among workers especially the nursing population.

2.5 MANAGEMENT OF WRLBP

Management of LBP generally is complex and demands multidisciplinary care (Krismer & Van Tulder; Soeker, 2004, Porter, 2003). But, physiotherapists may play an important role (Fidvi & May, 2010; Hakala et al., 2006; Van Griensven & Justins, 2005; Waweru, 2005). Although various modes of management are indicated considering the nature of the disorder (Stossel, 2010), little information is known about the best intervention strategies (Poitras, Blais, Swaine & Rossignol, 2005). Porter (2003) suggests that physiotherapy is the most important conservative management of LBP with the four main aims of allowing healing, restoring mobility, correcting posture and strength as well as prevention of recurrences.

Among nurses, improved ergonomic interventions for prevention (Smedley et al.,1997), education to enable the return to work, medication, physical therapeutic and psychotherapeutic management approaches may be necessary in combination (Hoffman et al., 2002). Thereafter, organization and work modification (Tinubu et al., 2010). Mukaruzima (2010) proposes that participating in physical activity to increase muscle strength is recommended in prevention of LBP as weakness of leg and hip muscles, back and abdominal supporting or stabilizing muscles may contribute to the development of LBP.

2.5.1 The role of education in the management of WRLBP

Education has been investigated in different studies and has been shown to be part of the management of LBP in the work places in general and among nurses in particular. Moreover, these studies have reported the importance of education in the management of LBP. Good results have been demonstrated in studies where education/advice of workers were used as intervention, either by itself or as addition to physical interventions (Stossel, 2010; Hedge, 2009;

Couper, Smith & Hancock, 2009 ; Gaudry, 2005; Bekkering et al., 2003b; Charney & Hudson, 2003; Holman & Lorig, 2000). One example of education used was training of workers in correct lifting techniques, correct handling materials in sitting position, the use of proper ergonomic chairs to support the lumbar spine (Alcouffe et al., 1999). This corroborates with results of a study of Sikiru and Hanifa (2010) indicating that all 100% of participants in their study with no LBP claims that they had previous training of back care.

Effectiveness of education has also been demonstrated in a Canadian study (Poitras et al., 2005). Among two groups of patients 57.4% of those without radiating and 43.9% of those with radiating pain recovered sufficiently using physiotherapy interventions. These included education on stretching and strengthening exercise program, pain control, explanation of physical causes, increase in home activities, advice on activities of daily living, ergonomics and work tasks, and posture education. However, education has been observed to be the most preferred treatment choice used by physiotherapists to treat patients with non-specific LBP (Twagirayezu, 2005). In a Tanzanian study on nurses, it was found that having knowledge about back care injury prevention techniques may not be sufficient unless nurses apply the given knowledge into their daily activities. Due to the lack of sufficient back care training, poor working conditions, personal attitudes and behavior can also be considered factors exposing nurses to LBP (Mwilia, 2008).

As in the nursing population stressors are common and huge, nurses often face these working ergonomic stressors. Smedley et al. (1995) therefore suggest training nurses in lifting requirements so that they are aware of how to protect their backs during daily work tasks. Very often nurses do not use body mechanics in their clinical practices as a result of back disorders.

However, the importance of lifting and transferring techniques in nurses has been highlighted in preventive measures (Charney & Hudson, 2003; Trinkoff et al., 2003). According to Mwilia (2008) the shortage of staff nurses to assist in lifting and transferring techniques, lack of assistive devices and environmental hindrances (space, patients lying on the floor and overcrowd patients in a ward), insufficient time for a quick transfer, and sometimes lack of sufficient back care training are the prime barriers of not implementing back care techniques.

Education with a psychosocial approach has also been used as intervention especially when managing chronic LBP (Porter, 2003). Sometimes LBP may resolve without complications when managed correctly in the very early phase (acute) (NINDS, 2010; Patel & Ogle, 2000). When LBP has become a chronic problem, the assessment and treatment needs a bio-psychosocial approach (Krismer & Van Tulder, 2007; Maniadakis & Gray, 2000) because 80% of sufferers have been found without pathology despite their disability presentation (Porter, 2003). Therefore, identification of possible risk factors and education in this regard are very important, and could not be ignored in the WRLBP management strategy (Patel & Ogle, 2000).

2.5.2 The role of ergonomics and posture in the prevention of WRLBP amongst nurses

Ergonomics becomes important in preventing illnesses such as LBP or even when generally designing the workplace to ensure that it is fit for workers. The recent version of the Mosby's Dental Dictionary (2008) defines the term ergonomics as the study of workplace design and the physical and psychological impact it has on workers. It is also about the fit between people, the work activities, equipment, work systems, and environment to ensure that workplaces are safe, comfortable, and efficient and that productivity is not compromised. Although ergonomics is the science of designing the workplace environment to fit the workers, proper ergonomic design is

necessary to prevent repetitive strain injuries, which can develop over time and lead to long-term disability very often related to the uncomfortable work occupied. This aims in making sure that tasks, equipment, information and the environment suit each worker (SHE, 2003).

Hattingh and Acutt (2009) on their side defined ergonomics as the study of human capabilities and the interactions of the worker and the job demands that has beneficial interests in practice. They also argue that ergonomics attempts to decline the physical and mental stress of the job by optimizing the work environment and design of the work to fit individual worker (eg: nurse).

Several studies have been done and their results have proved that ergonomics in the workplace can be beneficial. The recent guidelines of Occupational Safety and Health administration (OSHA) (2009) particularly amongst nurses working in nursing homes state that nursing homes that have implemented injury prevention efforts focusing on resident lifting and repositioning methods have achieved considerable success in reducing work-related injuries and associated workers' compensation costs. Providing a safer and more comfortable work environment has also resulted in additional benefits for some facilities. These additional benefits include reduced staff turnover and associated training and administrative costs, reduced absenteeism, increased productivity, improved employee morale, and increased productivity as well as an increased resident comfort (OSHA, 2009). The above mentioned guidelines provide recommendations for employers to help them reduce the number and severity of WRMSDs in their facilities by using methods that have been found to be successful in the nursing home environment.

According to Sikiru and Hanifa (2010), the conclusion of their study indicates the importance of having knowledge of back care ergonomics and availability of lifting equipment to reduce the major cause of LBP and other occupational hazards among nurses. Furthermore, it is cited in Williams et al. (2007) that ergonomic intervention such as participatory ergonomics, workplace adaptation, adaptation of job tasks and adaptation of working hours are effective in returning injured worker to work. However, the OSHA (2009) recommends that for nurses, the number and severity of injuries resulting from physical demands in nursing homes and related health costs can be substantially reduced by providing an alternative way to manual resident lifting. This is considered the primary goal of the ergonomics process in the nursing home setting.

Even if some studies recommended that training nurses in biomechanics (correct lifting techniques) and transferring patients can be sufficient in work-related low back injury decline, Hignett (1996) argued that training nurses in lifting and handling techniques alone is not enough. The value of ergonomic intervention is of greater importance. Conversely, support for the fact that an increasing number of work related low back injuries secondary to manual handling activities has been confirmed (Hignett, 1996). According to Porter (2003) and Smedley et al. (1995), it is important that when managing CLBP, re-education and ergonomic advice to improve awareness in lifting requirements, as well as relieving injured nurses from the most physically demanding jobs are of paramount importance. Nonetheless, getting help in handling heavy patients, modification of nursing procedures in order to avoid re-injury, and modifying patient's/nurse position have been found to be the top three coping strategies (Tinubu et al., 2010).

2.6 PHYSIOTHERAPISTS AND LOW BACK PAIN MANAGEMENT

Physiotherapists are the most involved in the management of LBP among the health care professionals in a health care setting (Hakala et al., 2006; Waweru, 2005; Twagirayezu, 2005; Porter, 2003). Physiotherapists have skills to carry out a full and accurate assessment taking account of the individuality of the patient (Porter, 2003). As in other health care professions, physiotherapists also struggle to find evidence to prove their efficacy (Gaudry, 2005, Poitras et al., 2005). However, several studies have shown that patients with musculoskeletal injuries such as LBP benefit from physiotherapy intervention and generally have high expectations of recovery once physiotherapy has been initiated (Metcalf & Moffett, 2005).

Generally, physiotherapists are professionals who specialized in specific areas. They use a variety of interventions to treat LBP as massage therapy, spinal manipulation and mobilization or manual therapy, electrotherapy, exercise therapy (commonly used in case of low back pain), hydrotherapy, advice (encouraging return to work or usual activities, patient education), re-education, training, cognitive behavioral therapy interventions (needed for patients with psychosocial problems) and specific exercise programmes (stretching, strengthening exercises, extension and flexion exercises, very often given in sub-acute and chronic phases of LBP, McKenzie extension exercises in chronic stage, spinal stabilization exercises).

Some of these treatments given by physiotherapists to LBP patients are considered as passive treatments, for example, manual therapy, massage and physical modalities ((Moffett & McLean, 2006, Bekkering et al., 2003a). These authors stated that physical modalities encompass among

which transcutaneous nerve stimulation: TENS, heat/ cold, traction, shortwave diathermy, interferential, laser therapy, ultrasounds, back corsets) (Moffett & McLean, 2006). Again, the use of various forms of treatment in dealing with LBP has also been confirmed in a study of Twagirayezu (2005). Although all patients with LBP do not receive physiotherapy as their treatment option, by only taking medication or herbal remedy (Waweru, 2005), the physiotherapist has a wide ranging role at all stages of back pain (Moffett & McLean, 2006, Waweru, 2005). Early on, it is incumbent upon physiotherapists to be able to identify patients with serious spinal pathology and refer them to the most appropriate specialists. They are also ideally placed to identify patients who are developing psychosocial barriers to recovery, provide reassuring advice, explanation and education and encourage early return to normal activities. They are further placed to offer more intensive rehabilitation interventions, such as exercise and manual therapy. Physiotherapists must also use cognitive behavioral therapy techniques to maximize benefit (Moffett & McLean, 2006, Bekkering et al., 2003b).

As many patients may have psychosocial additional problems, the best approach for them would be an intensive biopsychosocial rehabilitation approach with functional restoration because of the factors relating to mental health of the subjects (Failde et al., 2000). For this, physiotherapists need to have close communications with other health disciplines, to handle psychosocial back problems (Moffett & McLean, 2006). According to Moffett and colleague (2006), the overall role of physiotherapists for a worker with a non-specific LBP such as a nurse, is to help him/her return to fulfilling his daily activities including work tasks, where applicable. According to Porter (2003), their role requires objectives when managing LBP. The objectives should be a) to control and monitor pain levels, b) gain the patients trust and confidence, c) ensure compliance

and willingness to persevere with treatment, d) increase and maintain muscle strength, e) provide education and facilitating long term self-management of the condition. Their role is also based on reducing pain, increasing function (ROM: for stiff joints of the low back), and treating the existing pain to prevent future musculoskeletal dysfunction. All along the way of work, they need to have a close liaison with other health care professionals to be able to handle CLBP problems maximally which are thought to relate on psychosocial sources. The choice of treatment chosen depends upon the phase by which the present patient is categorized in (Porter, 2003).

As a ubiquitous symptom for patients, unrelieved pain remains a great problem in our community, healthcare and hospital setting practice. The socio-economic disability related to LBP has been highlighted in a number of reports and that health professionals such as physiotherapists are now paying attention (Van Griensven, 2005). According to the International Classification Study of pain (IASP), pain is defined as unpleasant sensory and emotional experiences associated with actual or potential tissue damage, or described in terms of such damage. This means that pain is either the result of tissue damage or the result of stimulus damage, if sustained or increased (Van Griensven, 2005).

Physiotherapists used to have a list of pain relieving modalities depending on the phase of the present pain whether acute or chronic. This is because they are naturally trained to have a professional responsibility to use their skills appropriately for the benefit of their patients (Porter, 2003). Traditionally, serious pathology (red flags) would therefore have been screened by physicians, but at the moment, physiotherapists can expect to be the first line of contact as they

are presently able to prove red flags, and even yellow flags (factors that may influence patient recovery) (Moffett & McLean, 2006).

2.7 INTERVENTION STRATEGIES OF WRLBP IN THE WORKPLACE

Even if LBP is treated in the same way for everyone who suffers from it, nurses and other workers have their own specialties depending upon what causes the pain. This means that, the emphasis of treatment of people in the workplace should be put on developing worker potential and work task demands, by enhancing health safety at the worksite, increasing organizational flexibility in terms of job demand, design, and home based work (Rogers, 2003). Soeker (2004) added work place adaptation, modification and increase of empathy for the sufferer by co-workers and the employer. Also, healthcare organizations are requested to recognize the importance and benefits of a safe patient handling program. This needs a comprehensive program with effective risk assessment and setting risk control policies. Once more, providing lifting equipment, ongoing training for use of it, and cooperation of workers at all levels. It will also help nurses to get all resources to help them to prevent and reduce ergonomic stressors and back injuries at their site of work (Howard, 2010).

In their study, Roupa et al. (2008) conclude that LBP problem in nurses can be alleviated with the focus of two ways. Firstly, a personal level intervention including physical fitness, exercises, relaxation, social contacts and time management techniques. Secondly, organizational intervention including prevention and professional burnout such as improved ergonomic planning of hospital space, lifting techniques training, clarification of everyone's role. Finally, the planning of further training and education about back care is needed (Roupa et al., 2008).

OSHA (2009) supports that injury reduction in nursing lies on the techniques in the primary goal of ergonomic process. It adds also that back injuries can be minimized if the employers develop a process addressing automatically ergonomic issues in their facilities by incorporating programs that recognize and prevent their workplace from health hazards. This would be possible if their strong support to workers creates opportunities for success, or if they provide the necessary resources for easy and safe work by assigning responsibilities to a staff member and a structured follow-up. This corroborates also with the conclusion of Karahan et al. (2009) stating that body mechanics educational programs should be set for health workers in targeting prevention of back injuries and stopping of some personal habits like smoking, is necessary. However, it should be noticed that physiotherapists may have an important role in encouraging through education active self-management, an essential component in the treatment and management of all back patients (Moffett & McLean, 2006; Porter, 2003).

2.8 POLICY IMPLICATIONS FOR REDUCTION OF LBP IN THE WORKPLACE

According to Smedley et al. (2003b), it is very important for handling equipment and mechanized equipments to be designed in order to reduce risk factors that may contribute to LBP, such as slide sheets that might lessen exposures to pulling and reaching and further lead to LBP amongst nurses. Not only this, but also in hospitals and other healthcare settings, such as health centers, ergonomic interventions should include consideration of risk of symptoms of LBP (Knibbe & Friele, 1996). This may include education and training of the worker in order to increase his awareness of how to minimize or prevent work place stressors in addition to injury and disability assessment (OSHA, 2009; Soeker, 2004). Smedley et al. (2003a) and Smedley et al. (1995) also propose that job changes or redeployment of the nurse might be considered for

nurses with recent and prolonged previous history of LBP. If the risk remains high, optimal management of physical exposures at work becomes necessary (Smedley et al., 1995).

As a number of studies have proven LBP to be a major health issue among nurses worldwide, sometimes due to lack of exercise, nurses should be given time for physical exercise as recommended by the WHO (World Health Organization) to improve their health lifestyle benefit (Mukaruzima, 2010). In addition, Karahan et al. (2009) and Yip (2004) added also that ergonomic assessment in work place risk factors is necessary, and recommend the arrangement of proper work breaks and the use of back care intervention programmes. Furthermore, team building workshops, relaxation, and training for high risk work postures to prevent LBP incidence are essential. However, Trinkoff et al. (2003) also confirmed the importance of a zero lift program creation at workplace and hospital settings in targeting back injury reduction, sick leave days and workers compensation costs.

Work assessment, and design are necessary to see whether the workplace fits every worker. Also, consider injured workers when decisions like alternative work placement have been taken (Soeker, 2009; Edlish et al., 2004). Clearly, WRLBP is a serious worldwide problem especially in the nursing population. Management must thus not only consider the disease itself (biomedical view), but also the psychosocial risk factors which may contribute to the development of chronic WRLBP without ignoring some individual or personal factors which may also play a role. Several studies indicate that nurses are prone to ergonomic work stressors in their nursing job, exposing them to LBP. Most stressors seem to be associated with manual lifting and transferring patients as well as repositioning patients whether in bed or elsewhere. Based on that, some

nurses have been found not aware of what and how they should apply preventive measures when handling patients manually. As a result, ergonomic awareness training of nurses should be part of management and prevention strategy in their work place (OSHA, 2009; Knibbe & Friele, 1996).

Summary of the chapter

This chapter highlighted the overall information regarding LBP in healthcare workers, with emphasis on nurses. The review discussed information on the prevalence of WRLBP in nurses, its impact on society and especially resulting disability, a holistic risk/ contributing factors of this health condition of the working population and particularly nurses in hospital setting, and finally some intervention strategies for management and prevention of WRLBP amongst workers and nursing population in particular. Based on theories, it appears that WRLBP is common amongst nurses. Most contributing factors are physical and related to the job demand, but others such as individual, psychological or social risk factors are indirectly related.

The following chapter addresses the methodology used in this study.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

The present chapter describes the research setting in which this study was conducted, the study design, study population and sampling, instrumentation, and procedures of data collection and analysis. Lastly, ethical considerations related to the present study are discussed.

3.2 AIM AND OBJECTIVES OF THE STUDY

The aim of the current study was to determine the prevalence, perceived disability and contributing/risk factors to WRLBP among nurses in Rwanda. The objectives were to determine the prevalence of WRLBP among nurses in Muhanga and Nyanza District, Southern Province in Rwanda; to determine the resulting perceived disability from WRLBP amongst nurses in Rwanda; to identify and establish the perceived possible causes and risk factors for WRLBP amongst nurses in Rwanda, and to identify the current intervention strategies for WRLBP received by nurses in Rwanda.

3.3 STUDY SETTING

This study was conducted in the Southern Province of Rwanda. The study setting included two rural hospitals and their related health centers in two districts, namely, Muhanga and Nyanza. Kabgayi Hospital (situated in Muhanga district, 48 km from Kigali, the capital of Rwanda) has a 400-bed capacity with 14 health centers under its supervision. Nyanza Hospital (situated in Nyanza district, 104 km from Kigali) has a 200-bed capacity and 15 health centers under its supervision. Both hospitals have several departments (outpatients, Maternity or Gynecology and obstetrics, intensive care unit (ICU), pharmacy, etc), and small units of specialty (physiotherapy, dentistry, mental health and antiretroviral therapy).

3.4 STUDY DESIGN

The research study was a descriptive quantitative cross-sectional survey to measure its main objectives. This design was chosen by the researcher because it is a suitable manner of collecting data at one point in time; and it is economical and easy to manage (Polit, Beck & Hungler, 2001).

3.5 STUDY POPULATION AND SAMPLING

The population targeted in this study was 550 nurses working in the district hospitals of Kabgayi and Nyanza, and those in health centers who are under their supervision. In order to carry out this research in the time frame, the researcher used a sample computed on the formula of

Cochran (1963). This formula was used under normal distribution at (95% CI, P= 0.5, q= 50%),
 e = error limit, no = provisional sample N = Population, nc = collected sample).

$$n_0 = \frac{z_{\alpha/2}^2 * p * q}{e^2} = 384$$

$$n_c = \frac{N * n_0}{N + n_0} = 226$$

According to the literature 45- 90% of nurses suffer from WRLBP (Kniebbe & Friele, 1996; Smedley et al., 1995), and 3 studies in Nigeria and Ethiopia reported 44.1%, 69%, 70.87% of LBP prevalence respectively (Tinubu et al., 2010; Omokhodion et al., 2000, Sikiru & Shimaila, 2009). Another study in Tanzania near Rwanda reported a high prevalence rate of 73.6% among hospital clinical nurses (Mwilia, 2008). Based on results of the present studies of sub-Saharan Africa, we assumed that at least 50% (q) of nurses in Rwanda will report WRLBP. The minimum number needed to be recruited to complete the questionnaires was calculated as 226 nurses.

3.6 SAMPLING TECHNIQUE

Convenience sampling technique has been used to collect data because the researcher was unable to access a wider population within the limited time frame. Participants were chosen according to their availability (Castillo, 2009).

3.7 SELECTION CRITERIA

3.7.1 Inclusion criteria:

All nurses who complained of intermittent low back pain (LBP) (periods of no LBP in between periods of LBP) during the previous 6 months, and who experienced LBP related to their daily work (WRLBP) up to the day of data collection, were included in the study.

3.7.2 Exclusion criteria:

Nurses with an old back problem but who did not experience LBP during the last six months (to reduce memory bias); and patients with continuous LBP without aggravating factors related to work (to exclude possible chronic pain patients for whom change in work circumstances would not affect their LBP) (Hashemi, Webster, Clancy, Barbara & Volinn, 1997).

3.8 METHODS OF DATA COLLECTION

Data collection was done using three self-administered questionnaires: The Nordic Back Pain Questionnaire (NBPQ), the Oswestry Disability Index (ODI), and an open-ended questionnaire on perceived risk factors for WRLBP.

3.8.1 The Nordic Back Pain Questionnaire (NBPQ) Appendix A

The Nordic Back Pain Questionnaire (NBPQ) (Holmstrom et al., 1991) was developed from the Standardized Nordic Back Pain Questionnaire (Kuorinka et al., 1987), and is a standardized, validated instrument developed to analyze musculoskeletal symptoms in an ergonomic or

occupational health context. The NBPQ has been tested for reliability with a high Kappa value of 0.73-0.93 (Fredricksson et al., 1998). LBP prevalence questions were taken directly from the Nordic Back Pain Questionnaire (NBPQ) (Holmstrom et al., 1991), that captured information retrospectively on lifetime, 12-month, one-month and one-week prevalence. As the research study is limited to occupational LBP during the previous 6 months, questions were adapted, asking if the patient has had low back pain during 6 months, one month, and one week.

3.8.2 The Oswestry Disability Index (ODI) Appendix A

The ODI was developed from the Oswestry Low Back Pain Questionnaire of Fairbank et al. (1980), and is used to determine the impact of LBP on the activities of daily living (Fairbank & Pynsent, 2000; Delitto, Erhard, Bowling, 1995). The questionnaire contains 10 sections describing pain and its impact. Each section is scored from 0 to 5, with higher values indicating more severe impact. High test-retest reliability was demonstrated with an Intraclass Correlation Coefficient (ICC) of 0.83 – 0.94 (Fritz & Irrgang, 2001) and ICC of 0.90 (Kopeck, Esdaile, 1995), over 4 weeks in a group of patients judged as stable. Internal consistency of the ODI was demonstrated with a Cronbach's Alpha of more than 0.7 (Fairbank & Pynsent, 2000). The construct validity of the ODI is good and the questionnaire reflects the patient's level of disability related to the level of pain, with high levels of pain having higher functional limitations (Hicks and Manal, 2009). The ODI was also shown to correlate well with the functional scales of the SF-36 and a Pearson correlation of -0.66 was calculated (Mousavi et al., 2006). The minimal clinically important difference of the ODI is 8-12 % points (Fritz & Irrgang, 2001).

3.8.3 The Open-Ended Questionnaire on Perceived Risk Factors (OQPRF) Appendix A

The OQPRF consisted of questions on perceived risk or contributing factors to LBP that were identified in the literature (Tinubu et al., 2010; Karahan et al., 2009; Van Niewenhuyse et al., 2009; Cilliers, 2007; Denis et al., 2007; Vieira et al., 2006; Eriksen et al., 2004; Yip, 2004; Mounce, 2002; Vingard, 2000; Alcouffe et al., 1999; Engels et al., 1998; Smedley et al., 2003b, 1997, 1995; Shoko et al., 1999; Burdorf & Sorock, 1997; Spencor, 1997; Buckle et al., 1987; Howard et al., 1986; Harber et al., 1985). Open-ended questions regarding physical factors (positions, tasks and other activities), psychosocial factors as well as personal or individual factors that were perceived as risk or contributing factors to LBP, were included.

The initial content validity of the questionnaire was tested in a pilot study to determine whether the risk factors in the questionnaire were relevant (Boynton & Greenhalgh, 2004; Sirard & Russel, 2000; Domholdt, 1993), by a group of clinical experts in the field of WRLBP in Rwanda. For this, the questionnaire was given to two experienced clinical nurses at Kabgayi, two general medical practitioners and one experienced physiotherapist. The physiotherapist and two general medical practitioners that have been chosen in this pilot study are responsible to assess and treat nurses suffering from low back pain. All participants (100%) agreed with the content of the questions asked in the questionnaire, and that the relevant risk factors, as described in the literature, were covered in the questionnaire.

Face and content validity was established by implementing the questionnaire in a group of WRLBP sufferers (nurses) to establish whether the questionnaire is understandable and easy to complete, and has questions applicable to their LBP. The questionnaire was given to 10 clinical

nurses, five at Kabgayi district hospital and five at Nyanza district hospital. These nurses were not been included in the main data collection of the study after the pilot study. Nine of the nurses (90%) reported that the questions were understandable and easy to complete and suggested only minor changes in the way of how the questions were set. The changes that were made: *yes* and *no* have been included in responses of questions 1, 2, 3, 4 before they give explanations of their answers. The pilot group completed all three questionnaires which took them 20 to 30 minutes. The overall questionnaire has then been found to be reliable after conducting the pilot study.

3.8.4 Translation of the questionnaires

This research study used three questionnaires to collect data. After the pilot study, all three questionnaires were translated from English to Kinyarwanda which is the national language of all Rwandese. Translation from Kinyarwanda to English was then done by independent professional translators, to ascertain that the meaning and content of the questions of the original copy have not been changed during the translation.

3.9 PROCEDURE OF DATA COLLECTION

After ethical clearance was received two research assistants were trained and data collection started. The researcher in collaboration with the hospital directors made an appointment to meet with the nurses. The questionnaires were given to all the nurses who were willing to participate in the study after having signed a consent letter. The researcher explained unclear questions where necessary. Confidentiality was explained to the nurses before completing the

questionnaire, requesting them not to include any names and personal date, as the questionnaires would all be coded chronologically as received by the researcher. They were requested to complete a questionnaire as soon as possible and return it to the researcher or to the research assistants in 4 days. The data collection started on 12th December 2010 and ended on 22nd January 2011.

3.10 DATA ANALYSIS

All the questionnaires were numerically coded, captured and analyzed, using a statistical package for social sciences (SPSS) 17.0 version software program. Descriptive statistics have been used to describe the dependent variable (WRLBP) and independent variables (socio-demographic characteristics of individuals, etc) as well as inferential statistics to determine the relationship between the variables of the study. Results of this study have been presented by means of frequencies and percentages distributions, tables and graphs (to summarize data), correlations as well as cross-tabulations, together with a chi-square test for the association between the dependent and independent variables of the study.

3.11 ETHICAL CONSIDERATIONS

Ethical clearance was firstly sought from UWC's higher degree ethical committee. Then, letters requesting consent were addressed to the Ministry of Health, and the selected institutions. Ethical clearance was received from the Research Grant Ethical Committee of the University of the Western Cape, as well as the Rwandan Research Ethical Committee (RNEC) of the Ministry of

Health. Permission was also received from both the authorities of the administrative districts and the district hospitals. At the start of data collection the reason and purpose of the study were clearly explained to the respective authorities in administrative districts and in district hospitals. Also, before they received a questionnaire, nurses who accepted to participate in the study received an informed consent to sign. Questions they had were explained. Participation in the study was anonymous and voluntary. The researcher ensured participants that they had the right to withdraw from the study at any time and that information gathered from them would be treated with confidentiality. Results of the study will be made available to the relevant authorities/institutions (Ministry of Health and administrative districts concerned) in Rwanda, including selected district hospitals (Muhanga and Nyanza).

This chapter described the methodology used in the study, explaining the research setting, the study design, the sampling techniques and the process used to collect and analyze data of the study. It also explained the ethics followed during the whole process of this research project. The following chapter presents the results of the study.

CHAPTER FOUR

RESULTS

4.1 INTRODUCTION

This chapter presents the results of the current study which aimed to determine the prevalence, perceived disability and contributing/risk factors to work-related low back pain (WRLBP) among nurses in Rwanda. It also describes the demographics of the population sample, and the data collected thanks to Nordic Back Pain Questionnaire (NBPQ), the Oswestry Disability Index (ODI) and the open-ended questionnaire on perceived risk factors for low back pain (OEQPRF).

4.2 DEMOGRAPHIC DATA

Two hundred and forty-five nurses, who satisfied the in- and exclusion criteria, completed the questionnaires. Only 226 questionnaires (92.25%) could be analyzed due to incompleteness of information. Among the 226 of nurses with WRLBP who participated in the study, 136 (60.2%) were from Kabgayi District Hospital, while (90 or 29.8%) were from Nyanza District Hospital. Most participants were qualified nurses (216 or 95.58%) and 10 (4.42%) were nursing aids. The mean number of the days since their last episode of LBP was 29.8 days, ranging from one to 180 days ago during the previous 6 months.

4.3 RESULTS OF COMPLETED NORDIC BACK PAIN QUESTIONNAIRE

4.3.1 Distribution of participants according to gender (Question 1)

The majority of participants were female nurses with WRLBP (72.1%). See Table 4.1 for a summary of the distribution per hospital.

Table 4.1: Gender distribution of participants (n=226)

Institution	Females	%	Males	%	Total	Total %
Kabgayi Hospital and health centers	95	42.03	41	18.14	136	60.2
Nyanza Hospital and health centers	68	30.09	22	9.73	90	39.8
Total	163	72.1	63	27.9	226	100

4.3.2 Distribution of nurses according to age and age-group (n=226) (Question 2)

The mean age of the whole sample was 33.50 years. The youngest nurse was 22 while the oldest was 67 years old. Table 4.2 summarizes the association between age and gender of the total sample of nurses (n=226).

Table 4.2: Age distribution of male and female participants (n=226)

		Age		
Gender		Mean age	Number	Std
		Females	33.79	163
	Males	32.73	63	7.946
Total		33.50	226	8.658

Figure 4.1 shows that the majority of nurses who participated in this study were between the ages of 15-30 years old: 102 (45.74%), followed by 99 (44.45%) nurses aged between 31-45 years. Only a few nurses (1.35%) were 60 years and older when the questionnaires were completed.

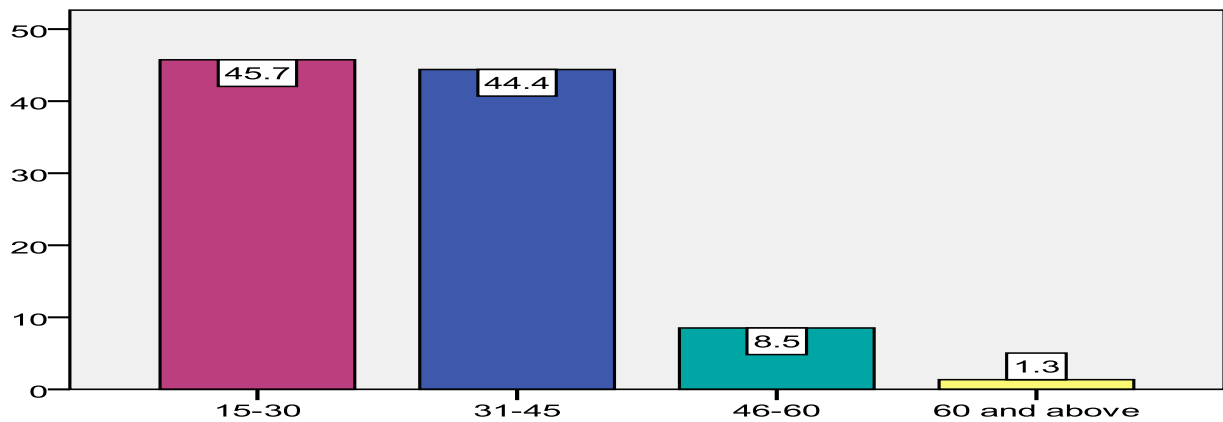


Figure 4.1: Age-group distribution of participants (n=226)

4.3.3 Distribution of nurses according to their body mass index (Question 3)

Figure 4.2 displays the groups of nurses according to their body mass index (BMI), based on the standard international classification (WHO, 2011). The majority of nurses 114 (50.7%) were overweight with BMI ranging between 25.1 and above, followed by 105 (46.7%) nurses within normal range of BMI, while only 7 (2.7%) nurses were underweight.

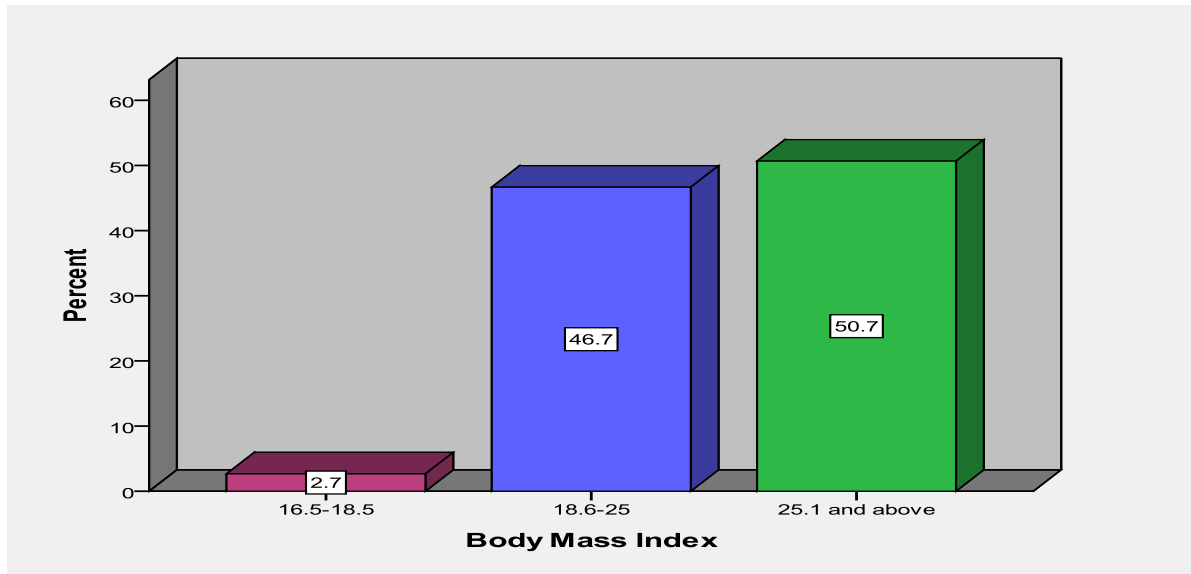


Figure 4.2: Distribution of Body Mass Index of participants (n=226)

4.3.4 Distribution of nurses according to their years of work (Question 4)

As displayed in Table 4.3 below, the majority of nurses (66 or 29.2%) have been working between 6-10 years followed by 26.5% nurses who worked between 3-6 years.

Table 4.3: Distribution of participants according to years of work by range (n=226)

Years of work of nurses	Frequency	Percentage (%)
1-6 months	12	5.3
6-12 months	6	2.7
1-3 years	33	14.6
3-6 years	60	26.5
6-10 years	66	29.2
10-20 years	30	13.3
Above 20 years	19	8.4
Total	226	100

4.3.5 Low back pain related to specific incident (n=225) (Question 6)

As can be seen in Figure 4.3, a high number of nurses who participated in this study revealed that their low back pain can be related to a specific incident or an event regarding their daily activities (208). Only 17 reported that they cannot relate their condition to a specific incident or event. One of the questionnaires lacked information about this question.

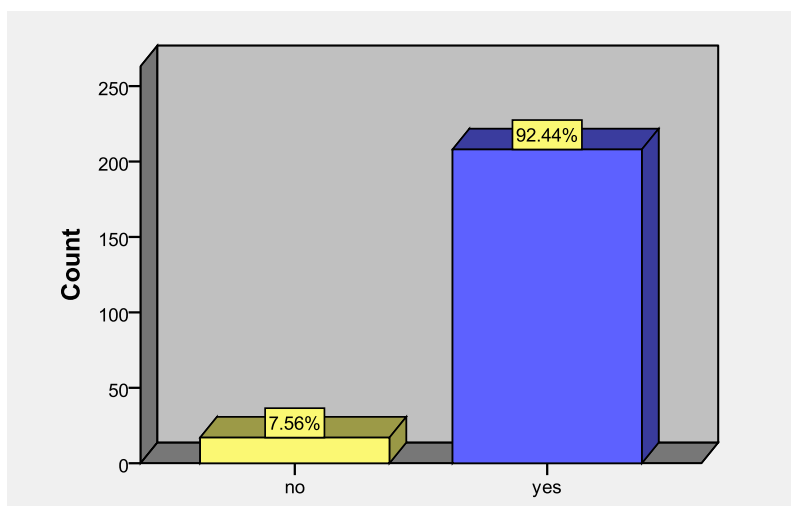


Figure 4.3: Participants relating their LBP to a specific incident

Asked to report which incidents caused or instigated their low back problems during work activities, only 111 nurses gave their different views. The biggest number of nurses among them 23 (20.72%) reported that standing for a long time during their working hours when taking care of patients was the most common factor for their LBP. This was followed by answers of ‘sitting for a similar period of time’ by 11 (9.91%), and then frequent bending forward and aside to lift patients or other objects at work, 5 nurses (4.50%).

4.3.6 Hospitalization of the nurses because of LBP (Question 7)

Most participants (217 - 96%) were never hospitalized, and 4% have been hospitalized as a result of WLBP (n=226).

4.3.7 Absence from work as a result of LBP (Question 8)

The majority of nurses (209 - 92.5 %) who participated in the study did not change their jobs or were not absent from work. Only 7.5% have been absent from work as a result of their WRLBP (n=226).

4.3.8 Days of experiencing LBP during the 6-months period (Question 9)

Figure 4.4 below shows that the majority of participants in the study (126) experienced WRLBP for 1-7 days during their last episode in the six months preceding the time of data collection. The next group was 33 participants reported 8-30 days, 57 participants showed more than 30 days of WRLBP. Only 10 nurses did not have pain for a full day during the period of questionnaire completion.

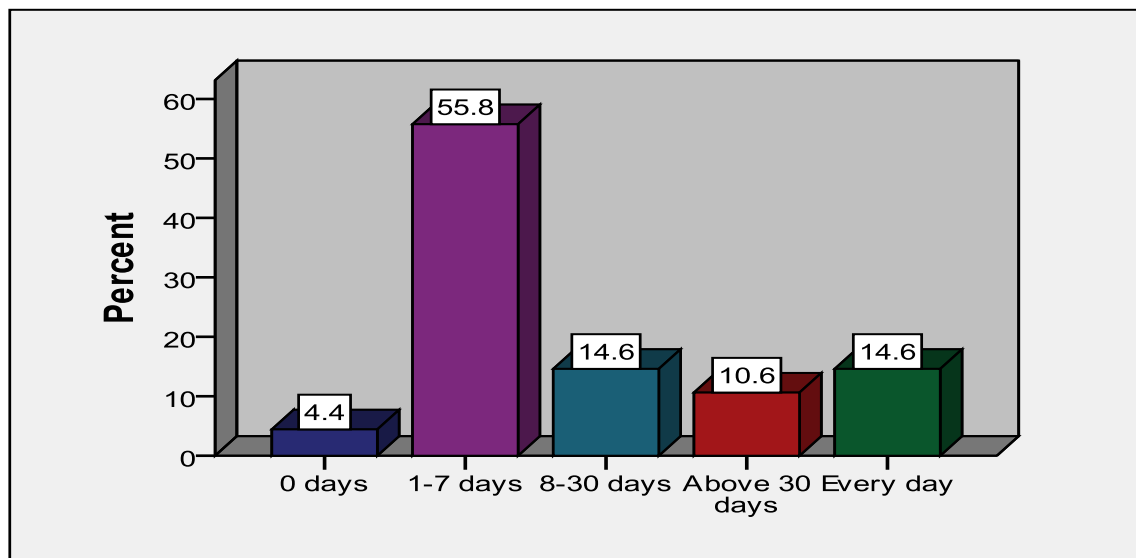


Figure 4.4: Distribution of participants according to days of LBP (n=226)

4.3.9 Impact of LBP on daily work and leisure activities (Questions 10 & 11)

Table 4.4 shows that 68.6 % of participants continued to work and did chores at home despite their LBP, while 31.4% of participants indicated that their LBP caused them to reduce their daily work activities. However, no reduction in leisure activities was reported by 61.50% of the participants.

Table 4.4: Effects of LBP on participants work and leisure activities (n=226)

Work reduction	Frequency	Percentage (%)
Yes	71	31.4
No	155	68.6
Total	226	100
Leisure activities reduction		
Yes	87	38.5
No	139	61.5
Total	226	100

Table 4.5 reflects that the majority of nurses with low back pain who contributed to the present study did not lose any day from work or home activities (ADL).

Table 4.5: Days of which nurses were unable to continue work or ADL due to LBP (n= 226)

Number of days off work	Frequency	Percentage (%)
0 days	165	73.0
1-7 days	49	21.7
8-30 days	9	4.0
More than 30 days	3	1.3
Total	226	100

4.3.10 Consultation of a medical practitioner or another health care worker (Question 12)

Table 4.6 displays that more than half of the nurses have consulted a health practitioner for their LBP.

Table 4.6: Rate of participants who consulted a health care practitioner (n=226)

Consultation with a medical health practitioner or another health worker	Frequency	Percentage (%)
Yes	145	64.2
No	81	35.8
Total	226	100

4.3.11 Prevalence of LBP in the study sample (Questions 5, 13 & 14)

Due to the inclusion criteria of this study, all participants (100%) have experienced LBP during the last 6 months preceding the time of data collection. The results of the study in Table 4.7 show that 70.4% of participants reported having suffered from LBP during the month before the data collection.

Table 4.7: One month prevalence of LBP in a sample of workers reporting WRLBP (n=226).

Institution	Yes	%	No	%	Total by institution	Total %
Kabgayi Hospital	89	39.38	47	20.79	136	60.2
Nyanza Hospital	70	30.97	20	8.85	90	39.8
S/Total %	159	70.4	67	29.6	226	100

The results also demonstrated that the confidence intervals for the mean ages (low bound and upper bound) of (30.97-34.56) have been reported among nurses who had not LBP with the mean age of 32.76 and (32.37-34.56) for nurses without LBP with the mean age of 33.81.

The results of the study in Table 4.8 below show that 54.4% of participants experienced LBP during the week before or up to the day of data collection.

Table 4.8: One week prevalence of LBP in a sample of workers reporting WRLBP (n=226)

Institution	Yes	%	No	%	Total by institution	Total %
Kabgayi Hospital	62	27.43	74	32.74	136	60.2
Nyanza Hospital	61	26.99	29	12.83	90	39.8
S/Total %	123	54.4	103	45.6	226	100

Only 115 (50.9%) of the participants reported a possible related incident to the start of their one-month or one-week LBP. The commonly identified incidents were getting up from a sitting position, bending for a long time and coming up from bending. Daily work activities such as lifting, washing, toileting patients, lifting drug boxes, drug distribution and delivery cares were also listed.

4.3.12 Treatment received and effect of treatment for LBP (Questions 15-17)

It can be seen from Table 4.9 that the majority of nurses (169) took analgesic medication rather than other treatment methods. Only 28 participants used physiotherapy as their choice of treatment while 29 made use of a mixture of the two or other treatment options.

Table 4.9: Treatment used by participants (n=226)

Type of treatment	Frequency	Percentages (%)
Medication	169	74.8
Physiotherapy	28	12.4
Other methods of treatment or mixture of treatments	29	12.8
Total	226	100

Table 4.10 shows the variety of treatments the participants received. Only 131 participants specified the treatment they obtained.

Table 4.10: Types of treatments received by participants for LBP (n=226)

Type of treatment received	Frequency	Percentage (%)
Not mentioned	95	42.0
Drugs	14	6.2
Drugs, advices	1	0.4
Drugs, sick leave, advices	3	1.3
Drugs, surgical intervention	1	0.4
Physiotherapy	25	11.1
Physiotherapy, advices	1	0.4
Self massage	11	4.9
Self treatment	40	17.7
Self treatment, sick leave	1	0.4
Sick leave	31	13.7
Sick leave without home chores added	1	0.4
Sick leave, self massage	1	0.4
Sport activities	1	0.4
TOTAL	226	100.0

Table 4.11 demonstrates that 169 (74.8%) did not report whether they used physiotherapy or not, and only a limited number of nurses who made use of physiotherapy benefited from physiotherapy services. Among those who used physiotherapy as intervention, including those who had recourse to mixture of treatments, 26.2% benefited from physiotherapy as a part of their treatment option. Massage and exercises were the most received prevalent physiotherapy treatment.

Table 4.11: Type of physiotherapy treatment option received by nurses

Type	Frequency	Percentage (%)
Stretching or strengthening exercises	17	7.5
Electrotherapy (machines)	2	0.8
Manual therapy/ mobilization	7	3
Massage	27	11.6
Education or advices	8	3.3
S/Total	57	26.2
Didn't report use of physiotherapy	169	74.8
Total	226	100

As demonstrated in Figure 4.5 below a high number of participants 142 (65.1%) stated that intervention (physiotherapy, medication and others) reduced their back problem while the remaining 34.9% reported no positive effect of their low back pain as a result of the intervention.

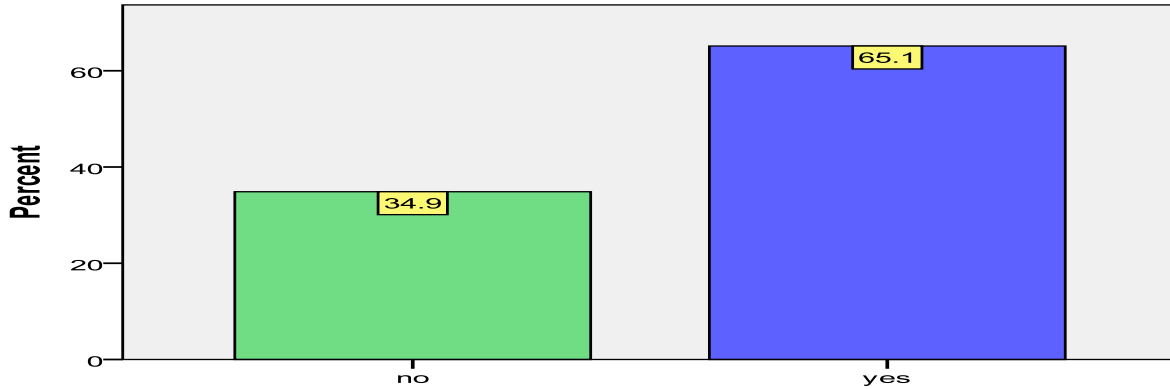


Figure 4.5: Reported benefit from WRLBP intervention outcomes

4.3.13 Comparison between age, gender and nurses who had LBP during last month of data collection

The results of this study revealed that there was a significant association between LBP and females as shown by the Pearson chi-square statistic of 7.309 associated with a p-value of .007, which is greater than .05 (level of significance). Contradictorily to the literature, the study has proved that there is no relationship between LBP and age- group ($\chi^2 = 1.813, p - value = 0.612 > 0.05$) (see Table13) through cross-tabulation study. Results also show that more females than male have had limitations in their daily activities because of LBP. According to the results, out of 87 nurses whose daily activities have been reduced 58 were females. This can be seen in Table 4.12 below.

Table 4.12: Reduction of daily activities as a result of LBP

	Gender		Total
	Female	Male	
Reduction of nurses' daily activities	58	29	87
Nurses who have undergone limitations	105	34	139
Total	163	63	226

4.3.14 Relationship between LBP and selected variables

As seen in Table 4.13, 78.4% of female and 22.6% male nurses have been suffering from LBP one month before the data collection. The results through cross tabulation test have indicated a slight significant association between these two variables ($p\text{-value} = 0.007 < 0.05$). Results also revealed that the prevalence of LBP was high (45%) among nurses of the age group between 31-45 years, followed closely by those aging between 15-30 years (44%). However, this difference in proportions did not explain the association between LBP and age-group as the reported $p\text{-value}$ was $0.612 > 0.05$.

Results have further shown that a high one month prevalence rate was observed among younger nurses who worked in a range 1-5 years (41%), followed by those who worked between 6-10 years (38%). Unfortunately, the Chi-square and $p\text{-value}$ of 1.672, 0.796 respectively indicate a lack of association between LBP and the work experience (level of significance tested at 0.05). Only 8% of those with LBP were aged between 21 and above.

Table 4.13 displays the outline of associations between BMI and LBP according to the p-value of $0.779 > 0.05$. It particularly highlights the fact that overweight and obese nurses with LBP were presenting a high percentage rate of 36.4%. The results have not indicated a significant relationship between LBP and work positions ($p = 0.199$) even though 96.5% of nurses related LBP to their working positions. Furthermore, there was also no significant association between work tasks and recent LBP ($p\text{-value} = 0.617$).

In the same way, the results did not show a significant link between psychosocial factors and recent LBP amongst nurses ($p\text{-value}: 0.342$). They also did not indicate a significant association between personal factors or non-occupational factors and LBP ($p\text{-value}: 0.809 > 0.05$). Yet, 91.1% of the nurses perceived a link between their personal factors and LBP. The analysis has also failed to prove the relationship between having an episode of LBP and lost time from work ($\chi^2(3) = 0.324, p = 0.456 > 0.05$).

Table 4.13: A summary of association between LBP and selected variables

Characteristics	LBP (%)	No LBP (%)	Chi- square statistic (p-value)
Gender (n=226)			$\chi^2(1) = 7.309, p = 0.007^*$
Males	22.6	40.3	
Females	78.4	59.7	
Total	100	100	
Age group (n=223)			$\chi^2(3) = 1.813, p = 0.612$
15-30	44	50	
31-45	45	42.4	
46-60	9	7.6	
Above 60	2	0	
Total	100	100	
Work experience (n=226)			$\chi^2(4) = 1.672, p = 0.796$
1-5 years	41	43	
6-10 years	38	34.5	
11-15 years	7.5	12	
16-20 years	5.5	4.5	
21 and above	8.0	6	
Total	100	100	
BMI (n=225)			$\chi^2(2) = 0.679, p = 0.775$
16.5-18.5	5 (2.2)	1 (0.4)	
18.6-25	72 (32.0)	33 (14.7)	
25.1 and above	82 (36.4)	32 (14.2)	
Work position			$\chi^2(1) = 1.647, p = 0.199$
Yes	155 (68.5)	63 (27.9)	
No	4 (1.8)	4 (1.8)	
Work tasks			$\chi^2(1) = 0.250, p = 0.617$
Yes	152 (67.3)	63 (27.9)	
No	7 (3.1)	4(1.8)	
Psychosocial factors			$\chi^2(1) = 0.903, p = 0.342$
Yes	110 (48.7)	42 (18.6)	
No	25 (11.1)	49 (21.7)	
Personal factors			$\chi^2(2) = 0.324, p = 0.809$
Yes	144 (63.7)	61(27.4)	
No	14 (6.2)	6 (2.7)	

Significance at 5% level, (1, 2, 3, 4) = degrees of freedom, p = p- value

4.4 RESULTS OF COMPLETED OSWESTRY DISABILITY INDEX (ODI) QUESTIONNAIRES

The first part of the ODI provides information on participants' work experience and number of days they experienced back pain.

4.4.1 Distribution of nurses according to their personal working experience

Figure 4.6 below demonstrates the working experience for all nurses who participated in the study. The majority of them, 12.39 % have worked for 3 and 6 years followed by those who worked for 5 years, then 4 years, etc. The lowest number of nurses worked for 17, 21, 37, 40, 44 years and represent a percentage of 0.4% each.

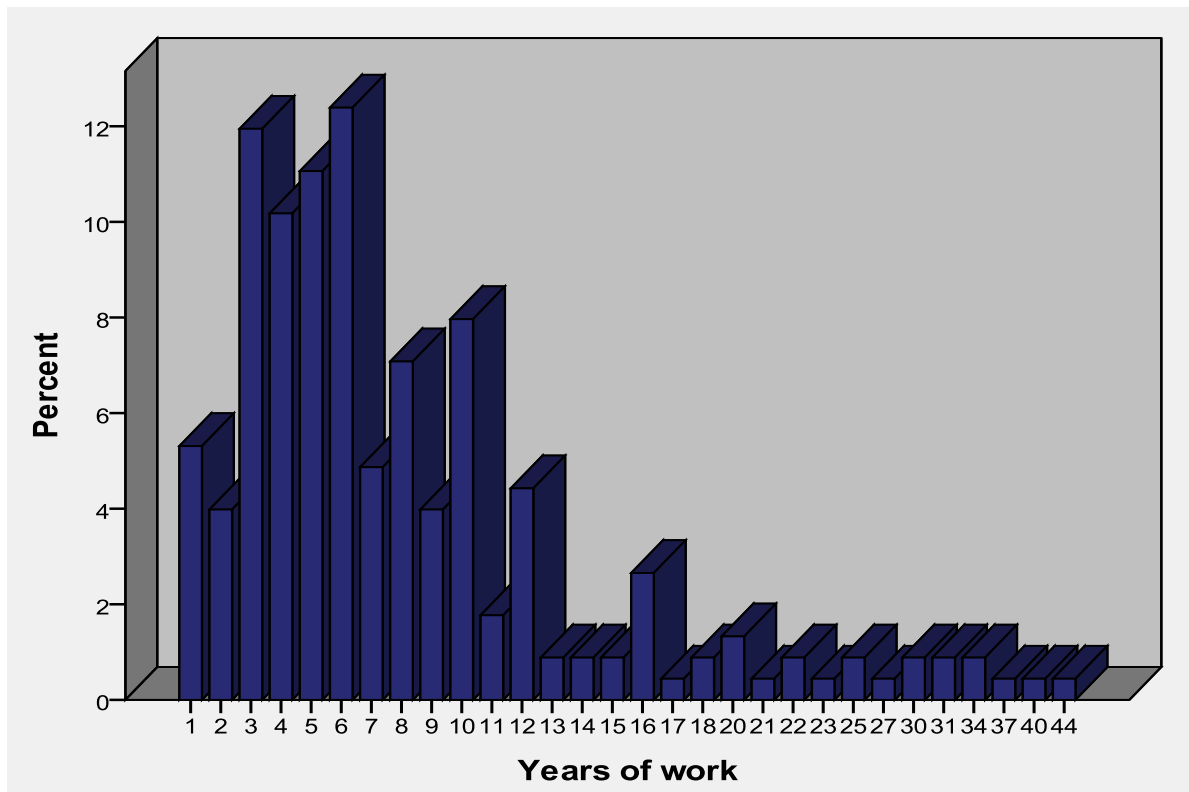


Figure 4.6: Working experience of nurses

These results have not demonstrated an association between personal working experience of the nurses and LBP during the last month of data collection ($\chi^2(29) = 26.654, p = 0.590 > 0.05$).

4.4.2 The impact of LBP in relation to time off work or sick leave

In this study, as reported in Figure 4.7, the majority of nurses have lost 5, 3 and 7 days of work during the previous 6 months with percentage of 11.1%, 10.2%, and 7.5% respectively. An important number of nurses also have lost one month, two months, three months and four months. The lowest percentage of lost time from work has been for those who have taken sick leave of one day (1.3%).

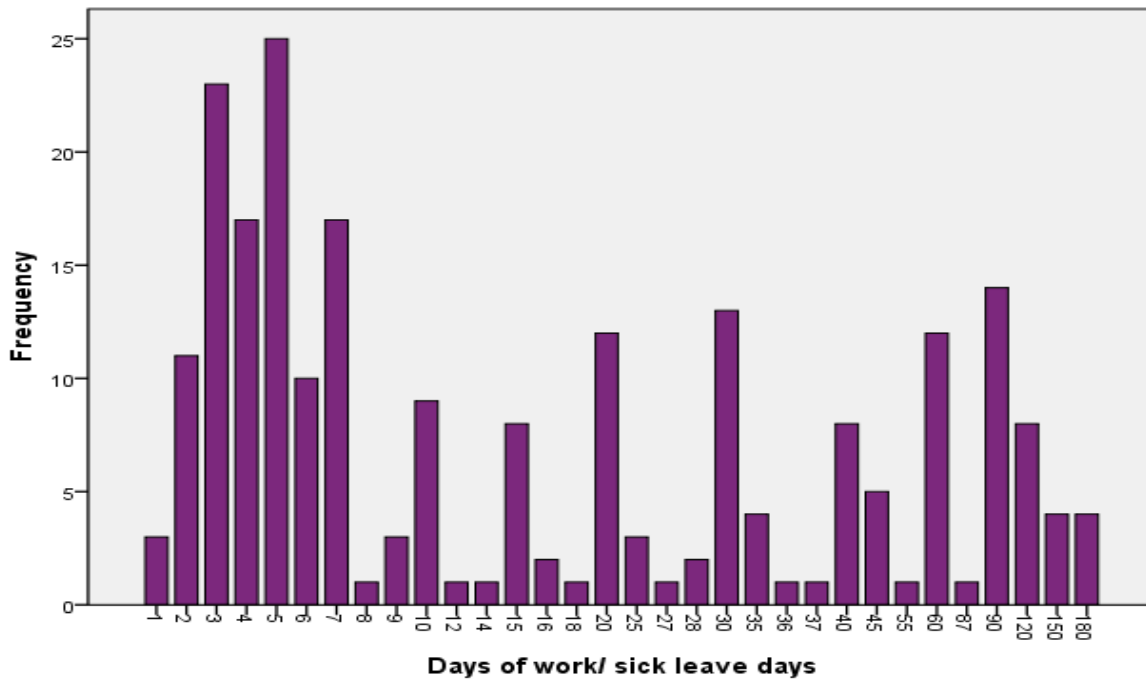


Figure 4.7: Distribution of nurses according to days off work.

4.4. 3 Functional limitations from LBP during daily life activities (ADL)

In Part 2 of the ODI, participants reported on their functional limitations as a result of their LBP. The 10 sections have 6 questions and each is counted from 0 to 5 points in order to find the degree of disability. The sum of all sections of the questionnaire is computed statistically, divided by 50 and multiplied by 100 to find the percentage of disability of the participant (0 means the least affected, while 5 means maximally affected in every section of the ODI).

Reported disability due to LBP amongst participants (nurses) has been analyzed using univariate analysis to find out the mean scores of each disability section. In addition, bivariate analysis has been used in terms of correlation in case the chi-square tests failed to prove the relationship between different variables. Five categories of disability have been distributed according to the disability percentages reported: Mild disability (0-20%), moderate disability (21-40%), severe disability (41-60%), bed-bound (61-80%) and crippled (81-100%).

4.4.1.1 Pain intensity (Section 1) (n=226)

By the univariate analysis, Table 4.14 summarizes the degrees of experience of pain in the group, and shows that the majority of nurses reported mild pain which comes and goes.

Table 4.14: Report of nurses in Section 1 of the ODI

Degree of pain	Frequency	Percentage (%) of disability
The pain is mild and comes and goes	74	32.7
The pain is mild and does not vary much	16	7.1
The pain is moderate and comes and goes	54	23.9
The pain is moderate and does not vary much	24	10.6
The pain is severe and comes and goes	46	20.4
The pain is severe and does not vary much	12	5.3
Total	226	100.0

4.4.1.2 Personal care (Section 2) (n=226)

The majority of nurses (28.0%) stated that they did not need to change the way they washed and dressed to avoid pain. 26.2% affirmed that washing and dressing increased their pain, but they could do it without changing the way they did it. A group of 24.4% of nurses reported that they needed to change the way they dressed and washed because of pain. One nurse addressed the incapacity of washing and dressing without help.

4.4.1.3 Lifting (Section 3) (n=226)

A big number of nurses (44.7%) reported that they could lift heavy weights, but it caused increased pain. 21.2% of the nurses revealed that they were able to lift only light weights, this is followed by 10.69% of nurses who could only lift heavy weights when they were conveniently

arranged, as a result of their LBP. One nurse highlighted the incapacity to lift or carry anything at all.

4.4.1.4 Walking (Section 4) (n=222)

The effect of pain on walking displayed that 39.6% of nurses have no pain when walking, and 37.8% had pain, although they could still walk their required normal distances. Two nurses (0.9%) reported that even short distances of walk are limited, and nobody revealed incapacity of walking. Four nurses did not report their level of disability in this section.

4.4.1.5 Sitting (Section 5) (n=226)

In this section the effect of sitting on their LBP was investigated. Results showed that 46.7% of nurses were minimally affected. They could sit for a while as long as they liked providing that they had a choice of seating surfaces. More than a quarter of the group (27.1%) did not have any LBP when sitting and 21.3% of the nurses reported LBP that prevents them from sitting for more than one hour. However, 3 nurses (1.3%) could not sit at all.

4.4.1.6 Standing (Section 6) (n=225)

LBP related to standing was reported by 54.7% of nurses who could stand, but with increasing pain over a time. 21.3% revealed that pain prevented them from standing for more than 1 hour. 14.7% of nurses had no pain when standing. Though, 7 (3.1%) nurses could not stand at all as the pain increased immediately. One nurse did not complete this section.

4.4.1.7 Sleeping (Section 7) (n=224)

No problems related to LBP during the night were reported by 43.3% of nurses, while 42.0% reported that pain during the night did not prevent them from sleeping well. However, 9.4% of nurses sleep three-quarters of their normal hours and 4% slept only half. LBP prevented 2 (0.9%) nurses from sleeping at all. Two nurses did not complete this section.

4.4.1.8 Employment/Homemaking (Section 8) (n=226)

The majority of nurses (65.5%) reported that their normal job activities increases pain, but they could still perform what was required of them. 6.6 % of nurses affirmed that they did not have any problem with their job or household activities. Furthermore, 22.6% could perform most of their job activities but pain prevented them from performing more physically stressful activities. However, 3 (1.3%) nurses reported that they could perform light duties despite having pain.

4.4.1.9 Social life (Section 9) (n=222)

In this study, 38.3% of nurses reported that their social life did not increase their pain. Almost the same percentage of nurses (37.8%) acknowledged that their social life increased their level of pain. However, 14% said that pain prevented them from participating in more energetic work/ activities such as sports and dancing. 4.1% experienced high disability from LBP indicating that they hardly had any social life because of pain. Four nurses did not complete this section.

4.4.1.10 Travelling (Section 10) (n=219)

Univariate analysis revealed that 36.1% of nurses stated that travelling increased their pain. 38.8% got some pain while travelling; buy another form of travel than their usual. Also, 16.9% of the group reported increased pain with travel but did not need to seek alternative forms of travel. 6.4% of these nurses sought alternative ways of travel. However, 1.4% nurses had a high percentage of disability related to LBP when travelling. Their pain prevented all forms of travel. Seven nurses did not complete this section.

4.4.2 Group Section scores of Part 2 of the ODI.

Based on the results from total scores for the sections, most nurses (65.4%) reported that LBP affected their work activities (Section 8). A high restriction of social life was also observed to be experienced by 4.1% of the nurses, followed by difficulties in standing (3.1%). They also had limitations in sitting, employment and travelling (1.3%). Lastly, 0.44% of nurses indicated that they had restrictions in walking, sleeping, personal care and lifting. Pain was reported as the most restricting factor (Figure 4.8).

In general, as displayed by the total scores of Part 2 of the ODI in Table 4.15; most nurses were experiencing mild and moderate disability respectively. Additionally, no one of the participants was classified as bed- bound after analyzing the whole ODI questionnaire part 2.

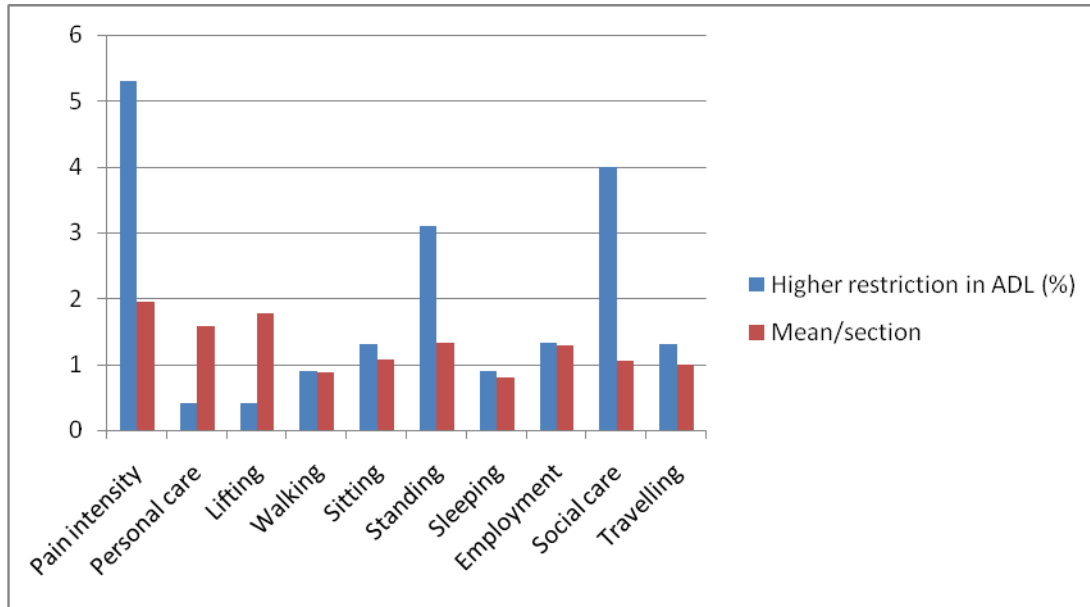


Figure 4.8: Distribution of nurses according to restriction in ADL and total mean/section

Table 4.15: Distribution of nurses according to the level of disability

Type of disability	Level of disability	Frequency	Percentage (%)
Mild/ minimal	0-20 %	100	44
Moderate	21-40%	95	42
Severe	41-60%	29	13
Crippled	60-80%	2	1
Bed-bound/ Exaggerated pain	81-100%	0	0
Total		226	100

The maximum score of the ODI is 50 (maximum disability) and the minimum score is 0. In the study sample of 226 individuals, the mean of total scores of disability reported in the ODI was observed to be 12.7030 with a standard deviation (STD) of 6.7624 (Data not showed in a table or

figure). The scores ranged from 1.11 as minimum to 34.00 as maximum scores of disability. This can be observed in Figure 4.9.

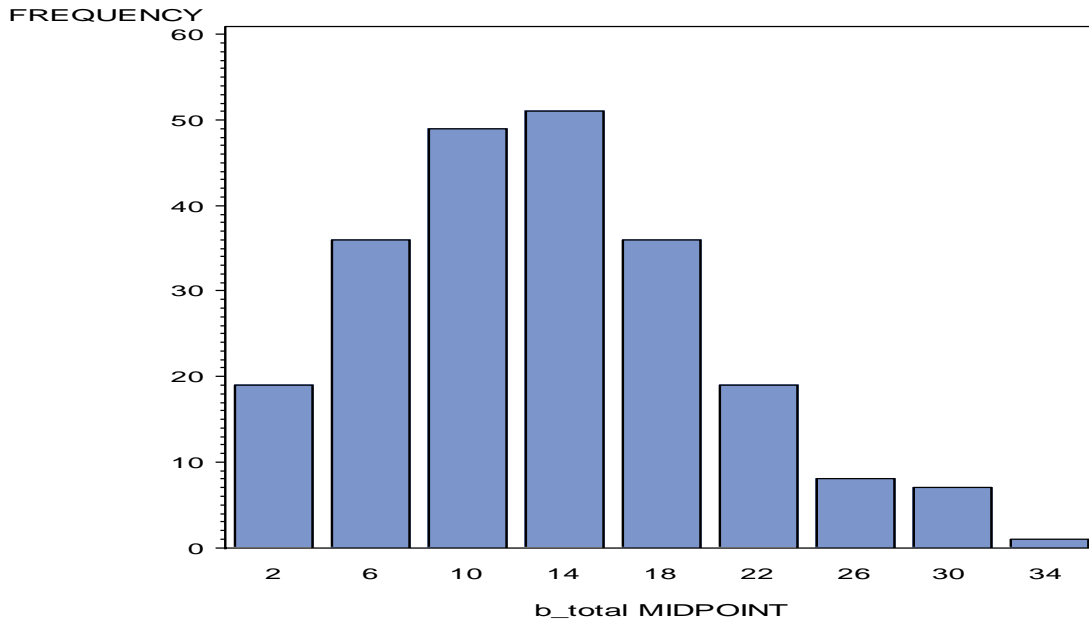


Figure 4.9: Distribution of total scores of the Oswestry Disability Index

Figure 4.9 shows that 19 nurses have midpoint disability score ranging from 0 to less than 4, 25 with a midpoint score ranging between 8 to less than 12. Forty-nine (49) nurses experience disability with a midpoint score ranging between 16 to less than 20. 53 nurses had a midpoint score ranging between 24 to less than 28 and so on. The highest midpoint disability score ranged between 64 and less than 68 presented by one individual nurse. However, the above figure shows that a large number of nurses presented moderate disability related to LBP.

4.4.3 Correlation between total disability ODI, BMI and the reported length of time of LBP (NBPQ Question 9)

The correlation between total disability score, BMI and the length of time of LBP have been calculated (See Table 16).

Table 4.16: Correlation between total disability score, BMI and reported length of time

	Total disability score	
	Correlation coefficient	p-value
BMI	0.029620	0.0001*
Length of time	0.19640	0.0030*

Significance at 0.01% level

Positive but weak Spearman correlation coefficients of 0.29620 and 0.19640 were found between nurses' total score (total disability) and BMI and the length of time respectively. These coefficients were associated with low p-values ($p = 0.0001$ and $= 0.003$) which indicate a statistical significance at 0.01% level (Table 4.16). The nurses' BMI and the length of time of LBP were also positively correlated with having recent back pain and disability.

It has also been explored whether there is a correlation between having recent LBP (last month) and total disability scores of the ODI. The results have shown that nurses who have suffered from LBP during the last month are more likely to have a higher mean and standard deviation

than those who did not (14.07, 6.66 vs 9.45, 5.85). The correlation equation is summarized in Table 4.17.

Table 4.17: Correlation between having recent LBP and related disability

Having LBP last month	Number	Mean	Std Deviation	Minimum	Maximum
No	67	9.45	5.85	2.00	34.00
Yes	159	14.07	6.66	1.11	31.00

4.5 RESULTS OF THE OPEN-ENDED QUESTIONNAIRE ON PERCEIVED CONTRIBUTING/RISK FACTORS TO LBP (OEQPRF)

Answers to open questions in the questionnaire regarding perceived contributing factors, were analyzed and then randomly presented following nurses opinions to provide reasons supporting their Yes and No responses.

4.5.1 LBP and working positions (Question 1)

The results of this questionnaire showed a high number of nurses (96.5%) with LBP attributed the work position of their bodies to be the cause of their condition and the key source of their pain (Table 4.21). Their first reason given for this association was that they often took one position for a prolonged period of time and that there was no other option as it was their daily work. Secondly, the majority of them reported that their hospitals or health centers did not provide them with appropriate equipment to help them reduce stressing positions during work activities. Thirdly, other nurses stated that shortage of nursing staff obliged them to work in these positions during the whole day. For some, pain came and increased when they were at work which meant that being at work might play a role in the development of LBP. However, the chi-square test was unable to prove such association ($\chi^2 = 1.647$, $p - value = 0.199 > 0.05$).

4.5.2 Perceived nursing ergonomic work positions and approximate time spent in these positions

Responding to the question of which positions were more likely to contribute to LBP, the majority of nurses revealed that standing for a prolonged time at work was the most important factor (12.8%). As indicated in Figure 4.10, bending and standing took the second place at 12.4%. Standing and bending was ranked in the third place on the list with 10.2%. Sitting occupied the fourth place with 8.4% followed by standing and sitting for a long time according to the report from the nurses. Thus, this has been a trend of this questionnaire by which respondents reported more than one ergonomic work position (Figure 4.10).

Figure 4.10: Nursing work positions that contribute to LBP more than others

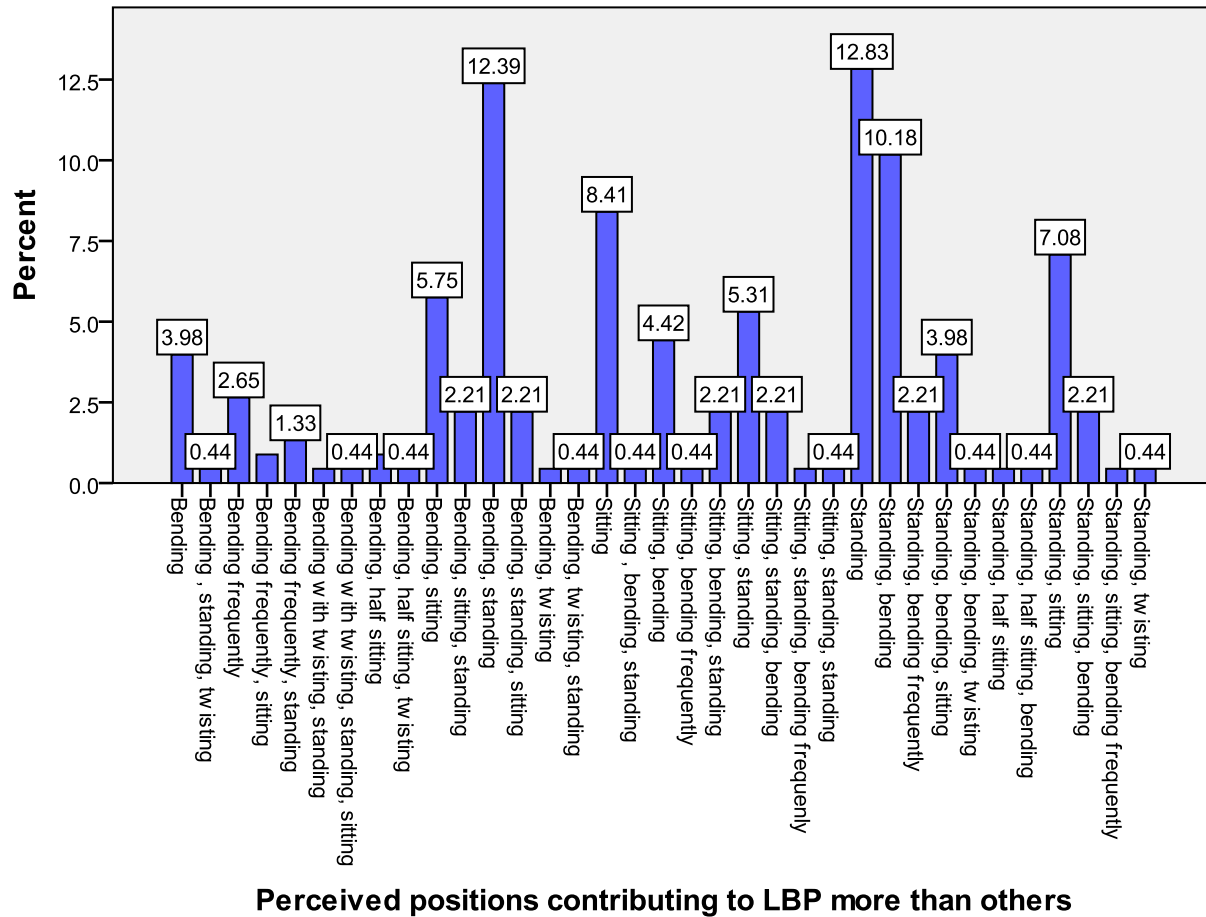


Figure 4.11 shows that the majority of nurses (49.6%) spent 5 hours or less in positions they perceived that would make them vulnerable to LBP. 49.1 % stated that they spent 6 to 10 hours in those positions. The proportion of nurses who asserted spending a long time in stressing positions was 1.3 % for 11 and 12 hours. Hence, the mean number of time spent in work positions was 5.6239 with a standard deviation (STD) of 2.3954 data not showed in a table but, calculated for the purpose of comparison with results from other studies.



Figure 4.11: Approximate time spent in work positions

4.5.3 LBP and perceived nursing Tasks (Question 2)

Of the 226 nurses who participated in the study, 215 (95.1%) agreed that their work tasks could be a factor leading to LBP, while 11 (4.9%) disagreed with a relationship between LBP and work tasks (Table 4.22). Three reasons were mentioned why work tasks contribute to LBP. The first reason given by those who agreed that LBP could be related to their work tasks was that most of their work tasks were performed in a prolonged position without short breaks and that there were no other options. The second one was that those tasks were performed without working aids or appropriate equipment to help nurses to reduce ergonomic stressors. The third reason listed, was that the number of nurses was insufficient to be able to change working positions frequently. This shortage of nursing staff caused an overload of work and often over-times working hours. Some similarities have been noticed among nursing responses about reasons for LBP related to

work positions. They also gave answers about LBP related work tasks because of the interrelationship between their work activities and postures. Although most nurses blamed their tasks to be the cause of their LBP, no significant association could be found with cross-tabulation test between LBP and nursing tasks ($\chi^2 = 0.250$, $p - value = 0.617 > 0.05$).

Nurses were asked to list common working tasks that contribute more than others to their LBP. The majority of the reported nursing tasks were physical factors, as can be seen in the random order in Table 4.18.

Table 4.18: Common nursing tasks contributing more to LBP

1.Repositioning patients in bed	7.Making injections	12.Suturing (episiotomy & scars)
2.Dressing wounds	7.Carrying heavy objects	13.Patients' veins screening
3.Lifting heavy patients and other heavy objects	8.Vaccination, drug administration	14. Surgical interventions' assistance.
4.Transferring patients	9.Anaesthesia setting	15.Delivery care
5.Bathing or washing patients	10.Vital signs taking	16.Bed making
6.Patients' consultation (curative & pre-natal consultation)	11.Drug distribution or pharmacy distribution	

The majority of nurses 123 (54.42%) reported that they spent up to 5 hours doing tasks that might put them at risk for LBP. Furthermore, 99 (43.41%) spent at least 6 to 10 hours doing these tasks. More or less 4 nurses (1.77%) spent between 11 to 15 hours on these daily tasks. The mean of all the time spent in these tasks predisposing nurses to LBP is 5.3850 with a standard

deviation (STD) of 2.6243 which ranges from one hour to 13 hours. This can be seen on figure 4.12 below. The data regarding mean time has also been produced with the aim of comparison, yet does not appear in any table.

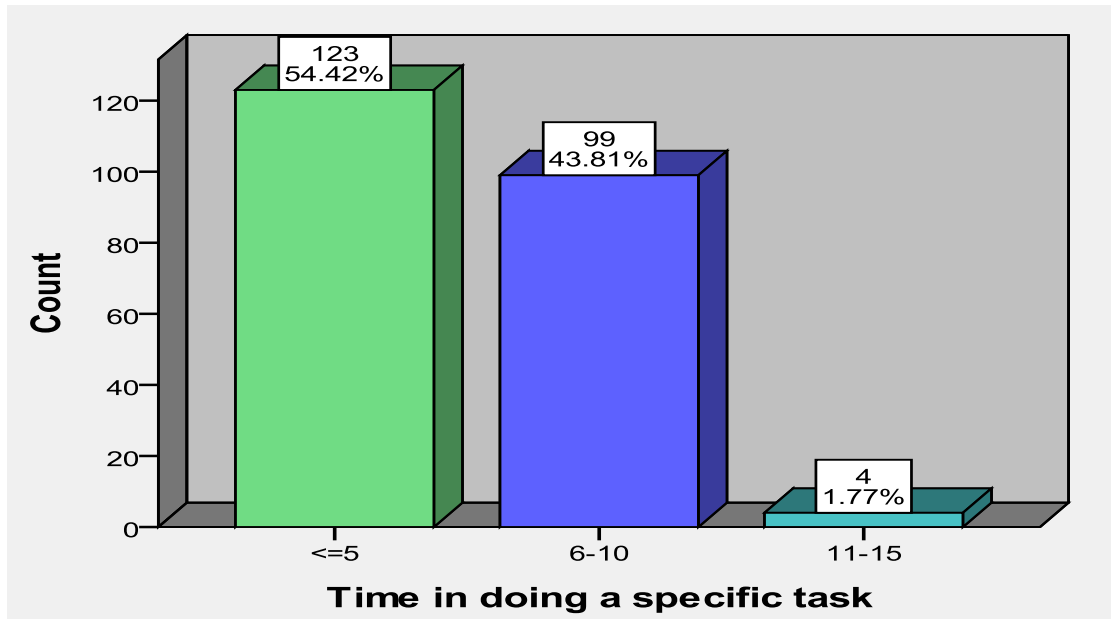


Figure 4.12: Approximate time in doing a specific task

4.5.4 Perceived psychosocial risk factors contributing to LBP (Questions 3)

Out of 226 nurses, 152 (67.3%) reported that other factors (mostly reported as psychosocial factors) might make them vulnerable to LBP (Table 22). Nurses added that these might indirectly influence them to counteract LBP. Nurses listed amongst other factors: frustration with heavy work demands, insufficient number of staff, low salaries, family problems, as well as lack of support and empathy from employers, colleagues and their family members. The listed factors are summarized in random order in Table 4.19 below.

Table 4.19: Nurses’ perceived risk factors (psychosocial) contributing to LBP

A sample of perceived psychosocial risk factors by respondents	
1.Heavy work load/work demands	9.Riding a motorcycle during field work
2.Low salary /financial problems	10.Lack of or les support from employer or family
3.Lack of working aids or supportive equipments	11.Poor work organization in work tasks
4.Extra-time work	12.Repetitive work duties without breaks or rest
5.Repetitive night shifts	13.Marital conflict
6.Having problems with relatives, family members and surroundings	14.Lack of job satisfaction or being discontented due to work related problems
7.Having long term misunderstanding with fellow nurses at work	15. Being close to the dying and people who are in pain.
8.Lack of empathy from employer and family members	16.Work pressure

4.5.5 Perceived personal or individual risk factors contributing to LBP (Question 4)

A high number of nurses (206/91.6%) considered personal/individual factors as contributing to their LBP (Table 4.22). The nurses reported on what they considered as personal or non-occupational predictors by mentioning, amongst others, the following factors: being older, bearing many children, monthly periods, pregnancy, lack of knowledge of how to protect their backs, lack of time to exercise, wearing high heel shoes, and not having transport to their job place. The perceived personal factors have been summarized in random list in Table 20.

Table 4.20: Perceived personal factors contributing to LBP

Factors		
1. Being older/aging	7. Number of children for a nurse (female nurses)	13. Females nurses
2. Being pregnant	8. Having had trauma of the back	14. Wearing of high heel shoes
3. Overweight/ obesity	9. Assuming the same frequently at work	15. Work accidents
4. Menstruation for females nurses	10. Having physical disability of one or both legs as a nurse	16. Taking excess alcohol and or other drugs
5. Having had low back pain previously	11. Lack of time for physical fitness and sport activities	17. Long distance walking to and from worksite and having additional work at home.
6. Having poor knowledge of how to protect the back during working tasks	12. Being a tall nurse	18. Having additional home tasks /chores and working hard after work.

**4.6 WHAT CAN BE DONE TO PREVENT AND REDUCE LBP AMONGST NURSES?
(Question 5)**

In order to reduce the incidence and prevalence of LBP in health care settings, a number of measures or recommendations have been suggested by nurses. A number of measures suggested to promote health are presented randomly order in the Table 4.21.

Table 4.21: Workplace intervention strategies to prevent and reduce LBP among nurses

Perceived recommendations aiming at reducing or promoting health of the nurses		
1.Increase the number of nurses and midwives	7.Offer sick leave to nurses	13.Consider sick nurses
2.Provide appropriate and modern equipments (adjustable and adaptable)	8. Facilitate sick nurses to meet doctors or consult LBP experts (chiropractor, physiotherapist)	14.Provide special tables and chairs in gynecologic and surgical department
3.Work modification	9.Increase salaries	15.Create a good relationship between nurses
4.Improve work organization	10.Provide nurses shelters near worksite	16.Create a safe work environment
5.Back care and ergonomic work training to nurses	11.Provide safe transport to nurses	17.Ward change for sick nurses
6.Ward rotation to all nurses	12.Offer more break time at work	18.Provide working aids/ assistive devices

Table 4.22: A summary of distribution of nurses demonstrating their agreement on perceived WRLBP factors

Type of work factors	Number of nurses who agreed with the contributing factors to LBP	Percentage (%)	Number of nurses who disagreed with the contributing factors to LBP	Percentage (%)
Ergonomic work positions	218	96.5	8	3.5
Ergonomic work tasks	215	95.1	11	4.9
Psychosocial factors	206	91.6	20	8.4
Individual factors/ personal factors	152	67.3	74	32.7

In this chapter the results of the three completed questionnaires were described. The next chapter discusses the results for their relevance and in comparison with pieces of research in the field.

CHAPTER FIVE

DISCUSSION

5.1 INTRODUCTION

In this chapter, the results are discussed in relation to the aim and objectives of the study as well as relevant literature reported from different studies. The primary aim of this study was to determine the perceived disability as a result of work-related low back pain (WRLBP), and the contributing factors to WRLBP amongst nurses in Rwanda. Furthermore the prevalence of WRLBP, and the current intervention strategies received by nurses were explored. The good response rate of 92.25% to administered questionnaires implies that the study was deemed necessary and could be beneficial to manage and prevent WRLBP amongst nurses in Rwanda.

5.2 PREVALENCE AND DEMOGRAPHIC CHARACTERISTICS OF WRLBP

5.2.1 Prevalence of WRLBP in the nursing population

The prevalence rate of WRLBP amongst nurses appears to be high according to the literature of various studies and ranges up to about 90% (June & Chao, 2011; Smith et al., 2004; Yip, 2004; Knibbe & Friele, 1998; Smedley et al., 1995). Results of the current study demonstrate a prevalence of 54.3% (one week prevalence) and 70.4% (one month prevalence). The prevalence found in the current study compares to the results of Ando et al. (2000) among Japanese nurses, Smith et al. (2004b) among Chinese nurses, Maul et al. (2003) in Netherlands and Mwilia (2008) in Tanzania. This is higher than the prevalence reported by Yip (2001) in Hong Kong and Tinubu et al. (2010) in Nigeria, but lower than the prevalence reported by Dundar et al. (2010) among Turkish nurses, Smith et al. (2003) in Japanese nurses, and June and Chao (2011) in ICU

South Korean nurses. As in other African studies in Tanzania (Mwilia, 2008), Nigeria (Sikiru & Shmaila, 2010), and South Africa (Cilliers, 2007) a high prevalence was reported in the current study, thus challenging the assumption that WRLBP prevalence rates amongst nurses in developing countries are lower compared to those of developed countries.

5.2.2 Gender of nurses with WRLBP

5.2.2.1 The predominance of female nurses in the profession

More female than male nurses participated in the study. According to the literature, predominantly more females from the nursing population participated in several studies. The results of this study are in agreement with those of other studies. In a study by Mwilia (2008) among clinical nurses in Tanzania, more females participated in the study (83.6%). Also, two other studies in Nigeria (Sikiru & Hanifa, 2009; Omokhodion et al., 2000) reported similar results with a more dominant number of female than male nurses participating in their studies. Likewise, Roupa and colleagues (2008) similarly noticed a high participation rate among female nurses than male (84.2% vs 15.8%). From the results of a Japanese study it was concluded that the nursing profession is gender based in nature (Smith et al., 2009).

5.2.2.2 The prevalence is higher in female than in male nursing population

Apart from the higher participation of female nurses in this research on WRLBP, there is generally a higher prevalence of WRLBP amongst female nurses. For instance, in South Africa female nurses have been found to be associated with higher risk of WRLBP among Tshwane hospital nurses (Naude, 2008). The findings from a study carried out in Nigeria and Ethiopia demonstrate that 67.5% of females and 34.5% of males experienced LBP (Sikiru & Hanifa,

2009). In addition, Omokhodion et al. (2000) in Nigeria found similar results and they noticed high prevalence rates among female nurses compared to their male counterparts. They also indicated that a higher number of female nurses claimed back injuries than males. In a study of Alamgir, Cvitkovich, Yu and Yassi (2007) comparable results have been obtained. In contrast to the results from the current study, Smedley et al. (1995) did not see any difference between prevalence rates of male and female nurses with LBP.

5.2.3 Age and working experience of nurses and WRLBP

In the current study there was no association between age and LBP as the majority of nurses with LBP were young. The mean age reported by nurses with WRLBP was 33.50 which correlates with the mean number obtained in a previous study among Japanese nurses (Smith et al., 2004). The results of the present study also demonstrate that most nurses were young and middle- aged in the age group of 15 to 41 years, while most of them had 6-10 years of working experience. This is not surprising, because it is in this age group that nurse's graduates from secondary schools and those from higher institutions in Rwanda start their occupational nursing career.

Conclusions from different studies imply that nurses are prone to low back stressors early in their career. This results on the lack of information about ergonomic stressors and awareness on how they can take care of their backs as nurses (Minematsu, 2007). Similar findings have also been reported across different countries such as the studies of Maul et al. (2003) in Netherlands and Mwilia (2008) in Tanzania. An explanation of why junior nurses are more prone to LBP than seniors is that heavy and physical demanding jobs are usually assigned to junior nurses (Maul et al., 2003). Furthermore, Tsauo et al. (1998) conclude from their study that even one year of working experience could increase the risk of developing LBP. This could be explained by the

results of studies reporting that LBP symptoms rise sharply, after students have entered nursing school and could be the result of bad practices of nursing schools (Videman et al., 2005). One can thus conclude that intervention strategies targeting WRLBP in the nursing population should start with nursing students.

Experiencing WRLBP at such a young age as notified above with a relatively short working career as a nurse may confirm the opinion that having work experience is a protective factor for LBP (Maul et al., 2003). This assumption contradicts the proposal that the risk of musculoskeletal injuries, including LBP, increases with duration (Tinubu et al., 2010), of years at work as reported by Lorusso et al. (2007) in Italy and Byrns, Reeder, Jin and Pachis (2004) in USA. June and Chao (2011) suggested that WRLBP might increase with some years of experience, adding that with 2-4 years of working experience there was a high probability of having WRLBP among nurses working in the ICU. This is also confirmed by the results of Knibbe & Friele (1996) in Netherlands and Mitchell et al. (2009) in Australia who reported that LBP increases with age of nurses. These results may suggest that senior nurses develop WRLBP because they have been exposed to ergonomic back stressors for a long time (Tinubu et al., 2010). On the other hand, Ando and colleagues (2000) proposed that being in a ward for a long time may not increase LBP but decreases the risk of developing it.

Studies on the relationship between age, working experience and WRLBP in nurses have controversial results. In this study, nurses experienced WRLBP after some years of work but the younger ones were more affected than the older nurses. However, even if the ideal of WRLBP to decrease with age has been highlighted in some studies (Dundar et al., 2010); it has also been contradicted by the results of this study.

5.2.4 BMI and WRLBP in the nursing population

Overweight and obesity are known to increase the risk of healthcare hazards, especially cardiovascular problems (Manchikanti, 2010, Burton, 2004). Other researchers have identified them as factors that cause WRLBP among nurses. In the context of this study, the majority of nurses with LBP were overweight. Vieira et al. (2006) demonstrated that being overweight or having a high rate of BMI was a significant risk factor for WRLBP among nurses. In another study, Vieira et al. (2008) found that overweight nurses were at a higher risk of developing low back injuries, and that 66% of nurses who reported WRLBP disorders were overweight. Similar increase of LBP disorders from increased BMI have been observed by Bejia et al. (2005) in their study in Tunisia and in a study of Naude (2008) in South Africa. Although BMI is viewed as the leading cause of LBP in some studies, others could not find an association between LBP and BMI (Dundar et al., 2010; Karahan et al., 2009; Lorusso et al., 2007).

5.2.5 Absence from work and WRLBP in the nursing population

Generally, it is believed that people with LBP are affected in their capacity to work, resulting in work absence and lost productivity (Ekman, Johnell & Lidgren, 2005). In the current study, almost all nurses reported that they did not reduce their work activities. They rather cut down on their leisure activities as a result of WRLBP. Few nurses with WRLBP have been hospitalized. The findings of the present study are closely related to those of other studies which indicated that most of the time nurses with LBP continue to work with some degree of pain. According to ANA (2010), a high number of nurses continue to work with work-related injuries. Some of them considered leave the profession due to job demands. Soeker (2004) stated that workers with LBP continue to work with pain because they are often afraid of being labeled as malingering on the

job. This can explain how more nurses work with pain and some don't even seek health care but rather treat themselves.

As reported by nurses in this study, shortage of nursing staff, work pressure, lack of short breaks and days off work contributed to their WRLBP. They sometimes do not even take days off work; they worry of being accused of malingering or not having commitment to their job. Even if LBP is usually the cause of absence from work place, it has been shown in this study that the relationship between sick leave and LBP was insignificant. Only 7.5 % of participants have reported to be totally absent from their work. However, about 25% of participants in the current study stated that they had lost 1-7 days off work or were unable to continue their work as a result of WRLBP. The results of the current study were corroborated by more study findings (Karahan et al., 2009; Yip, 2004; Smedley et al., 1995). Although a small number of nurses with WRLBP do not take long off work in Rwanda, the results of the study demonstrated that LBP is a matter of great concern. A need for risk assessment and measures of prevention are necessary, because of its negative impact on the nursing profession and on healthcare services in general. Some nurses have been absent from work for 1 to 4 months.

5.3 MANAGEMENT OF LBP AMONGST NURSES IN RWANDA

As displayed by the results of this cross-sectional study, more than half of the nurses reported having consulted a health practitioner for their WRLBP, while less than half of them used a self-care treatment option. Self-care treatment is referred to as taking medication and doing self-massage care treatments without any consultation guided by other health practitioners. Even if the reason for this treatment may not be clearly understood, some nurses in health care centers in Rwanda consult and treat other patients with LBP initially. These nurses believe that they can

take care of themselves. Failure to seek help from medical practitioners may also be due to the limited time to visit specialized healthcare facilities as a result of heavy workload. This tendency was also demonstrated in a study by June & Chao (2011) who reported that only 18.3% of the participants with LBP got medical treatment. Nurses are also supposed to have knowledge regarding their back injury risk factors so that they can also take responsibility for their WRLBP management and participate in their own prevention strategies when performing daily activities (Mwilia, 2008).

The other possible factor might be that these nurses may not have sufficient information or is unaware of the importance of physiotherapy in the management and prevention of back injuries (Perreault, 2008). According to Minematsu (2007), physiotherapists should play an important role in the management of WRLBP through education, advice and other treatment methods. In the current study more than a half of the participant's highlighted benefits from intervention, but also stated that they often have relapses when they had to work hard in uncomfortable conditions. However, it is commonly known that LBP relapses exist among the majority of sufferers and that may be aggravated by adverse postures during work activities (Burton, 2004). Only 34.9% in this study reported different treatment options to be unhelpful regarding their WRLBP problem.

The majority of nurses who received physiotherapy for treatment of their back problems affirmed that they have been treated with massage, stretching and strengthening exercises, education, advices and manual mobilization respectively. Other various studies have also reported the use of these treatment options in case of non-specific LBP among physiotherapists (Fidvi and May, 2010; Poitras et al., 2005; Twagirayezu, 2005; Waweru, 2005). Although from

this study massage was the most prevalent treatment given to nurses with LBP in Rwanda, Perreault (2008) in his study in Canada claimed that health education would be the most preferred treatment for physiotherapists to offer patients as a target strategy of WRLBP in terms of health promotion to date. It has to be noted that physiotherapists in Rwanda do not participate in the health promotion with regard to the matter of WRLBP management. Thus, physiotherapists have to extend their services from the medical model to a new health promotion model for the benefit of the community (Perreault, 2008; Wazakili, 2001).

Evidence of the good results of managing WRLBP by the physiotherapists is accumulating (Poitras et al., 2005; Waweru, 2005). At the moment, research results indicate that physiotherapy could be the first line of contact for patients with back pain, as they have the relevant skills to screen the red and yellow flags that negatively influence recovery or can aggravate the situation (Moffett & Mclean, 2006). More physiotherapists are presently using clinical reasoning than before, and have the ability to apply other approaches, such as bio-psychosocial educational approaches, when appropriate (Porter, 2003; Wazakili, 2001). Since chronic LBP is a complex condition and a common reason for people to seek physiotherapy services (Twagirayezu, 2005; Waweru, 2005), the physiotherapy department of a hospital often hosts a number of patients with chronic LBP. Therefore, physiotherapists should be encouraged to shift from a purely medical model of assessment and treatment that was dominating interventions in the management of chronic LBP in the past decades, towards a bio-psychosocial approach of intervention (Perreault, 2008).

Perreault (2008) is also of the opinion that physiotherapists should be more involved in health promotion and primary prevention programs through patient education and clinical health

promotion, emphasizing behavior modification, self-care and patient empowerment. This means that a person's whole-life context is taken into account, and not just the condition itself. Although physiotherapists could be leaders in LBP rehabilitation, little recognition of the role of physiotherapy by policy makers and rural communities have been highlighted (Wazakili, 2001). The latter also mentions the fact that development of physiotherapy services and their effectiveness is inhibited by policies where patients cannot consult physiotherapists directly without waiting for referral from medical doctors. Furthermore, the physiotherapy services are urban-based and not in rural communities.

In this study, a limited number of nurses consulted physiotherapy for intervention. Although the questionnaire did not contain a question regarding nurses' awareness about physiotherapy, assumptions about treatment can be made considering the number of nurses who consulted physiotherapy and others who used other types of treatment options for their back problems. However, in Rwanda, any patient who visits the physiotherapy department must always be referred by a physician who first sees LBP patients. The problem may thus lie in the referral system for physiotherapy services (Wazakili, 2001). Again, if we consider the high number of nurses who made use of self-care treatment options in this study, and a limited number of nurses with LBP who benefited from physiotherapy services, it is clear that medical practitioners and nurses in rural areas do not have sufficient information about physiotherapy. Physiotherapists may need to market their services better and supply supporting evidence for their role in preventing and treating WRLBP (Wazakili, 2001).

The overall reduction and prevention of work-related low back injuries amongst healthcare workers has been suggested by several studies to rely as well on risk assessment and improved

ergonomic work conditions (Karahana et al., 2009; Minematsu, 2007; Omokhodion et al., 2000; Smedley et al., 1997; Harber et al., 1985) and on back care training (Hignett, 1996; Garg & Owen, 1992a). This indicates that the management of WRLBP requires multidisciplinary care and rehabilitation in order to prevent and reduce WRLBP (Soeker, 2004; Porter, 2003).

5.4 PERCEIVED DISABILITY RELATED TO WRLBP

In the current study, data from the Oswestry Disability Index demonstrate that the majority of nurses suffered from mild/minimal and moderate disability related to WRLBP. Pain interfering with activities of daily living (ADL) was the reason for this disability. The mean pain disability score was high when compared to that reported in a study by Murat et al (2009). Lifting and standing were said to aggravate pain intensity of LBP, followed by sitting, employment, home-making and travelling. In addition, the significant number of nurses has highlighted different rates on limitations in their daily-life activities and social behaviors as a result of the LBP. The concerned restrictions were observed in personal care, walking, sitting, standing, sleeping, employment/ homemaking, social life as well as travelling.

Though most nurses continued to work regardless of their problem, some activities were affected due to LBP. The disability rates reported in this study were lower compared to those in the study of Denis et al. (2007) using Roland Morris Questionnaire for LBP amongst 100 nurses. The previous results are similar with those in another study on the impact of work-related neck pain amongst workers where the majority of workers had mild to moderate disability (Panwalkar, 2008). Besides, the results of the current study are comparable in a sense to the above mentioned studies on musculoskeletal disorders. In this study, almost all nurses expressed the fact that they did not reduce their work activities, but rather their leisure activities as a result of WRLBP.

Several nurses claimed that they did not have time to participate in leisure and sport activities due to a heavy workload. This may lead to continuous fatigue, weakening of muscles and later to LBP due to inactivity (Vieira, et al, 2006; Mukaruzima, 2010).

Even if the disability from back pain correlated with having higher scores ($P < 0.05$) in the study of Dawson, Steele, Hodges and Stewart (2010), the disability scores of this study were however significantly correlated with the length of time and BMI of the nurses ($r = 0.0001, 0.0030 < 0.01$). According to their study in USA, Dawson et al. (2010) claimed that disability related to back pain in nurses results in reduced productivity, work absenteeism and attrition of the nursing population globally. The nurses in this study presented higher disability scores compared to the results of Dawson et al. (2010). However, their cohort study on nursing students in Chicago, USA, using ODI questionnaire, reported the low mean scores of 8.8 as compared to the mean scores of 12.70 in this study. Consequently, Dawson et al. (2010) challenged the appropriateness of ODI measurements for back pain disability, and proposed an alternative tool which is sensitive to lower levels of disability. On the other hand, Denis et al. (2007) established a total disability score which can be compared to the results of this study, and different from that of Dawson and colleagues (2010).

Dundar et al. (2010) in their study among Turkish nurses found a higher rate of moderate disability from the ODI of 47.1% compared to 44% in the current study. They also noticed a low severe disability score of 11.8% which is close to 13% in this study. Nurses in the current study reported limitations to other activities rather than work tasks. Dundar et al. (2010) found comparable results in household chores. This may be because workers learn to live with the pain and learn how to cope with it in their daily activities (Soeker, 2004).

5.5 PERCEIVED CONTRIBUTING RISK FACTORS TO WRLBP

In the current study only half of the participating nurses have reported possible related events or incidences that could have caused their last episode of LBP. The majority of these stated events included getting up from sitting posture, frequent coming up from bending or taking one position for a long time during working hours, as aggravating factors. They also mentioned some daily work activities such as lifting, and washing patients, lifting drug boxes, drug distribution and delivery care, as main risk factors that contributed to the start of their problem. This is in line with other studies conducted on the same topic. Researchers Cilliers (2007); Vieira et al. (2006) and Smedley et al. (1997) have come up with comparable results.

Smedley and colleagues (1997) showed that lifting or moving patients without mechanical aids can predict LBP in nurses. Cilliers (2007), on his part found that the gynecologic department contained more nurses claiming back problems than others in Makwane Hospital in South Africa, because of delivery care process, that requires standing and frequent bending for a long time. Contrary, Smith et al. (2003) found the opposite in Chinese nurses and stated that gynecologic nurses were less physically challenged and less stressful than others. In addition, Vieira et al. (2006) also recognized lifting as a powerful predisposing factor of LBP amongst nurses. In their 2008 study, Vieira et al. viewed transferring and moving patients and objects as the main incidences of WRLBP in nurses. Other studies (Karahan et al., 2009; Alcouffe et al., 1999; Omokhodion & Sanya, 2003) suggested that working in a prolonged position, such as sitting and standing for a long time, as WRLBP predictors, because the positions require the worker to be in a so-called “sedentary life” or inactivity status.

In the current study the possible perceived risk factors contributing to WRLBP amongst nurses were divided into 4 categories namely: the perceived work-related risk positions factors, work related tasks factors, perceived psychosocial factors and individual/personal or non-occupational factors.

5.5.1 Work-related risk positions in nurses

Most nurses (96.5%) in this study perceived that their daily work postures play a key role in their WRLBP. Although a small number of these nurses attributed their LBP to other causes not related to work postures. However, standing headed the overall list of nursing stress work postures, followed by bended standing. Similar attributions have been reported in a study of Omokhodion and colleagues (2000) in Nigeria, and a study of Mwilia (2008) in Tanzania where standing trunk rotated or flexed were the perceived work position exposing nurses to LBP with 55.6%, 12.3% respectively. Engels, Van der Gulden, Senden and Van't Hoff (1996) on the other hand, recognized that LBP is severely related to awkward, stooping/ bending or lifting postures of the nursing work. Studies also confirmed the contribution of static work postures exceeding one hour, to be the main leading cause of LBP in nurses in Nigeria and Turkey (Tinubu et al., 2010; Karahan et al., 2009; Omokhodion et al., 2000).

The results of the present study correlate with the results of Mwilia (2008) in Tanzania that presented a similar percentage of LBP patients who attributed their problem to work postures. In addition to this, findings of an earlier study amongst nurses in China confirmed a link between standing and sitting for prolonged period of time with LBP and considered them as powerful predictors (Tsauo et al., 1998). Nevertheless, in the current study, the chi-square test has not been

able to clarify the existing relationship between LBP development and work positions ($\chi^2(1) = 1.647, p = 0.199$).

5.5.2 Work-related task factors in nurses

Various studies reported that overexertion related to lifting and moving patients are the most important position causing nurses to have low back injuries (Vieira et al., 2006; BLS, 2006; Smedley et al., 1995; Buckle, 1987). Ando et al. (2000) support this suggestion in saying that work postures such as standing and sitting postures, half sitting, frequent lifting and bending had higher rates amongst nurses with WRLBP. Frequent lifting was also a significant factor of WRLBP in a study on nurses in USA (Byrns et al., 2004). Mitchell et al. (2008) argued that frequent coming up from flexion and sustained spinal flexion positions were predictors of WRLBP in nursing students. In the current study, it was observed that the time spent in such work positions by nurses was between 5 and 10 hours per day. The results correlate with those of Karahan et al. (2009) who found that taking a static work posture for at least 1-4 hours can predict LBP to workers, but spending up to 8 hours like that can worsen the situation.

The results of a study in Tanzania on the other hand reported a low average duration spent in a nursing work position was about half-an-hour (Mwilia, 2008). Thus, the results of the present study give an implication that nurses in Rwanda would be more exposed to WRLBP than those in Tanzania. The rate of results is higher than those of Karahan et al. (2009) who found that just half of the respondents attribute their LBP to their work activities. Furthermore, about 12.5% of nurses with LBP attributed their low back condition to household tasks. Thus, apart from work tasks, also household tasks after work can aggravate or lead to LBP; that is why they could not be put aside when setting preventive strategies to handle the problem like LBP amongst nurses.

Engels et al. (1996), as well as Tsauo et al. (1998) found comparable results with more than 90% of nurses relating their back pain to their work and 70% of them reported that their problems eased off during holidays and spare times. This may indicate that their LBP was originating from tasks or activities at work.

The common work activities reported to contribute to WRLBP in this study were: repositioning patients in bed, dressing wounds, lifting heavy patients or objects, transferring patients, bathing and washing patients, patients consultation, making injections, carrying heavy objects, drug administration, vital signs taking, pharmacy distribution, anaesthesia setting, suturing episiotomy, bed making, delivery care, surgical interventions assistance and patient's blood veins taking. Previous studies indicated a similar relationship between work activities/ tasks and the development of LBP and other MSDs among nurses (Karahan et al., 2009; Smith et al., 2004; Smedley et al., 1997). In addition to the above, other researchers support transferring and ambulating patients, manual repositioning or moving patients, to be in relation with the occurrence of LBP (Tinubu et al., 2010; ANA, 2010; Vieira et al., 2008; Bejia et al., 2005).

Mwilia (2008) in her study found lifting patients and items, also pulling and pushing objects during daily work activities, as factors to LBP. She also found that bed-making, drug distribution and administration, dressing wounds and assisting in surgical interventions were significant contributing physical factors of LBP among Tanzanian clinical nurses. Likewise, lifting heavy loads during nursing hours has been found to hinder musculoskeletal complaints, while back problems are mostly caused during stooping and working in awkward postures (Engels et al., 1996). Treating an excessive number of patients has also been perceived as top job

risk factors of musculoskeletal problems and mostly LBP amongst the nursing population (Tinubu et al., 2010).

In this study, most job factors leading to LBP in nurses were related to frequent manual handling, as confirmed by various studies. According to Hignett (1996), frequent patient handling correlated with the increased LBP incidences in nurses. Ando et al. (2000) and Tsauo et al. (1998) found similar results and stated that nurses with LBP were more likely to roll and lift patients, assisting patients in ambulation, moving beds and assisting patients to bath, bed making, support patients in sitting and conduct cardiopulmonary resuscitation than others and were taken as important factors predicting LBP. Even if so, Tsauo et al. (1998) reported unavailability of a significant association between patient transfers and insertion of intravenous injections and LBP, even if they have been highlighted as the main predictors of higher rates. However, the other notion was brought up by Mitchell et al. (2008) who viewed that patient transfers are significantly associated with LBP in nursing students in Australia. Their study also added history of delivery care to be highly associated with the development of a new LBP as perceived in the current study.

In the same spirit, Dundar et al. (2010) investigated some professional tasks such as: lifting patients, transferring patients and constraining lower back movements in a workplace and found them to be strongly associated with WRLBP in nurses. They concluded that LBP was higher among nurses who worked hard without short breaks or those who have done traumatizing work. Although there was no significant association between LBP and work positions during cross-tabulation in the current study, most nurses in this study perceived that their job activities contribute much to the development of their LBP.

5.5.3 Psychosocial risk factors

In this study, the perceived low back pain (LBP) factors in nurses were collected randomly among nurses. The collected perceived psychosocial factors were: Work or job demands, low salary or financial problems, extra-time work, repetitive night shifts, having problems with relatives and surroundings, having misunderstanding with fellow nurses, lack of or less support from employer or family members, poor work organization, repetitive work duties without breaks or rest, having marital conflict, being discontent with the job, being close to people in pain and dying often and work pressure.

In response to the question why with regard to the above perceived factors; participants openly explained some reasons behind their perceptions. They reported that they are usually frustrated by the heavy work demands that they are unable to cope with due to insufficient staff. They added that with long periods of no rest, they get sick and often suffer from pain starting in the back. Some nurses reported that their salaries remain problematic, because it does not meet the daily needs of their families. Working under pressure and long hours probably contribute to their LBP. Nevertheless, socio-economic needs that are not satisfied lead to frustration and discomfort which can result in any kind of pain.

Some of them also reported that the pain started after being assigned to daily patient care (especially having overtime tasks and very often repetitive night shifts) without assistive devices or other working aids that can help to give up back stressors. In such a way, they often work to finish their tasks without considering back stressors in order to satisfy patient's needs. Nurses further said that many of them who had family problems used to complain of back pain and chronic headaches. In addition, they argued that having misunderstandings with fellow nurses at

work may also play a role in creating their feeling of pain. Other nurses, especially those in health centers reported that they felt pain may be, because of riding a motorcycle for long time during their usual field work in bad roads and paths. Lack of support and empathy from their employer, colleagues (fellow nurses), husband, wife or other family members, was also perceived as a contributing factor to their pain.

The results of this study are consistent with those of previous researchers such as Hartvigsen, Lings, Leboeuf-Yde and Bakketeig (2004). Their findings reported low job dissatisfaction, social support, poor relations with co-workers, social relations, excessive work demands and monotony and poor work organization to be the contributing factors to the occurrence of LBP among workers. Psychosocial factors are taken as a measurement, which potentially relates psychological phenomena to the social environment and to spinal pathophysiological changes. It probably leads to altered spinal loading due to increased muscle tension. This affects the nutrition of intervertebral discs, nerve roots, and other spinal tissues, increase the plasma cortisol level related to high work demands and leave muscles vulnerable to mechanical loads (Hartvigsen et al., 2004). This therefore, embraces what was perceived in the current study that too often be close to dying and people with pain is a source of work stress and depression which results in LBP. Bongers (2002) supported work stress as a psychosocial work factor of LBP among workers, as argued by Smedley et al. (1997). The authors argued that the existence of frequent low morale at the workplace contributes to WRLBP development among nurses.

Various studies investigated the relationship of direct nursing job and psychosocial factors. The presence of this relationship has been confirmed in different studies previously: Alamgir, Cvitkovich, Yu, and Yassi (2007); Smith, Mihashi, Adashi, Koga and Ishitake (2006); Bejia et

al. (2006); Smith et al. (2004); Hoogendoorn, Bongers, Ariens, Van Mechelen and Bouter (2001); Yip (2001) and Smedley et al. (1997). These studies reported that work satisfaction, low social support, either from supervisor or co-workers, influence sickness absence in nurses (Hoogendoorn et al., 2001). Also, mental pressure related to heavy work demands as a powerful psychosocial factor (Smith et al., 2006; Smith et al., 2004; Smedley et al., 1997). Another study also found low social support at work as significantly associated with the increase of WRLBP amongst registered hospital nurses in USA (Byrns et al., 2004). In addition, Alamgir et al. (2007) recognized that psychological job demands amplify the effects of physical exertion and thus increase the risk of nursing injuries. Naude (2008) and Mitchell et al. (2008) found that stress at work resulting from work environment as a psychological/social factor that can increase the risk of developing WRLBP. While Spencor (1997) in his study on work satisfaction found the same psychosocial factors as a cause to back pain, he also recommended that stress can be reduced by ensuring a decent pay package and job security which will increase the level of job satisfaction.

The majority among nurses perceived that their problem may be due to poor organization of their work tasks. Some of them have a work overload and don't have any rest or break time at all. Others reported that their back problems come from being employed for long periods in stressful wards or departments such as maternity and Intensive Care Unit (ICU). Again, these nurses further added that work accidents (a fall during working hours) can be a factor related to LBP. Caring for the dying and being near to patients in pain can also be indirect factors leading to pain felt in low back. Nurses may even fail to explain its rightful source. However, they finally believe that their job is stressful and sometimes they are disappointed in their jobs. Most of them are depressed and their life sometimes becomes detrimental. However, some believe that their

job is a calling. They make sacrifices, which can be damaging to their health that might leave no option to WRLBP prevention.

In the current study, as supported by several studies, high work stress often results from working with the dying and patients with pain. This has been identified to often occur in the nursing population and generally amongst health workers. Even though the link between stress and LBP remains unclear, literature all around the world reveals a relationship between psychosocial factors and LBP. Psychosocial factors are suggested as important related risk factor of WRLBP in the nursing profession and amongst health workers in general.

5.5.4 Individual or Non-occupational risk factors

Although LBP in nurses is believed to be an occupational problem that might logically be related to their work activities, various non-occupational factors may play an important role in magnifying their LBP. In the current study, the nurses reported several non-occupational factors they perceive to play a role in their backache. Nurses perceived that being older or aging, bearing a number of children, menstruation for female nurses, being tall and being overweight or obese, having had LBP previously, being pregnant, being unaware of how to protect the back during nursing tasks, being prone to same work posture for a long time, having disabilities of legs (asymmetry of legs) among others predict LBP to nurses. They further reported lack of time for physical fitness and sport activities, regular wearing of high heel shoes, work accidents, being a female nurse, having in addition household tasks, long distance walking from and towards the work, taking in of excess alcohol and drug use to be other predictors of WRLBP.

According to nurses, age is blamed to predict LBP among several nurses. Firstly due to many years of exposure to back stressors and secondly to degenerative changes it causes. Nurses also perceived that menstruation and pregnancy predict LBP by the fact that some female nurses' feel uncomfortable with work tasks during these periods due to physiological changes of body built therefore some of their daily routine activities are affected whether at work or in some home tasks. A study of Smith et al. (2009) among Japanese nurses supported this contribution of pregnancy and menstruation.

Nurses in this study also perceived other personal factors that may have contributed to their WRLBP. An imbalance between weight and height might play a significant role. They argued that if the nurse is taller, (s) he is supposed to take a stooped position for a long time for over low beds while dressing wounds or doing injections. They added that when it is done over a long time it can lead to LBP. They further argued that having had a LBP history can also predispose them to a recurrent pain.

They also reported that not having enough knowledge or information about back care can be a factor predicting to LBP. This may be due to not applying good body mechanics during their work tasks, as well as having some congenital or acquired malformations especially those who limbs have muscle imbalances (weakness vs strength). This muscle imbalance can also be aggravated by inactivity, resulting from lack of physical fitness and sport activities. According to nurses, even lack of short breaks and insufficient rest during working hours are blamed for causing WRLBP. Continuous fatigue, resulting in muscle weakness aggravates LBP more when added to home chores that are often done after work.

The roles of gender, age and BMI have already been discussed in the beginning of this chapter. Some have been proved to play a key role in the LBP development. Several previous studies reported a relationship between some of the demographic variables as non-occupational predictors of LBP (OSHA, 2009; Anderson, 1999). Other studies found no association between LBP and some of the demographic variables such as age, working experience in a ward (Lorusso et al., 2007), height, BMI and marital status (Tinubu et al., 2010; Dundar et al., 2010; Van Niewenhuyse, 2004; Ando et al., 2000; Tsauo et al., 1998).

A history of LBP is a strong predictive factor for recurrence of LBP (Byrns et al., 2004). In their study in USA among hospital registered nurses, about 84% of the respondents who claimed work related LBP have already had the low back injuries in the past. 36.2% have had WRLBP in the past year that interfered with their routine work activities. In the current study, also 31.4% have been limited in their work activities. This implies that having an episode of LBP in the past; can predict the similar pain in the future. However, Byrns et al. (2004) added that heavy lifting during household chores can also be considered as an individual factor and not job related.

The current results further demonstrate that having increased mean disability score as well increased BMI correlates with having recent LBP. In the study results by Smedley et al. (1997), also tall nurses have been shown to be at higher risk for LBP symptoms. Unfortunately, their study reported unclear link between age, weight, and BMI and LBP among nurses. Their study added further that, even if the direct link between age and BMI is not clear, they cannot confirm their total exclusion. According to Engels et al. (1996), age and height of the nurses and BMI are the potential risk factors of LBP and argue that as the nurse ages, (s) he is likely to develop back injuries. In support to the results of this study, the above authors add that bearing children and

duration of employment may also contribute to LBP. This is consistent with results of this study where nurses bear more children can develop LBP when exposed to job stressors for some time. Naude (2008) and Vieira et al. (2008) compared the results of this study with the lack of physical exercises which can increase the risk of having LBP. Despite the contribution played by age, no association has been found for sex to be a LBP predictor, in a cohort study among Irish hospital workers (Cunningham et al., 2006). However, these factors have been supported in a study by Bejia et al. (2005) in Tunisia where aging, female gender and increased BMI were reported as LBP predictors.

Long distance walking has been perceived as LBP predictor in this study. Tsauo et al. (1998) also reported similar findings in their study on nurses indicating that long distance walking during daily work activities was associated with the occurrence of LBP in nurses, as found by their results of multivariate logistic regression. Paradoxically, their chi-square test did not show any significant association to prove such relationship. Consequently, the fact that walking long periods of time may suggest increased work load, it has been taken as an indirect factor of LBP amongst nurses (Tsauo et al., 1998). Although the majority of nurses in this study did not report smoking, some previous studies reported that smoking may also be a predicting factor of LBP in nurses regardless the unclear patho-physiology of the results (Ommokhodion et al., 2000; Vingard, 2000). In their view, Vieira et al. (2008) asserted that alcohol consumption and smoking can predict the LBP in nurses. Cigarettes contain nicotine, which causes vasoconstriction and reduces the blood flow in intervertebral discs. They further reported that among nurses with LBP, 86% of them were smokers.

Even though the cross tabulation of results in this study failed to prove such an association (p-value: 0.809), the current study and literature from other studies marked a link between non-occupational/personal factors and LBP. Based on these, one can conclude that personal/individual factors may increase the risk of low back pain in nurses.

5.6 INTERVENTION STRATEGIES AIMED AT REDUCING WRLBP AND PROMOTING HEALTH STATUS OF NURSES

In order to promote health status of the nurses, and prevent or reduce WRLBP occurrence and other occupational health hazards amongst healthcare workers and nurses in Rwanda, some interventions strategies are needed from various stakeholders. These include sufferers (nurses), co-workers, and employers, health institutions in general, policy makers, ministries and government among others. The reported intervention strategies, suggested by the participants, have been listed as follows: increase in the number of nurses and midwives, provide appropriate, modern and adjustable equipment, work modification and work organization, back care and ergonomic training, ward rotation, sick leave or days off work, facilitate nurses to get medical care and provide short breaks and rest at work, increase the salary with allowances/ incentives, provide shelters near the worksites/workplaces and provide safe transport, create or build a good relationship at work between co-workers.

5.6.1 Increase nurses and midwives

Most nurses suffer from occupational LBP, sometimes because of the insufficient number of nurses working in a ward. Those working in a ward then have to take care of all the patients. This creates a heavy workload with no time to rest, not even short breaks or change stressing

postures as they should. In this study nurses/ midwives suggested that with an increase of staff nurses, they will benefit from the following:

- Decrease in work demands and work pressure/ stress
- Time for sport and participation in physical activities
- Short breaks during working hours
- Reduction of night shifts. Work causes stress when nurses work alone the whole night.
- Reduction of working hours
- Reduction of ergonomic work stressors and more nurse aides help during transfers and lifting.

The increase of staff nurses as intervention strategy of LBP among nurses has been supported by Vieira et al. (2006 & 2008) who stated that the shortage of nurses is one of the leading causes of work stress. This is due to the increase of work and being prone to ergonomic work positions. Nurse shortage is sometimes the cause of the non- use of assistive devices (Garg & Owen, 1992a). Inadequate staffing was also a problem. Nurses had too more night shifts which made them prone to LBP especially nurses working in the ICU in South Korea. This increased the risk of LBP among them to at least 64%. The increase of nursing staff, to decrease all shifts suggested as measures towards prevention of LBP (June & Chao, 2011).

5.6.2 Provide appropriate, modern and adjustable equipment

Many nurses who participated in the study reported that working in a healthcare setting without appropriate equipment expose them to LBP. Other occupational health disasters might also occur at an early stage of employment, because of uncomfortable postures during working hours. They also mentioned that adjustable and movable equipment such as tables, beds and chairs, can help

them in this process to reduce some ergonomic stressing postures. They would also be able to adjust for example the table or bed to the level of the nurse. They argued that no assistive devices are available to help in some hard work activities. They further suggested that the gynecologic department (maternity) needs special tables and chairs to help nurses minimize stressing positions during delivery process. Similarly, Cilliers (2007) also found that the Gynecologic department exposed more to low back injuries than any other departments.

Appropriate beds are needed in all hospitals and health centers. Wards where beds and equipment are not appropriate, nurses who work in a bending position are prone to LBP (Tinubu et al., 2010; Mounce, 2002; Smedley et al., 1995). In addition, appropriate chairs equipment aids such as hoists that will assist in lifting techniques (Smedley et al., 1995), slide sheets (OSHA, 2009), walking belts (Edlich et al., 2004). All these have been voted of paramount importance to protect nurses who are sitting during consultation and carrying or moving heavy objects. Nurses in Tanzania for instance, suggested that assistive devices can play an important role in the reduction of ergonomic stressors when made available for nurses. The availability of appropriate equipment can improve the good working environment (Mwilia, 2008). Vieira et al. (2006) also found that assistive devices for lifting and patient transfers are important. It must be made available and be increased when targeting WRLBP prevention in the workplace. In contrast, another study stated that assistive devices are not always good for transfers as the task takes longer (Daynard et al., 2001).

5.6.3 Work modification and work organization

According to the study results, nurses reported that when the work is not well organized, some of them can be victims of undefined organization and have tasks that exceed their capacity. Unorganized schedules are the main cause of work pressure and further lead to work stress. This is supported by the results of previous studies of Ando et al. (2000) and Hoffman et al. (2002) who stated that poor work modification and work organization may have a possible link with LBP in nurses due to work stress. Ando et al. (2000) added that also that work control can be a factor, while Tinubu et al. (2010); ANA (2010) and Smedley et al. (1997) proposed work modification in handling patients, to avoid stress related injuries. Thus, improved work organization and ergonomic modification may be of the solutions to assist nurses while trying to satisfy patients' needs.

5.6.4 Back care and ergonomic training

The nurses who participated in this study reported a need to receive back care education and ergonomic work training in order to reduce their vulnerability, related to LBP. According to Mwilia (2008), lack of knowledge about back care techniques can predict LBP among nurses, due to lack of knowledge about of body mechanics during daily nursing activities. In his study, the majority of nurses (62%) who reported LBP were inconsistent in applying back care techniques. This is not only because of ignorance, but also because of not being aware of how to prevent these stressors. Thus, training nurses in back care techniques for high risk work activities, ergonomic assessment (Yip, 2004; Lynch & Freund, 2000; Smedley et al., 1997; Garg & Owen, 1992b) and training in workstation adjustment (Trinkoff et al., 2003) are crucial.

In OSHA's study (2009), training is very important because it ensures employees and managers of the institution to recognize potential ergonomics issues in the workplace. It will also help understand measures available for injury reduction, and will encourage them to participate in the workplace injury changes. Charney and Hudson (2003) stated in their review, that usually nurses do not apply body mechanics in their daily work. That is why they suggested that knowledge about ergonomic work postures, in terms of education, is to be given to nurses due to its importance in reducing back stressors in occupational settings (Poitras et al., 2005). **“As prevention is better than cure”** ergonomic training is necessary to every newly employed nurse. WRLBP has been demonstrated as one of the most common musculoskeletal problems encountered in the nursing profession. Prevention should be in creating educational programmes and coping strategies aiming at reducing musculoskeletal injury rates by increasing awareness, targeting health promotion and patient care through a well designed ergonomic work intervention.

5.6.5 Ward rotation and ward change to nurses

In this study, most nurses recommended ward rotation as important in order to protect nurses in general. The reason for this recommendation has been the fact that all wards and departments do not have same stressing tasks. Having ward rotation will protect nurses from being exposed to too many stressing-related tasks and uncomfortable postures for too long time in one ward. The reason for ward change has been that some wards or departments such as Gynecology, surgical, outpatient and intensive care units have more stressing tasks and positions than others. Working in these wards for a long time can expose nurses to LBP more than those in any other departments as highlighted in some previous studies (June & Chao, 2011; Cilliers, 2007). Vieira

et al. (2006) added that nursing jobs need to be evaluated differently because the risks differ in each department. Thus, ward change for the nurse with WRLBP can be a way of reducing the stress.

5.6.6 Sick leave or days off work

Nurses who participated in the study reported that sick leave is sometimes necessary in the case of WRLBP. Though, the majority of them continue to work with high levels of disability and pain related to their daily activities. They work in positions that put stress on their back for long time which increases their degree of pain. They argued that a few days off work for them reduced their degree of pain. Getting sick leave when they are unwell, could make them feel appreciated their superiors. This could become a form of psychosocial therapy. Although the majority of nurses reported having sick leave between 1-7 days and sometimes more, being off work for 3 days and more is insufficient for recovery. According to the management guidelines of LBP the sufferer should avoid being inactive because it might delay the recovery process (Chou et al., 2007).

5.6.7 Facilitate nurses to get medical care and provide short breaks and rest at work

The majority of nurses reported having self-care as treatment option for WRLBP. For some, it is simply because of not getting permission to go for medical consultation for their problem due to heavy workload especially in health centers. For others, their superiors don't understand their degree of pain or level of vulnerability that may be caused by LBP. Others argued that physiotherapists are not available to them (nurses working in health centers) at their workplaces. Also an insufficient number of physiotherapists (one or two physiotherapists to a district hospital

in Rwanda) have to serve all sick nurses at the hospital and health center. Short breaks and time to rest for nurses at the hospital and health centers are also needed in order to reduce accumulative injuries and continuous fatigue of back muscles.

5.6.8 Increase the salary in a form of allowances/ incentives

Reports from nurses revealed that most nurses prefer the use of self-care facilities. For some, medical care is expensive and with their low salaries they can't afford treatments like physiotherapy, which is costly. Thus, the increase of salary can help nurses to pay for medical care and also benefit from other health care facilities such as hydrotherapy and other costly health interventions. Though most nurses subscribe to Rama (La Rwandaise d'Assurance Maladie) and MMI (Military Medical Insurance) these insurances cannot pay for certain preventive treatments. Thus, being unable to afford certain medical costs due to low salaries, can affect their job satisfaction, increase work stress and decrease health outcomes towards their patients (Spencor, 1997). Mwilia (2008) also reported that the increase of nurses' salary in the form of risk incentives is necessary to motivate them. Nurses often work in high risk environments and an increase in salary might make them feel appreciated. Although their job is “a calling job”, they work in a high risk environment (Mwilia, 2008).

5.6.9 Provide shelters near the worksites/workplaces and help in transport safety

Most nurses, especially those in health centers, reported that they walked or rode a motorcycle on bad paths/roads for long distances to and from their work places. For some nurses working in health centers, there are no shelters close to their work. According to them, getting shelters near their workplaces can decrease their degree of vulnerability. Walking long distance can create

continuous fatigue and added to cumulative work stressors, can increase the risk or create pain whether they already have a LBP history or not. Thus, the provision of nearby shelters as well as providing safe transport can decrease their continuous fatigue that could aggravate their pain.

5.6.10 Create or build a good relationship at the workplace and between co-workers

In the current study, poor relationship with either the family or co-workers was mentioned. Poor relationship/misunderstanding between nurses can be the first step of having many problems leading to stress, when added to heavy work tasks that nurses are prone to. This results in a stress which plays an important role in LBP development. Attempting to create good relationship between nurses or workers in general, increases team work spirit among them. That may facilitate to reduce heavy physical workload for the whole team as it promotes task sharing. This unity also creates a safe work environment since all problems are debated, discussed and solved together as a result of less back complaints than those who work individually (Lorusso et al., 2007). Several previous studies have linked good relationship in the work place to the remedial of psychological WRLBP in nurses and also to the reduction of exposure to physical workload and ergonomic stressors (Vieira et al., 2006; Hartvigsen et al., 2005; Eriksen et al., 2004).

WRLBP is a well-known occupational problem among nurses worldwide due to multifactorial origins. Whether work related, non-occupational and other indirect factors it may play a part in their daily nursing work. When targeting prevention of WRLBP in workplaces, some factors such as environmental and organizational factors, which influence the condition and increase its incidences, as highlighted by theories, should be dealt with to ensure the harmonious and motivating working environment. Other activities such as training are crucial. It will create

awareness among nurses on how to take the stress off their backs before and even during the sickness. In addition, the high increase of the prevalence rates of WRLBP amongst nurses and its preventive and management strategies might rely on good risk assessment, improved ergonomic work conditions and medical care interventions at all levels when initiated at the earliest.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter presents a summary of the study and conclusions on the results. Thereafter, some recommendations have been proposed. The chapter ends by presenting the strengths and weaknesses of this study as well as its limitations. It also indicates recommendations for further research.

6.2 SUMMARY AND CONCLUSION

There are is a lack of data regarding WRLBP amongst health care workers in Rwanda. The present study aimed at determining the prevalence of WRLBP, disability and perceived contributing factors to WRLBP amongst nurses in Rwanda. It specifically dealt with cases reported by nurses of Kabgayi and Nyanza District Hospitals, and the respective health centers under their supervision. There is a lack of data regarding WRLBP amongst health care workers in Rwanda. The study also investigated intervention strategies that are currently used in the management of the condition amongst nurses. In order to ascertain this, identification and description of injured nurse's WRLBP prevalence, resulting disability from LBP, perceived risk factors and intervention strategies used, have been gathered by questionnaires.

The study was a descriptive quantitative cross-sectional study using a self-administered questionnaire. The data collection process involved 226 nurses from Kabgayi District Hospital and Nyanza District Hospital including a total of 29 health centers under their supervision.

Questionnaires with sufficient information and fitting the study sample have been recruited and analyzed. The study revealed that a minority of the nurses consulted physiotherapy for their WRLBP; mainly due to being unaware of the role that physiotherapy could play in preventing and managing their backache. Work absenteeism, lost productivity, hospitalization and limitation in daily-life activities of the nurse with WRLBP have been highlighted. The results further showed the agreement of nurses with the development of WRLBP resulting from work positions, tasks, psychosocial and non-occupational factors in their work. The disability from WRLBP correlates with the length of time in the nursing job. The study results also demonstrated that WRLBP may not only be a personal problem but also a societal and possibly a national problem of the nursing profession in Rwanda. There is confirmation of results of other studies done worldwide.

The prevalence rates found in the current study show the extent and impact of WRLBP in the nursing population in Rwanda, given that the sample population was approximately 550 nurses. The study stated that, because of pain, a number of nurses have been seen to be limited in certain activities regarding their personal care, lifting activities, walking, standing, sitting, sleeping, employment or homemaking, social life as well as in their travelling. The study revealed also that occupational daily work tasks of nurses have a great impact in exposing them to this occupational hazard because of many different reasons. Firstly, the uncomfortable conditions of work caused by the lack of appropriate equipment that might protect them from ergonomic stressors, to make their work easy. Due to those uncomfortable working conditions with inappropriate materials/ equipment, nurses are often exposed to poor work postures. This may lead to overload and overuse of certain muscle stabilizers of the back, lower limbs and abdominals. It might result in continuous fatigue and weakness that later alone lead to back pain.

Secondly, there is insufficient staffing that leads to heavy workload/demand, therefore the nurses experience work pressure and stress. This further leads to psychological pain of the lower back as a result of being exposed to ergonomic work stressors without rest or short breaks. Lastly, some psychosocial and non-occupational factors should be emphasized as manual handling activities. However, it is important to remember their contribution in predicting LBP in the community of nurses, who always work in the dying and people with pain. Sometimes they go without resting or have time for physical activities indicated to be healthy by the World Health Organization (WHO).

We cannot forget that nurses who suffer from LBP face many problems when they are socio-economically disabled and cannot easily benefit from medical care and other health care facilities. This includes specifically those who are not compensated by health insurance companies, such as RAMA, MMI and others. In conclusion, it is believed that WRLBP is an important problem in the nursing population, impacting on their daily household chores, nursing work activities as well as other related activities.

As we know that “prevention is better than cure”, if all institutions take this as their primary responsibility, back injuries in nurses might be prevented or reduced. Thus, all institutions can minimize behaviors that result in these injuries by lessening back stressors through education of the nursing staff, instituting a well-trained lift team, modern mechanical lifting equipment, and policies and procedures that clearly mandate a new method of handling patients.

6.3 RECOMMENDATIONS

Based on the problems reported by the nurses of Rwanda, a number of recommendations towards prevention and health promotion can be drawn and possibly addressed to different institutions of concern.

6.3.1 To the Ministry of Health:

- Provision of appropriate assistive devices/equipments required. In many, if not all district hospitals and health centers, the Ministry of Health should provide appropriate assistive devices to ensure that the working condition and environment is conducive to nurses. This will reduce the back injuries. This process will also involve the ongoing training in the use of these equipments. Ergonomics trainings, by targeting back injury reduction and prevention is important, though it is impossible to prevent those injuries 100%.
- There is a need to increase the number of staff of health centers and hospitals to ensure the reduction of back exposures. In this way, the tasks will be shared and nurses will decrease low back stressors, which are often related to work pressure due to shortage of staff. In addition, it is better to help back injured nurses to get medical care and set a follow-up program to protect them against high physical workload.
- Nurses should be provided time for exercise and sport activities. To achieve this, a follow-up mechanism guided by a specialized person can be designed to make sure that the program is implemented and beneficial to everyone.
- Incentives or allowances: The Ministry of Health must consider that the monthly salaries of these nurses are not enough for them to meet the treatment requirements once they

experience the WRLBP. Therefore, provision of allowances will provide them with an opportunity to respond to the treatment of their backaches. It will also be a motivating factor that will minimize psychosocial problems and then improve nursing work satisfaction.

- **More physiotherapists needed:** Enough physiotherapists must be made available in all district hospitals. They should be given opportunities to participate in LBP health promotion programs and offer treatment when needed. Moreover, they should be provided with facilities to participate in prevention of WRLBP with ergonomic work training to the community of nurses.

6.3.2 To District Hospital Directors and Management Team

- **Setting measures of injury reduction and prevention:** District Hospitals have a big role to manage their local hospitals and health centers the best way in their area. It is their responsibility to set measures aiming at injury reduction and prevention amongst nurses of their hospitals and for their respective health centers.
- **Nursing ward rotation program:** The hospital management team should initiate a ward rotation program. It should ensure its implementation, whether in a hospital or in health centers after a conventional timeframe of a temporary ward stay. The aim is to decrease the working hours in known stressing wards. Not all wards have the same harmful conditions.
- **Setting ward change:** The ward change is necessary for nurses who already suffer from back injuries related to their work (when judged necessary and true). It is a way to seek for their protection and risk reduction.

- **Ensuring conducive working environment:** the management team and administration of the hospital should create a good and harmonious work environment, by providing the necessary social support, to prevent psychosocial work distress amongst workers.
- **Provision of appropriate and updated equipment:** Hospital directors and its management team should also try to provide appropriate equipments such as beds, hoists and updated mechanical assistive devices. It will help in preventing and minimizing back injuries in nurses of their district hospitals.
- **Ongoing training or seminars for nurses:** the management board of the hospital should increase awareness by training nurses in lifting techniques and especially back care and other ergonomic work tasks. Especially, emphasis should be put on new nurses who are starting their nursing career as they are often prone to LBP.

6.3.3 To clinical nurses

- It is their (nurses) own responsibility to take care of their health through taking preventive measures and coping strategies against their job-related injuries. They must be aware of how they can take care of their backs. They should apply given knowledge during their daily work practices in a way of prevention and back injury reduction among them.
- Working as a team must be encouraged as a way of sharing tasks (eg: transfers, lifting, etc), because the opposite can contribute to the development of back injuries. Nurses must be encouraged to benefit from the given rest time. They must participate in physical work activities when provided time and remain active in order to maintain muscle strength.

6.3.4 To family and community around the nurse

- **Collective support:** when nurses get sick, support from the family and community is considered a remedial factor. Collective support is therefore necessary to prevent psychosocial problems that often result in delay of recovery towards LBP chronic status.

6.3.5 To the physiotherapists and other medical practitioners in general

- **Provide advices and treatment:** LBP is believed to be a serious problem that can affect any person physically, as well as his mind and soul. It should be better if medical practitioners and health care providers in general, especially medical doctors and physiotherapists who receive the most LBP sufferers for treatment and management, take this into consideration and work as facilitators. They should also treat them by encouraging and advising the sufferer to stay active even if they may be sore. This can be a way to encourage them to remain strong, and prevent depression and anxiety that can worsen the problem and cause chronicity.

6.4 STRENGTHS AND WEAKNESSES OF THE STUDY

One strong point of the current study is that it has been conducted predominantly in rural areas, in health centers in Rwanda. It is most likely a reflection of all nurses in Rwanda. As the study was limited only to nurses who had LBP within 6 months before data collection, this appeared to limit a number of nurses who could participate and probably give more information. Another possible weakness is that a self-administered questionnaire is limited in gathering personal information.

6.5 AREAS OF FURTHER RESEARCH

Research studies in a similar field are necessary to the entire nursing population in Rwanda. The research should be without any exclusion criteria, regarding time and demographic characteristics, to confirm the extent of this problem amongst nurses and how to overcome it, for the well being of a Rwandan nurse. Further research is needed to investigate whether an intervention as proposed has an effect on the prevalence and perceived impact of WRLBP in a nursing population.

6.6 LIMITATIONS OF THE STUDY

The timing of the field research coincided with nurses' refresher courses which were followed by a national vaccination campaign that involved nurses in Rwanda. That reduced the availability of the research participants.

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