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Occupational Stress in an Information and Communication Technology Company in South Africa.

Moyagabo Reginald Setlhakgoe

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand in fulfilment of the requirements for the degree of Master of Medicine in Occupational Medicine

Johannesburg, November 2018

Supervisors:

Professor David Rees

Dr Spo Kgalamono

DECLARATION

I, Moyagabo Reginald Setlhakgoe, declare that this research report is my own, unaided work. It is being submitted for the Degree of Master of Medicine in Occupational Medicine at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.



06 Nov 2018

Name: M. R. Setlhakgoe Date:

DEDICATION

This work is dedicated to my beautiful and loving wife Shandukani, for being the pillar of my strength, hope and self believe, the rock which I stood firm on even during challenging climates. To my daughters Olerato and Tshegofatso, and my son Tumisho for giving me an opportunity to embark on this project, and also reaffirming my God given purpose on this world. Their presence and smiles always served as a reminder of the importance of family and therefore the need to manage factors of work-family conflict. Without your love and support, this would have not been possible.

ACKNOWLEDGEMENTS

First and foremost, Glory be to God Almighty for His Grace, without which nothing is possible, and this work would have not been possible.

To my supervisors, Professor Rees and Dr Kgalamono of the National Institute for Occupational Health and University of the Witwatersrand, thank you for affording me the opportunity and guidance to broaden my knowledge of occupational health under your guidance. Without your wisdom, guidance and patience, this would have not been possible. I would also like to extend my gratitude to Ms Sharon Kgoedi for providing me with statistical guidance on data analysis. A thank you to the Information and Communication Company including its management and employees who supported and participated in the study.

To Dr Heinrich Volmink, who allowed me to use his thesis as a guideline for my research. Thank you for the research work you conducted on occupational stress in 2014, it paved the way for this work.

To my onsite supervisor, Dr Charlme Blignaut, thank you for your encouragement and guidance.

Finally, a special thank you to the Dr Mpumi Ndaba and Dr Odette Abrahams of NIOH, Dr Andre Louw, Dr Adriaan Combrinck, Dr Shamila Fakie and Mr Anton Le Roux for the support.

ABSTRACT

Background

Occupational stress is a major concern globally as it results in significant negative economic and health effects. This study is aimed to measure the prevalence of occupational stress and identify workplace risk factors that are related to occupational stress among junior and middle management employees in an Information and Communication Technology (ICT) company in South Africa.

Methods

This was a cross-sectional descriptive and analytical study. Primary data were collected using the medium size version of the Copenhagen Psychosocial Questionnaire (COPSOQ II) between August 2016 and December 2016. The Copenhagen Psychosocial Questionnaire was used for this study because it had been validated for the South African context and also comes with reference values which can be used to interpret the study findings relative to the normative values. The intended sample size for the study was 230, stratified into men (n=154) and women (n=76).

Prevalence of occupational stress was measured for both men and women, and regression models were applied to estimate associations between exposure variables namely stress, burnout, sleeping troubles and self-rated health and outcome variables.

Results

The overall study response rate was 64.8%. The response rate for men was 52.5% and for women was 89.5%.

The study sample had a mean value of 45.29 (SD25.03) for stress, 50 (SD30.1) for burnout and 37.5 (SD32.4) for sleeping troubles. These study sample means were higher than the respective reference mean values of 26.7 (SD17.7), 34.1 (SD 18.2) and 21.3 (SD 19.0). Self-rated health had a study sample mean of 59.53 (SD 26.99), which was lower than the reference value of 66.0 (SD 20.9). These differences between the study sample's mean values for stress, burnout, sleeping troubles and self-rated health and reference means were statistically significant with p- values of < 0.001 for stress and sleeping troubles, p=0.001 for burnout, and p=0.003 for self-rated

health. There were no statistically significant differences (p >0.05) found between the mean values for stress, burnout, sleeping troubles and self-rated health for men and women. Work- family conflict was the most common significant (p<0.05) harmful risk factor for stress *(men: OR 15.06, 95% CI: 4.64 - 48.81; women: OR 6.59, 95% CI: 1.73 - 25.09)*, burnout (*men: OR 11.86, 95%CI: 3.50-40.22; women: OR 11.90, 95%CI: 2.80-50.62)*, sleeping troubles *(men OR 23.11,95%CI: 4.66-114.66)* and self-rated health *(men OR 16.00, 95%CI: 1.49-171.48; women OR 10.47, 95%CI: 2.12-51.69)* among both men and women.

Conclusion

The study sample results demonstrated a higher prevalence of occupational stress among study participants. This was reflected by higher levels of stress, burnout and sleeping troubles, and lower levels of self-rated health. These factors are regarded by COPSOQ as indicators of health and wellbeing and it can therefore be inferred that occupational stress existed amongst the study participants. There were no statistically significant differences in the prevalence of occupational stress between men and women. Family-work conflict was the main risk factor associated with occupational stress for both men and women, while the presence of interpersonal relations and leadership factors (e.g. social community at work and social support from supervisors) were found to be negatively associated with occupational stress, especially among women. Based on the response rate, the findings of this study must be generalised to the whole workforce with caution particularly for men as this stratum had a lower response rate. Further research into the factors of work-family conflict is recommended, and occupational stress interventions should be implemented to address the identified risk factors in order to manage the level of occupational stress for this study group.

Key words: occupational stress, burnout, family work conflict

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ABBREVIATIONS

ANOVA	Analysis of Variance
BPO	Business Process Outsourcing
CI	Confidence Interval
COPSOQ	Copenhagen Psychosocial Questionnaire
EU	European Union
ICT	Information and Communication Technology
ILO	International Labour Organization
IQR	Interquartile Ranges
JSE	Johannesburg Stock Exchange
MID	Minimal Important Difference
NIOH	National Institute for Occupational Health
NIOSH	National Institute of Occupational Safety and Health
OR	Odds Ratio
PTSD	Post-traumatic Stress Disorder
ROC	Receiver Operating Characteristics
SAP	Systems Applications and Products
SD	Standard Deviation
US	United States
VIF	Variance Inflation Factor
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1. Background

Employment has been described by the World Health Organization[1] as one of the social determinants of health. In other words, being employed has significant positive influences on an individual's quality of life. However, being employed has also been shown to have negative effects on the quality of life.[2-8] One of such negative effects is work-related stress. Stress was defined by Lazarus[9] as "a particular relationship between a person and the environment that is appraised by the person as taxing or exceeding his or her resource and endangering his or her well-being".

Stress in general, is associated with both physical and psychological negative health effects, and these occur when stress triggers stimulate physiological systems such as the autonomic nervous system and hormonal system resulting in negative emotions, such as anger, anxiety, irritation and depressive symptoms.[10] The stress triggers also stimulate the behavioural systems which is seen through a decline in one's productivity and interests, increased substance (e.g. alcohol and cigarette) use, absenteeism, etc.[11]

In the context of the workplace where workplace factors are the primary triggers of stress, the phenomenon is referred to as occupational stress.[2-5, 9]

Occupational stress is defined by the National Institute for Occupational Safety and Health (NIOSH)[11] as "The harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker", while the World Health Organization[12] defines work-related stress as "The response people may have when presented with work demands and pressures that are not matched to their knowledge and abilities and which challenge their ability to cope".

Some of the risk factors associated with occupational stress include tasks and roles demands, decision making latitude and autonomy, employee recognition, relationships, physical working conditions, and work schedules.[13]

Occupational stress, just as general stress, has been shown to be associated to various adverse health outcomes including cardiovascular diseases such as

hypertension, coronary artery disease and stroke, musculoskeletal diseases, immunological problems, diabetes mellitus, and mental health disorders such as anxiety, depression, insomnia and burnout.[6-8,14-18] Literature suggests that burnout occurs as a result of cumulative stress, and it presents with features of cynicism and depersonalisation, emotional exhaustion and feelings of personal underachievement.[5]

Apart from the negative health effects, occupational stress is also associated with negative financial impacts as a result of absenteeism, presenteeism and high turnover of employees, just to mention a few.[19-21]

1.2. Statement of the problem

In recent years, South Africa just like the rest of the world, has seen rapid growth in Information and Communication Technology.[22] A significant number of services related to Information and Communication Technology are being provided by the private sector through the business process outsourcing (BPO) approach.[23]

Despite the rapid growth seen within the Information and Communication Technology sector, the epidemiology of occupational stress among the information technology professionals is not well documented. The majority of the studies conducted on occupational stress in South Africa, were conducted among public sector employees and this is despite South Africa being a middle income country where more than 70% of the domestic gross product GDP is generated by the private sector.[24,25]

The rapid growth in the Information and Communication Technology sector has in recent years contributed more to domestic gross product (GDP) than many sectors including agriculture.[22] Given the rapid progression in this sector in South Africa and also the scope of work of business process outsourcing covered by the Information and Communication Technology professionals in both private and public sector, it is therefore worthwhile to study the presence and magnitude of occupational stress in this sector.

1.3. Justification

Occupational stress impacts both the employer and employees negatively[21], however there is scant research on occupational stress in the middle and low income countries globally, more specifically in the Information and Communication Technology sector

setting. South Africa is one of the many middle countries with a developing economy and a growing information and telecommunication technology sector, however little is known regarding the magnitude of occupational stress within this sector. The paucity of information regarding the magnitude of occupational stress on both health and economy extends beyond the information and telecommunication technology industry. Formal publication on economic impact of occupational stress in South Africa could not be found. However, in 2012, the economic loss related to occupational stress in South Africa was estimated to be approximately R3 billion per year.[26]

The researcher believes that research on occupational stress aimed at understanding the prevalence of occupational stress and distribution of workplace risk factors of occupational stress in this sector will provide valuable knowledge and understanding of the psychosocial health challenges facing employees, and also pave a way for occupational health interventions and research aimed at understanding the extend of both financial and health negative health effects.

CHAPTER TWO: LITERATURE REVIEW

2.1. Literature review overview

This chapter seeks to provide information on the epidemiology of occupational stress and its associated risk factors. The role of demographic variables that could influence the prevalence of occupational stress was also reviewed. The extent of occupational stress both globally and locally was explored, with a focus on the Information and Communication Technology sector. The chapter also looked at available tools that could be used to measure the prevalence of occupational stress and its determinants.

2.2. Extent of occupational stress

General

The need to address health effects associated with occupational stress as well as work related health conditions were classified by the World Health Organization in the mid-90s as some of its priorities.[27] This was based on research conducted among workers in industrialized counties where about 50% of workers regarded their work to be "mentally heavy".[27] Studies conducted in various regions of the developed world including Europe and US found that the prevalence of occupational stress among employees was more than 20%[11, 28] In 2005, the European Agency for Safety and Health at Work[28] found that the prevalence of occupational stress was about 22% among all European Union Member States workers, while the data reported by the National Institute for Occupational Safety and Health[11,] showed that 26-40% of workers in the US reported their jobs as either very or extremely stressful, or that they often felt stressed by their jobs or while at work.

Information Technology

Worldwide, studies into the magnitude of occupational stress and its determinates among the Information and Communication Technology sector have been conducted.[29-32] In recent years, India among other countries conducted a number of studies on occupational stress in the Information and Communication Technology sector and found a high prevalence of stress ranging between 44% and 85%.[31,32]

Local: South Africa

In South Africa, research on occupational stress among Information and Communication Technology professionals could not be found. However literature,

even though scanty, was found on other professionals including police, academics, healthcare professionals, emergency personnel and banking personnel.[24] Volmink [24] in 2014 conducted a review of the research done in South Africa and found that South Africa did not have nationally representative epidemiological data for occupational stress, and therefore recommended that further research be conducted on occupational stress among other occupations.

2.3. Risk Factors

Risk factors associated with occupational stress include:

a) Work environment: this refers to the standard of the working environment such as lighting, furniture, restrooms and physical hazards such as exposure to extreme temperatures, noise etc.[33]

b) Job characteristics: these include work load; working hours; and complexity of tasks.[33] Studies show that high job strain and job demand are associated with early retirement[34, 35]

c) Organisational role(s): this includes lack of role clarity and levels of control. Studies conducted among nurse educators looking at workplace empowerment, burnout, and job satisfaction found that those with higher level of empowerment at work had lower levels of burnout and greater work satisfaction.[36]

d) Organisational relationships: studies looking at the relationship between line managers and employees found that management style, such as an autocratic style, is associated with high employee turnover, low morale and high absenteeism.[37,38]

e) Career development: employees with poor promotion and career development prospects were found to have a higher risk of poor self-rated health and high levels of feeling stressed.[39]

f) Home-work interactions: this denotes the factors such as being absent from home due to work demands, taking work-related tasks into the home environment resulting in intrusiveness into family time, leisure activities and one's inability to psychologically detach from work tasks.[40-43] Work–life conflict has also been shown to be significantly and strongly associated with both physical and psychological health outcomes.[43]

A systematic review conducted by Nieuwenhuijsen[2] found strong evidence between the occurrences of stress-related disorders and high job demands, low job control, low co-worker support, low supervisor support, low procedural justice, low relational justice and a high effort–reward imbalance.

The risk of occupational stress has also been shown to be associated with demographic factors such as sex and age.[2,44,45] Research conducted by the European Agency for Safety and Health at Work[28], found that the prevalence of occupational stress is higher among males than females. These findings were supported by the findings of the study conducted by Galanakis.[45]

However, studies conducted by Hämmig[43] found no significant difference in the level of occupational stress between males and females, while study conducted by Nilsen[46] found that the differences in the level of occupational stress between men and women was influenced by different workplace risk factors.

According to de Smet[47] men experience lower prevalence of job strain than women, while women are more likely to experience lower prevalence of job control than men. A systematic review conducted by Gyllensten[48] in 2005 has however found the role of sex in occupational stress to be inconsistent because of differences in the risk factors of occupational stress between men and women.

The role of age on one's perception and management of stress has also been considered. In 2010 and 2012, studies conducted by Darmordy[49] among primary school teachers in Ireland and Bolhari[50] among information technology professionals in Iran respectively found higher levels of stress among employees above the age of forty.

2.4. Assessment of psychosocial work environment factors

Many different data collection tools used to measure workplace psychosocial risk factors have been validated worldwide[51]. One of these tools which has been shown to provide a broad range of psychosocial work risk factors is the Copenhagen Psychosocial Questionnaire (COPSOQ).[52] The COPSOQ questionnaire has been demonstrated to cover various proven theories including the job characteristics model, Michigan organizational stress model, effort-reward - imbalance model, demand-control-(support) model, action-theoretical approach and sociotechnical approach.

Furthermore, most of the questions used in the development of the questionnaire were obtained from existing and validated questionnaires.[24, 52-56]

The (COPSOQ) questionnaire assesses four outcome variables namely stress, burnout, sleep troubles and self-rated health, which are referred to as aspects of health and wellbeing and therefore indicators of occupational stress.[24,52-56] Figure 2.1 below provides classification of risk factors of the COPSOQ questionnaire.[52-56] The outcome variable, stress, represents the manifestation of strain on worker's resources and /or capacities as a result of environmental demands.[57]

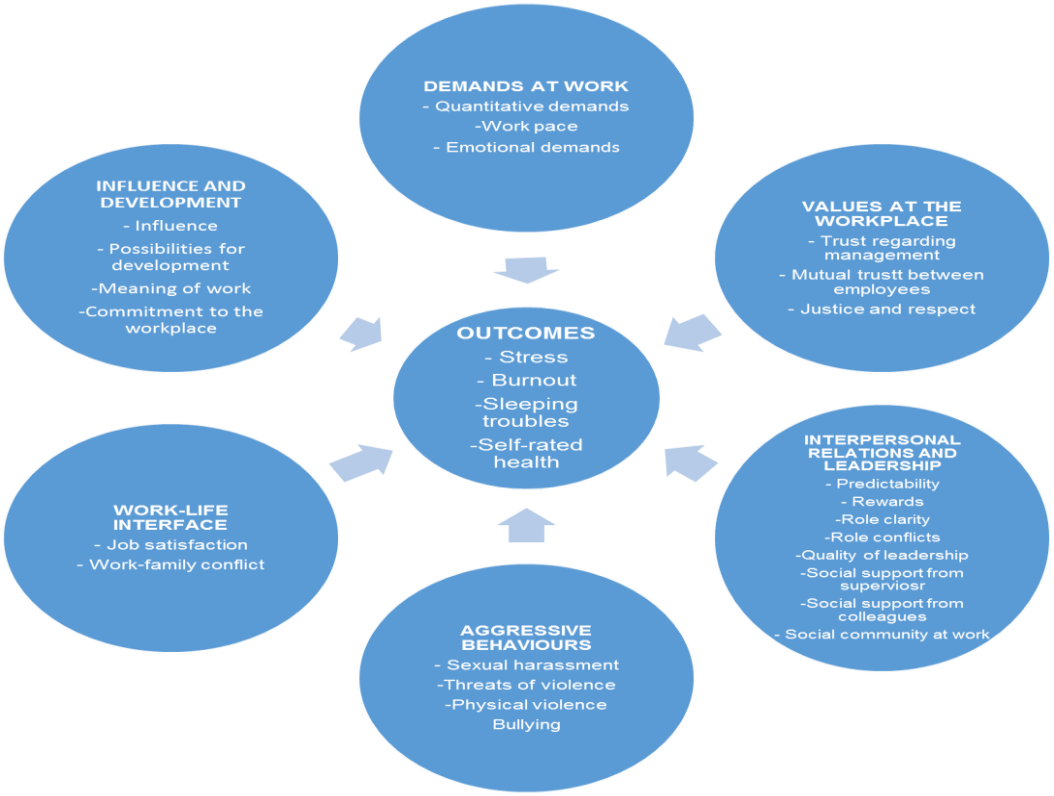


Figure 2.1: Classification of various risk factors of the COPSOQ questionnaire

The questionnaire is available in three sizes namely short, medium and long, which are each developed for various purposes.[52-56, 58-61] The questionnaire has also been translated into many languages, used in many countries and various occupational sectors.[52-56, 58-61]

The medium size of the COPSOQ II questionnaire was validated by Volmink[24] in 2014 for the South African context.

2.5. Outcomes

Given the known health effects of stress, the outcomes can vary from strain to severe depression.[10,11] The COPSOQ questionnaire, however, measures stress, burnout, sleep troubles and self-rated health as four outcomes which indicate health and wellbeing and are therefore indicators of occupational stress.[24,53-56,58] Various studies have shown significant correlation between the four outcomes of the COPSOQ questionnaire.[62-70] Stress has been found to be positively correlated with burnout and sleeping troubles but negatively correlated with self-rated health.[63-66] Employees with higher levels of burnout and sleeping troubles were also found to have lower self-rated health.[62-70]

2.6. Managing occupational stress

A large body of literature exists on interventions to reduce occupational stress and its negative effects. This literature is not reviewed, rather examples are given to demonstrate the effectiveness of some of the interventions. Various institutes have designed guidelines on how to manage occupational stress.[9,20,70,71] In 2009, Lohela[72] conducted a study looking at psychosocial factors at work that promote positive changes in employee health and found that improving leadership and social climate at work increases the chance of positive changes in health. Based on this finding it was concluded that it is possible to improve employees 'health and wellbeing by improving psychosocial factors at work. A systematic review conducted by Wagner[73] also found moderate evidence which suggests that positive work outcomes occur when social support interventions are available in the workplace. However, there was limited evidence supporting positive effects related to supervisory quality interventions.

2.7. Hypothesis

The prevalence of occupational stress within an Information and Communication Technology workforce is similar to that found within other South African workforces.

2.8. Study Aim

The aim of this study was to determine the magnitude of occupational stress in an Information and Communication Technology company in South Africa.

2.9. Study Objectives

1. To measure the prevalence of occupational stress among junior and middle managers in an Information and Communication Technology company in South Africa.

2. To identify the workplace risk factors for occupational stress among junior and middle managers in an Information and Communication Technology company in South Africa.

3. To measure the difference in the prevalence and determinants of occupational stress between men and women in an Information and Communication Technology company in South Africa.

CHAPTER THREE: METHODS

3.1. Study design and setting

This was a cross-sectional descriptive and analytical study conducted at one of the Information and Communication Technology in South Africa. The company had its head office in the Gauteng Province, South Africa, and was also listed on the Johannesburg Stock Exchange (JSE). At the time of the study, the company had about 12 000 employees with a national footprint in South Africa. It provided diverse service offerings to both the private and public sectors.

3.2. Study population

The study population included employees characterized by the company as junior and middle managers. The company's department of interest was involved in business process outsourcing of Systems Applications and Products (SAP) products to both private and public sectors. The SAP employees were categorised into four main groups namely senior, middle, junior and semi-skilled, based on their level of roles and responsibilities. Figure 3.1 below provides an overview of the structure of the company's department.

At the time of the study, the SAP department had 622 employees in total, of whom 617 were based in South Africa. There were 415 men and 207 women.

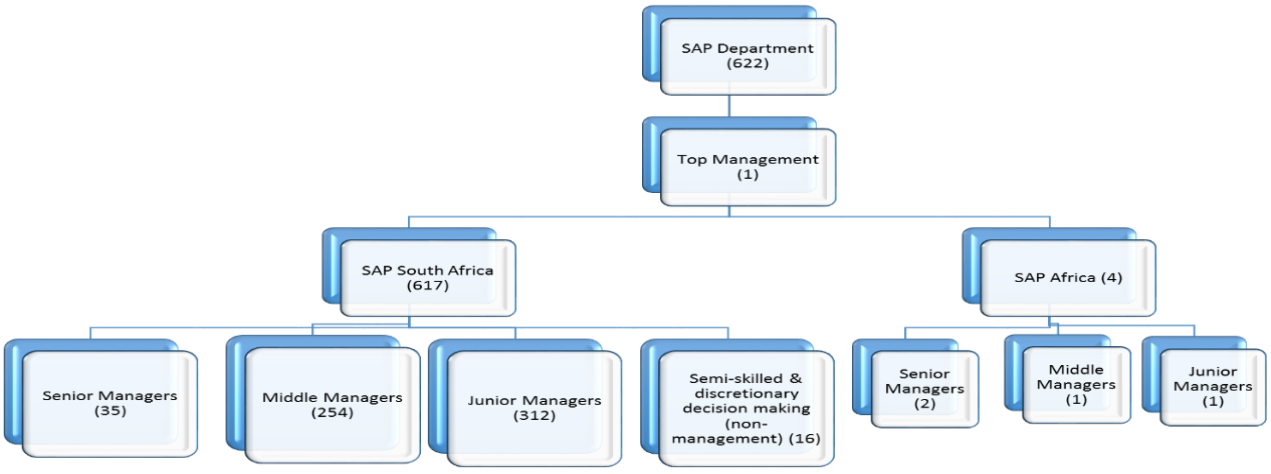


Figure 3.1: Department staff establishment and structure

Junior and middle managers accounted for 91.7 %(566/617) of the department with men to women ratio of 2.1:1 The other levels of staff, namely senior managers, top managers and semiskilled employees were excluded from the study because their number of employees were too small to be analysed and combining these groups with junior and middle managers would have been inappropriate as staff levels were a potential determinant of occupational stress.[24]Furthermore, stratification of the population according to job category (junior vs middle management) was not considered because the sample size was too smal1 and non-senior (junior and middle) managers had similar education and job responsibilities.

Based on the company's descriptions, junior managers were skilled employees who were technically and academically qualified supervisors/foremen/superintendents, while middle managers were professionally qualified and experienced specialists. These employees had at a minimum of a tertiary level qualification, were computer literate and had daily access to emails.

The selected study population was based in various provinces across South Africa, and also served various industries in both the private and public sectors.

For this study, only junior and middle managers who had been in employment for at least 3 months, regardless of their contractual agreement, were included.

The permission to conduct the study was obtained from the company (Appendix 2).

3.3. Study period

Data collection commenced in August 2016 and concluded in December 2016.

3.4. Sampling approach

A sampling frame containing all 566 junior and middle managers with their demographics and contact details was obtained from the company's Human Resources Manager. The population was stratified into men and women.

A sample size was calculated using the Sample Size Calculator of Creative Research Systems survey software[73] and proportionate stratification was calculated to ensure that the number of units per stratum is proportionate to the number of men and women in the population. A simple random sampling was carried out per stratum using Microsoft. Excel (Figure 3.2.).

Stratification of the study population into men and women was in line with object 3, which is aimed at determining differences in the prevalence and risk factors of occupational stress between men and women.

3.5. Sample size calculation.

In order to calculate prevalence, a sample size of 230 (men: 154; women: 76) was required (Figure 3.2.). This was calculated using the Sample Size Calculator of Creative Research Systems survey software[72] based on a population size of 566, 5% margin of error (at 95% confidence level) and statistical power of 0.80.

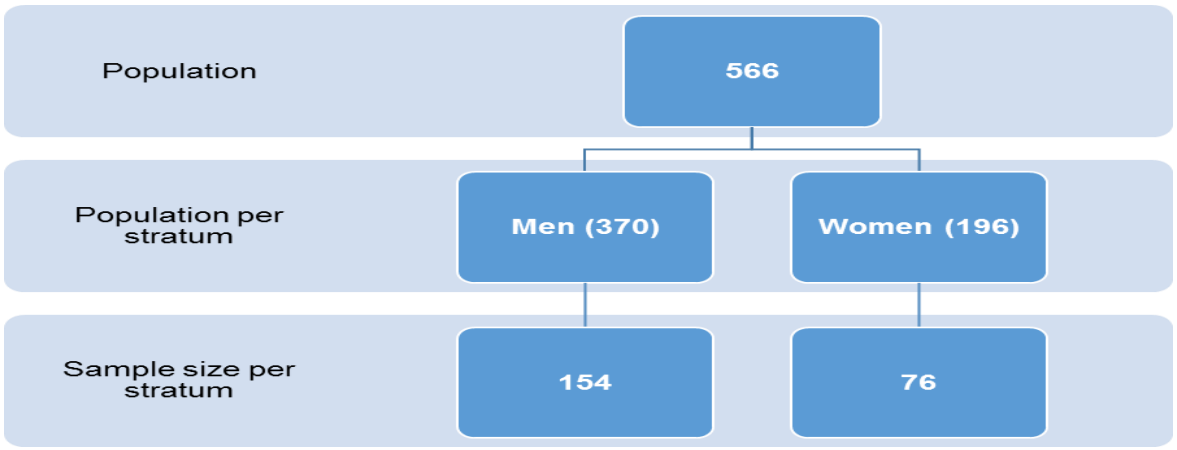


Figure 3.2: Population stratification and sampling

3.6. Data collection

Data were collected using the medium size version of the COSPOQ II questionnaire[75] (Appendix 1). The questionnaire was presented in English and self-administered. It was distributed to the selected participants via a web link as all employees were computer literate and had daily access to emails. Other modes of distribution of questionnaire including email and hand delivery were considered and made available to be deployed if required. However, given the employees' accessibility to email, there was never a need to deploy the above mentioned alternative modes of questionnaire distribution.

Prior to distributing the questionnaire, a permission letter (Appendix 2) to conduct the study was obtained from the company, and the study was announced to all employees within the SAP department. The communication was done in two steps. The initial communication was sent out from the human resource manager's office. The primary objectives of this communication were:

1. To ensure that employees are informed of the study
2. To reassure the employees of the authenticity of the study and that the study had received the company's approval.
3. To reaffirm the confidentiality of their participation
4. To communicate the potential benefits that the employees and company can be derived from the study.

The announcement by the human resource manager was then followed up by an introductory letter (Appendix 3) from the principal researcher. This was also communicated to the entire department.

The selected participants were then sent individual emails which included the web link and allowed a period of two weeks to respond.

To encourage participation, participants were also given the opportunity to be entered into a lucky draw to win one of six Woolworth's vouchers valued at R500 each.

3.7. Data management

Data completed via the web link was automatically pulled into a cloud server, and downloaded in a Microsoft Excel format by two independent people, compared and cleaned prior to analysis.

Access to the data was restricted and password protected.

3.8. Data analysis

Once the data were cleaned, it was then migrated into Stata version 14 for analysis. Variables were divided into three main categories namely Demographics, Exposure and Outcome variables. Refer to Table 3.1 below.

The demographic variables included sex and age. The sex variable was the main demographic variable of interest since objective three of the study was to measure the difference in the prevalence and determinants of occupational stress between men and women, and hence the group was also stratified according to sex.

For analysis, the age variable was categorised into five age groups namely below 30 years, 30 to 39 years, 40 to 49 years, 50 to 59 years and 60 years and above.

Demographic, exposure and outcome variables of interest were as per the medium size of COPSOQ II questionnaire[73] summarized in Table 3.1 below.

Table 3.1: Demographics, exposure and outcome variables as per the medium size COPSOQ II questionnaire

Variable group	Variable name	Variable type	Data source
Demographics	Sex - Male - Female	Categorical- Nominal	COPSOQ data field
	Age group - Under 30 years - 30 to 39 years - 40- 49 years - 50 to 59 years - 60 years and above	Categorical- Ordinal	COPSOQ data field
Exposures	Quantitative demands	Numerical	COPSOQ scale
	Work pace	Numerical	COPSOQ scale
	Emotional demands	Numerical	COPSOQ scale
	Influence	Numerical	COPSOQ scale
	Possibilities for development	Numerical	COPSOQ scale
	Meaning of work	Numerical	COPSOQ scale
	Commitment to workplace	Numerical	COPSOQ scale
	Predictability	Numerical	COPSOQ scale
	Rewards (recognition)	Numerical	COPSOQ scale
	Role clarity	Numerical	COPSOQ scale
	Role conflicts	Numerical	COPSOQ scale
	Quality of leadership	Numerical	COPSOQ scale
	Social support from colleagues	Numerical	COPSOQ scale
	Social support from supervisors	Numerical	COPSOQ scale
	Social community at work	Numerical	COPSOQ scale
	Job satisfaction	Numerical	COPSOQ scale
	Work-family conflict	Numerical	COPSOQ scale
	Mutual trust between employees	Numerical	COPSOQ scale
	Trust regarding management	Numerical	COPSOQ scale
	Justice and respect	Numerical	COPSOQ scale
Outcomes	Self-rated health	Numerical	COPSOQ scale
	Sleeping troubles	Numerical	COPSOQ scale
	Burnout	Numerical	COPSOQ scale
	Stress	Numerical	COPSOQ scale

In order to analyse the exposure and outcome variables, the answers were weighted as per the scales of the medium size COPSOQ II questionnaire (Appendix 4).[74] The COPSOQ scale was based on a Likert scale of four or five points which were weighted equally and scored between 0 and 100 in an ordinal progression.[75]

Most of the questions in the COPSOQ questionnaire had five response options, namely *always, often, sometimes, seldom* and *never/hardly ever*, or *to a very large extent, to a large extent, somewhat, to a small extent* and *to a very small extent* while the options for the four response questions were *very satisfied*, *satisfied*, *unsatisfied* and *very unsatisfied* (Appendix 4*).*[75]

The scores for the five and four response questions were weighted as per table 3.2 and 3.3, respectively.

Table 3.2: COPSOQ scores for five response questions

Answer options – group 1	Answer options- group 2	Allocated score
Always	To a very large extent	100
Often	To a large extent	75
Sometimes	somewhat	50
Seldom	To a small extent	25
Never/ hardly ever	To a very small extent	00

Table 3.3: COPSOQ scores for four questions

Answer option 1	Allocated score
Very satisfied	100
Satisfied	66.7
Unsatisfied	33.3
Very unsatisfied	00

Some questions had a reversed scoring. The average of the scores on the individual items became the respondent's total score on a scale (Appendix 4). The scales of the medium size COPSOQ II questionnaire considered a person missing if less than half of the questions in a scale had been answered. For each set of questions representing an exposure variable, the scales were scored and mean value used to represent the specific exposure variable. These scores from each outcome question were compared with the average values of the COPSOQ scales guidance (Appendix 4), which were baseline and reference values (Table 3.4).[75]

Table 3.4: COPSOQ baseline/ reference values

Outcome variable	Mean/ reference value (+/- SD)
Sleeping troubles	21.3 (19.0)
Burnout	34.1 (18.2)
Stress	26.7 (17.7)
Self- rated health	66.0 (20.9)

Demographic variables, namely sex (referred to as gender by COPSOQ) and age groups (as described in the COPSOQ) were computed and described using frequency, bar graphs, and proportion and ratio tables.

Exposure and outcomes variables were analysed, tested for normality using Skewness-Kurtosis tests and also compared to the reference values of the COPSOQ scales (Appendix 4). Normally distributed data were described using means and standard deviations (SD) while non-normally distributed data were described using medians and interquartile ranges (IQR), and these sample means and medians were compared for differences against the COPSOQ reference values using the one sample t-test for normally distributed data and the non- parametric Wilcoxon signed-rank test for non-normally distributed data.

Box and whisker plots were used to present the distribution including central values of the outcome variables, while scatter plots were used to present correlation between stress and other outcome variables, and a correlation coefficient (r) using Pearson's test for normally distributed variables and Spearman's test for skewed data, was calculated in order to determine the strength and direction of a linear relationship between stress and other individual outcomes.

Analysis of variance (ANOVA) was conducted to assess differences among group means namely age group and sex in relation to outcome variables. A two sample t-test was used to assess the differences between sex and normally distributed outcome variables while one- way analysis of variance was conducted for age groups and normally distributed outcomes. Wilcoxon signed-rank test was conducted for non-normally distributed outcome data. Analysis of variance were also conducted for demographic variables where significant variances were detected.

Multivariate analysis

Logistic regression analyses were used to identify covariates associated with the outcome variables.

A multicollinearity test was performed to assess the level of correlation between exposure variables. Variance inflation factors for exposure variables were measured and a VIF of 4 was used as the upper limit.

Exposure variables which passed the multicollinearity test were converted into binary variables by using the COPSOQ scale (Appendix 4) reference values and the minimum important different (MID), which is calculated as the mean plus 0.5 SD, as cut-off points. Variables with values within the MID values were regarded as low (0) and those above the MID values were regarded as high (1). Other variables that could not be classified as high and low were classified as exposed (1) and not exposed (0). These included physical violence, threats of violence, bullying and sexual harassments.

Outcome variables namely stress, sleep troubles and burnout were converted into binary variables using COPSOQ scale reference values plus 0.5 SD (MID) as a threshold resulting in values below threshold regarded as low (0) and those above as high (1). However, self-rated health values below the threshold were regarded as poor health rating (1) and those above the threshold as good health rating (0).

Exposure variables which were converted into binary variables were subjected to bivariate and multivariate logistic regression in order to assess associations with converted binary outcome variables, and these associations were expressed using odds ratios (ORs).

Exposure variables which were found to be associated ($p<0.05$) with the outcome variables during the bivariate analysis were included in the multivariate logistic regression models. Furthermore, the final multivariate logistic regression model was subjected to a goodness-of-fit of model test using Hosmer and Lemeshow's goodness of fit test, and also predictive performance of the model assessment using receiver operating characteristic (ROC). For the goodness of fit test, a p- value of < 0.05 was regarded as not significant.

3.9. Ethical considerations

Before data collection could commence, the research proposal was presented to and approved by the Human Research Ethics Committee (Medical) of the University of Witwatersrand (Appendix 5) - Ethics Clearance number: M160520.

Confidentiality and protection of information was achieved through the following steps:

- The employer supplied the principal researcher with the list of all junior and middle managers of the South African SAP department.

- The researcher performed a random selection.
- General information communication about the study was sent by the human resource manager to the entire department.
- The communication including the web link was sent directly to the selected employees' email addresses by the researcher.
- Each participant used their name and email address to access the web link.
- The information/ data obtained from participants was automatically referred back to the researcher by the system.
- Only the researcher and assistant personnel were given access to view the data pulled through the web link. Thus, the data/ information within the web link was password protected, and only the researcher and assistant personnel had log in details into the data.
- The information communique sent to the participants also included the details of the Human Research Ethics Committee (Medical) of the University of Witwatersrand providing a platform to lodge any complains when necessary.

Prior to commencement of data collection, the principal researcher established an understanding with the company's employee assistance programme to ensure that any identified high risk cases could be referred to the company's employee assistance programme for further assistance.

It was also agreed that the findings of this study would also be shared with all the relevant stakeholders.

CHAPTER FOUR: RESULTS

4.1. Description of the study sample

The target sample size (n) for the study was 230 divided into two strata: 154 men; and 76 women. Of the 230 invited participants, 149 (81 men and 68 women) responded resulting in overall study response rate of 64.8% (52.5% of invited men and 89.5% of invited women). Details of participation are shown in Table 4.1 below.

Table 4.1: Study participation overview

Stratum	Population per stratum	Sample size per stratum	Respondents per stratum	Response rate
Men	370	154	81	52.6%
Women	190	76	68	89.5%
Total	566	230	149	64.8%

There were no missing persons as all participants answered at least 93% of the questions in the questionnaire. Table 4.2 below gives the number of respondents per question.

Table 4.2: Number of respondents per questionnaire

Scale groups	Variable	Respondents (n = 149)	% Respondents
Demands at work	Quantitative demands	147	98.7%
	Work pace	148	99.3%
	Emotional demands	148	99.3%
Work organization and job contents	Influence	143	96.0%
	Possibilities for development	147	98.7%
	Meaning of work	146	98.0%
	Commitment to workplace	147	98.7%
Interpersonal relations and leadership	Predictability	146	98.0%
	Rewards (recognition)	147	98.7%
	Role clarity	147	98.7%
	Role conflicts	147	98.7%
	Quality of leadership	143	96.0%
	Social support from colleagues	147	98.7%
	Social support from supervisors	143	96.0%
	Social community at work	148	99.3%
Work-individual interface	Job satisfaction	146	98.0%
	Work-family conflict	143	96.0%
Values at the workplace	Mutual trust between employees	143	96.0%
	Trust regarding management	143	96.0%
	Justice and respect	143	96.0%
Health and wellbeing	Self-rated health	139	93.3%
	Sleeping troubles	140	94.0%
	Burnout	140	94.0%
	Stress	139	93.3%

Eight five percent of the participants were below the age of 50 years. Age group 30 to 39 years had the most representation for both men and women (men: 54 vs women: 37). Age 60 and above had the lowest representation (2.7%), of whom all the participants were men. Table 4.3 below provides overview of age group distribution by sex.

Table 4.3: Overview of age group distribution by sex

	Women		Men		
Age group	**N**	**% of total sample**	**n**	**% of total sample**	**Group % of total sample**
Under 30 years	22	14.8%	14	9.4%	24.2%
30 -39 years	25	16.8%	36	24.2%	40.9%
40 - 49 years	12	8.1%	18	12.1%	20.1%
50 - 59 years	9	6.0%	9	6.0%	12.1%
Over 60	0	0.0%	4	2.7%	2.7%
Total	**68**	**45.6%**	**81**	**54.4%**	**100.0%**

4.2. Distribution of exposure variables

Exposure variables were tested for normality using Skewness-Kurtosis test and only 50% were found to be normally distributed. Results of the test for normality are summarised in the table 4.4 below.

Table 4.4: Summary of outcomes of test for normality

Normally distributed variables	Non-normally distributed variables
Quantitative demands	Possibilities for development
Work pace	Meaning of work
Emotional demands	Commitment to workplace
Influence	Role clarity
Predictability	Quality of leadership
Rewards(recognition)	Social support from supervisor
Role conflicts	Social community at work
Social support from colleagues	Job satisfaction
Trust regarding management	Work- family conflict
Justice and Respect	Mutual trust between employees

4.3. Exposure variables mean values relative to COPSOQ reference mean values

One sample t-test and Wilcoxon signed-ranked test were applied to normally and non-normally distributed exposure variables respectively. The study sample mean values for quantitative demands, work pace, influence, possibilities for development, predictability, rewards, job satisfaction, work-family conflict, mutual trust between employees, trust regarding management, and justice and respect were found to be different from reference mean values. These differences were statistically significant with p-value of <0.05 (Table 4.5).

Exposure variables, namely influence, predictability, rewards, mutual trust between employees, trust regarding management, and justice and respect had a statistically significant lower study sample mean values than the reference mean values, while quantitative demands, work pace, role conflict, work-family conflict possibility for development and job satisfaction were statistically higher for the study sample than reference mean values (Table 4.5).

Table 4.5: Mean values of various exposure variables against COPSOQ reference values

Scale groups	Variable	Study sample mean (+-SD)	Reference values, mean (+/-SD)	p-value
Demands at work	Quantitative demands	43.91 (12.95)	40.2 (20.5)	***<0.001***
	Work pace	64.22 (19.93)	59.5 (19.1)	***0.002***
	Emotional demands	39.74 (21.94)	40.7 (24.3)	*0.297*
Work organization and job contents	Influence	44.86 (21.45)	49.8 (21.2)	**0.003**
	Possibilities for development	68.75 (56.25 - 83.33)	65.9 (17.6)	**0.047**
	Meaning of work	75 (58.33 - 91.67)	73.8 (15.8)	*0.214*
	Commitment to workplace	56.25 (43.75 - 68.75)	60.9 (20.4)	*0.137*
Interpersonal relations and leadership	Predictability	47.86 (25.74)	57.7 (20.9)	**<0.001**
	Rewards (recognition)	54.45 (23.47)	66.2 (19.9)	**<0.001**
	Role clarity	75 (50 - 83.33)	73.5 (16.4)	*0.322*
	Role conflicts	43.18 (20.00)	42.0 (16.6)	*0.237*
	Quality of leadership	50 (31.25 - 75)	55.3 (21.1)	*0.867*
	Social support from colleagues	56.97 (23.06)	57.3 (19.7)	*0.432*
	Social support from supervisors	66.67 (41.67 - 83.33)	61.6 (22.4)	*0.132*
	Social community at work	75 (66.67 - 83.33)	78.7 (18.9)	*0.084*
Work-individual interface	Job satisfaction	71.88 (58.33 - 75)	65.3 (18.2)	**0.004**
	Work-family conflict	41.63 (16.65 - 66.60)	33.5 (24.3)	***<0.001***
Values at the workplace	Mutual trust between employees	58.33 (50 - 75)	68.6 (16.9)	**<0.001**
	Trust regarding management	58.22 (21.28)	67.0 (17.7)	**<0.001**
	Justice and respect	48.62 (22.31)	59.2 (17.7)	**<0.001**

4.4. Description of outcome variables

In terms of outcome variables (Figure 4.1), stress and self-rated health were two variables that were normally distributed, while burnout and sleeping troubles were non-normally distributed.



Figure 4.1: Box plot showing distribution of outcome variables

4.5. Prevalence measurements

A t-test applied to normally distributed outcome variables namely, stress and self-rated heath against reference mean values, found a statistically significant differences between these two outcome variables and reference mean values (stress: $p<0.001$, self-rated health: $p =0.003$). The study sample had a higher mean value of 45.3 (SD 25.0) for stress against a reference mean value of 26.7(SD 17.7), and a lower mean value of 59.53 (SD26.99) for self-rated health against a reference mean value of 66.0 (SD20.9). See table 4.6 below.

When non-parametric test (Wilcoxon signed-rank test) was applied to non-normally distributed outcome variables, namely burnout and sleep disturbances against the reference values, the differences were found to be statistically significant (Table 4.6) with a p-value of 0.001 and < 0.001 respectively. For burnout, the study sample was found to have a median value of 50 (IQR31.25-71.88) with an estimated mean value of 50 (SD30.1) against reference mean value of 34.1 (SD 18.2), and a median value of 37.5 (IQR18.75-62.50) with an estimated mean value of 37.5 (SD34.41) for sleeping troubles against reference mean value of 21.3 (SD 19.0). Estimated mean values for

burnout and sleeping troubles were calculated using the estimator of sample mean and standard deviation.[75]

Table 4.6: Analysis of differences between outcome variables and COPSOQ reference values

Outcome variable	Study sample mean	Reference values, mean (+/-SD)	p-value
Stress	45.29 (25.03)	26.7 (17.7)	<0.001
Self-rated health	59.53 (26.99)	66.0 (20.9)	0.003
Burnout	50 (30.1)	34.1 (18.2)	0.001
Sleeping troubles	37.5 (32.41)	21.3 (19.0)	<0.001

Even though the prevalence analysis by sex showed women to have higher levels of stress, burnout and sleeping troubles, and associated lower levels of self-rated health than men (Figure 4.2), analysis of variance (ANOVA) test found no significant differences between men and women (mean values for stress: p=0.22, burnout: p=0.18, sleeping troubles: p=0.68 and self-rated health: p=0.08).

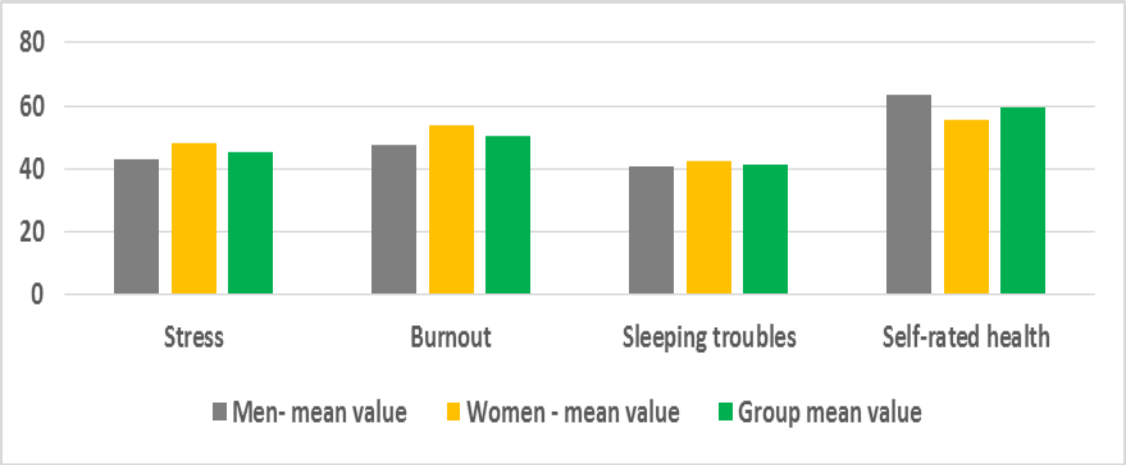


Figure 4.2: Mean values for stress, burnout, sleeping troubles and self-rated health for men and women against study sample mean values

Age groups above 39 years had highest mean values for stress (Figure 4.3) and sleeping troubles (Figure 4.4), while age groups under 50 years had the highest mean values for burnout (Figure 4.5). Age groups from 30 to 49 years had the lowest mean values for self-rated health (Figure 4.6).

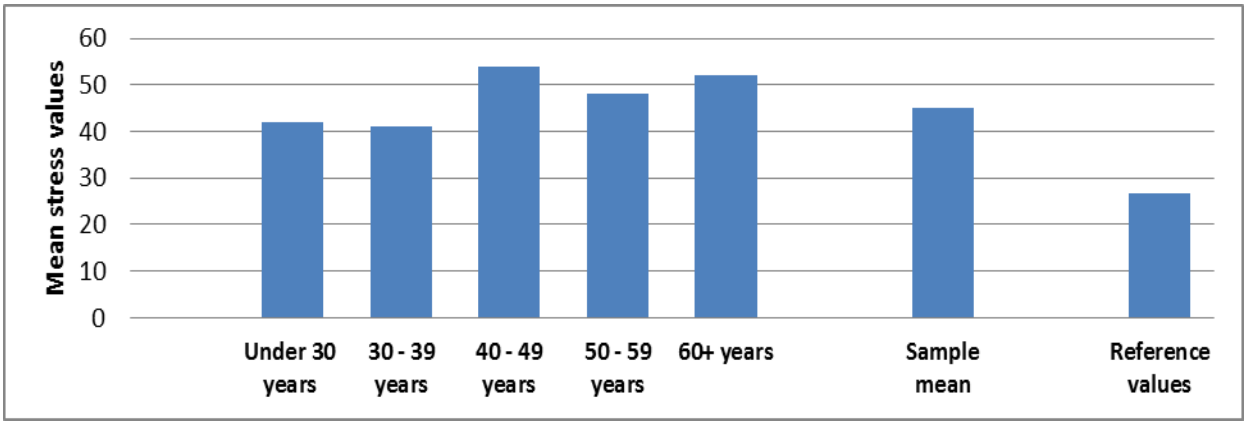


Figure 4.3: Stress mean values by age groups

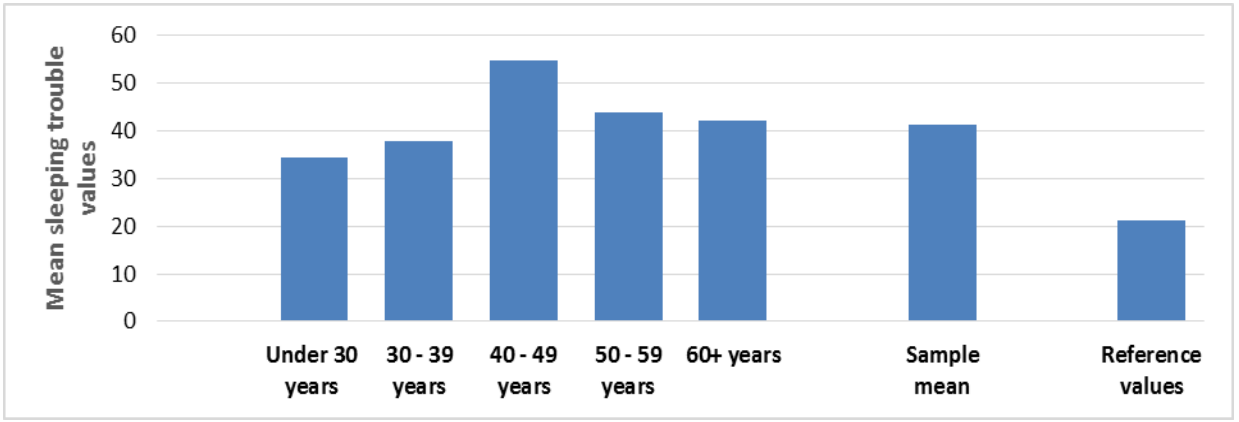


Figure 4.4: Sleeping troubles mean values by age groups

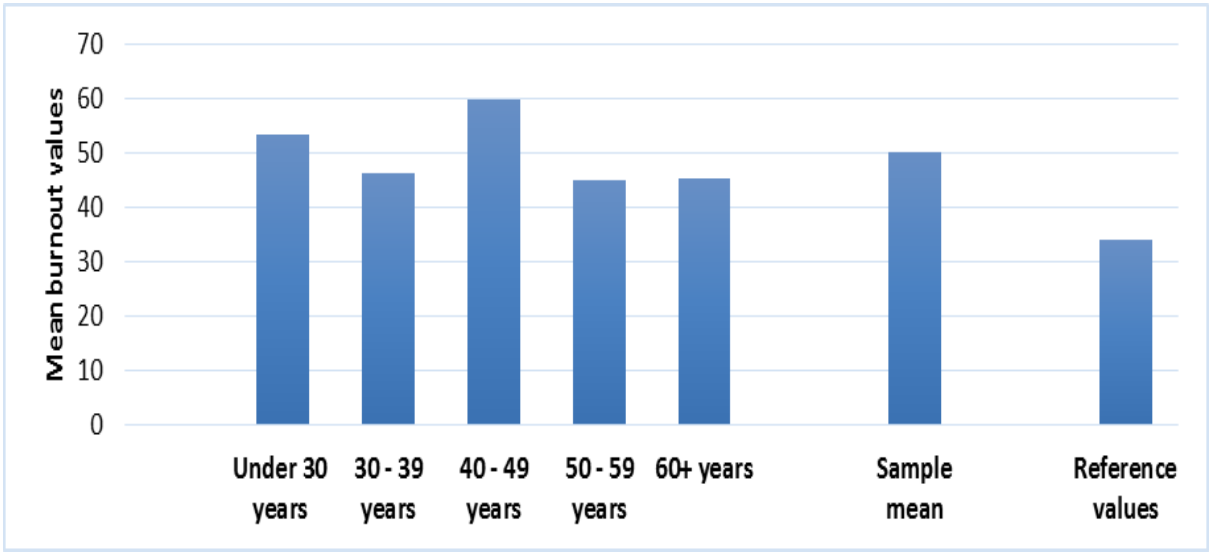


Figure 4.5: Burnout mean values by age groups

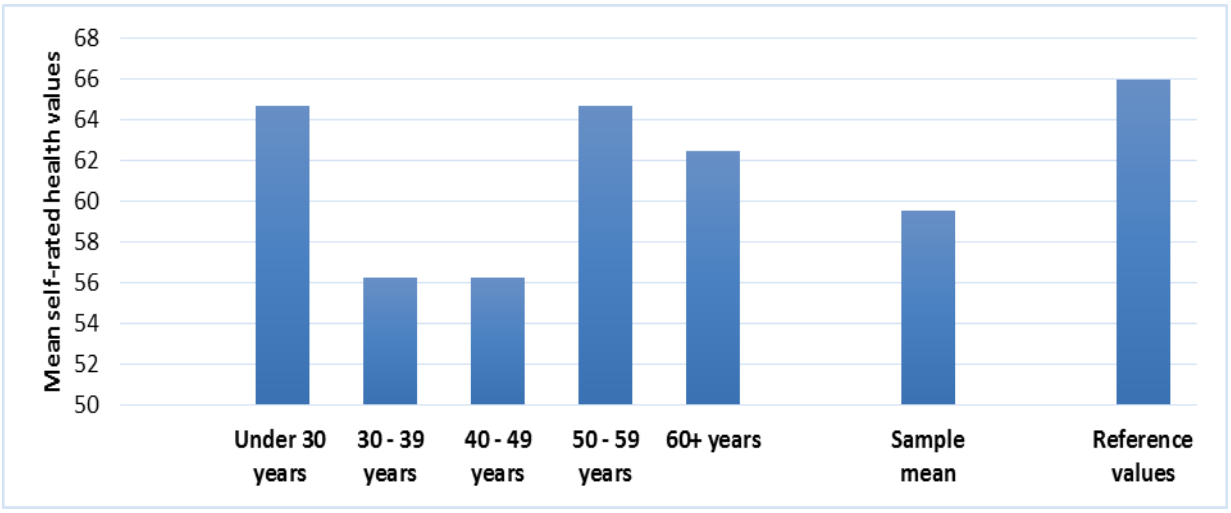


Figure 4.6: Self-rated health mean values by age groups

Analysis of outcome variables by sex and age group found age group 40-49 years among both men and women to have the highest mean values for stress, burnout and sleeping troubles, and the lowest mean value for self-rated health among women only. The highest mean values for self-rated health were observed among men aged under 30 years and women aged 50-59 years. Refer to figure 4.7 below.

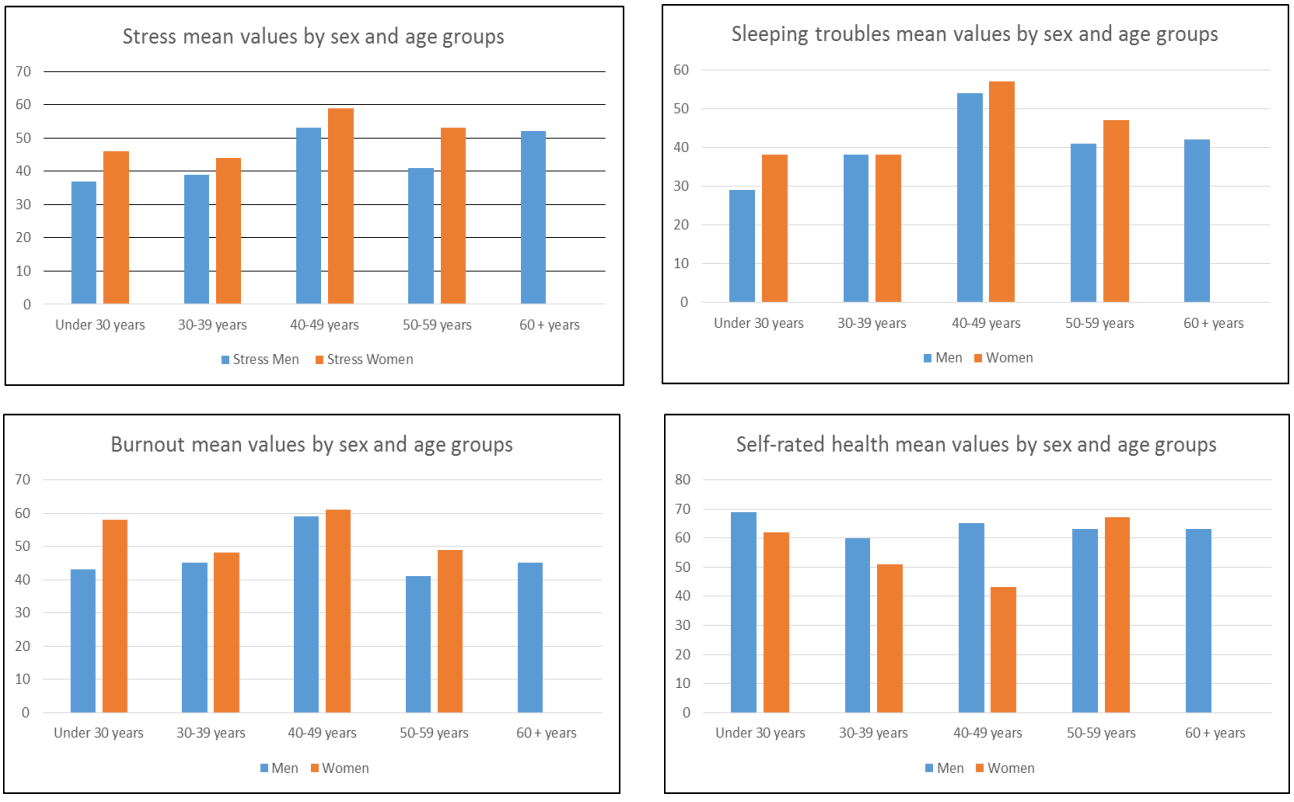


Figure 4.7: Analysis of outcome variables' mean values by sex and age groups

The one-way analysis of variance (ANOVA) found no statistically significant differences in the mean values of stress (p=0.19), burnout (p=0.21) and self-rated health (p=0.54) among age groups, however there was a significant difference in mean values of sleeping troubles (p=0.03) among age groups.

4.6. Analysis of correlation between outcomes

The three outcomes of the COPSOQ questionnaire namely burnout, sleeping troubles and self-rated health which are other indicators of occupational stress, were tested for correlation to the fourth outcome of the COPSOQ questionnaire, stress, using Pearson's correlation test and found a linear correlation.

Stress displayed a positive linear relationship with sleeping troubles and burnout, but a negative linear relationship with self-rated health. Thus, levels of sleeping troubles (Figure 4.8) and burnout (Figure 4.9) increased with increased levels of stress, while levels of self-rated health decreased with increased level of stress (Figure 4.10). The correlation coefficients (r) for stress to sleeping troubles and burnout were 0.73 and 0.79 respectively, while a correlation coefficient (r) for stress to self-rated health was 0.60.

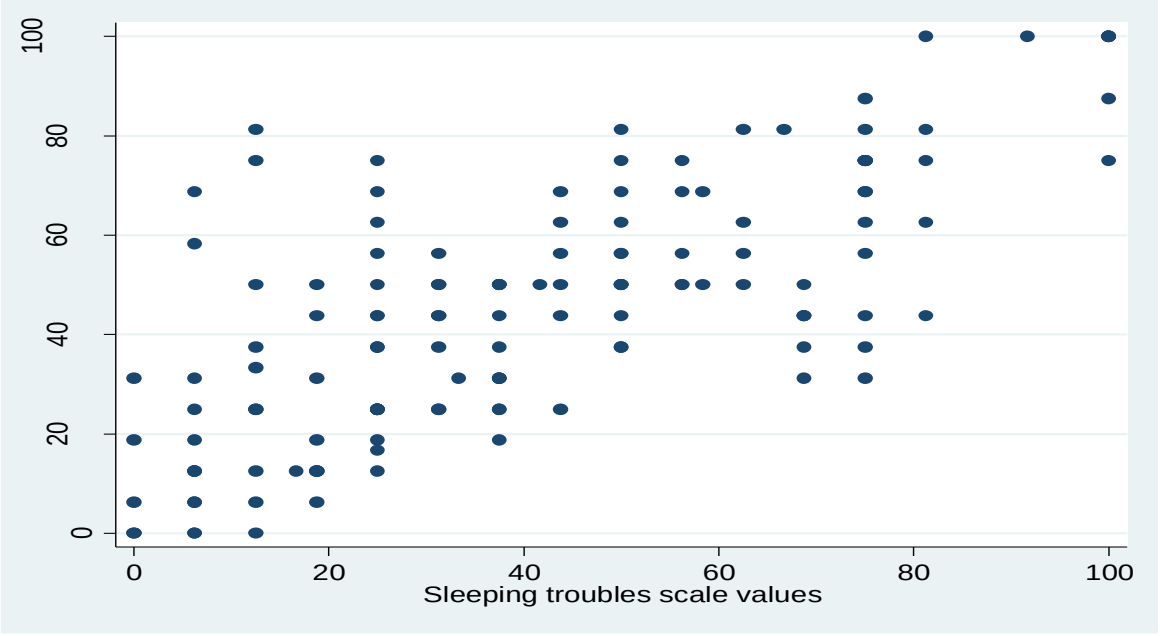


Figure 4.8: Scatter plot showing correlation between stress and sleeping troubles

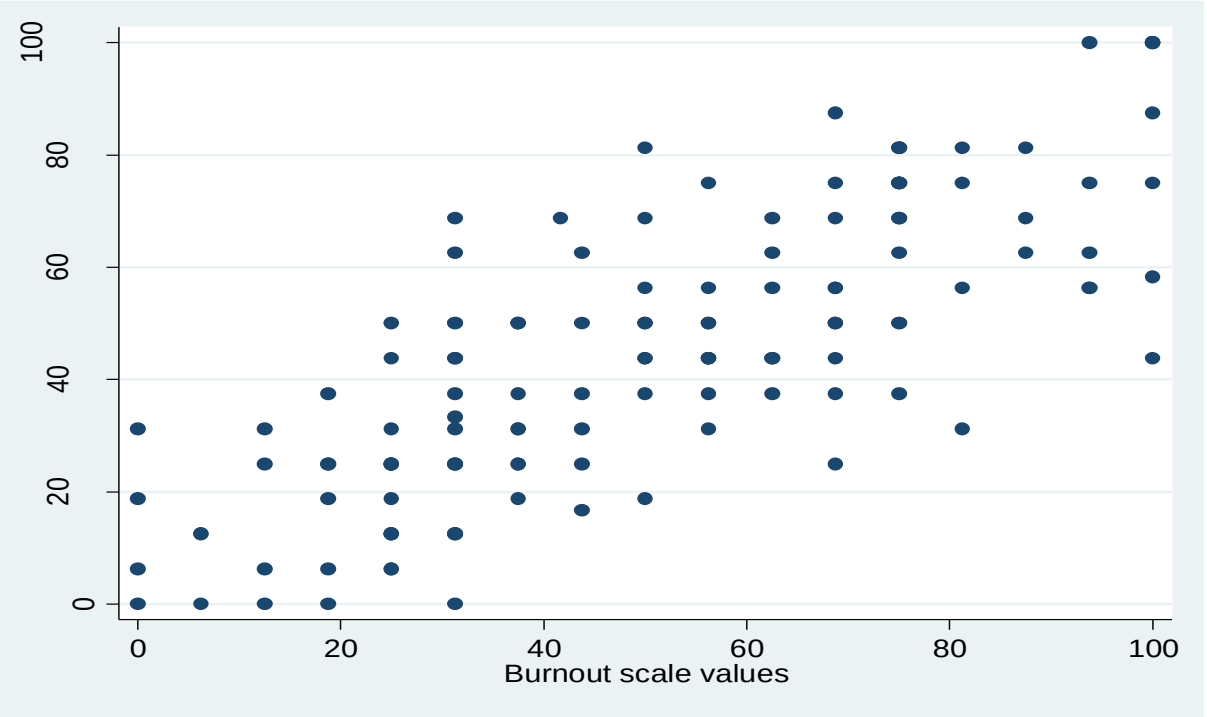


Figure 4.9: Scatter plot showing correlation between stress and burnout

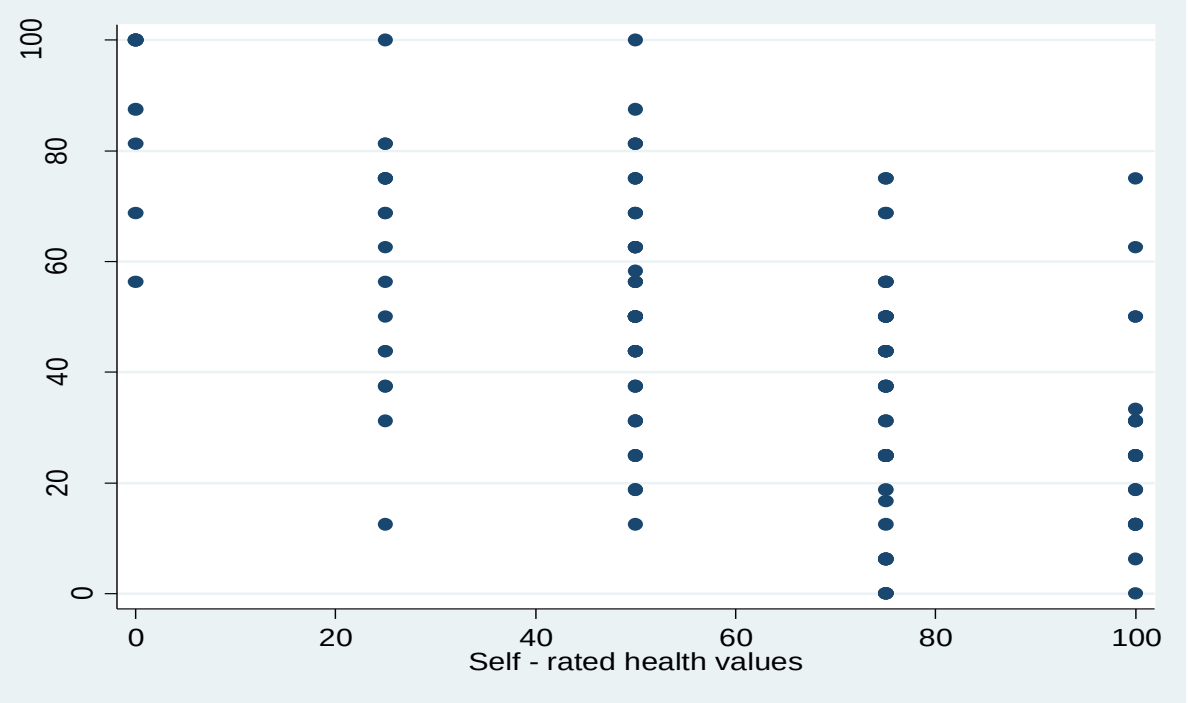


Figure 4.10: Scatter plot showing correlation between stress and self-rated health

4.7. Analysis of risk factors

Exposure variables were tested for collinearity and displayed acceptable levels of correlation **(**below $\sqrt{VIF}$ of 2**).**[76] Thus, the exposures variables were not highly correlated with each other. Table 4.7 below provides results of the test of multicollinearity for the exposure variables.

Table 4.7: Results of multicollinearity test

Exposure variable	**VIF**	$\sqrt{VIF}$
Quantitative demands	1.3	0.8
Work pace	1.4	0.7
Emotional demands	1.6	0.6
Influence	1.3	0.8
Possibilities for development	1.8	0.5
Meaning of work	2.3	0.4
Commitment to workplace	1.8	0.6
Predictability	1.8	0.6
Rewards (recognition)	1.9	0.5
Role clarity	2.2	0.5
Role conflicts	1.4	0.7
Quality of leadership	3.0	0.3
Social support from colleagues	1.8	0.5
Social support from supervisors	3.1	0.3
Social community at work	1.7	0.6
Job satisfaction	1.8	0.6
Work-family conflict	1.6	0.6
Mutual trust between employees	1.4	0.7
Trust regarding management	2.6	0.4
Offensive behaviour	1.5	0.7
Mean	1.91	0.6

Exposure variables which passed the multicollinearity test were converted into binary variables and included into the bivariate logistic regression. Sixty percent of these exposure variables were found to be associated with stress, burnout and sleeping troubles, while 50% were associated with self- rated health (Table 4.8). Quantitative

demands, emotional demands, role conflicts, work-family conflict and offensive behaviour were found to be associated with higher odds (OR >1) of stress, burnout and sleeping troubles, while meaning of work, commitment to workplace, predictability, rewards, role clarity, role conflicts, social support from supervisor, job satisfaction and mutual trust between employees were associated with higher odds (OR>1) of self-rated health (Table 4.8). Of worth noting is that some of the factors associated with higher odds (OR>1) of self-rated health namely meaning of work, rewards, role clarity, social support from supervisors and job satisfactions were found to be associated with lower odds (OR<1) of stress, burnout and / or sleeping troubles, while emotional demands and work-family balance which were associated with higher odds stress (OR>1) of burnout and sleeping troubles were found to be associated with lower odds of less than one (p = 0.00) for self-rated health (Table 4.8)

Work pace, influence, trust regarding management, and justice and respect were found not have any statistically significant (p>0.05) association with either one of all the four outcomes (Table 4.8).

The variables that were found to be statistically significant in the bivariate regression (Table 4.8) were included into the multivariate regression models. Multivariate regression models found work-family conflict and emotional demands to be the only exposure variable associated with higher odds (OR>1) of stress, burnout and sleeping troubles. Emotional demand was associated with higher odds of stress, however lower odds of self-rated health. Justice and respect associated with higher odds of sleeping troubles, while role clarity was associated with higher odds of self-rated health. Rewards was found to be associated with lower odds (OR < 1) of stress, social commitment was associated with lower odds of burnout, and quality of leadership and job satisfaction was associated with lower odds of sleeping troubles. These outcomes of the multivariate regression model are illustrated in table 4.9 below

Table 4.8: Crude logistic regression results for the four study outcomes

	Stress			Burnout			Sleeping troubles			Self-rated Health		
Variable	Bivariate regression			Bivariate regression			Bivariate regression			Bivariate regression		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Quantitative demands	**2.23**	1.11 - 4.45	**0.023**	**2.42**	1.23 - 4.74	**0.01**	2.12	1.08 - 4.17	**0.03**	0.66	0.34 - 1.27	0.21
Work pace	1.80	0.91 - 3.58	0.093	1.52	0.78 - 2.93	0.22	1.34	0.69 - 2.61	0.39	0.78	0.41 - 1.49	0.46
Emotional demands	**5.23**	2.40 - 11.41	**0.000**	**4.61**	2.24 - 9.50	**0.00**	2.25	1.13 - 4.47	**0.02**	0.32	0.16 - 0.63	**0.00**
Influence	0.90	0.46 - 1.78	0.771	0.85	0.44 - 1.63	0.62	0.76	0.39 - 1.47	0.41	1.08	0.57 - 2.06	1.80
Possibilities for development	0.43	0.21 - 0.90	**0.024**	0.48	0.24 - 0.96	**0.04**	0.45	0.22 - 0.91	**0.03**	1.69	0.87 - 3.27	0.12
Meaning of work	0.48	0.24 - 0.98	**0.044**	0.51	0.26 - 1.01	**0.05**	0.62	0.31 - 1.23	0.17	1.88	0.97 - 6.62	**0.06**
Commitment to workplace	0.63	0.32 - 1.24	0.180	0.57	0.30 - 1.12	0.10	0.93	0.48 - 1.81	0.83	1.69	1.06 - 4.13	**0.03**
Predictability	0.56	0.28 - 1.13	0.104	0.54	0.27 - 1.06	0.07	0.72	0.36 - 1.42	0.34	2.09	1.06 - 4.13	**0.03**
Rewards (recognition)	0.33	0.16 - 0.67	**0.002**	0.38	0.19 - 0.75	**0.01**	0.44	0.22 - 0.87	**0.02**	1.92	0.99 - 3.74	**0.05**
Role clarity	0.39	0.19 - 0.80	**0.010**	0.47	0.24 - 0.93	**0.03**	0.73	0.37 - 1.42	0.35	2.09	1.08 - 4.03	**0.03**
Role conflicts	**2.85**	1.41 - 5.78	**0.004**	**2.29**	1.17 - 4.48	**0.02**	1.82	0.93 - 3.57	**0.08**	0.92	0.48 - 1.75	0.80
Quality of leadership	0.40	0.19 - 0.80	**0.010**	0.36	0.18 - 0.71	**0.00**	0.34	0.17 - 0.69	**0.00**	1.67	0.87 - 3.19	0.12
Social support from colleagues	0.40	0.20 - 0.83	**0.014**	0.43	0.22 - 0.86	**0.02**	0.47	0.23 - 0.93	**0.03**	2.22	1.15 - 4.29	**0.02**
Social support from supervisors	0.36	0.17 - 0.75	**0.007**	0.36	0.18 - 0.72	**0.00**	0.43	0.21 - 0.87	**0.02**	1.60	0.83 - 3.08	0.16
Social community at work	0.35	0.17 - 0.70	**0.003**	0.25	0.13 - 0.51	**0.00**	0.47	0.24 - 0.93	**0.03**	1.69	0.88 - 3.26	0.11
Job satisfaction	0.41	0.19 - 0.88	**0.022**	0.43	0.21 - 0.87	**0.02**	0.33	0.16 - 0.71	**0.00**	1.94	0.99 - 3.81	**0.06**
Work-family conflict	**10.48**	4.53 - 24.25	**0.000**	**9.2**	4.26 - 19.86	**0.00**	4.13	2.03 - 8.42	**0.00**	0.36	0.19 - 0.70	**0.00**
Mutual trust between employees	0.60	0.29 - 1.25	0.174	0.67	0.33 - 1.37	0.27	0.74	0.36 - 1.54	0.43	2.34	1.12 - 4.89	**0.02**
Trust regarding management	0.65	0.33 - 1.29	0.218	0.74	0.38 - 1.43	0.37	0.95	0.49 - 1.87	0.90	1.90	0.98 - 3.66	0.06
Justice and respect	0.68	0.34 - 1.39	0.292	0.71	0.36 - 1.41	0.32	1.27	0.62 - 2.58	0.51	1.90	0.96 - 3.79	0.07
Offensive behaviour	**4.38**	1.70 - 11.26	**0.002**	**3.37**	1.47 - 7.72	**0.00**	2.90	1.26 - 6.64	**0.01**	1.36	0.67 - 2.78	0.40

Table 4.9: Results of multivariate logistic regression analysis for the four outcome variables

	Stress			Burnout			Sleeping troubles			Self-rated health		
Variable	Multivariate regression			Multivariate regression			Multivariate regression			Multivariate regression		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Quantitative demands	1.29	0.55 - 3.01	0.561	1.84	0.84 - 4.04	0.13	1.78	0.83 - 3.81	0.14			
Emotional demands	2.76	1.11 - 6.88	**0.029**							0.35	0.17 - 0.72	**0.00**
Rewards (recognition)	0.37	0.16 - 0.84	**0.017**									
Role clarity										2.03	1.02 - 4.04	**0.04**
Quality of leadership							0.36	0.15 - 0.90	**0.03**			
Social community at work				0.35	0.16 - 0.77	**0.01**						
Job satisfaction							0.39	0.16 - 0.96	**0.04**			
Work-family conflict	7.45	3.05 - 18.20	**0.000**	7.53	3.39 - 16.71	**0.00**	3.76	1.70 - 8.34	**0.00**			

Multivariate regression for men and women separately found work-family conflict to be the only risk factor associated with higher risk of stress for both men and women, $p < 0.05$, while social support from supervisors was negatively associated with stress among women only ($p<0.05$). See table 4.10

Table 4.10: Results of multivariate logistic regression model for stress for men and women

Variable	**Men**			**Women**		
	OR	95% CI: h	p-value	OR	95% CI: h	p-value
Quantitative demands	1.35	0.43 - 4.20	0.603	3.28	0.92 - 11.72	0.067
Work-family conflict	**15.06**	**4.64 - 48.81**	**0.000**	**6.59**	**1.73 - 25.09**	**0.006**
Social support from supervisors				**0.20**	**0.05 - 0.82**	**0.026**

4.8. Goodness of fit test

The goodness of fit test using Hosmer and Lemeshow's goodness of fit test found the multivariate logistic regression to fit the data (p=0.06)

4.9. Performance of the model

The receiver operating characteristics (ROC) curve analysis demonstrated that the multivariate logistic regression model used was the correct model to predict stress - ROC curve analysis was 0.85 (95% CI 0.79 - 0.92). This is indicated by figure 4.11 below.

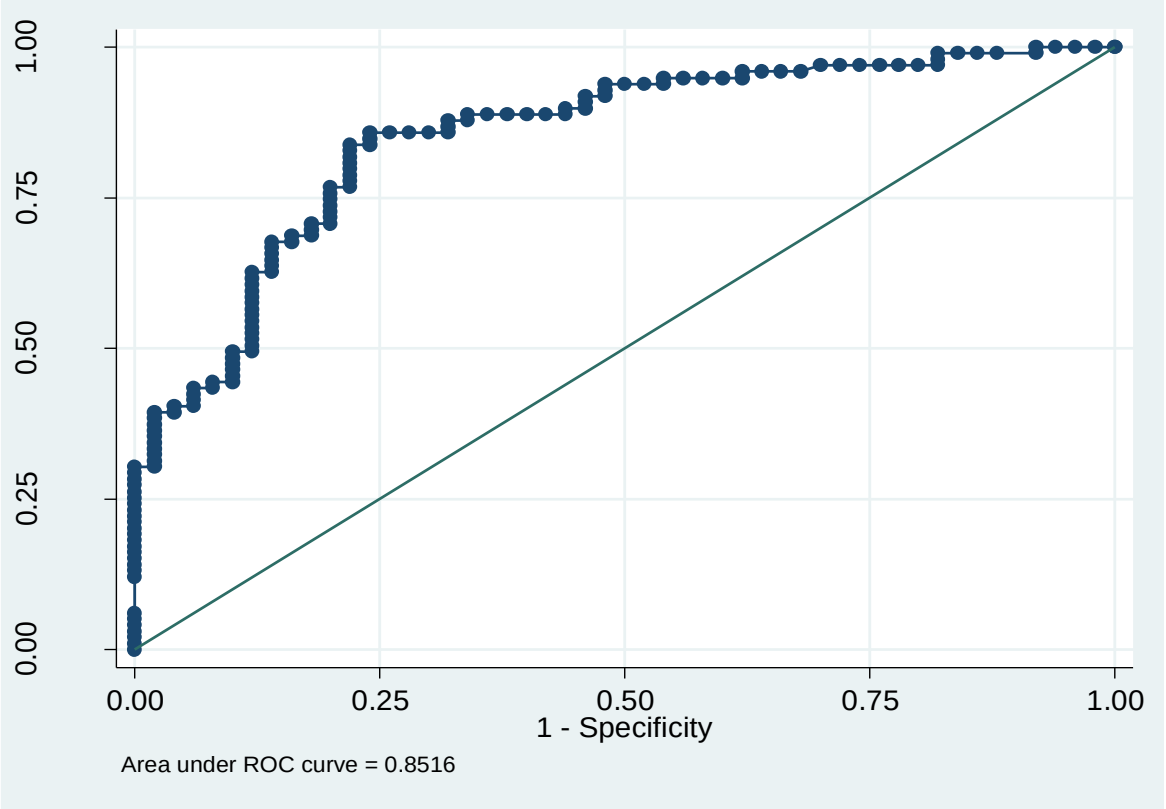


Figure 4.11: ROC curve analysis of main multivariate logistic regression model

4.10. Summary of results

Overall the study response rate was 64.8% (men: 52.5% and women 89.5%.). Sample mean values of 45.29 (SD25.03) for stress, 50 (SD30.1) for burnout and 37.5 (SD32.4) for sleeping troubles were found. These are statistically worse than the respective reference mean values of COPSOQ. However, there were no statistically significant differences (p >0.05) found between the mean values for stress, burnout, sleeping troubles and self-rated health between men and women.

Work- family conflict was the most common significant ($p<0.05$) harmful risk factor for stress (men: OR 15.06, 95% CI: 4.64 - 48.81; women: OR 6.59, 95% CI: 1.73 - 25.09), burnout (men: OR 11.86, 95%CI: 3.50-40.22; women: OR 11.90, 95%CI: 2.80-50.62), sleeping troubles (men OR 23.11,95%CI: 4.66-114.66) and self-rated health (men OR 16.00, 95%CI: 1.49-171.48; women OR 10.47, 95%CI: 2.12-51.69) among both men and women.

CHAPTER FIVE: DISCUSSION

5.1. Prevalence of occupational stress

The prevalence of occupational stress for the selected population was assessed by measuring four outcomes namely stress, burnout, sleeping troubles and self-rated health as indicators of occupational stress, using the medium size COPSOQ questionnaire, which was validated for the South African context by Volmink[24] in 2014.

Sixty-six percent (n=149) of the study sample had a stress value higher than the COPSOQ reference mean value of 26.7 (SD 17.7). This is comparable to the findings of the study conducted by Volmink[24] in South Africa in one of the largest public hospitals. However poor response rate and possible questionnaire bias (the COPSOQ questionnaire could not be translated into multiple languages due to lack of resources) were noted as weakness in Volmink's study. Furthermore, this observed prevalence of occupational stress also falls within the prevalence (44% to 85%) observed among Information and Communication Technology sector employees in India.[30,31] These similarities in the prevalence of stress among both private and public sector employees who are in two different fields of work, seen in these two studies raise a question regarding the country's (South Africa) prevalence of occupational stress.

The study sample had a stress mean of 45.29 (SD25.03), which was above the COPSOQ reference mean value of 26.7 (SD 17.7), and very similar to the findings of the study by Stauder[77]. Stauder[77], in a study conducted among the Hungarian working population, found significant differences in the mean values for stress among various industrial sectors, and the mean value for stress within the Information and Communication Technology community was 49.5 (COPSOQ reference mean value = 26.7: 17.7)

The difference observed between the study sample mean value and COPSOQ reference mean value for stress, when subjected to the t-test, was found to be statistically significant ($p<0.001$). This was again consistent with the studies by Stauder[77] and Volmink[24]. In both of these studies, the sample means for stress were found to be significantly different ($p<0.001$) from and higher than the COPSOQ reference mean values. The study sample's mean values for the other three outcomes, namely burnout, sleeping troubles and self-rated health were also statistically different ($p<0.05$) from the reference values. Study sample's mean values for both burnout (50;

SD30.1) and sleeping troubles (37.5; 32.4) were significantly higher than the reference values of 34.1 (SD18.2) and 21.3 (SD19.0) respectively, and self-rated health (59.53; SD26.99) was significantly lower than the reference values (66.0; SD20.9). Lower study mean value for self-rated health indicates poorer self-rated health.

The higher mean values of stress, burnout and sleeping troubles associated with lower mean value of self-rated health signify a high prevalence of occupational stress among the study sample. These findings support the findings of a study conducted by Stauder[78] across occupational sectors in Hungry. The study by Stauder[76] found significantly higher mean values for stress, sleeping troubles and burnout, and lower values for self-rated health among the information technology community than the COPSOQ reference values, and it was concluded that the information technology community has a higher prevalence of occupational stress as compared to the reference population.

Assessment of differences in the mean values of stress, burnout, sleeping troubles and self-rated health between men and women found no statistical differences ($p > 0.05$). Thus, men and women did not differ significantly in their experience of occupational stress. These results support the findings of the studies conducted by Kumasey [43] in the banking sector in 2014 and Borkakoty[79] among public and private sector employees in India (Guwahati city) in 2013. However, the study contradicts the findings of studies conducted by Galanakis[45] where differences in occupational stress were found between men and women. For the general working population, the difference in occupational stress between men and women remains unclear as shown by inconsistent results found during a systematic review conducted by Gyllensten[48] in 2005. It is however important to note that there were differences in the risk factors for stress, burnout, sleeping troubles and self-rated health between men and women noted in the systematic review by Gyllensten.[48]

Assessment of differences in the mean values of stress, burnout and self-rated health among age groups found no statistically significant differences ($p > 0.05$). However, there were significant differences in mean values of sleeping troubles ($p = 0.03$) for age groups, with the age group 40-49 years having most sleeping troubles. These findings of no statistical differences in the mean values of stress, burnout and self-rated among age groups contradict the findings of the studies conducted in 2010 and 2012 by

Darmordy[49] among primary school teachers in Ireland and by Bolhari[50] among information technology professionals in Iran respectively, which both found lower levels of stress among employees below the age of 40 years.

Correlation analysis of stress to burnout, sleeping troubles and self-rated health found a strong correlation. Stress was found to be positively correlated to burnout (r= 0.79) and sleeping troubles (r= 0.73), however negatively correlated to self-rated health (r= 0.60). These findings support the findings of the study conducted by Volmink[24] in 2014. These findings support the theory that occupational stress leads to various adverse health outcomes such as insomnia and burnout.[14-18] The correlations in the expected directions also support the validity of the study reported in this Research report.

5.2. Risk factors of the study outcomes

Stress

In multivariate regression analysis, emotional demands and work- family conflict were the only two risk factors which were found to be associated with higher risk of stress for the study group ($p<0.05$), while rewards were negatively associated and may thus have had a protective effect. Analysis of risk factors by sex found work-family conflict to be associated with higher risk of stress among both men (OR 15.06; 4.64 - 48.81) and women (OR 6.59; 1.73 - 25.09). Social support from supervisors was shown to be negatively associated (possibly protective) especially for women (OR 0.20; 0.05 - 0.82). The latter findings support the findings of Sanne[80] and Rivera-Torres[81,] who both found that employees who had support in the workplace had a lower prevalence of occupational stress.

Burnout

Work-family conflict was also found to be related to higher risk of burnout (OR 7.53; 3.39 - 16.71) for the study sample, while social community at work possibly had a protective effect (OR 0.35; 0.16 - 0.77). Work-family conflict was associated with a higher risk for burnout for both men (OR 11.86; 3.50-40.22, p=0.000) and women (OR 11.90; 2.8-50.62, p= 0.001). Influence was associated with a higher risk of burnout for women (OR 4.51; 1.16-2.61, p=0.03) while social support from supervisors was associated with a lower risk (OR 0.13; 0.03-0.55. p=0.005). Social community at work (OR 0.30; 0.10-0.94, p0.039) and influence (OR 0.27; 0.08-0.95; p=0.041) were

associated with a lower risk of burnout among men. Thus, factors related to interpersonal relations and leadership (social community at work and social support from supervisors) were protective for burnout, while factors of work-life interface and influence and development were associated with higher risk.

A systematic review conducted by Aronsson[82] found burnout to be strongly influenced by factors such as job demands, support and the possibility to exert control. The factors outlined by Aronsson[82] represent factors of demands at work (job demands), interpersonal relations and leadership (support) and influence and development (possibility to exert control). In 2012, Kay-Eccles[82] conducted a meta-analysis of the relationship between co-worker social support and burnout and found a significant negative correlation between co-worker social support and symptoms of burnout (depersonalization).

In the current study, factors of social support were also found to be protective against burnout and therefore consistent with the studies by both Kay-Eccles[83] and Aronsson.[82]

Sleeping troubles

With respect to sleeping troubles, the current study found work-family conflict and justice and respect to be associated with higher risk of sleeping troubles for the study sample. These findings were consistent with the findings by Crain[84] who found that a combination of work-family conflict and family–supportive supervisor behaviour was significantly related to both objective and self-reported measures of sleep quantity and quality. A systematic review aimed at understanding the effect the work environment has on future sleep disturbances, conducted by Linton[85] in 2015 also found that factors including social support at work, control and organizational justice were related to fewer sleep disturbances

Quality of leadership and job satisfaction were found to be negatively associated with sleep troubles. These findings were consistent with the findings of the study by Linton.[85]

Analysis of sleeping troubles by sex found work-family conflict and role conflicts to be associated with higher risk of sleeping troubles among men, while work-family conflict and emotional demands were associated with higher risk among women. Social

support from colleagues was associated with a lower risk of sleeping troubles among women.

Self- rated health

Emotional demands" was found to be a negatively associated with for self-rated health. This suggests that employees within the study population perceived their emotional demands to be within normal demands and therefore not impacting on their health.

With respect to stress, self-rated health was negatively correlated to stress (r=0.60). Work-family conflict was associated with higher risk of poor self-health rating for both men and women, while social support from supervisors was associated with higher risk of poor self-rated health among men only, with rewards associated with lower risk.

5.3. Limitations

The study had a good response rate among women (89.5%), however a lower response rate for men of 62%, and therefore a potential volunteer bias, especially among men. Thus, there is a risk of higher participation among men employees experiencing higher levels of stress which could result in biased stress mean levels. This could have also been coupled with a possible response bias. For instance, in some cases information may have been supressed or overstated for various reasons such as lack of trust by the participants coupled with fear of victimization in a case where confidentiality is bridged.

In 2014, Volmink[24] validated the COPSOQ questionnaire for South African use, however, the questionnaire has never been adapted for local use. Over and above the lack of adaptation of the questionnaire for local use, at the time of the study there was no industry specific and national baselines and reference values. The lack of adjustment does, however, allow for direct comparison with findings from studies conducted elsewhere.

The study had external validity limitation as the findings may be specific to the particular population studied, and therefore may not be generalizable to other groups and those populations with different domestic and working conditions.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

The aims of this study were first to determine the magnitude of occupational stress within the Information and Communication Technology sector by measuring the prevalence of and identifying workplace risk factors associated with occupational stress, and second, to explore the differences in the prevalence of occupational stress and its determinants between men and women of junior and middle management in the study setting. This was done using the Copenhagen Psychosocial Questionnaire which identifies different aspects of occupational stress and strain and had also been validated for the South African context.

The study sample demonstrated significantly higher prevalence of occupational stress than a reference population. This was signified by higher levels of stress, burnout, sleeping troubles and lower levels of self-rated health. There were no significant differences in the levels of occupational stress (stress, burnout, sleeping troubles and self-rated health) between men and women, however there were differences in risk factors, except for factors of work-life interface, specifically work-family conflict.

Work-family conflict was a significant predictor of occupational stress for both men and women, while factors of interpersonal relations and leadership (e.g. social community at work and social support from supervisors) were found to be possibly protective, especially for women.

Factors of demands at work and influence and development were associated with higher levels of burnout, sleeping troubles and lower self-rated health among women, and therefore being significant predictors of occupational stress for women.

6.2. Recommendations

The study sample group demonstrated higher levels of occupational stress related mainly to work-family conflict affecting both men and women, and the employer should therefore investigate factors of work-family conflict that affect these employees, and in turn implement corrective measures in order to reduce the levels of occupational stress within this population. Examples of factors which may be affecting work-family conflict include time based factors such as flexibility of work schedules, long job related travels and strain factors such as high work demands.[86]

A meta-analysis study conducted by Kossek et al[87] on workplace social support and work–family conflict found that work–family-specific support plays a central role in individuals' work–family conflict experiences.[86] Furthermore, research has shown that initiatives that focus on work practices, interactions, and expectations significantly improve employees' work-family conflict and family time adequacy.[88-90]

Various studies conducted in South Africa, including this current study, have shown significantly higher levels of occupational stress among various study populations, however the extent of occupational stress at a national level is still unclear due to lack of a sector wide research.[24]

Research on the prevalence, health and economic impacts as well as on interventions of occupational stress across industrial sectors is therefore recommended in order to obtain a sector wide South African baseline.

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APPENDICES

Appendix 1: The medium size version of the COSPOQ II questionnaire

Questionnaire on psychosocial factors at work

This space is for company logo or name



Which department do you work in?

What is your job(Position)?

Are you: ☐ Woman ☐ Man

How old are you?

☐ Under 30 years

☐ 30-39 years

☐ 40-49 years

☐ 50-59 years

☐ 60 years or more

Psychosocial factors at work

The following questions are about your psychosocial work environment and job satisfaction. Some of the questions may fit better to your work than others, but please answer all questions.

	Always	Often	Some-Times	Seldom	Never/ hardly ever
Is your work unevenly distributed so it piles up?	☐	☐	☐	☐	☐
Does your work put you in emotionally disturbing situations?	☐	☐	☐	☐	☐
Do you have a large degree of influence concerning your work?	☐	☐	☐	☐	☐
Do you have to work very fast?	☐	☐	☐	☐	☐
Is there a good atmosphere between you and your colleagues?	☐	☐	☐	☐	☐

	Always	Often	Some-times	Seldom	Never/ hardly ever
Do you have to relate to other people's personal problems as part of your work?	☐	☐	☐	☐	☐
Do you have a say in choosing who you work with?	☐	☐	☐	☐	☐
Do you have any influence on what you do at work?	☐	☐	☐	☐	☐
Do you get behind with your work?	☐	☐	☐	☐	☐
Is there good co-operation between the colleagues at work?	☐	☐	☐	☐	☐
How often do you not have time to complete all your work tasks?	☐	☐	☐	☐	☐
Do you have enough time for your work tasks?	☐	☐	☐	☐	☐
Do you feel part of a community at your place of work?	☐	☐	☐	☐	☐
Can you influence the amount of work assigned to you?	☐	☐	☐	☐	☐
How often do you consider looking for work elsewhere?	☐	☐	☐	☐	☐
How often do you get help and support from your colleagues?	☐	☐	☐	☐	☐
How often are your colleagues willing to listen to your problems at work?	☐	☐	☐	☐	☐
How often do your colleagues talk with you about how well you carry out your work?	☐	☐	☐	☐	☐

	To a very large extent	To a large extent	Some-what	To a small extent	To a very small extent
Is it necessary to keep working at a high pace?	☐	☐	☐	☐	☐
Is your work emotionally demanding?	☐	☐	☐	☐	☐
Does your work require you to take the initiative?	☐	☐	☐	☐	☐
Is your work meaningful?	☐	☐	☐	☐	☐
At your place of work, are you informed well in advance concerning for example important decisions, changes, or plans for the future?	☐	☐	☐	☐	☐
Does your work have clear objectives?	☐	☐	☐	☐	☐
Are contradictory demands placed on you at work?	☐	☐	☐	☐	☐
Is your work recognised and appreciated by the management?	☐	☐	☐	☐	☐
Do you feel that the work you do is important?	☐	☐	☐	☐	☐
Would you recommend a good friend to apply for a position at your workplace?	☐	☐	☐	☐	☐
Do you know exactly which areas are your responsibility?	☐	☐	☐	☐	☐
Does the management at your workplace respect you?	☐	☐	☐	☐	☐
Do you get emotionally involved in your work?	☐	☐	☐	☐	☐
Can you use your skills or expertise in your work?	☐	☐	☐	☐	☐
Do you enjoy telling others about your place of work?	☐	☐	☐	☐	☐
Do you receive all the information you need in order to do your work well?	☐	☐	☐	☐	☐

	To a very large extent	To a large extent	Some-what	To a small extent	To a very small extent
Do you do things at work, which are accepted by some people but not by others?	☐	☐	☐	☐	☐
Are you treated fairly at your workplace?	☐	☐	☐	☐	☐
Do you know exactly what is expected of you at work?	☐	☐	☐	☐	☐
Do you sometimes have to do things, which ought to have been done in a different way? (	☐	☐	☐	☐	☐
Do you have the possibility of learning new things through your work?	☐	☐	☐	☐	☐
Do you feel motivated and involved in your work?	☐	☐	☐	☐	☐
Do you sometimes have to do things, which seem to be unnecessary?	☐	☐	☐	☐	☐
Do you work at a high pace throughout the day?	☐	☐	☐	☐	☐
Does your work give you the opportunity to develop your skills?	☐	☐	☐	☐	☐
Do you feel that your place of work is of great importance to you?	☐	☐	☐	☐	☐

Regarding your work in general.

How pleased are you with:

	Very satisfied	Satisfied	Un-satisfied	Very unsatisfied
- your work prospects?	☐	☐	☐	☐
- the physical working conditions?	☐	☐	☐	☐
- the way your abilities are used?	☐	☐	☐	☐
- your job as a whole, everything taken into consideration?	☐	☐	☐	☐

The workplace as a whole

The next questions are not about your own job but about the workplace as a whole.

	To a very large extent	To a large extent	Some-what	To a small extent	To e very small extent
Does the management trust the employees to do their work well?	☐	☐	☐	☐	☐
Can you trust the information that comes from the management?	☐	☐	☐	☐	☐
Are conflicts resolved in a fair way?	☐	☐	☐	☐	☐
Does the management withhold important information from the employees?	☐	☐	☐	☐	☐
Are employees appreciated when they have done a good job?	☐	☐	☐	☐	☐
Do the employees withhold information from each other?	☐	☐	☐	☐	☐
Do the employees withhold information from the management?	☐	☐	☐	☐	☐
Do the employees in general trust each other?	☐	☐	☐	☐	☐
Are all suggestions from employees treated seriously by the management?	☐	☐	☐	☐	☐
Are the employees able to express their views and feelings?	☐	☐	☐	☐	☐
Is the work distributed fairly?	☐	☐	☐	☐	☐

The next questions concern your relationship to your nearest superior.

	Always times	Often	Some-	Seldom hardly ever	Never/
How often is your nearest superior willing to listen to your problems at work?	☐	☐	☐	☐	☐
How often do you get help and support from your nearest superior?	☐	☐	☐	☐	☐
How often does your nearest superior talk with you about how well you carry out your work?	☐	☐	☐	☐	☐

To what extent would you say that your immediate superior...

	To a very large extent	To a large extent	Some-what	To a small extent	To a very small extent
- makes sure that the individual member of staff has good development opportunities?	☐	☐	☐	☐	☐
- gives high priority to job satisfaction?	☐	☐	☐	☐	☐
- is good at work planning?	☐	☐	☐	☐	☐
- is good at solving conflicts?	☐	☐	☐	☐	☐

Work and private life

The next questions are about the connection between work and private life.

	Yes, often	Yes, some-times	Rarely	No, never
Do you often feel a conflict between your work and your private life, making you want to be in both places at the same time?	☐	☐	☐	☐

	Yes, certainly	Yes, to a certain degree	Yes, but only very little	No, not at all
Do you feel that your work drains so much of your energy that it has a negative effect on your private life?	☐	☐	☐	☐
Do you feel that your work takes so much of your time that it has a negative effect on your private life?	☐	☐	☐	☐
Do your friends or family tell you that you work too much?	☐	☐	☐	☐

If you have more comments on your psychosocial work environment, please write here:

Health and well-being

These questions are about how you have been during the last 4 weeks.

	All the time	A large part of the time	Part of the time	A small part of the time	Not at all
How often have you slept badly and restlessly?	☐	☐	☐	☐	☐
How often have you felt worn out?	☐	☐	☐	☐	☐
How often have you found it hard to go to sleep?	☐	☐	☐	☐	☐
How often have you been physically exhausted?	☐	☐	☐	☐	☐
How often have you been emotionally exhausted?	☐	☐	☐	☐	☐
How often have you woken up too early and not been able to get back to sleep?	☐	☐	☐	☐	☐
How often have you felt tired?	☐	☐	☐	☐	☐
How often have you woken up several times and found it difficult to get back to sleep?	☐	☐	☐	☐	☐
How often have you had problems relaxing?	☐	☐	☐	☐	☐
How often have you been irritable?	☐	☐	☐	☐	☐
How often have you been tense?	☐	☐	☐	☐	☐
How often have you been stressed?	☐	☐	☐	☐	☐

	Excellent	Very good	Good	Fair	Poor
In general, would you say your health is:	☐	☐	☐	☐	☐

Conflicts and offensive behaviors

	Yes, daily	Yes, weekly	Yes, monthly	Yes, a few times	No
Have you been exposed to undesired sexual attention at your workplace during the last 12 months?	☐	☐	☐	☐	☐

	Collea-gues	Manager/ superior	Sub-ordinates	Clients/ customers/ patients
If yes, from whom? (You may tick off more than one)	☐	☐	☐	☐

	Yes, daily	Yes, weekly	Yes, monthly	Yes, a few times	No
Have you been exposed to threats of violence at your workplace during the last 12 months?	☐	☐	☐	☐	☐

	Collea-gues	Manager/ superior	Sub-ordinates	Clients/ customers/ patients
If yes, from whom? (You may tick off more than one)	☐	☐	☐	☐

	Yes, daily	Yes, weekly	Yes, monthly	Yes, a few times	No
Have you been exposed to physical violence at your workplace during the last 12 months?	☐	☐	☐	☐	☐

	Collea-gues	Manager/ superior	Sub-ordinates	Clients/ customers/ patients
If yes, from whom? (You may tick off more than one)	☐	☐	☐	☐

1

Bullying means that a person repeatedly is exposed to unpleasant or degrading treatment, and that the person finds it difficult to defend himself or herself against it.

	Yes, daily	Yes, weekly	Yes, monthly	Yes, a few times	No
Have you been exposed to bullying at your workplace during the last 12 months?	☐	☐	☐	☐	☐

	Collea-gues	Manager /superior	Subordinates /patients	clients
If yes, from whom? (You may tick off more than one)	☐	☐	☐	☐

There are no further questions.

Thank you for filling out the questionnaire

Appendix 2: Permission letter

PERMISSION LETTER TO CONDUCT RESEARCH

Research Topic: Occupational Stress in an Information and Communications Technology Company in South Africa

Researcher: Dr. M.R. Setlhakgoe

University: Witwatersrand

Department: School of Public Health

Supervisor 1: Prof David Rees

Supervisor 2: Dr Spo Kgalamono

Date of completion of Data collection: 30 November 2016

EOH gives Dr M. R. Setlhakgoe permission to conduct the above said research within its South Africa's SAP (Systems, Applications and Products) division. The permission to conduct the research is subject to:

1. Permission having been granted by the University of Witwatersrand's Human Research Ethics Committee.
2. The research will be used towards his Master's degree qualification and not for monetary gains.
3. EOH will be informed of any serious adverse events as soon as they occur.
4. The researcher shall treat the information obtained from EOH and EOH employees with acceptable level of confidentiality.
5. The Researcher will not refer to the name of the Company (EOH) within his report
6. The Researcher will present the outcome and recommendations of the research to EOH to be used by the company at the discretion of the company

Recommended by (Name): Nancy Todd Capacity: Divisional HR Director

Signature: NTodd Date: 27/6/2016

Approved by (Name): Umesh Ram Capacity: MD Director

Signature: Date: 27/6/2016

Appendix 3: Introductory letter

INTRODUCTORY LETTER

Research Title: Occupational Stress in an Information and Communications Technology Company in South Africa.

Hello, my name is Dr M.R Setlhakgoe and I am part of team conducting research into occupational stress. This type of stress is a substantial health challenge in many workplaces in South Africa. The research is being carried out through the National Institute for Occupational Health (NIOH) and the University of the Witwatersrand (Wits). One of the reasons why we are conducting this research is to establish risk factors for occupational stress.

How are you involved?

You are requested to complete a questionnaire called the Copenhagen Psychosocial Questionnaire which will include questions relating to occupational stress. This questionnaire should take about 30 minutes of your time to complete. This is a web-link questionnaire- Once you have received the email, click to open the link and follow the instructions. Once completed, the information will be sent back to the researcher and not your employer. For those do not have access to email, one of the members of the research team will bring you a copy of the questionnaire for you to complete at your own convenient venue and time. All of the data obtained from completed questionnaires will be analyzed through a scientific research process.

How were you selected?

You have been randomly selected from the master data sheet of the company - your selection was not based on any prior knowledge of your health or who you are.

What about Confidentiality?

Every participant will be assigned a unique study number and the link between this number and his/her

name will be kept securely by the researcher. All you will be asked for is your signature on a consent form. In this way you will remain anonymous. Data that may be used in reports will not include any information that identifies you as a participant in this study. Only collective results will be published.

What if the questionnaire shows that I have a high level of occupational stress?

If significant health risks are detected by this study we will contact you directly and assist you on how to get the necessary help.

What will the benefits of the study be?

The outcome of the study will be used to plan and implement appropriate programs to minimize and prevent the health risks related to occupational stress.

What if I don't want to participate in the study?

Your participation in this study is entirely voluntary and you may choose to stop at any time without any consequences.

Who can I contact if I have any questions?

If you have any questions regarding the study, please contact Dr M.R Setlhakgoe on **073 258 6299 or 011 554 1930.** If there are any further concerns relating to the research process, please contact the Health Research Ethics Committee at Wits on 011 7171234/ anisa.keshav@wits.ac.za .

Appendix 4: The scales of the medium size COPSOQ II questionnaire

27.8.2007

COPSOQ II

The scales of the MEDIUM SIZE COPSOQ II questionnaire.

The purpose of this paper is to describe the scales and items of the medium size questionnaire of the COPSOQ II. The questionnaire was developed on the basis of a survey of a representative sample of adult Danes aged 20-59 years. A total of 4,732 persons responded of whom 3,517 were employees. The response rate was 60.4% and 52% of the respondents were women. The population of 3,517 employees comprise the study base for the analyses described in the following.

As a rule we have been aiming for scales with 3-4 questions (items) per scale. It is our experience that this gives sufficient reliability and precision.

New items and scales, which were not part of COPSOQ I, are in *italics*. The numbers correspond to consecutive numbers in the original test-questionnaire.

Most of the questions in COPSOQ II have *five response options*. These are:

1. Always, Often, Sometimes, Seldom, Never/hardly ever. (Called *(Always ...)* in this paper).
2. To a very large extent, To a large extent, Somewhat, To a small extent, To a very small extent. (Called *(To a very large ...)* in this paper).

Scoring of the scales

All the scales of COPSOQ are scored 0-100 points. (The exception is the short questionnaire in which a very simple scoring system is used). The five response options are scored 100, 75, 50, 25, 0. In case of only four response options the scores are 100, 66.7, 33.3, 0. The total score on a scale for a respondent is the average of the scores on the individual items. A person is considered missing if less than half of the questions in a scale have been answered.

High scores correspond to high values on the respective dimensions. Thus, a high score on burnout means a high burnout level, and a low score on influence means a low level of influence at work. In most cases high levels are "good" or "healthy". The exceptions are quantitative demands, work pace, emotional demands, role conflicts, work-family conflict, burnout, stress, and sleeping problems.

A few of the questions are scored with "reversed scoring". This is indicated in the text below at all the relevant places.

32.9 Do you have a say in choosing who you work with? *(Always…)*

32.24 Can you influence the amount of work assigned to you? *(Always…)*

32.13 Do you have any influence on what you do at work? *(Always…)*

Scale characteristics: Non responders: 78. Average: 49.8. SD: 21.2. Cronbach's alpha: 0.73. Item correlations with total scale: 0.43 – 0.59. Inter-item correlations: 0.31 – 0.49.

Possibilities for development (Skill discretion):

35.4 Does your work require you to take the initiative? *(To a very large…)*

35.31 Do you have the possibility of learning new things through your work? *(To a very large…)*

35.20 Can you use your skills or expertise in your work? *(To a very large…)*

35.36 Does your work give you the opportunity to develop your skills? *(To a very large…)*

Scale characteristics: Non responders: 91. Average: 65.9. SD: 17.6. Cronbach's alpha: 0.77. Item correlations with the total scale: 0.47 – 0.70. Inter-item correlations: 0.34 – 0.70.

Variation of work:

There is no scale on variation of work in the medium size questionnaire.

Degrees of freedom at work:

There is no scale on degrees of freedom at work in COPSOQ II.

Meaning of work:

35.5 Is your work meaningful? *(To a very large…)*

35.13 Do you feel that the work you do is important? *(To a very large…)*

35.32 Do you feel motivated and involved in your work? *(To a very large…)*

Scale characteristics: Non responders: 97. Average: 73.8. SD: 15.8. Cronbach's alpha: 0.74. Item correlations with total scale: 0.55 – 0.57. Inter item correlations: 0.48 – 0.49.

Commitment to the workplace:

35.21 Do you enjoy telling others about your place of work? *(To a very large…)*

35.37 Do you feel that your place of work is of great importance to you? *(To a very large…)*

35.14 Would you recommend a good friend to apply for a position at your workplace? (To a very large…)

32.28 How often do you consider looking for work elsewhere? (Always…) (Reversed scoring).

Scale characteristics: Non responders: 78. Average: 60.9. SD: 20.4. Cronbach's alpha: 0.77. Item correlations with the total scale: 0.55 – 0.61. Inter item correlationers: 0.38 – 0.51.

32.9 Do you have a say in choosing who you work with? *(Always…)*

32.24 Can you influence the amount of work assigned to you? *(Always…)*

32.13 Do you have any influence on what you do at work? *(Always…)*

Scale characteristics: Non responders: 78. Average: 49.8. SD: 21.2. Cronbach's alpha: 0.73. Item correlations with total scale: 0.43 – 0.59. Inter-item correlations: 0.31 – 0.49.

Possibilities for development (Skill discretion):

35.4 Does your work require you to take the initiative? *(To a very large…)*

35.31 Do you have the possibility of learning new things through your work? *(To a very large…)*

35.20 Can you use your skills or expertise in your work? *(To a very large…)*

35.36 Does your work give you the opportunity to develop your skills? *(To a very large…)*

Scale characteristics: Non responders: 91. Average: 65.9. SD: 17.6. Cronbach's alpha: 0.77. Item correlations with the total scale: 0.47 – 0.70. Inter-item correlations: 0.34 – 0.70.

Variation of work:

There is no scale on variation of work in the medium size questionnaire.

Degrees of freedom at work:

There is no scale on degrees of freedom at work in COPSOQ II.

Meaning of work:

35.5 Is your work meaningful? *(To a very large…)*

35.13 Do you feel that the work you do is important? *(To a very large…)*

35.32 Do you feel motivated and involved in your work? *(To a very large…)*

Scale characteristics: Non responders: 97. Average: 73.8. SD: 15.8. Cronbach's alpha: 0.74. Item correlations with total scale: 0.55 – 0.57. Inter item correlations: 0.48 – 0.49.

Commitment to the workplace:

35.21 Do you enjoy telling others about your place of work? *(To a very large…)*

35.37 Do you feel that your place of work is of great importance to you? *(To a very large…)*

35.14 Would you recommend a good friend to apply for a position at your workplace? (To a very large…)

32.28 How often do you consider looking for work elsewhere? (Always…) (Reversed scoring).

Scale characteristics: Non responders: 78. Average: 60.9. SD: 20.4. Cronbach's alpha: 0.77. Item correlations with the total scale: 0.55 – 0.61. Inter item correlationers: 0.38 – 0.51.

Predictability:

35.6 At your place of work, are you informed well in advance concerning for example important decisions, changes, or plans for the future? *(To a very large…)*

35.22 Do you receive all the information you need in order to do your work well? *(To a very large…)*

Scale characteristics: Non responders: 80. Average: 57.7. SD: 20.9. Cronbach's alpha: 0.74.

Rewards:

35.10 Is your work recognised and appreciated by the management? (To a very large…)

35.17 Does the management at your workplace respect you? (To a very large…)

35.25 Are you treated fairly at your workplace? (To a very large…)

Scale characteristics: Non responders: 98. Average: 66.2. SD: 19.9. Cronbach's alpha: 0.83. Item correlations with the total scale: 0.63 – 0.75. Inter item correlations: 0.54 – 0.70.

Role clarity:

35.7 Does your work have clear objectives? *(To a very large…)*

35.15 Do you know exactly which areas are your responsibility? *(To a very large…)*

35.28 Do you know exactly what is expected of you at work? *(To a very large…)*

Scale characteristics: Non responders: 96. Average: 73.5. SD: 16.4. Cronbach's alpha: 0.78. Item correlations with total scale: 0.55 – 0.67. Inter item correlations: 0.48 – 0.65.

Role conflicts:

35.23 Do you do things at work, which are accepted by some people but not by others? *(To a very large…)*

35.8 Are contradictory demands placed on you at work? *(To a very large…)*

35.29 Do you sometimes have to do things, which ought to have been done in a different way? *(To a very large…)*

35.33 Do you sometimes have to do things, which seem to be unnecessary? *(To a very large…)*

Scale characteristics: Non responders: 93. Average: 42.0. SD: 16.6. Cronbach's alpha: 0.67. Item correlations with total scale: 0.43 – 0.49. Inter item correlations: 0.30 – 0.41.

Quality of leadership:

48. To what extent would you say that your immediate superior…

2. makes sure that the individual member of staff has good development opportuni-ties? *(To a very large...)*

4. gives high priority to job satisfaction? *(To a very large...)*

5. is good at work planning? *(To a very large...)*

7. is good at solving conflicts? *(To a very large...)*

Scale characteristics: Non responders: 852. Average: 55.3. SD: 21.1. Cronbach's alpha: 0.89. Item correlations with total scale: 0.73 – 0.79. Inter item correlations: 0.60 – 0.71.

Social support:

Scale for *social support from colleagues:*

33.1 How often do you get help and support from your colleagues? *(Always ...)*.

33.2 How often are your colleagues willing to listen to your problems at work? *(Always ...)*.

33.3 How often do your colleagues talk with you about how well you carry out your work? *(Always ...)*.

(For these items an extra response option: "Not relevant" has been added for those employees who might work alone without contact to colleagues. These respondents were scored as missing on this scale).

Scale characteristics: Non responders: 187. Average: 57.3. SD: 19.7. Cronbach's alpha: 0.70. Item correlations with the total scale: 0.48 – 0.56. Inter item correlations: 0.39 – 0.49.

Scale for *social support from supervisors:*

47.1 How often is your nearest superior willing to listen to your problems at work? *(Always ...)*.

47.2 How often do you get help and support from your nearest superior? *(Always ...)*.

47.3 How often does your nearest superior talk with you about how well you carry out your work? *(Always ...)*.

(These questions were only addressed to respondents who were not supervisors themselves and who had a supervisor).

Scale characteristics: Non responders: 852. Average: 61.6. SD: 22.4. Cronbach's alpha: 0.79. Item correlations with total scale: 0.59 – 0.68. Inter item correlations: 0.49 – 0.61.

Correlation between the two scales on social support from colleagues and supervisors, respectively, is 0.46 (rather low).

Feedback:

There is no scale on feedback in COPSOQ II.

Social relations:

There is no scale for social relations in COPSOQ II.

Social community at work:

33.4 Is there a good atmosphere between you and your colleagues? *(Always…)*

33.5 Is there good co-operation between the colleagues at work? *(Always…)*

33.6 Do you feel part of a community at your place of work? *(Always…)*

Scale characteristics: Non responders: 127. Average: 78.7. SD: 18.9. Cronbach's alpha: 0.86. Item correlations with total scale: 0.71 – 0.74. Inter item correlations: 0.65 – 0.68.

Job insecurity:

There is no scale on job insecurity in the medium size questionnaire.

Satisfaction with work – job satisfaction:

34. Regarding your work in general. How pleased are you with -

1. your work prospects? *(Very satisfied. Satisfied. Unsatisfied. Very unsatisfied. Not relevant)*

2. the physical working conditions? *(Very satisfied. Satisfied. Unsatisfied. Very unsatisfied. Not relevant)*

4. the way your abilities are used? *(Very satisfied. Satisfied. Unsatisfied. Very unsatisfied. Not relevant)*

6. your job as a whole, everything taken into consideration? *(Very satisfied. Satisfied. Unsatisfied. Very unsatisfied. Not relevant)*

Scale characteristics: Non responders: 122. Average: 65.3. SD: 18.2. Cronbach's alpha: 0.82. Item correlations with total scale: 0.57 – 0.71. Inter item correlations: 0.46 – 0.62.

Work family conflict:

29. Do you often feel a conflict between your work and your private life, making you want to be in both places at the same time? (Yes, often. Yes, sometimes. Rarely. No, never).

30.1 Do you feel that your work drains so much of your energy that it has a negative effect on your private life? (Yes, certainly. Yes, to a certain degree. Yes, but only very little. No, not at all).

30.2 Do you feel that your work takes so much of your time that it has a negative effect on your private life? (Yes, certainly. Yes, to a certain degree. Yes, but only very little. No, not at all).

30.3 Do your friends or family tell you that you work too much? (Yes, certainly. Yes, to a certain degree. Yes, but only very little. No, not at all).

Scale characteristics: Non responders: 101. Average: 33.5. SD: 24.3. Cronbach's alpha: 0.80. Item correlations with total scale: 0.52 – 0.74. Inter item correlations: 0.39 – 0.69.

Family work conflict

There is no scale on family-work conflict in the medium size questionnaire.

Trust:

Top of the page: *The next questions are not about your own job but about the workplace as a whole.*

Scale for *"horizontal trust":*

36.10 Do the employees withhold information from each other? (To a very large...) (Reversed scoring)

36.11 Do the employees withhold information from the management? (To a very large...) (Reversed scoring)

36.15 Do the employees in general trust each other? (To a very large...)

Scale characteristics: Non-responders: 113. Average: 68.6. SD: 16.9. Cronbach's alpha: 0.77. Item correlations with total scale: 0.48 – 0.69. Inter item correlations: 0.41 – 0.68.

Scale for *"vertical trust":*

36.1 Does the management trust the employees to do their work well? (To a very large...)

36.4 Can you trust the information that comes from the management? (To a very large...)

36.7 Does the management withhold important information from the employees? (To a very large...) (Reversed scoring).

36.19 Are the employees able to express their views and feelings? (To a very large...)

Scale characteristics: Non responders: 87. Average: 67.0. SD: 17.7. Cronbach's alpha = 0.80. Item correlations with the total scale: 0.55 – 0.69. Inter item correlations: 0.40 – 0.56.

The two scales for trust have a correlation of 0.57, which confirms that they do not measure the same thing.

Justice and respect:

These items were under the same heading on the top of the page as the items on trust.

36.5 Are conflicts resolved in a fair way? (To a very large...)

36.8 Are employees appreciated when they have done a good job? (To a very large...)

36.18 Are all suggestions from employees treated seriously by the management? (To a very large...)

36.25 Is the work distributed fairly? (To a very large...)

Scale characteristics: Non responders: 93. Average: 59.2. SD: 17.7. Cronbach's alpha = 0.83. Item correlations with total scale: 0.61 – 0.72. Inter item correlations: 0.48 – 0.66.

Inclusiveness, the social responsibility:

There is no scale on social inclusiveness in the medium size questionnaire.

Self rated health:

8. In general, would you say your health is: *(Excellent, Very good, Good, Fair, Poor)*

Characteristics: Non responders: 41. Average: 66.0. SD: 20.9.

Sleeping troubles:

Top of page: These questions are about how you have been during the last 4 weeks.

10.1 How often have you slept badly and restlessly? (All the time; A large part of the time; Part of the time; A small part of the time; Not at all)

10.3 How often have you found it hard to go to sleep? (All the time…)

10.8 How often have you woken up too early and not been able to get back to sleep? (All the time…)

10.10 How often have you woken up several times and found it difficult to get back to sleep? (All the time…)

Scale characteristics: Non responders: 21. Average: 21.3. SD: 19.0. Cronbach's alpha: 0.86. Item correlations with total scale: 0.62 – 0.79. Inter item correlations 0.48 – 0.74.

Burnout:

Top of page: These questions are about how you have been during the last 4 weeks.

10.2 How often have you felt worn out? (All the time…)

10.4 How often have you been physically exhausted? (All the time…)

10.7 How often have you been emotionally exhausted? (All the time…)

10.9 How often have you felt tired? (All the time…)

Scale characteristics: Non responders: 22. Average: 34.1. SD: 18.2. Cronbach's alpha: 0.83. Item correlations with total scale: 0.58 – 0.75. Inter item correlations: 0.38 – 0.69.

Stress:

Top of page: These questions are about how you have been during the last 4 weeks.

10.14 How often have you had problems relaxing? (All the time…)

10.16 How often have you been irritable? (All the time…)

10.24 How often have you been tense? (All the time…)

10.30 How often have you been stressed? (All the time…)

Scale characteristics: Non responders: 22. Average: 26.7. SD: 17.7. Cronbach's alpha: 0.81. Item correlations with total scale: 0.57 – 0.68. Inter item correlations: 0.45 – 0.58.

Depressive symptoms:

There is no scale for depressive symptoms in the medium size questionnaire.

Somatic stress:

There is no scale for somatic stress in the medium size questionnaire.

Cognitive stress:

There is no scale for cognitive stress in the medium size questionnaire.

Self-efficacy:

There is no scale on self-efficacy in the medium size questionnaire.

Offensive behaviour:

The medium size questionnaire also includes questions on *sexual harassment, threats of violence, physical violence, and bullying.*

The full response distributions of the four items may be found in the model questionnaire.

The 12 months' prevalence of these forms of offensive behaviours among Danish employees (2005) are as follows:

Sexual harassment: 2.9%

Threats of violence 7.8%

Physical violence 3.9%

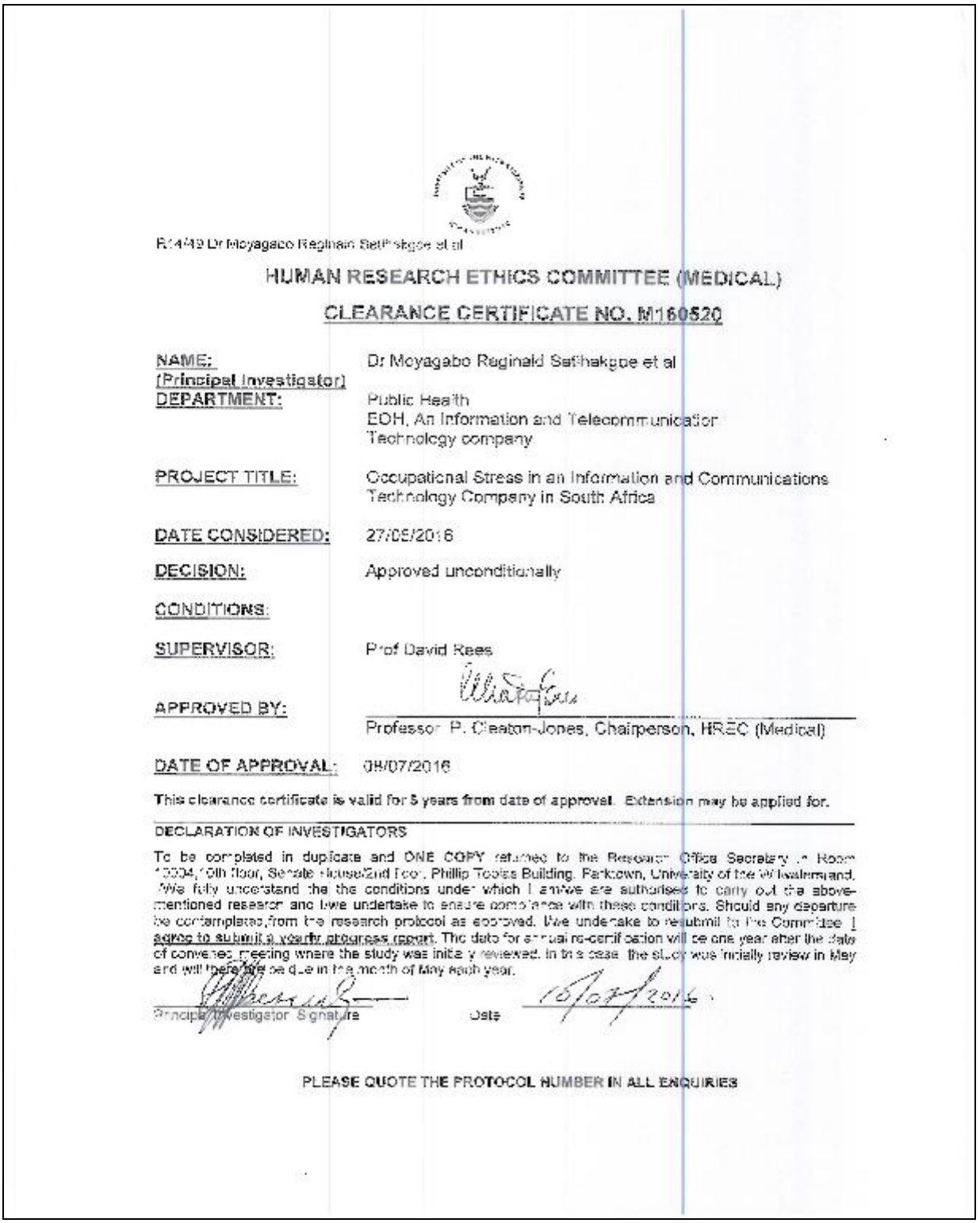
Bullying 8.3%

Overview of scales and number of questions in the three COPSOQ II questionnaires

	Questionnaire		
	Long	Medium	Short
Quantitative demands	4	4	2
Work pace	3	3	2
Cognitive demands	4	-	-
Emotional demands	4	4	2
Demands for hiding emotions	3	-	-
Influence	4	4	2
Possibilities for development	4	4	2
Variation	2	-	-
Meaning of work	3	3	2
Commitment to the workplace	4	4	2
Predictability	2	2	2
Rewards (recognition)	3	3	2
Role clarity	3	3	2
Role conflicts	4	4	-
Quality of leadership	4	4	2
Social support from supervisor	3	3	2
Social support from colleagues	3	3	-
Social community at work	3	3	-
Job insecurity	4	-	-
Job satisfaction	4	4	1
Work-family conflict	4	4	2
Family-work conflict	3	-	-
Trust regarding management	4	4	2
Mutual trust between employees	3	3	-
Justice and respect	4	4	2
Social inclusiveness	4	-	-
Self rated health	1	1	1
Burnout	4	4	2
Stress	4	4	2
Sleeping troubles	4	4	-
Depressive symptoms	4	-	-
Somatic stress symptoms	4	-	-
Cognitive stress symptoms	4	-	-
Self-efficacy	6	-	-
Sexual harassment	1	1	1
Threats of violence	1	1	1
Physical violence	1	1	1

Bullying	1	1	1
Unpleasant teasing	1	-	-
Conflicts and quarrels	1	-	-
Gossip and slander	1	-	-
Number of dimensions	41	28	23
Number of questions	128	87	40

Appendix 5: Ethics Clearance certificate



R14/49 Dr Moyagabo Reginald Setlhakgoe et al

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M160520

NAME: (Principal Investigator)	Dr Moyagabo Reginald Setlhakgoe et al
DEPARTMENT:	Public Health EOH, An Information and Telecommunication Technology company
PROJECT TITLE:	Occupational Stress in an Information and Communications Technology Company in South Africa
DATE CONSIDERED:	27/05/2016
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Prof David Rees
APPROVED BY:	Professor P. Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	08/07/2016

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and ONE COPY returned to the Research Office Secretary at Room 10004, 10th floor, Senate House/2nd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. I/We fully understand the the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to resubmit to the Committee. I agree to submit a yearly progress report. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case the study was initially review in May and will therefore be due in the month of May each year.

Principal Investigator Signature — Date 15/07/2016

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES